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Problems of sustainable development in the global economy: green economy and economic security

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Abstract

Research background: Sustainable development is one of the main priorities of the global economy, which is especially important in a geopolitically complex. One of the key points of sustainable development is green economy. Although the application of green technologies has a basis from the perspective of ecology, biology and other earth sciences and has its own economic efficiency, it can create problems in such areas of the economy as food and energy security. In particular, the examples of Ghana and Sri Lanka clearly demonstrate that even quite successful countries can lead to an economic crisis due to the non-competitive introduction of green technologies. Otoh, green technologies make it possible to develop export-oriented import substitution within the framework of proactive industrial policy.
Purpose of the article: The purpose of the research is to analyse the economic policies of several countries and identify the success factors of economic policies aimed at achieving sustainable development.
Methods: Such methods as building a matrix of competitiveness of territories and the Balassa index for analysing the prospects for export orientation are used.
Findings & Value added: Conclusions are drawn that the implementation of green technologies should be based on an adequate economic policy, otherwise the country's economy may not withstand this transition. Using the example of Russia, the article shows how to apply the Balassa index in assessing sectoral prospects for the implementation of an export-oriented industrial policy strategy and how such a strategy allows achieving a high level of food and energy security.

Keywords: *sustainable development; green economy; economic security; industrial policy*

JEL Classification: *Q01; Q18; Q43*

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1 Introduction

Sustainable development is one of the main priorities of the global economy, which is especially important to promote in a difficult geopolitical environment. One of the pillars of sustainable development is the "green" economy. The "green" economy is understood as a dynamic process of transforming the economy towards low-carbon development, increasing resource efficiency and the well-being of the population through the use of technologies and innovations that create new jobs and reduce environmental risks in the long term (Zomonova, 2016). Note that in order to achieve its goals, the green economy must be development-oriented: in 2011, the World Bank describes the "green" economy as an economy in which economic growth and environmental responsibility mutually reinforce each other, while at the same time supporting progress in social development (Simpson, 2011). However, over time, the situation begins to change: already in 2016, the World Bank, defining "green" growth, focuses, firstly, on the problem of resource conservation (efficiency in the use of natural resources); secondly, on environmental cleanliness (minimizing environmental pollution) and, in fact, moving away from such postulated sustainable development goals as the elimination of hunger (goal number 2) and affordable and clean energy (goal number 7). Such an interpretation changes our understanding of sustainable development and becomes the basis of the so-called "environmental revolution", when, contrary to data and common sense, ecology is declared a "global trend", and everything that is "not environmentally friendly" is subject to almost immediate destruction. Such "environmental chauvinism" not only makes sustainable development unsustainable, but also leads the economies of countries using this approach to a crisis.

Even though the use of green technologies is justified from the standpoint of ecology, biology and other geosciences and has its own economic efficiency, it can create serious problems in such areas of the economy as food and energy security. Let's take a look at these questions in more detail.

1.1. Green economy and energy security

The core of the introduction of green technologies in the energy sector are renewable energy sources, because ecology and the economy are closely related, and more than ever, this topic is very relevant today, both in the field of economics and in ecology. Every year more and more countries begin to switch to "green" energy. Each country tries to choose the best option available to it. Consider the main types of alternative energy and their contribution to economic activity (Table 1).

Table 1. The main types of renewable energy sources and their characteristics.

Type of energy	Estimated capacity	TW Household use	TW Use problems	Environmental impact
Solar energy	100000	0,3	Not evenly distributed in space and time	Close to acceptable
The energy of the "solar wind"	0,001	no	Virtually absent on the surface of the Earth	no
Tidal energy	1	0,01	Narrow spatial localization	Significantly transforms the landscape
Water energy	3	1	High capital costs during the	Significantly transforms the

			construction phase	landscape, and sometimes the climate
Geothermal springs	30	0,01	Narrow spatial localization	Close to acceptable
Wind energy	2000	0,5	Not evenly distributed in space and time	High maintenance and disposal costs, climate change possible
The energy of earth magnetism	10	no	Technological problems, very high costs during the construction phase	no
Nuclear and thermonuclear power engineering	300	10	High costs during the construction phase	Danger of environmental pollution in case of accidents
Biofuel	1000	30	Drive up global food prices	weak

Source: BP Statistical Review of Global Energy (2019), Alternative energy: prospects for the development of the renewable energy market in Russia (2021)

Today in Europe there are radical changes in this area. The supply of oil, gas and other extracted resources was stopped for political reasons, and the majority of own sources of non-renewable resources were withdrawn from circulation or do not allow meeting all needs. The situation is aggravated by the negative policy of the European Union towards non-renewable energy sources. The transition to such resources is good enough for the environment, but such a drastic transformation (the European Union decided to achieve a fully renewable energy by 2026-2030) has already led to an increase in energy prices (which is contrary to sustainable development goals) and the raw materials needed for its production. Prices for many green energy feedstocks and transport costs continue to rise. From 2020 to March 2022, the price of polysilicon for solar panels increased by 4 times, steel increased by 50%, copper by 70%, aluminium by 2 times, and transportation costs increased by almost 5 times. As a result, the total investment costs in the construction of solar and wind power plants increased by 15–25%. On the face of it, the competitiveness of renewables is enhanced by the much more dramatic increase in the cost of gas and coal. But these sources cannot provide continuous generation during the day and, moreover, provide a constant necessary amount of energy for the operation of factories. Electricity prices in the EU are breaking historical records: wholesale prices in Germany, France, Italy and Spain have increased by more than 6 times compared to the average values of 2016-2020. As Bloomberg postulates in its European Energy Outlook report, the EU is rapidly descending into a deep energy crisis (Elbahrawy, 2022). It cannot be resolved quickly and by market methods, which makes the EU economy less and less efficient. At the same time, theoretically, a replacement for Russian gas for the EU can be found no earlier than within five years, and this will be an extremely expensive alternative without a guarantee of uninterrupted supplies.

It looks like the European Union has followed Ghana's path in abandoning economic efficiency. Ghana is a newly prosperous state in Africa, a fast-growing economy, and a net exporter of electricity in 2014. In 2015, the World Bank adopted a program for its energy transformation and economic efficiency (supported by grants from the World Bank and various non-profit organizations), which was aimed at the dominance of green energy. As a

result, since 2021, there have been constant power outages in the country in the regions, residents are left without electricity and even water (after all, electric pumps are used).

1.2. Green economy and food security

"As the world is moving into a sustainable era, achieving zero hunger has become one of the top three Sustainable Development Goals, applying a considerable amount of pressure on the agri-food systems to make decisions contemplating the sustainability dimensions," writes Professor Chethana Kumari Chandrasiri et al. (Chandrasiri et al., 2022). However, in fact, this, unfortunately, is not true, which is clearly illustrated by the example of Sri Lanka. "Environmental chauvinism" leads to huge problems in the field of food security. Thus, in 2016, Joseph Stiglitz called on the government of Sri Lanka to switch to "highly productive organic farming" to reduce the differentiation of society (Stiglitz, 2016). In 2019, a new president, Gotabhaya Rajapaksa, came to power in Sri Lanka, who was a supporter of organic farming and banned the purchase of fertilizers starting in 2020 (under the pretext of budget cuts due to the pandemic and the fight for the environment). Rajapaksa wanted to turn Sri Lanka into the world's first country with agriculture without fertilizers and pesticides, with completely organic agriculture. As a result, in 2 years he managed to bring a prosperous country to default, plunge the country into an energy crisis (no money to buy fuel), turn a food exporter into an importer and cause the largest riots in the history of the country. (Mammadov, 2022)

It should be noted that there is no consensus in the scientific community with the basic climate models (Goulet Coulombe and Göbel, 2021) and tools used to green the economy. It seems that the attempt to apply modern technologies of the green economy and the attempt to present "non-green" technologies as economically inefficient - climate finance (Fang et al., 2021) - is grossly disrupting the movement towards sustainable development. What can be done here? It is possible to study the experience of Russia, which implements a proactive industrial policy (Kirillovskaya et al., 2016) and managed to significantly increase the efficiency of the economy.

1.3. Ways to solve the problem of food security: export-oriented import substitution (case of Russia)

In the context of the ongoing sanctions confrontation between Russia and Western countries led by the United States, as well as the consequences of the COVID-19 coronavirus pandemic, pushing the world towards a global economic crisis, the issue of increasing the country's competitiveness in the international arena and ensuring its economic security does not lose its relevance. Thanks to the policy of import substitution since 2014 (the beginning of the sanctions confrontation), several Russian industries have not only overcome their critical dependence on imports but have also built up a significant export potential.

As for the dynamics of exports, it can be noted that for most commodity groups, the share of the Russian Federation in world exports, albeit slightly, has increased. However, product groups that account for more than 1% of world exports still account for only 1/3 of the total. At the same time, high positions (more than 5%) remained in the export of timber (6.12% against 5.6% in 2014) and cereals (7.84% against 5.89% in 2014). At the same time, fertilizers (12.57%), mineral fuels and oils (9.4%), as well as nickel and products from it (13.28%) consistently demonstrate the highest export rates (more than 9%).

Based on this, it is possible to single out commodity groups that have the greatest export potential (see Table 2).

Table 2. Groups of goods with the greatest export potential (% of global exports)

		2014	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
10	Cereals	5,89%	5,43%	5,81%	7,21%	9,30%	7,50%	7,84%
27	Mineral fuels, mineral oils	11,40 %	11,95 %	9,10%	10,75 %	9,49%	10,71 %	9,40%
31	Fertilizers	13,78 %	14,19 %	13,31 %	14,13 %	13,96 %	14,68 %	12,57 %
44	Wood and products;	5,61%	5,08%	5,14%	5,84%	6,08%	6,33%	6,12%
72	Cast iron and steel	4,98%	4,65%	4,68%	5,04%	5,52%	4,92%	4,92%
75	Nickel and products	13,27 %	10,57 %	10,89 %	10,41 %	10,19 %	10,79 %	13,28 %
81	Other metals; cermet; products	4,40%	4,75%	4,80%	4,32%	4,88%	4,82%	4,94%

Source: author's calculations

However, the progressive development of the domestic economy was noticeably hampered by the spread of the coronavirus infection and the massive sanctions of the collective West. Sanctions, the pandemic and quarantine measures against it caused a significant reduction in the income of a significant part of the population, a sharp decline in domestic demand, and an increase in inflation. Nevertheless, even despite the general decline in foreign trade indicators, the dynamics of exports and imports shows that Russia's potential is by no means exhausted, especially strong increments are given in 2021 and, especially, in 2022, the sale of energy resources and grain gives (in full accordance with the concept sustainable development). In order to show whether this is actually the case and which sectors of the Russian economy are the most promising for the implementation of an export-oriented industrial policy strategy, let us turn to the calculation of one of the most indicative indices in this respect - the Balassa index.

2 Methodology

The Balassa Index (RCA) is a calculated value of any country's revealed comparative advantage in producing and exporting a full range of products in a given year. Country A is said to have a revealed comparative advantage in a given product i when the ratio of exports of product i to total exports of all commodities exceeds that of the world as a whole.

$$RCA_{Ai} = \frac{\frac{X_{Ai}}{\sum_{j\in P} X_{Aj}}}{\frac{X_{wi}}{\sum_{j\in P} X_{wj}}} \geq 1 \tag{1}$$

Where:
P – the set of all products (with $i \in P$),
X_{Ai} – export of product by i country A,
X_{wi} – global product export i,
$\sum_{j\in P} X_{Aj}$ – total exports of country A (of all products j in P),
$\sum_{j\in P} X_{wj}$ – total world exports (of all products j in P).

When a country has a revealed comparative advantage for a given product (RCA≥1), it is assumed to be a competitive producer and exporter of that product compared to a country that produces and exports that good at or below the world average. A country with a revealed comparative advantage in product i is considered to have a strong export position in that product. The higher a country's RCA value for product i, the higher its export power for product i.

3 Results

According to UNCTAD, industries and products with a revealed comparative advantage (RCA≥1) can be classified (see Table 3):

- food products, among which various grain crops (first of all, wheat and barley), as well as fish and seafood have the greatest export potential;
- non-food raw materials (except for fuel), primarily nickel ores and concentrates, whose export potential has increased by 5.7 times over the years of the sanctions confrontation (!), as well as timber and primary wood products (note the growth in exports of finished wood products under a slight decrease in roundwood exports, which indicates an increase in the value added of exported products); in addition, crude fertilizers and sulphur products have a tangible competitive advantage;
- mineral fuels, in the field of export of which Russia's competitive advantages have significantly increased (despite the decrease in natural gas supplies). In particular, one can note the high potential for the export of petroleum oils and coal, as well as peat, coke and residual oil products;
- animal and vegetable oils, whose comparative competitive advantage increased from 2.18435 to 3.98205 during the period under review;
- chemical products, where fertilizers are the absolute leader;
- processed products classified primarily by material, primarily iron or steel ingots, nickel, cast iron and sponge iron, silver and platinum, as well as veneer, plywood and other wood products;
- machinery and transport equipment (although the growth of competitive advantages compared to 2014 can only be noted in terms of exports of railway vehicles and related equipment).

Table 3. Calculation of the Balassa Index (RCA): Export Groups with the Largest Comparative Advantage

	2014	**2015**	**2016**	**2017**	**2018**	**2019**
Wheat and meslin	4,27287	4,88233	6,09043	6,887619	8,797597	6,99467
Barley, unground	3,77664	5,76215	3,59545	5,202693	5,742415	4,68420
Timber raw	3,64959	4,47495	4,86645	4,102285	3,438093	3,14632
Wood of simple processing and sleepers made of wood	3,34472	3,94240	4,51597	4,45156	4,282913	4,94447
Raw fertilizer	3,51895	4,21639	6,05509	5,098861	4,322635	4,46214
Sulfur and uncalcined pyrite	3,77263	3,73175	3,42266	3,202774	3,099833	3,1932
Nickel ores and concentrates	0,00083	0,11828	2,66838	5,192144	5,012873	5,71398
Brown coal and peat	1,09917	1,70562	2,53789	3,672645	3,960903	4,303

Coke and coal residue	2,57053	3,59582	3,15959	3,466369	3,06591	3,55565
Petroleum oils, bituminous oils, materials, raw materials	3,95729	5,34476	5,85408	5,135951	4,877404	5,21674
Petroleum oils or bituminous minerals > 70% oil	4,48772	5,11957	5,68675	4,936486	4,10363	4,01479
Residual oil products	0,59549	1,07130	1,60283	1,774019	2,873339	3,89249
Coal	4,53674	6,03106	6,39290	5,696008	5,762039	6,26266
Vegetable fats and oils	2,18435	2,40048	2,94294	3,006416	2,835319	3,98205
Cast iron and spiegel, sponge iron	4,38963	5,21802	5,46939	4,657255	4,684749	4,26514
Silver, platinum, other platinum group metals	0,83713	1,65282	3,52578	3,674137	3,463278	4,14763

Source: UNCTAD (https://unctadstat.unctad.org/).

Thus, over the years of sanctions opposition, the Russian Federation has built up a significant export potential in such industries as the agro-industrial complex, metallurgy, the chemical industry and the timber industry, as well as mechanical engineering. Exports of grains (wheat, barley and corn), fertilizers, refined petroleum products, wood products and metal products have particular comparative advantages. Based on the latest data on the growth leaders in exports of industrial and agro-industrial products of the Russian Federation (see Table 4), it is safe to say that these comparative advantages will continue even despite the global economic downturn caused by the coronavirus pandemic.

Table 4. Growth leaders in 2020

	Growth, million USD	Export, million dollars	Growth rate
Mechanical engineering			
Specialized vessels	315	324	3580%
Passenger cars	88	194	82%
Special vehicles	85	451	23%
Electric motors and generators	75	349	28%
Steam boilers	58	94	162%
Chemical industry			
Polyethylene	449	823	120%
Foam propylene	285	659	76%
Diagnostic reagents	51	92	126%
Metallurgy and precious metals			
Gold	12773	18536	222%
Platinum	2714	7842	53%
Timber industry complex			
Paper and cardboard packaging	114	316	56%

Pharmaceuticals			
Medicines packaged	195	718	56%
Light industry			
Special textiles	38	71	13%
Oil and fat industry			
Sunflower oil	605	2811	27%
Soy oil	84	482	21%
Meat and dairy products			
Pork	132	265	99%
Frozen beef	49	74	199%
Meat and poultry offal	101	427	31%
Cereals			
Wheat	1780	8186	28%
Barley	323	1086	42%
Corn	81	699	13%
Other agricultural products			
Sunflower	308	564	120%
Soy	210	487	76%

Source: Russian export centre (https://www.exportcenter.ru/).

Nevertheless, the Russian Federation categorically cannot stop there, because. agricultural and raw material specialization without the progressive development of first capital-intensive, and then science-intensive industries will not lead to sustainable economic growth in the long term.

4 Discussion

This model can be applied to analyse various situations related to economic policy. At the same time, there are certain limitations associated with both the analysis of sustainable development and the features of the model itself.

First, statistics reflect the state of the economy in past periods. Therefore, if there has been a qualitative change in the economic environment or the introduction of fundamentally new instruments of economic policy, then in the short term, an incorrect result may be obtained.

Second, some of the sustainable development goals may be achieved with a long-time lag, and negative results may reflect "exogenous heterogeneity in the timing and scale of benefits", as noted by Gollin et al. (2021), rather than be the result of a fundamental restructuring of the entire economy.

Thirdly, food and energy security are critical policy areas, which give rise to often untimely and populist actions (as noted, for example, by Rodrik (2018), Harstad (2020)), exacerbated by fake news (Massey et al., 2018) and often leads to research bias, as emphasized by Rubin and Rubin (2021).

Fourth, despite the high level of development of the topic of climate change, a number of the models used are oversimplified, as emphasized by Philippe Goulet Coulombe and Maximilian Göbel (Goulet Coulombe and Göbel, 2021), which clearly demonstrate the

errors of the models used (Stips et al., 2016). Therefore, the original results may not be entirely true.

Fifth, regulation of the greenhouse gas market is very difficult: as early as 2019, Severin Borenstein, James Bushnell, Frank A. Wolak, and Matthew Zaragoza-Watkins (Borenstein et al., 2019) warned that the market price of greenhouse gas allowances will not be determined by market methods, but by an administrative price floor or price cap, with "a unilateral carbon tax resulting in a loss of welfare" even for highly developed countries (Baylis et al., 2012).

Sixth, the success of the export-oriented development model when applying the import substitution policy requires the implementation of a proactive industrial policy that is closely related to achieving critical economic security parameters and taking into account social risks (Kirillovskaya, et al., 2016; Kliestik and Dengov, 2015). However, this factor is often not taken into account when analysing the situation.

5 Conclusion

To achieve the goals of sustainable development, it is necessary to focus on the evolutionary nature of the ongoing changes. It is important to take into account that the replacement of obsolete and less environmentally efficient tools with others is possible only when innovative tools become economically profitable and make it possible to support social production and a comfortable existence of citizens. Attempts to politicize the problem and "cancel" non-renewable energy sources to please voters or global financial institutions are doomed to failure.

As a result, it can be argued that in order to achieve economic growth, it is impossible to focus solely on import substitution, abandoning efficient technologies in the energy and agriculture sectors. it is usually limited by the capacity or purchasing power of the domestic market, and also reduces the competitiveness of enterprises protected by protectionist support measures. Further development can only be ensured by integrating into global production chains. At the same time, the training of highly qualified personnel, support for fundamental R&D and further stimulation of proactive export-oriented businesses seem to be of fundamental importance.

Using the Balassa index, it is possible to identify the key success factors of styrene and make the most competitive industries the basis for the application of proactive industrial policy and export-oriented import substitution.

In addition, in addition to the already existing export promotion tools, it is worth improving the system of state strategic planning in terms of developing short-, medium- and long-term plans and development scenarios not only for the economy in general, but also for foreign economic activity in particular, based on the successful experience of China and countries "Asian tigers".

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The Year 2022: The Economic Policy In The New Reality

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Abstract

Research background: The modern model of the economy, with its glaring inequalities in the distribution of income and wealth, a bet on the development of the financial sector, a high level of consumption with a low level of production, has put society in the face of fundamental challenges that require the development of a model adequate to the new reality. The current world order in the context of financial turmoil is particularly painful for countries whose financial markets are among the developing ones.

Purpose of the article: The main purpose of this article is to analyse the problems faced by developing countries (for example, Russia) in the modern economic model, and ways to solve these problems.

Methods: To conduct the study, we used official statistics data, the analysis of which allowed us to determine the degree of mutual influence of key parameters of economic development.

Findings & Value added: Determining the directions of implementation of the new economic policy, it seems important to build a two-circuit model of economic management based on the compatibility of the planned system and private interest. Such a model should combine two components. The first component is the mobilization, administrative and command economy, aimed at ensuring its stability in the face of external challenges and priority support for strategic industries. The second component is a market economy, where private entrepreneurship would deal with the problems of saturation of the domestic market due to import substitution.

Keywords: *economy policy; model of the economy; finance system; emerging markets*

JEL Classification: *E52; E62; E64*

1 Introduction

The emerging geopolitical situation and the sanctions of Western countries have exacerbated the risks and contradictions in economic policy that have been accumulating in

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the Russian economy in recent decades. We are faced with fundamental challenges that require the development of a model which is adequate to the new reality.

For almost three decades, the Russian economy has struggled to become an equal part of the global economic community, by getting involved as much as possible in the processes of globalization. Meanwhile, despite the ambiguity of the definition of the category "globalization" in modern economic theory (Nový, 2015), most authors agree that it not only carries a positive potential for the world community, but also increases the risks and threats to its development (Šoltes & Štofko, 2015). Globalization processes contribute to the increasing of the contradictions in the development of the world community (Tokárová, 2015), the growth of the interdependence of national economies (Kramárová & Valášková, 2015), and their increasing dependence on a relatively small number of transnational corporations (Harumová, 2015). One of the most important features of these processes has become the widespread financialization of the economy, which enslaves society and subordinates the entire economy to its logic. As a result, the financial sector no longer performs the function of optimal allocation of capitals and risks and contributes to the further development of "casino finance". Due to these circumstances, the economy stops to play its role and contribute to social welfare (Bernards, 2019, Bresser-Pereira, 2019). According to a study (Van Velthoven et al., 2019), income inequality caused by finance (financial development, financial liberalization and banking crises) is associated with more income redistribution than inequality caused by other factors. Meanwhile, the growing social bundle of society and economic inequality are considered by many leading economists as one of the key global threats not only to economic development, but also to the whole world community (Nordhaus & Romer, 2019, Piketty T. et al., 2019, Stiglitz J., 2015, Sen A., 2015).

In this way, the Western model of economic development with a stake on the development of the financial sector, a high level of consumption with a low level of production has turned the economy of the golden billion into a destabilizing factor in the world economy. In May-June 2020, the President of the World Economic Forum, Klaus Schwab, proclaimed the "Great Reset", the main goal of which is the transition from current capitalism to the so-called inclusive supranational world capitalism, under which a new slave-owning system is hidden. (Katasonov, 2021)

Until recently, Russia was involved to the maximum in the described processes and acted as a vivid example of how the dominance of the "golden billion" countries and their largest companies damages the national interests of less developed countries.

2 Research methods

The methodological basis of the research is the dialectical materialistic and concrete historical method. At the same time, the dialectical-materialistic approach is the initial principle of research. As applied to this study, this means that, on the one hand, the dialectical method allows to know the essence and causes of the processes considered in the most adequate reflection of their dynamic integrity, on the other hand, any theoretical research should be supported by historical practice and statistical data. In this regard the empirical basis of the analysis is statistical materials and specific economic and statistical studies.

3 Results and Discussions

Modern economy, with its blatant inequalities in the distribution of income and wealth, has gone down the wrong path. While some take away value and pump wealth out of national economies, others act as resource providers and wealth creators, but do not receive anything

from this wealth. The current development model, which encourages "rent seekers" rather than true "wealth creators", stimulates the desire to generate income not by producing something new, but by imposing a premium on top of the competitive environment and undermining competition. Rent-oriented activity is aimed at taking value from creators. The financial sector has enormously diversified, and its total volume has increased significantly. This is especially true for such segment as asset management, which has become one of the fundamental characteristics of modern capitalism. Financial markets simply distribute income generated by activities in other areas and add nothing to those incomes. There is no way to change this, financial regulation must be used to help steer the financial sector towards the real economy, encouraging long-term investment through a tax on financial transactions.

Around 1970, the system of national accounts, which gives picture of one or the other economy, began to include the financial sector in the calculation of GDP as the total value of goods and services produced in the economy. Taken together, these changes have increased the influence of the financial sector over the real economy. So, the contribution of the financial sector to the economy in the UK is 7.2% of GDP, and in the US, it is 7.3%. Today problem is not simply in the size of the financial sector and its superiority over the non-financial sector, but its impact on large segments of the economy that have become financialized. The financial sector acts as a rentier - a value miner which is interested in short-term income. «For large banks and speculative funds, the satisfaction of private interests is increasingly at odds with the common good and interests of the economy» (Rampini and Viswanathan, 2018).

Starting out from 2008, the global financial system solved any problems by issuing additional money and increasing public debt, which did not solve the accumulated structural problems, but created new ones. Measures to support the global economy during the pandemic have exacerbated the situation. The Fed, by having printed an additional 7 trillion dollars, deprived itself of the possibility in the future of the usual tools for dealing with the next crisis. The aggravation of the geopolitical situation and its consequences associated with rising food and energy prices gave rise to a new global crisis comparable to the scale of stagflation in the 1980s.

The Fed's balance has grown from almost $1 trillion to $9 trillion from 2008 to 2022. The same trend was observed in the economies of Europe, Japan, Canada, Australia, Great Britain and Switzerland. As a result, the total balances of all the listed Central Banks grew from $4.5 trillion to $29 trillion by the beginning of 2022. Global inflation began to gain momentum since 2020. In the structure of the inflation index, energy and food are the most rising in price groups of goods.

According to the IMF, at the end of 2021, US GDP amounted to 23.0 trillion. dollars, equal to a quarter of the world, and the volume of US debt has already exceeded 30 trillion dollars, and this is clearly not the limit. The debts of developed countries such as the USA, Italy, France, Japan exceeded 100% of GDP. They can be served only at zero rates. Rising inflation in these countries, approaching the double-digit mark, will increase the price of new borrowing and lead to a tightening of monetary policy, the development of a debt crisis, which is fraught with the potential for a global destruction of the world economy with a slide into a financial disaster.

In the face of financial turmoil, the current world order hits especially hard countries whose financial markets are among the developing ones. Minor disturbances in the world markets lead to capital escape to the "quiet" dollar haven, which destroys their currency systems and causes inflation. We observed such a scenario in the context of global crises in 1998., 2008., when a massive outflow of capital from Russia led to a panic in the currency и and stock exchanges, increased ruble inflation, suppressed real investment, which led to a drop in real incomes of the population and an increase of unemployment.

Thirty years of integration into the global financial system, which can rightfully be called the offshorization of the Russian economy, is over. The Russian Ministry of Finance was proud of the share of non-residents in the OFZ market, borrowing rubles at double-digit rates, while giving the euros and dollars earned by the country at 2-3% growth. A high key rate made the bond market attractive and gave a competitive advantage to foreign investors who could raise cheap loans at home. Such model was destroying the domestic industry, which did not have the same available cheap financing. The most popular type of foreign business in Russia was the "carry trade" operation when they were engaged in loans at 2% in their homeland and issued to the Russian Ministry of Finance at 10%. "Structural" and "institutional" reforms were carried out, because of which 20% of the shares of Rosneft were owned by BP, 40% of the shares of Sberbank - by non-residents, control over a dozen strategic industrial and infrastructure enterprises - by Western countries, creating threats to economic security with what we are facing in today's conditions.

However, after Russia's exit from the global financial web, our economic system and the whole economy are being reformatted. Let's decide with the changes and priorities of economic policy in the new conditions.

Firstly, the outflow of capital from the country has stopped, which gives hope that these funds will now be used within our economy. The only important macroeconomic parameter in such conditions will be the size of the trade balance. If earlier we tried to have a trade balance surplus, a significant part of which either turned into an outflow of capital or accumulated into reserves that ensure the conditions for the stability of our economy, now in the new conditions the question arises of how to manage these surpluses. It no longer makes sense to increase the export of energy resources, receiving the currencies of unfriendly countries for them. The domestic economy was annually deprived of investments from 100 billion dollars due to the formation of foreign exchange reserves, the replenishment of the NWF and the export of capital. It is fundamentally important, while supplying our energy carriers to these countries, to receive a return flow maybe in a smaller volume, primarily of goods, not money, what will help to achieve a balance of our ability to monetize exports for the required volume of imports. In March 2022, exports exceeded imports by two and a half times. Therefore, the ruble is strengthening against the dollar and the euro. The inflow of foreign currency to the domestic market increases because of the introduction of the mandatory sale of 80% of export foreign exchange earnings in rubles, but as the ruble strengthens, 50%. The freezing of the Central Bank's reserves in the currencies of unfriendly countries in the amount of more than 300 billion dollars made it necessary to switch to paying for 100% of Russian gas exports in rubles, which will stimulate the trade partners of the Russian Federation to accumulate ruble reserves. The ruble ceases to be a currency of exclusively domestic consumption since it can be used to buy something in global economic activity. There is a vital need to develop a new monetary system with the ruble pegged to real monetary assets or to a basket of export goods that have a currency value. Russia accounts about 40% of the world's stocks of goods that have both commodity and monetary properties. It is impossible to underestimate Russia, which occupies 25% of the world energy raw materials market, provides about 15% of world grain exports, has strong positions in the metals, uranium, etc. Based on these goods, index of multi-commodity price stability is formed, which allows to create commodity-currency reserves as a replacement or supplement to existing gold and foreign exchange reserves.

The development of a national currency strategy within the framework of the ideas of the Breton Woods system of the new version, which involves pegging national currencies to real assets, is a condition for ensuring one's own independence as a global economic unit, and not a colony of the world dollar system.

As a result of the economic measures taken by the authorities, citizens' confidence in the ruble has grown and the volume of deposits in Russian banks now stands at about 30 trillion rubles.

Secondly, in the conditions of the new reality, the size of the budget deficit should become the main parameter. Before the well-known events, the most important postulate of budget policy was a balanced budget. Additional oil and gas revenues, within the framework of the budget rule, were accumulated in special sovereign funds, being converted into reserve currencies of unfriendly countries. In the current conditions, such construction is no longer acceptable and there is a need to move to deficit budget financing. At the same time, the deficit should play the role of a development budget aimed at stimulating the restructuring of the economy. The size of the deficit should be regulated considering the possibilities of domestic, market, non-equity financing. Here we have a reserve - this is a low amount of public debt (external and internal) of just over 20% of GDP, where 13% is domestic).

Thirdly, among the most important measures, must be noted the transition from the financial and economic justification of investment measures to the socio-economic one, the key parameter of the effectiveness of which can be employment and income growth. At the end of 2021, commercial banks earned a record profit for the entire post-Soviet period (see Table 1) - about 2.4 trillion rubles, more than the net financial result of agriculture, construction and transport combined. Like any intermediaries, banks do not create added value. By attracting deposits and issuing loans, banks are engaged in the purchase and sale of money and appropriate for their services a part of the GDP created by the real sector of the economy. The sources of super profits of banks were the working capital of enterprises and the funds withdrawn from citizens through loans. In the conditions of the most acute geopolitical crisis, the formation of available financial resources for import substitution becomes a matter of national security.

The urgent need for changes in the financial sector has led to the fact that over the past three months, the Russian financial authorities have done more to develop the country's domestic financial sector than in a decade. The most important thing that was done was that the Russian financial authorities had to block the channels of capital outflow from Russia and disconnect the country from the external financial circuit.

Table 1. Key indicators of the Russian banking sector for 2014-2021.

Year \ Indicator	2014	2015	2016	2017	2018	2019	2020	2021
Bank assets to GDP, %	108,7	99,7	93,0	92,5	90,8	88,4	96,9	92,1
The share of loans to the economy in GDP, %	57,2	52,8	47,7	45,6	46,5	47,0	60,6	58,8
The share of loans to the economy in the assets of banks, %	52,6	52,9	51,3	49,1	51,3	53,2	62,5	63,8
The profit of the banking sector in billion rubles	589,1	191,9	929,6	789,6	1344,8	2036,0	1909,7	2363,0

Source: Bulletin of Banking Statistics 2015,2016,2017,2018,2019,2020,2021, 2022.

Fourthly, the final goal of the medium–term economic policy may be the structural and technological restructuring of the Russian economy based on the domestic market and exit by 2025, at a steady pace of sovereign economic growth, building a self-sufficient economy capable of providing itself with 90% of everything necessary and only 10% of imports in relation to GDP. Before the well-known events, this share ranged from 20 to 30%.

Since the beginning of the military special operation, the budget surplus amounted to more than a trillion rubles, the foreign trade balance surplus was $190 billion, the exchange rate of the ruble against the dollar strengthened to 60 rubles against the backdrop of growing payments for gas under the scheme proposed by Russia, the global food market is increasingly degree depends on ours. But these successes should not lead to euphoria and put off for the future - the restoration of a full-fledged industrial system with production chains deeply integrated into our economy. Now we do not know how to produce complex special equipment for road construction, we almost do not have our own high-quality motor fuel, we do not grow durum wheat, we do not produce silk or wool, we do not have our own fine chemistry in order to make high-quality medicines and cosmetics, and we don't even produce nails. Medium business in Russia is waiting for sectoral programs of consistent import substitution.

At first glance, it may seem that huge funds are needed. But if we convert the reserves we lost into rubles and divide them by the years that we accumulated them, we will find out that every year we have taken more out of the economy than was necessary for consistent import substitution. Now we have lost most of the foreign exchange reserves, but at the same time did not feel the strong consequences. So, it is not about the money. It is just that in some minds of the Russian elite there is a consciousness that sanctions will be weakened, and everything will return to its former life, or there is a desire to replace one import with another.

The cost of existing demand in the context of recovery instead of importing production chains is estimated by analysts at 18–20 trillion rubles, while investments in the creation of such new volume of value should be approximately 30% of GDP annually, which will ensure economic growth at a rate of 7–9% per year and the growth of the well-being of the majority of the population in Russia. We have the potential to achieve such sustainable economic growth. The gap between gross savings and gross savings is up to 10% of GDP (see Table 2). This result was due, among other things, to the insufficiently efficient work of banks in investment lending to the economy. A high propensity to save on the part of the population gives a negative effect to the investment multiplier. Kaigorodova et al. (2018) showed in their study (2018) that in Russia there is a tendency to increase the amount of money left outside the sphere of consumption or investment. This situation has developed in our country due to the low level of trust on the part of most people in commercial and government structures, many people are not sure about their future and prefer to save money "for a rainy day."

Russia, with its low standards and structure of household consumption and underfunding of investment projects, is still far from meeting its basic needs: the level of housing provision and provision of cars is three to four times lower than in economically developed countries, the provision of durable goods is significantly lower, the lag in the level of development of transport infrastructure is multiplier, the gap in the consumption of some essential foodstuffs remains significant (Kotsofana, 2007). In this regard, the idea of effective management of aggregate demand is especially important since long-term economic growth is impossible without its expansion and increasing of investment.

In conditions of investment hunger, with falling consumer demand, the real sector can accumulate money emission without pressure on the foreign exchange and consumer markets. And it is right time for the Bank of Russia to follow the path of most developed countries, where governments and central banks provide systematic support to their economies through the form of financial injections and the provision of government guarantees. (Ruščáková, 2015). At the same time, they see deflation rather than inflation as the main threat to the stability of their economies (Jarý, 2015). And this is completely justified, since an important parameter for the economy is not inflation, but real interest rates for the non-financial sector and the volume of lending to the non-financial sector

(Domashcenko, 2016), which grows in proportion to the money supply. There are studies proving that the correlation between inflation and economic growth is not significant, especially in the long run (Bhaduri, 2015). As for the dependence between the growth rate of the money supply and the rate of consumer inflation, it should be noted here that the growth of the money supply, on the contrary, leads to a decrease in consumer inflation (Altunyan, 2015). And here we can agree with Bresser-Pereira (2020) in fact, that «Money is an endogenous variable that does not cause but just validates a going inflation».

Table 2. GDP, savings, investments in 2014-2021.

	2014	2015	2016	2017	2018	2019	2020	2021
GDP in billion rubles	79030	83087	85616	91843	103861	109241	107390	131015
Gross savings as % of GDP	30,2	30,5	28,2	28,9	31,9	30,5	29,8	32,0
Gross accumulation as % of GDP	22,4	22,1	23,1	23,8	21,9	22,7	23,9	22,4
Gross fixed capital accumulation as % of GDP	21,4	20,6	21,9	22,0	20,6	21,1	21,7	19,8
Investments in fixed assets as % of GDP	17,6	16,7	17,2	17,4	17,1	17,6	18,9	17,5
Investments in fixed assets in % compared to the previous year	3,3	-0,1	6,1	8,7	10,9	8,7	5,0	13,0
The degree of depreciation of fixed assets in % at the end of the year	49,4	47,7	48,1	47,3	46,6	37,8	39,0	39,0

Source: http://gks.ru/free_doc/new_site/vvp/vvp-god/tab24.htm

4 Conclusion

In this way, defining the directions for the implementation of the new economic policy, it seems important to build a two-loop model of economic management based on the compatibility of the planned system and private interests. On the one hand, the mobilization, administrative-command economy, aimed at ensuring its stability in the face of external challenges and priority support for strategic industries. On the other hand, the market, where private business would deal with the problems of saturating the domestic market through import substitution.

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Working Evenings or on Weekends in the Context of Sustainability in Eurozone

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Abstract

Research background: Smart technologies and Internet are an integral part of every day life making it more convenient and transforming the way employees work. While it allows employees to work when and where they want, it increases the risk of employees working later in the evenings of letting the work into weekends.

Purpose of the article: The purpose of the paper is to identify the effectiveness of work in the evening and on weekends and propose sustainable development solutions. The aim of this research is to analyse the impact of work in the evening or on weekends on productivity per capita, life satisfaction and happiness in countries of Eurozone.

Methods: Data were collected from Eurostat database 2017-2021. Correlation analysis and descriptive statistical methods are used to analyse the nature of association between the variables.

Findings & Value added: Working in the evening and on weekends is beneficial neither for the economy nor for well being of employees in Eurozone. Nevertheless, work on Sunday has positive impact on life satisfaction, however it decreases the feeling of happiness what can reflect on employee productivity during the week.

Keywords: *work in the evening; work on weekend; life satisfaction; happiness; four days workweek*

JEL Classification: *J8; J81; M16; M54*

1 Introduction

Human progress is very closely linked to the development of technology and intellectual revolutions. This phenomenon is perceived as a fact when the speed of growth and development overtakes the very needs of people. On the other hand, the satisfaction curve is influenced by factors that directly affect the productivity and efficiency of processes. In principle, there is an equation, the better people are, the more they expect in their favor. With the goals of very rapid growth, a turning point is occurring, which in the past was

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focused on sustainability - primarily human resources. In these cases, a social system was developed, employee protection was developed, working hours were shortened, working conditions were improved, or various alternatives and flexible forms of work organizations were introduced.

The limitation of resources and lack of inputs is beginning to show in some industries, which forces us to think about the very setting of processes and production. In recent years, general progress has focused on the concepts of ecology and sustainable growth. Many problems in the form of rapid global warming or the ongoing energy crisis are the result of disproportionate and uncontrolled development at the expense of nature.

Not only GDP growth and positive numbers in graphs, but real benefits and satisfaction on the part of organizations and employees can contribute to permanent development.

1.1 Effectiveness of evening work and work on weekends

Continuous operations or production (on weekends and during the night) is economically beneficial for organizations, therefore considered as an advantage, but is this still valid?

The price of inputs and the cost of continuous operations or production are lower than the price for the product itself. Another positive effect of this shift setting is the need to hire more employees what results in a reduction of unemployment or is able to create opportunities for other types of employees (Heyes and Tomlinson, 2021).

It is true that manufacturing and industrial countries have more evening shifts and weekend work in an effort to continuously produce and meet production plans, especially in Central and Eastern Europe (Trif et al., 2021). In services, the main point of weekend and night hours is to provide continuous services or availability at a time when customers expect it and have the opportunity to use their free time. Many services aim at the weekend or night work, where this form of work cannot be avoided. Therefore, it is still true that many employees choose this type of employment (an atypical work schedule) as a solution to their situation when other circumstances prevent them from working in a standard employment relationship. Hence, employees can possibly earn extra money and use the "regular day" for other activities. Productivity of employees, however, faces its limits and an unstable regime has adverse effects in the long term (Pereira et al., 2021).

On the other hand, at low input and energy prices continuous operations and production is the most reasonable solution. The pressure to save, in addition to economic, ecological solutions, has been intensifying in the Eurozone in recent years (Kyriakidis, 2022). The goal of sustainability and the circular economy is to approach models that have an impact on production and services (Riforgiate and Kramer, 2021) that we do not inherently need.

Currently, the rising price of energy is becoming a more significant factor, when organizations begin to re-evaluate their activities in order to achieve maximum efficiency. Many organizations have decided to adapt flexible forms precisely according to the performance of the economy and their objectives.

The impact of setting working hours for employees has an impact on their overall performance, job satisfaction and happiness. A long-term setting can have an impact on health, so it is advisable to have a clear separation of the workweek and the weekend (Ginoux et al., 2021). To be effective means to perform all tasks that have been set without negative effects. Employees prefer flex time, which is limited to weekends and free time when they can relax, but also have space to complete all tasks (Demsky et al., 2021).

Weekend work and night work have their advantages and disadvantages. Due to the influence of ongoing macroeconomic changes in this research, we focused on their impact on the economy and on satisfaction and happiness in the individual countries of the Eurozone.

2 Methods

The purpose of the paper was to identify the effectiveness of work in the evening and on weekends and propose sustainable development solutions. The aim of this research was to analyse the impact of work in the evening or on weekends on productivity per capita, life satisfaction and happiness in countries of Eurozone.

The Eurozone is considered the highest form of integration, cooperation, unity and maturity. Based on the same currency from the point of view of the EU, it helps to recalculate all numbers more easily without losing the conversion rate.

2.1 Data

Data were collected from Eurostat database 2017-2021 for 19 countries in Eurozone. For research purposes, ISO 3166-1 Alpha 2 country codes were used to represent the studied countries in figures and tables.

Table 1. ISO 3166-1 Alpha 2 country codes Eurozone

Belgium	Germany	Estonia	Ireland	Greece	Spain	France	Italy	Cyprus	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Austria	Portugal	Slovenia	Slovakia	Finland
BE	DE	EE	IE	GR	ES	FR	IT	CY	LV	LT	LU	MT	NL	AT	PT	SI	SK	FI

Source: https://www.iban.com/country-codes

Overall work in the evening (Eurostat, 2022a) in Eurozone was decreasing during the studied years (from 16.7% - 13.7%). However, slight increase was recorded in 2021 in Belgium, Estonia, Greece, Spain, France, Luxembourg, Portugal and Finland what could be the result of the pandemic and work from home safety measure. Work from home during the pandemic offered employees not only place but also time flexibility. The highest rates (more than 30%) of evening work during the studied period were in Greece.

Largely, work on Saturday (Eurostat, 2022b) had the highest rates in Eurozone. Between 2017 and 2019 the rates were around 28%. In 2020 and 2021 the work on Saturday decreased to approximately 24%. Majority (approximately 40%) of people working on Saturday were in Greece.

Work on Sunday (Eurostat, 2022c) in Eurozone was stable (about 15%) between 2017-2019 and slightly decreased to 12.6% in 2020-2021. Since 2017 the highest rates (approximately 20%) were reported in Netherlands that decreased to 10% in 2021.

GDP per capita as the macroeconomic indicator capturing the national economic activity was slightly increasing since 2017, but decreased in 2020 (Eurostat, 2022d). In 2021 the values were increasing to the pre-pandemic years. On average, Luxembourg, Ireland and Netherlands reported the highest economic outcomes during the studied period

Data for life satisfaction (Eurostat, 2022e) were available only for year 2018. The highest reported life satisfaction (approximately 8%) was in Ireland, Austria and Finland. Data from Greece, Latvia, Lithuania and Portugal showcased the lowest life satisfaction (approximately 6%). Life satisfaction in the remaining countries from Eurozone was approximately 7%.

The latest data on the frequency of being happy in the last 4 weeks in Eurozone were from 2018. Happiness was measured on a scale from always – most of the time –

sometimes – rarely – never (Eurostat, 2022f). Spain had the highest rates of people being always happy (almost 30%). More than 50% of people living in Belgium, Germany, Ireland, France, Luxembourg, Malta, Netherlands, Austria and Finland were happy most of the time. More than 30% of people who reported being happy sometimes in the last 4 weeks were in Estonia, Greece, Italy, Cyprus, Latvia, Lithuania and Slovenia. More than 10% of people in Estonia, Greece, Cyprus, Latvia, Lithuania and Portugal felt rarely happy. Countries with the least happiness rates in 2018 were Latvia and Greece. Almost 7% of people in Latvia and more than 5% in Greece never felt happy in the last 4 weeks.

2.2 Data Analysis

Correlation analysis and descriptive statistical methods were used to analyse the nature of association between the variables. Additionally, regression analysis and analysis of variance (ANOVA) were computed. Statistical modelling was used to estimate the relationship between work in the evening or on weekends on productivity (GDP) per capita, life satisfaction and happiness in countries of Eurozone using MS Excel add-in program Analysis ToolPack.

GDP, life satisfaction and happiness as the dependent variables were analysed. Taking GDP Per Capita as an indicator for economic growth, life satisfaction and happiness as an indicator of employee well-being, the studied research question was: *How effective and sustainable is work in the evening or on weekends in Eurozone?* Accordingly, the hypotheses were written:

H_{01}: *Working in the evening has no effect on GDP in Eurozone.*
H_{02}: *Working on Saturday has no effect on GDP in Eurozone.*
H_{03}: *Working on Sunday has no effect on GDP in Eurozone.*
H_{04}: *Working in the evening has no effect on satisfaction and happiness in Eurozone.*
H_{05}: *Working on Saturday has no effect on satisfaction and happiness in Eurozone.*
H_{06}: *Working on Sunday has no effect on satisfaction and happiness in Eurozone.*

3 Results

The most important parameters from the regression analysis, ANOVA and correlation analysis necessary to accept or reject the hypothesis are summarized in Table 2 and Table 3.

3.1 Work in the evening, on weekends and its impact on GDP per capita

Table 2. Work in the evening, on weekends and GDP per capita in Eurozone [2017-2021]

	GDP per capita					
	Parameter	**2017**	**2018**	**2019**	**2020**	**2021**
Work in the evening	**F**	0.044	0.068	0.111	0.114	0.006
	df	18	18	18	18	18
	r	-0.051	-0.063	-0.081	-0.082	0.019
	p-value	0.836	0.797	0.743	0.740	0.940
	t	-0.210	-0.261	-0.333	-0.338	0.077
Work on Saturday	**F**	0.000	0.046	0.009	0.004	0.016
	df	18	18	18	18	18
	r	0.000	0.052	0.023	-0.015	-0.031
	p-value	0.999	0.832	0.927	0.952	0.899
	t	0.001	0.215	0.093	-0.061	-0.128
Work on	**F**	0.002	0.525	0.263	0.262	0.176

Sunday	**df**	18	18	18	18	18
	r	0.010	0.173	0.123	0.123	0.101
	p-value	0.967	0.479	0.615	0.616	0.680
	t	0.042	0.724	0.513	0.511	0.419

Source: own elaboration

H_{01}: *Working in the evening has no effect on GDP in Eurozone.*
Based on the correlation coefficient (r) in all studied years it can be concluded that between the work in the evening and GDP is a very weak relation. While from 2017-2020 the correlation was negative, positive correlation can be observed in 2021. Despite the correlation the p-values (p>0.05) do not support a rejection of the null hypothesis (Table 2).

H_{02}: *Working on Saturday has no effect on GDP in Eurozone.*
Work on Saturday and GDP between 2017-2019 are in a very weak positive correlation (r) and negative correlation (r) in years 2020 and 2021. Considering very high p-values in all studied years (p>0.05) the relation is not significant. Hence, data does not support a rejection of the null hypothesis (Table 2).

H_{03}: *Working on Sunday has no effect on GDP in Eurozone.*
Correlation coefficient (r) measuring the relation between work on Sunday and GDP per capita from 2017-2021 suggests a very weak to weak positive relationship between the variables (Table 2). However, according to p-values (p>0.05) the relationship is of no significance and does not support a rejection of the null hypothesis.

3.2 Work in the evening, on weekends and its impact on life satisfaction and happiness

Table 3. Work in the evening, on weekends and its impact on life satisfaction and happiness in Eurozone [2018]

		Life satisfaction	**Happiness**				
			Always	*Most of the time*	*Some-times*	*Rarely*	*Never*
Parameter			**2018**				
Work in the evening	F	0.046	0.003	0.014	0.025	0.125	0.001
	df	18	18	18	18	18	18
	r	-0.052	0.013	0.029	-0.038	-0.085	0.009
	p-value	0.833	0.956	0.906	0.877	0.728	0.972
	t	-0.214	0.056	0.120	-0.157	-0.353	0.035
Work on Saturday	F	0.397	1.027	0.019	0.131	0.273	0.087
	df	18	18	18	18	18	18
	r	0.151	0.239	0.033	-0.087	-0.126	-0.072
	p-value	0.537	0.325	0.892	0.722	0.608	0.771
	t	0.630	1.013	0.138	-0.362	-0.523	-0.296
Work on Sunday	F	5.280	1.193	2.592	2.226	4.983	2.030
	df	18	18	18	18	18	18
	r	*0.487*	0.256	0.364	-0.340	*-0.476*	-0.327
	p-value	*0.035*	0.290	0.126	0.154	*0.039*	0.172
	t	2.298	1.092	1.610	-1.492	-2.232	-1.425

Source: own elaboration

H_{04}: *Working in the evening has no effect on satisfaction and happiness in Eurozone.*
Work in the evening is in a very weak negative correlation (r) with life satisfaction and happiness experienced sometimes or rarely. Very weak positive correlation (r) can be observed between work in the evenings and happiness experienced always, most of the time

or never. However, since the p-values are very high (p>0.05), the relation is not significant. The data does not support a rejection of the null hypothesis (Table 3).

H05: Working on Saturday has no effect on satisfaction and happiness in Eurozone.
As per the results, work on Saturday is in a very weak negative correlation with the feeling of happiness experienced sometimes, rarely or never and in a weak positive correlation with life satisfaction and feeling of happiness experienced always and most of the time. Due to high p-values (p>0.05) the relation is not significant and does not support a rejection of the null hypothesis (Table 3).

H06: Working on Sunday has no effect on satisfaction and happiness in Eurozone.
Work on Sunday is in a positive correlation with life satisfaction and in a negative correlation with rare happiness. Both relations are significant (p<0.05). Therefore, the data partially support a rejection of the null hypothesis. Other studied outcomes are in a positive and negative correlation, but the relationship is not significant (p>0.05) (Table 3).
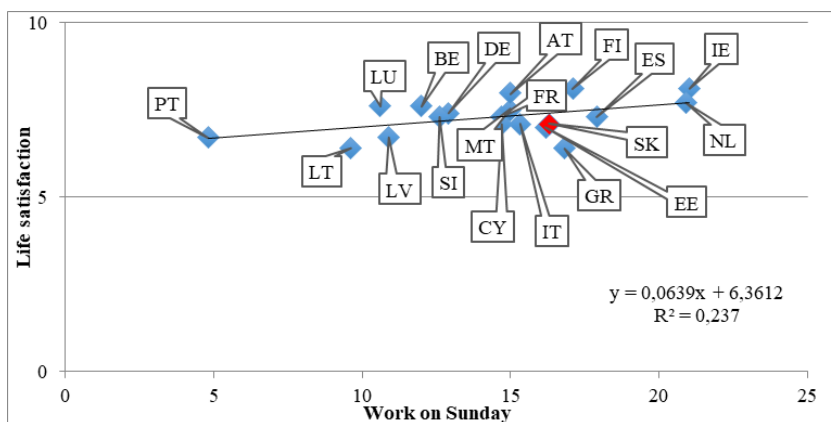
Figure 1. Work on Sunday and life satisfaction in Eurozone

Source: own elaboration

Work on Sunday is in a positive correlation with life satisfaction (F = 5.280, df = 18, r = 0.487, p < 0.05, t = 2.298) (Table 3). With increasing work on Sunday, life satisfaction increases (Figure 1).
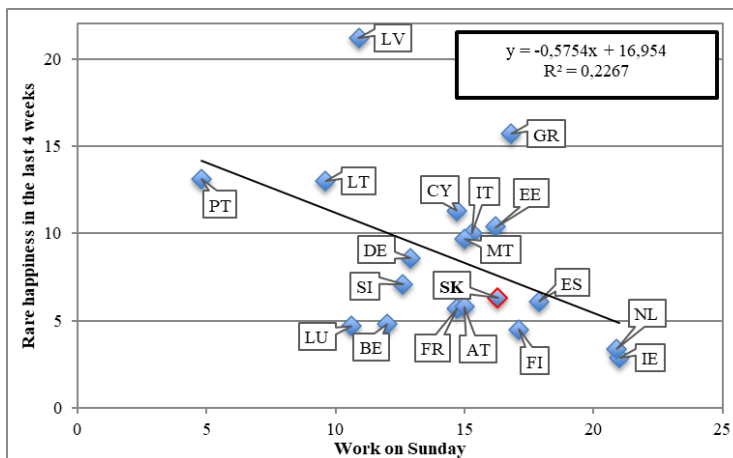
Figure 2. Work on Sunday and rare happiness in Eurozone

Source: own elaboration

However the relationship is in a negative correlation with rare happiness ($F = 4.983$, df $= 18$, $r = -0.476$, $p < 0.05$, $t = -2.232$) (Table 3). In another words, increased work on Sunday decreases employee feeling of rare happiness (Figure 2).

4 Discussion

Working in the evening and on weekends is not beneficial for the economy nor for well-being of employees. In essence, this research has shown that weekend or night work has no major impact on the economic activity. It does not increase productivity in terms of the economic growth, however it certainly maintains production or the provision of services (Becker et al., 2020).

Nevertheless, according to results work on Sunday has positive impact on life satisfaction. This can be explained by the Vroom's expectancy theory. Working on Sunday (exerted effort) results in a favourable performance (completed work). Favourable performance will result in a desirable reward (money, promotion, sense of accomplishment, appraisal). If the reward satisfies an important need then the desire to satisfy it will be strong enough to exert the effort. Consequently, meeting the desired needs can result in a feeling of life satisfaction.

On the contrary, work on Sunday decreases the feeling of happiness. It can be argued that it might be associated with less free time. As research shows, happy employees are more productive; hence, decreased happiness can negatively reflect on employee productivity during the week (Wang et al., 2022).

Furthermore, long working hours or work on weekend increases the energy consumption what leads to environmental problems. Though, reducing work in the evening or on weekends might be a significant problem for countries whose economy is based on production or services, for example Slovakia or Czech Republic. In the case of production, the reduction of weekend and evening shifts could be offered as a preventive measure, keeping morning or daytime shifts. These measures could help fulfil organizational goals, such as sustainability, efficiency, productivity and well-being of employees. In terms of services, shortened opening hours or changed mode of operation might manifest the measures. Adriano and Callaghan (2020) mentioned that in the less escalated periods it is also possible to use part-time employees and temporary employees who prefer to work on weekends because they have other responsibilities during the week or can earn extra pay. Many organizations can proceed with the transfer of services to the online space when they are closed (on Sundays or during holidays) based on the legislation in individual countries. Services are driven by customer demand, so the trend is to introduce days off when there is less demand for services (Monday) and extend opening times when there is demand for services (weekends, holidays).

On the basis of the current energy crisis and the sustainability of the business the question is which direction the organizations in individual countries will choose?

One of the sustainable development solutions in the global energy crisis seems to be a 4 days workweek. However, if the work of 5 days is crammed into 4 days with longer hours, it may not achieve the full range of benefits. Hence, it would be suitable to implement one of the following plans:

1. 4 days (8 -10 working hours) workweek,
2. 4 days (8 -10 working hours) workweek with 2 hours work from home every day,
3. 4 days (8 working hours) workweek with 5th day work from home.

Option 2 and 3 represent a hybrid-compressed workweek.

Another solution could be to offer flexible working hours to departments that need to work only in the specific time of the month, such as accounting or payroll. Many organizations in countries that are focused on manufacturing and services that cannot be

performed online do not have such extensive opportunities to implement a hybrid work model or to flexible working hours (Greve, 2019). Therefore, since communication is the driving force of employee satisfaction, the organization effort to show interest in employee needs will be valued more than benefits (Činčalová, 2020).

The aforementioned solutions could offer many economic and ecological benefits especially in the times of the energy crisis. A very negative approach will be the closing of factories and establishments that will not be able to pay their costs. In neutral cases, it will be switched to online mode mainly due to savings, which can have a negative effect on work life balance, as it was during COVID-19. The optimistic approach would be to continue mainly with option number 3. This approach is strengthened by the research from the pandemic period and could contribute to greater happiness.

In essence, it is quite clear that the mood and satisfaction of employees will change, the question remains in which direction (Perez et al., 2019) and whether the next few years will not be marked by macroeconomic aspects and the uncertainty of energy poverty. This would essentially cause a shift away from flexible forms of work organization, efficiency and happiness towards goals such as survival in the market.

4.1 Limitations

Further studies on work in the evening and on weekends and their impact on life satisfaction and happiness are required due to limited dataset. An extended dataset (for year 2022) would offer an interesting opportunity for further analysis. In 2022, an increased relevance of factors such as inflation, energy crisis or the need for sustainability of economic performance can change values to extremes.

Acknowledgements

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The impact of globalization on the innovation implementation within an emphasis on the bottom wave

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Abstract

Research background: If the task of internal communication is to influence the company's business activities positively, then it has to be part of the company's strategic planning linked to communication and business goals. At the same time, it requires an understanding of the importance of internal communication and its potential for increasing the performance of companies associated with its application to management processes.
Purpose of the article: The article aims to research the impact of innovative tendencies, which, under the pressure of globalization factors, increasingly influence how internal communication is managed in the company. We pay special attention to the formation of the bottom wave and direct contact with the information source, such as employees, because it is the employees who are an essential information source for the company, which requires constant monitoring, impact evaluation and flexible reaction in interactions with the bottom wave.
Methods: To achieve the set goal, domestic and foreign published sources were analyzed, and case studies and research were used for deeper analysis. Synthetic-analytical and inductive-deductive methods were used as well.
Findings & Value added: We expect the results to provide insight into innovation implementation within internal communication, while considering the bottom wave in the global environment context.

Keywords: *globalization; internal communication; bottom wave; employee; human resources*

JEL Classification: *M1; M4; L1; L2*

1 Introduction

The business environment is changing rapidly and, under the influence of globalization, creates a problematic complex of relationships and connections. Globalization directly affects and influences all business entities. These tendencies are much more visible if

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companies try to penetrate beyond the borders of their country and enter the environment of international markets. In globalization, multinational companies are becoming decisive players, but smaller businesses that can respond flexibly to market changes also get a chance. (Lesáková, 2008) Entering international markets naturally increases the pressure to introduce innovations, increase the productivity and competitiveness of the company. Competition and global rivalry are growing in the movement of trade and resources across national borders. (Baláž, 2001) Nowadays, the competitiveness of companies is no longer just a relation to the products and services offered (Watson and Popescu, 2021, Mae et al, 2021).

2 The influence of globalization tendencies on the business environment

The globalization of the economy brings along new ways of doing business. It introduces innovations into internal company processes, mainly due to the development of communication and information technologies, the implementation of strategic business management, which nowadays has a fundamental impact on the company's success (Grant, 2021; Ionescu, 2021; Hopkins and Siekelova, 2021). Increasing employment brings with it a new level of competition in attracting qualified and motivated labour as an essential capital of the company. In this area, we also observe a shift in the direction of maintaining the workforce, increasing employee satisfaction and motivation.

2.1 Global trends in keeping workforce and employment

Technological progress, higher mobility of production factors, liberalization of international business, as well as the constantly growing number of countries entering the competitive relations of global business reduces the dependence of companies on the conditions of the domestic market and significantly motivate them to accept the conditions and trends prevailing on the global market. Just as globalization is a reaction to the oversaturation of domestic markets, it is also an effort to gain a foothold in prospective sales markets and the search for new and cheaper material and human resources. (Lesáková, 2008) In this process, international trends in human resources management come to the fore as a necessary and irreplaceable capital of the company. Employee orientation can be understood as a natural reaction of companies to the situation in the labour market because it is necessary to consider turnover and the resulting costs associated with another fulfilling job position. It is, therefore, necessary to create a system that ensures long-term cooperation between the company and its employees to prevent fluctuation. (Mruk et al., 2005)

Global trends in workforce retention include, among others, the efforts of companies to achieve a balance between work and private life and work-life balance. (Reed et al, 2020) A study researching international trends in employment and human resources on a sample of 738 top managers from the world's most developed regions such as the United States, Europe and Asia points to specific findings related to the retention of talented and experienced employees. Across all organizations in the studied regions, the following strategies for maintaining a qualified workforce and increasing employee retention come as the most important:
- achieving optimal compensation and benefits for attracting new and retaining current talented employees,
- the creation of employee engagement plans and open communication channels,
- creating and maintaining the environment of a learning society through education and development,

- implementing a talent management system for managing all aspects of the employee experience, from employee recruitment to maintaining long-term satisfaction. (Manhertz, 2011)

2.2 Global trends in human capital development in business practice

In human resources management, there is an obvious need to introduce the concept of "European-type" management, including its application in everyday practice. In this area, the following aspects are particularly preferred:

1) **Transformation of personnel activities -** represents the transfer of operative tasks to the hands of line managers. However, transforming a personnel manager from an administrator to a consultant is not without issues. They often show a reluctance or inability to perform personnel activities, while they may feel a weakening of their position, even a loss of control.

2) **Strategic planning, measurement and benchmarking –** in this area, it is essential to transform individual activities into human resources management. To obtain an up-to-date overview of the state of human capital in the company and the effectiveness of individual activities in people management, it is necessary to start from an overview of incurred costs, productivity indicators and indicators of effective management in certain areas of HR. The company should also follow them when planning its future goals, and they can also be used for external benchmarking.

3) **Outsourcing personnel activities –** closely related to monitoring the effectiveness of all activities of HRD. It is very popular nowadays to use a supplier to ensure several processes inside the company through external cooperation. It means that the external supplier will take responsibility for certain company activities. Several experts agree that outsourcing in HRD is one of the fastest-developing segments within the entire outsourcing market. It represents a revolutionary change in the delivery of services within the company. It helps to eliminate all repetitive activities, the added value of which is negligible for the enterprise. In this way, the company can focus on more critical activities. At the same time, there also exists the assumption that, based on the new structures, it will be possible to support a higher degree of innovation and flexibility. However, there are also certain risks, such as failure of outsourcing, lower quality, higher financial costs, leakage of know-how, leakage of strategic information, loss of control over HRD activities, etc. Despite the disadvantages above, outsourcing personnel activities is becoming a critical trend that determines the future of HRD. (Vetráková, 2011)

4) **Personnel marketing –** is a way to find and recruit quality personnel, stabilize them and strengthen their feeling of belonging to the company. With the help of personnel marketing, only those applicants who meet the predetermined conditions of the company are approached. This requires, in particular, analysis and evaluation of jobs, an analysis of potential job seekers' wishes, needs, interests and attitudes. The formation of work potential through personnel marketing leads to the emergence of a specific corporate and employee culture.

5) **Management of work performance –**represents a strategically oriented process enabling the company's employees to understand better what to focus on when performing their work and what they can achieve at work. At the same time, the prerequisite for proper functioning is constant communication between the employee and his superior. The goal of this process is the continuous improvement of work performance, which includes the planning and monitoring work performance, evaluation, training and development of the company's human capital and, last but not least, the method of rewarding them. The prerequisite for such an approach is to

increase employees' work performance by providing information about the company's strategic goals.

6) **Lifelong learning –** has become a necessity in companies nowadays. The knowledge of employees is already becoming a preferred economic category in our conditions, i.e., they are an essential factor in the economic prosperity of the company. Company management must begin to perceive the introduction of education as a primary process in the company. Determining the company's overall training strategy is no longer sufficient. Therefore, each employee in each workplace must have a training strategy to start employee training engagement in the company. The legislation of the Ministry of Education of the Slovak Republic could also serve to increase the motivation of employers to train their employees, which should also regulate the employer's right to participate in the evaluation of the level of informal education and the recognition of the results of informal education, as well as to use funding sources for lifelong education. (Seková, 2013)

The above-mentioned new trends point to the fact that nowadays, more and more emphasis is placed on the powers of employees to manage the company. It is the proper way to contribute to the motivation of employees, who will show better work performance, use their classification more effectively, thus making the work of line managers and individual HR departments easier. (Kachaňáková, 2007)

3 Implementation of innovations within internal communication

Economic entities must be able to adapt and adjust to global conditions. The world is currently reacting to significant economic challenges, either due to the pandemic or the social situation. These conditions are transformed into the growth of inflation, the decrease of disposable income and thus, the employees demand salary increases. Internal communication faces a great challenge, and it is essential to have it built on regularity, openness and integrity. (Hrnčáková, 2022; Ober and Kochmanska, 2022; Castro-Martinez and Diaz-Morilla, 2021) We can say that internal communication can very quickly connect with crisis communication in current conditions, the use of which can currently increase. In solving problems arising from a complicated social and economic situation, companies are forced to resort to the principles and methods of crisis communication directed at employees.

Taking care of employees is one of the pillars of socially responsible business and is also related to internal communication. "Studies by the World Health Organization estimate that 264 million people worldwide suffer from depression, many of whom also suffer from anxiety, costing the global economy an estimated $1 trillion a year in lost productivity." (WHO, 2021) Regarding this adverse trend, companies have to focus more on the issue of burnout, which threatens their employees. For this reason, the importance of employee feedback has increased, which could represent one of the indicators of incorrectly set functioning of the company considering redistribution of tasks or internal communication. (Duvigneau, 2022) As mentioned, the company needs to set a strategy aimed at optimal management of employees, which is also transferred to internal communication.

As such, the pandemic has significantly changed the functioning of the entire world. We conclude that it also affected internal communication. Experts pointed out one of the significant trends: the effort to inform employees effectively and interestingly. Companies had to develop a strategy that covered the reach of information to all workers, including those who work outside the workplace. In addition, companies focused on diversified forms of communication, which ensured that employees at all levels of management were adequately informed. (Koliyot, 2022) Solving the pandemic situation in connection with internal communication has thus brought greater visibility even to workers who are not

primarily tied to a standard place of performance. Companies were therefore interested and motivated to link the entire company's communication and ensure the flow of information. According to research, adopting digital tools leads to a 67% increase in productivity, a 53% increase in employee engagement and a 43% increase in revenue. (IBM, 2019) Therefore, as a result of the pandemic, companies found a way or were forced to find a way to ensure company-wide internal communication and connect remote employees.

Just as companies change the formats used for external communication according to current trends and recipient requirements, they should also change the formats used for internal communication. Companies should perceive the change in format and the use of, e.g., video content or another visual format, not only as a way to attract new customers but also as a way to increase productivity and employee engagement. Up to 67% of employees showed better results in completing tasks when information included text with images or video than information that contained only text. The research also pointed to faster absorption of information, by 7%, if the company communicated with a message with an image and not only with text. (Knott, 2022) We can conclude that companies are forced to reevaluate their communication strategy aimed at internal audiences and try to communicate more effectively with their employees.
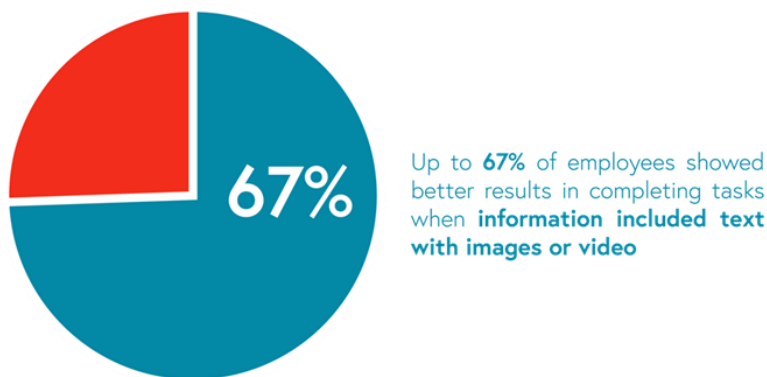
Source: (Knott, 2022)

New technologies affect the operation of economic entities as well as internal communication. An inherent trend that companies will have to adapt to is the Metaverse. The pandemic has already shown the importance of platforms that connect people. This platform represents a fusion of the digital and physical worlds in which users will spend their time. (Michalko, 2022) "It is based on the convergence of technologies that enable multi-sensory interactions with virtual environments, digital objects and people as virtual or augmented reality." (Mystakidis, 2022) By 2026, it is predicted that more than 10 trillion dollars will be invested in it. (Patel, 2022)

Metaverse can be a tremendous technological milestone to remove physical contact from the work-legal relationship while at the same time eliminating distance, and formal meetings can be transferred to an accurate simulation of the office, in which all colleagues will participate in the prescribed dress code. (Michalko, 2022) Thus, Metaverse will bring the potential for real-time experiences and connection to a hybrid or remote workforce. (Patel, 2022) According to experts, Metaverse has the potential for radical innovations in education, laboratory simulations (e.g., safety training) development of procedural skills necessary for the medical field or other education. (Mystakidis, 2022)

In addition, the company Meta Platforms is also working on artificial intelligence research that will allow people to communicate more naturally using voice assistants or naturally translate between different languages. (Michalko, 2022) This form can also influence internal communication and define its future direction.

Of course, the most significant disadvantages of this new platform are the cost. Businesses will have to invest significant funds in sophisticated software and hardware. Legal regulation that protects the privacy and information of interested parties is also essential. Such legislation is currently absent. (Patel, 2022)

4 The bottom wave phenomenon and its shift into the company's internal communication

The rise of social networks enabled the interactive exchange of information and permanently changed the business environment. Social networks have brought new possibilities to the internal company environment, such as expanding the communication mix with a new platform. In some cases, they also serve as a sales channel characterized by constant interaction with the audience. Employers agree that social networks belong to the workplace, offering employees various internal communication platforms, corporate social networks that are accessible only to internal users. Thus, users share diverse content in an enterprise environment, collaborate, communicate, share, give feedback, ask questions and make recommendations. (Pavithra and Deepak, 2021) With the correct setting of the internal communication strategy, companies can benefit in various ways from using internal social networks. Among the benefits, we include an increase in work productivity, an increase in the motivation and engagement of employees. (Benner and Tushman, 2003)

Organizations must analyse, monitor, and evaluate internal social network data to understand their employees better. Employees are becoming content creators for the organization as well as brand ambassadors, as a result of which the boundary between internal and external communication is constantly shifting. Studies show that when employees are encouraged to share their personal opinions, expertise and knowledge through social networks, they become more engaged. (Ewin et al., 2019)

The development of communication through social networks requires the modification of conventional approaches, including in the field of internal communication, affected by the significant onset of the bottom wave phenomenon. Succeeding in the bottom line means listening to your own customers, employees in your company, and people from other companies who comment on the topic. (Li and Bernoff, 2010) The bottom wave phenomenon deeply affects the internal corporate environment, as employees obtain information about their employer from various platforms based on social networks. When researching the phenomenon of the bottom wave in the company's internal communication, it is necessary to mention that the bottom wave is associated with informal communication using unofficial communication channels. Informal communication creates the basis for the growing social phenomenon of the bottom wave. (Švec et al., 2021)

5 Methods

The contribution is processed on the basis of a detailed analysis of secondary sources, while the aspect of relevance and topicality was followed. Domestic and foreign resources were used, such as scientific monographs, specialist periodicals related to the topic and scientific contributions from journals and conference proceedings. The paper used the inductive-deductive method, analysis, and synthesis.

6 Results and Discussion

We can state that labour-legal relations from the point of view of communication are subject to inherent changes. The pandemic contributed to changes in internal communication, as it was an inevitable step. The pandemic supported the implementation of several changes. Work-life-balance is a global trend in the field of maintaining the workforce. We consider this trend to be one of the key ones, as it has set a new approach to working life. Also based on this trend, changes took place in internal communication.

An integral part are trends that are increasingly used in company communication towards employees. The use of new technologies is a never-ending process that is inevitable. In our opinion, innovations in the field of communication are moving forward very quickly and the question is how companies will be ready to implement them. The financial and time aspects of implementation will be crucial for companies.

Companies must not forget the natural development of internal communication. Organizations must analyse, monitor, and evaluate internal social network data to understand their employees better. It is necessary to analyse social networks and monitor the interests of employees from the point of view of the means of communication used. We consider this an important step

The role of internal communication is to positively influence the company's activities, and thus it has to be part of the company's strategic planning, which is linked to the goals. Internal communication has potential for company performance associated with its application to management processes. It is essential that there is a constant examination of internal communication and an understanding of the required formats and options from the perspective of employees. If the company wants to progress, it is important that it has primarily functioning internal communication. Communication is subject to constant dynamics. Constant innovations and new trends bring improvement for companies. We assume that the constant influx of new trends will be crucial for companies, and it will be necessary to introduce these innovations into the company's operations.

Acknowledgements

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The impact of the global COVID-19 pandemic on the teaching of the university students at selected university

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Abstract

Research background: The COVID-19 pandemic has had an impact on the entire contemporary globalized world. One of the areas most affected by the pandemic was education at all levels. The rapid transition to online teaching and self-study was a big challenge for students and their teachers. The COVID-19 pandemic has affected education around the world.

Purpose of the article: The aim of this paper is to evaluate the impact of the global COVID-19 pandemic on the teaching of university students at selected university in the Czech Republic.

Methods: Primary data were obtained by quantitative research using a questionnaire survey (n = 306) in 2020 amongst full time bachelor and master degree students at selected university in the Czech Republic. The research was focused on the impact of the COVID-19 pandemic on the teaching of university students. In the analytical part of article was used testing of statistical hypotheses.

Findings & Value added: Teaching at the university level has been moved to online mode. Distance learning has fully replaced face-to-face learning. This method of teaching brought with it pros and cons. For more than 60% of respondents, the possibility of collaborating with other students in subjects in the online mode was worse than with the normal teaching style. Only 30% of the respondents felt as part of the study group as with the regular teaching style. Interest in studies, subjects and their content was the same for 45% of respondents. The transition to online learning during the global pandemic crisis brought with it challenges and obstacles for both students and educators.

Keywords: *globalized world; impact; online teaching; student; teaching; university*

JEL Classification: *E22; F65; G1*

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1 Introduction

The Covid-19 pandemic has undoubtedly affected the entire globalized world. The crisis has affected all areas of life, including education at all levels. Higher education, where teaching has its own specificities, was no exception (Ashour, El-Rafae and Zaitoun, 2021; Daniels, Geodan and Parker, 2021). The crisis brought with it new challenges and new possibilities in teaching. At the time of the most severe crisis, it was necessary to close the faculties and switch from face-to-face teaching to online teaching (Daumiller et al., 2021). In the spring of 2020, educational institutions began to gradually close throughout the globalized world. At all levels of education, there has been a shift towards a distance learning style (Abumalloh et al., 2021).

The Czech Republic was no exception. For the first time ever, education was transferred to an online environment on such a scale. Online learning environment is completely different from regular classroom learning. Changes occur in all areas, including student and teacher motivation, satisfaction, but also the interaction between student and teacher and students together (Gopal, Singh and Aggarwal, 2021; Selvaral et al., 2021; Muthuprasad et al., 2020).

As stated by many authors (Habib et al., 2021; Yunusa and Umar, 2021; Su and Chan, 2020), in the last two years, the most technological platforms for teaching support have been adopted at the level of higher education. These tools are considered indispensable and very important during the pandemic - they provide many functions - administration, organization of lessons, classification, testing, communication with students (Turnbull, Chugh and Luck, 2019). As they stayed (Agyeiwaah et al., 2022) *"Nonetheless, questions about the specific online attributes such as ease of use, attractiveness, practicality, and efficiency that have a significant impact on their learning satisfaction have received limited academic inquiry"*, this is confirmed by many other authors (Wang, Liu, & Su, 2021; Dhawan, 2020).

The aim of this paper is based on primary research conducted at selected university in the Czech Republic to evaluate impact of the global COVID-19 pandemic on the teaching of university students. This article contributes to the theoretical, practical and methodological understanding of university students' satisfaction with online teaching methods, which have become an irreplaceable tool in education in times of crisis.

The theoretical framework is presented in the Introduction. The Methods chapter deals with the method of performing the primary research and the description of the surveyed sample of respondents in terms of basic sociodemographic characteristics. The Results and Discussion chapter presents the results of the survey and includes a discussion and a comparison of the outcomes of our research with similar surveys in terms of the investigated issues. The most important findings are shown in the Conclusion chapter.

2 Methods

The theoretical framework of this article has been elaborated through the method of document research using scientific articles, books and data from internet. Primary data were collected using a questionnaire survey. The questionnaire survey was realized on-line in 2020. The respondents were full-time students at selected university in the Czech Republic. In total, 306 (n = 306) respondents took part in the primary research.

Basic sociodemographic factors of the reference group of respondents were as follows in the Table 1:

Table 1. Sociodemographic factors of respondents, in %

Gender	Female	70.59
	Male	29.41
Level of study	Bachelor's degree (BD)	55.88
	Master's degree (MD)	44.12

Source: own research (2020)

2.1 Statistical Tools for Analysis

The contingency table is used it for transparent visualization of mutual relations of two statistical variables. The type of the contingency table is given by the number of rows r and the number of columns s, it means r × s (Hendl, 2009). Obviously, χ^2 is a measure of the overall dissimilarity of n_{ij} and m_{ij}. The greater the difference between the observed and the expected values, the higher the test statistic χ^2.

$$m_{ij} = \frac{n_i . n_j}{n} \tag{1}$$

$$\chi^2 = \sum_{i=1}^{r} \sum_{j=1}^{s} \left(n_{ij} - m_{ij} \right)^2 / m_{ij} \tag{2}$$

i and j are indices of rows and columns, nij are observed frequencies, ni and nj are marginal totals, n is grand total of observations, mij are expected frequencies. We compare χ^2 to the critical value χ^2 with a chi-square distribution of (r-1) (s-1) degrees of freedom at the chosen level of significance (α = 5%). We reject the hypothesis if χ^2 is larger than the table value. This test is valid asymptotically and, thus, can only be applied if there are enough observations. All expected values ought to be higher than one [9]; at the same time, the table should not contain more than 20% of theoretical incidence rates (frequencies) of less than 5. Where zero values occur in any of the fields, we proceed to analyse a derived table, created by merging a small number of categories (Hindls, 2007). Cramer's V was used to determine the degree of association between the variables. Additionally, the method of adjusted residuals was applied. The calculation of adjusted residuals indicated precisely the location of the dependency. The results of adjusted residuals are included in the tables for zero hypotheses. The principle of adjusted residuals is based on comparing the values in the cells of the contingency table with the critical value of 2 (or 1.96). The comparison was performed and, considering that wherever the value in a cell equals or exceeds 2 (-2) a statistically significant difference exists, the dependency was confirmed. This method was enhanced by the sign scheme. Information on where the assumption of independence of both the compared characteristics was violated could be obtained through this method.

The data analysis was focused on the following tested hypotheses.

H01: The motivation to successfully complete a course in online teaching does not depend on the gender of the respondent.

H02: The motivation to successfully complete a course in online teaching does not depend on the level of study of the respondent.

3 Results and Discussion

In this chapter, the results of the primary research in the field of online teaching are presented, including comments. The next part is discussion, where the comparison of the

final results of the own research with similar studies in the context of the issue is carried out.

First, it was determined whether students are generally satisfied with the various aspects of online teaching that have been used at the university. Of the total number of respondents, 71.57% (219) are satisfied with online teaching and 28.43% (87) are not.

Table 3 shows the opinion in opportunity to collaborate with other students in subject. The possibility of cooperation with other students in a study group is crucial in some subjects. In this case, it can be seen from the results that this option was limited during online teaching - which was stated by more than 61% of respondents. Almost 30% of respondents said that this opportunity is the same for them, and less than 10% of respondents consider the opportunity for cooperation to be better.

Table 3. Opportunity to collaborate with other students in subjects, in %

Gender/ response	Same as face-to-face study	Better / bigger than face-to-face study	Worse / less than face-to-face study	Absolute frequencies	Relative frequencies
Female	19.61 %	6.54 %	44.44 %	216	70.59 %
Male	9.48 %	2.94 %	16.99 %	90	29.41 %
Total	29.08 %	9.48 %	61.44 %	306	100 %

Source: own research (2020)

Table 4 shows the interests of students in the content of taught subject. In terms of interest in the studied subject, more than 45% of respondents indicated the same interest in the content of the studied subject as in the classical style of teaching. Almost 17% of respondents even stated that their interest was higher and less than 38% of respondents characterized their interest in the content of the studied subject as worse during online teaching.

Table 4. Interest in the content of taught subjects, in %

Gender/ response	Same as face-to-face study	Better / bigger than face-to-face study	Worse / less than face-to-face study	Absolute frequencies	Relative frequencies
Female	33.66 %	12.09 %	24.84 %	216	70.59 %
Male	12.09 %	4.58 %	12.75 %	90	29.41 %
Total	45.75 %	16.67 %	37.58 %	306	100 %

Source: own research (2020)

Table 5 shows the feeling that I am part of a class / circle that I belong somewhere. The students' feeling that they are part of the study group has worsened for more than 63% of respondents. Almost 40% of respondents consider this feeling at the same level. And less than 7% of respondents spoke in favour of improvement.

Table 5. My feeling that I am part of a class / circle that I belong somewhere, in %

Gender/ response	Same as face-to-face study	Better / bigger than face-to-face study	Worse / less than face-to-face study	Absolute frequencies	Relative frequencies
Female	22.55 %	3.92 %	44.12 %	216	70.59 %
Male	7.84 %	2.61 %	18.59 %	90	29.41 %
Total	30.39 %	6.54 %	63.07 %	306	100 %

Source: own research (2020)

An essential issue of online teaching is also the motivation to study and complete the subject with successful completion. In this case, 37.1% of the respondents stated that it is not a problem for them to stay motivated to successfully complete the course during online teaching, as in the case of regular teaching. However, 36.8% of respondents stated that it is a big problem for them compared to contact teaching. On the contrary, 26.1% of respondents state that motivation to successfully complete the subject is less of a problem for them than with the usual teaching method.

Table 6 contains the results of the tested null hypotheses.

Table 6. The structure of the hypothesis calculation – motivation of students

Hypothesis No.	Wording of the zero hypothesis	χ^2	Critical value	H0 can be rejected	Cramer's V
$H0_1$	The motivation to successfully complete a course in online teaching does not depend on the gender of the respondent.	9.70	5.99	X	0.06
$H0_2$	The motivation to successfully complete a course in online teaching does not depend on the level of study of the respondent.	5.53	5.99	-	-

Source: own research (2020)

$H0_1$ - The value of the χ^2 statistic is higher than the critical value at the 0.05 significance level. The null hypothesis can be rejected. Thus, the dependence between whether the motivation to successfully complete a course in online teaching and the gender of the respondents is proved. The value of Cramer's V is at the level of 0.06, and it is, therefore, a very weak dependence. $H0_2$ – The value of the χ^2 statistic is lower than the critical value at the 0.05 significance level. The null hypothesis cannot be rejected. Dependence was not demonstrated in the case of the variable (level of study).

Student satisfaction is defined as students' ability to compare the desired benefit with the observed effect of a particular product or service (Budur, Faraj and Kamir, 2019). In particular, the quality of the e-learning system contributes significantly to student satisfaction, which includes attributes such as usefulness, informativeness, good visual appeal and easy navigation on the educational platform (Perifanou, Economides and Tzafilkou, 2021; Pham et al., 2019). In terms of motivation for successfully completing the course, more than 37% of respondents indicated a problem in this area. Similar results were also encountered by the authors (Vielma and Brey, 2021), who add that the self-motivation to successfully complete the subject can be impaired by, for example, lack of concentration, lack of time to watch online lectures, and also the lack of an academic environment that requires their attention. More than 60% of respondents cited the opportunity to collaborate with other students as worse compared to classic face-to-face teaching. Likewise, almost 64% of respondents said that they did not feel that they belonged to their study group. Both aspects were undoubtedly caused by the loss of personal academic interactions – both between students and between students and teachers (Hill and Fitzgerald, 2020; Vielma and Brey, 2021).

4 Conclusion

The COVID-19 pandemic has had an impact on the entire contemporary globalized world. One of the areas most affected by the pandemic was education at all levels. The presented article dealt with the evaluation of the impact of the COVID-19 pandemic on the teaching of students at a selected university.

Overall student satisfaction with online teaching is at a very good level. The area of cooperation between students has worsened for more than 60% of them. Interest in the stage of the given subject and its content remained the same for almost 50% of the students as in classical teaching. The impact of online teaching on the feeling that the student is part of the study group was critical - here almost 70% of respondents reported a deterioration compared to face-to-face teaching. The results show that the rapid transition to online teaching was a challenge not only for teachers, but also for the students themselves.

The research was performed at the selected universities in the Czech Republic only, which may be considered as a limitation. Another direction of research could be to compare teaching in the post-covid era - i.e. to return to the classic teaching model.

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Consumer Behaviour in the Meat Market within the V4 Countries: Social Consequences for the Length and Quality of Life

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Abstract

Research background: The current pandemic era with global overlaps creates a room for market segmentation. Lifestyle monitoring is based on a combination of activities, interests, and opinions (AIO) with respect for social consequences in order to increase the quality of life.
Purpose of the article: The aim of the paper is to analyse, compare, and predict the consumer behaviour in the meat market in the V4 countries and outline the possible social consequences of this consumer demand on the quality of life.
Methods: The paper will use data from the FAO database on meat consumption and life expectancy, as well as the results of a survey conducted in the Slovak Republic. The time span of the research is from 1961 to 2030. The obtained data will be processed by methods of quantitative and qualitative statistics.
Findings & Value added: The ambition of the paper was to provide a multidimensional view of consumer behaviour in the consumption of meat, as statistically proven results in this area encourage a change of lifestyle in order to achieve a higher quality of life.

Keywords: *market segmentation; meat consumption; life expectancy*

JEL Classification: *M31; E71; I10*

1 Introduction

To achieve overall health, everyone needs a healthy diet, regular physical activity and a healthy body weight. In the recent years, there has been a dramatic increase in overweight

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and obesity levels in the EU population, especially in the children. In the long run, this trend will have a negative impact on life expectancy in the EU and a reduced quality of life for many people (MPSR.sk, 2008). Small changes in eating habits and regular physical activity can have a major impact on quality of life, and also lower health care costs (Europa.eu, 2020). Food provides us with energy, protein, vital nutrients, happiness, and joy. On the other hand, if chosen incorrectly, processed food can cause disease, death, misery and despair in people (Jespersen, & Huffman, 2014). This contrast can also be influenced by climatic and natural conditions, the administrative division of the country, denominational contexts, migratory flows and historical events, ie factors that also call for the formation of the culture of the population (Urbanová and Michalík, 2018). In both theoretical and practical terms, there is a relationship between food and consumers. The role of consumer behaviour is also to find a link between people representing a certain lifestyle and consumption pattern (Chreneková and Dubcová, 2017). Properties, health, appearance and quality of food play an important role in the decision-making process and the purchase of the product itself, which can be considered a decisive criterion shaping the quality experience, satisfaction or dissatisfaction of the consumer and his future purchase (Banović et al., 2009).

Meat and meat products are an integral part human diet (Henchion, et al., 2014). Given some concerns about the negative effects of meat on the health of consumers, new functional meat products must be tasty with better nutritional value. The main reason for the reluctance of European consumers to accept functional food products is the dilemma between health-promoting values and their natural taste (Grunert, 2010). One of the most important factors that consumers perceive is meat quality, taste and overall satisfaction (Verbeke et al., 2010). These factors were added by other authors to their flavour, juiciness, freshness, leanness, healthiness and nutritional value, and brands or labels referring to process characteristics or quality control (Banović et al., 2009). The current level of meat consumption affects the environment and health, and it is emphasized the need to reduce meat consumption and increase interest in a plant-based alternative to protein (Stubbs et al., 2018).

A certain lifestyle represents the way a person lives, and it is helpful in predicting shopping and consumer behaviour. It is an expression of a person's individuality, a specific demonstration of an individual or a social group. Connecting the concept to sociology, it is connected with the terms way of life and standards of living, while these terms, by their nature, fit into the context of the life quality definition (Chreneková, & Dubcová, 2017). Researchers have examined and published exploratory studies looking for a relationship between lifestyle entrepreneurship and the quality of life. This relationship, complemented by the attributes of need, consumption, and food safety, is often perceived in a multidisciplinary way and is linked to global megatrends. Megatrends will lead to meaningful long-term changes that will affect economic, political, environmental, technological, but also social issues. They present new and often invisible challenges, threats and opportunities, the impact of which may vary between the economy as a whole and individual sectors. Key facts and forecasts include food production and waste minimization, which have a number of consequences for sustainability (Marcketti, et al. 2006). The shift in consumer behaviour, the growing need for exclusivity and individualism, more experienced, more critical, and more sophisticated travellers who care about quality of life are also attributes that influence the direction of not only the country's economic development (Beresecká et al., 2018).

2 Methods

The work contains secondary and primary data obtained by the method of a questionnaire survey. The collection was carried out in the time horizon from January to June 2017. A total of 931 respondents participated in the survey. For the purposes of processing the contribution, questions concerning consumer behaviour on the market in meat and meat products are purposefully specified: Do you consume meat and meat products? How often do you eat different types of meat - poultry, beef, pork and game? Part of the methodology was the formulation of hypothesis H: Is there a direct relationship between meat consumption and life expectancy? The search for answers and processing of the obtained data was based on the basic approaches used in the statistical analysis of time series, which serve to explain the development of the investigated quantity, but also to a qualified prediction of the estimate of its value in the following periods.

The meat consumption data used (beef, game, pork and poultry) were obtained from the FAO website (FAO.org, 2020). In the case of research in Hungary and Poland, data for the years 1961-2013 and the Slovak Republic and the Czech Republic for the years 1993-2013 will be processed. Due to the longer time series in the case of Hungary and Poland, it was possible to statistically express the prediction of the development of consumption of individual types of meat until 2030. Due to the division of the federal state Czechoslovakia, it was possible to lay out predictions in these countries only until 2020. The method of regression and correlation analysis was used to identify and mathematically describe the statistical dependence between quantitative statistical features. In the case of assuming that between the dependent variable Y and the explanatory (independent) variables Xi i = 1, 2, ... k the dependence is described by the equation:

$$Y = f(X_1, X_2 \dots X_k, \beta_0, \beta_1 \dots \beta_k) + \varepsilon \qquad (1)$$

which the authors estimate:

$$yj' = f(x_{1j}, x_{2j} \dots x_{kj}, b_0, b_1, b_k) \qquad (2)$$

The null hypotheses tested relate to the significance of the locating constant (Intercept) and regression coefficients (b1, b2, b3, b4), with the null hypothesis asserting the insignificance of the relevant coefficient, and the alternative hypothesis asserting its significance. If the P-value is> 0.05, the coefficient is statistically insignificant, if the P-value is <0.05, the coefficient is statistically significant (Beresecká and Svetlíková. 2020).

3 Results

The Slovak Republic is a landlocked country in Central Europe. The total area of the country is 49,035 km2, water areas occupy 931 km2 (i.e. 1.9%) (Europa.eu, 2020b) with human development index 0.857 (UNDP.org, 2020). The average life expectancy is 77.4 years (2018) (Europa.eu, 2020a). Agriculture in this country is of declining importance. In animal production, the number of livestock is gradually decreasing. The most significant decline is in pigs and cattle. Sheep farming is consistently low. The most numerous are poultry conditions. The Czech Republic has the total area of the state is 78,868 km2, water areas occupy 2.0% (Europa.eu,2020b) with human development index of 0.891 (UNDP.org, 2020). The average life expectancy is 79.2 years (Europa.eu, 2020a). The country is known for its old tradition of industrial production and its developed agriculture. The basis of animal production is the breeding of cows, pigs, poultry, and beekeeping. The Republic of Hungary occupies an area of 93,011 km2, water areas represent 0.74% (Europa.eu, 2020b) with human development index of 0.845 (UNDP.org, 2020). The average life expectancy is 76.7 years (2018) (Europa.eu, 2020a). Agriculture has suitable

conditions mainly due to favourable climatic conditions and quality soil, which occupies about 60% of the country's surface. Both animal and crop production is widespread. Livestock production is dominated by pigs, cattle, horses, sheep, and poultry. The Republic of Poland has an area of 312,679 km2, water accounts for 3.07% (Europa.eu, 2020b) with human development index of 0.872 (UNDP.org, 2020). The average life expectancy is 78.5 years (2018) (Europa.eu, 2020a). Poland is an important agricultural country based on a very strong agrarian tradition. It is the largest producer of poultry meat in the EU in terms of meat production (MZV.sk, 2020).

This section of the paper informs and compares the development of meat consumption in the V4 countries based on data from OECD (2021). In Slovakia, between the years 2013-1993, there was a decrease in consumption of beef by 69.49%, game 8.99% and pork by 32.02%. Poultry consumption increased by 120.55%. In the Czech Republic, in 2013-1993, there was a decrease in consumption of beef by 60.51% and pork by 29.41%. Consumption of poultry increased by 57.90% and game by 29.30%. The results show that in Hungary, compared to 1961, beef consumption fell by 8.66% compared to 1961. Consumption of game in the observed period decreased by 3.51% and consumption of poultry increased by 133.62% and consumption of pork increased by 21.90%. In 2013-1993, there was a further decrease in beef consumption by 72.35% and also a decrease in pork by 38.84%. On the contrary, game consumption increased by 14.55% and poultry consumption by 8.29% in the observed period. In Poland, between 1993 and 1961, consumption of game meat decreased by 66.15% and consumption of beef increased by 39.78%, pork by 47.21% and poultry by 463.25%. In 2013-1993, a decrease in consumption of beef by 82.15%, game in 36.36% and pork by 8.33% was recorded. An increase in consumption of 193.16% was recorded only for poultry meat.

The results of the questionnaire survey indicate that out of all, 785 respondents (84.32%) consume meat, 112 respondents (12.03%) consume meat only occasionally, and 34 (3.65%) do not consume meat at all. Furthermore, the results of the survey show that respondents consume poultry the most. This frequency was also reflected in the average consumption of poultry meat of all respondents (Figure 1). Pork is consumed by respondents on average once a week, and beef is consumed by respondents on average once a month. These types of meat have a significantly higher price than others, which is likely reflected in the infrequent consumption, despite the health-promoting substances that these types of meat contain. Likewise, respondents rarely consume game.

	Every day	Multiple times a week	Once a week	Once a month	Rarely	I do not consume at all
■ Game	0%	2%	4%	10%	53%	31%
■ Poultry	6%	61%	26%	3%	3%	1%
■ Pork	1%	24%	39%	18%	11%	6%
■ Beef	0%	5%	24%	30%	30%	11%
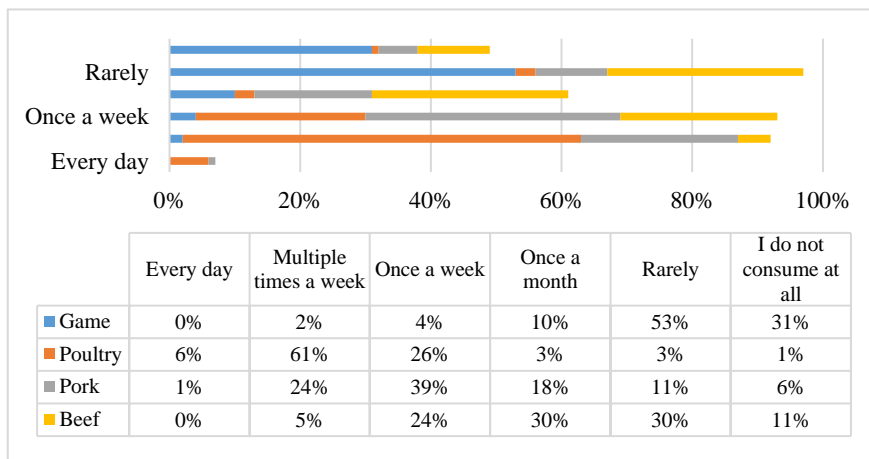
Figure 1. Frequency of meat consumption in the SR

Source: own processing (2020)

Based on the results of primary research in the Slovak Republic, the authors examined the consumption of individual types of meat in the V4 countries from 1961 to 2013 based on the FAO database, and through prediction since 2014. The results are shown in the following Figure 2. In the predicted period of years 2014-2020 in Slovakia and the Czech Republic, it is possible to expect a decrease in beef consumption in Slovakia by 113% in the Czech Republic by 45.66%, and also a decrease in pork consumption in Slovakia by 15.57% and in the Czech Republic by 4.13%. On the other hand, poultry consumption in Slovakia is expected to increase by 18.39% and in the Czech Republic by 11.11%, and game in Slovakia by 17.62% and by 9.99% in the Czech Republic.
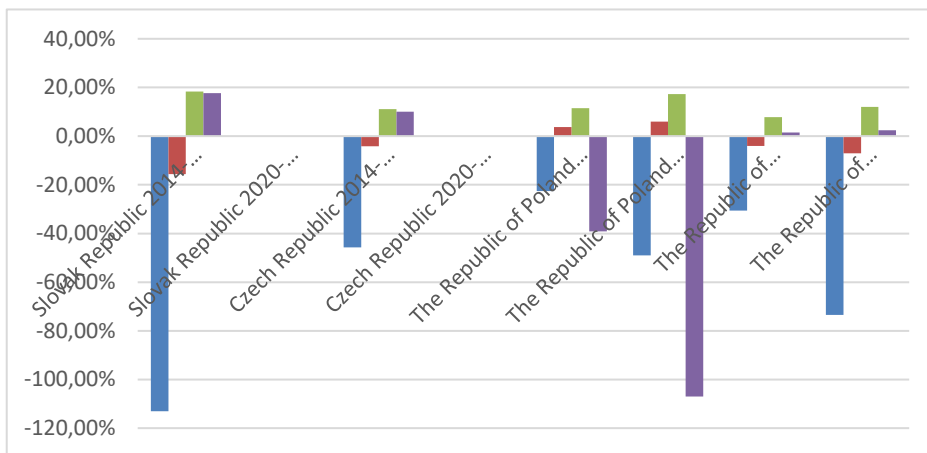
Figure 2. Prediction of meat consumption in V4 countries

Source: FAO database (FAO.org, 2020), own processing

According to the data, Poland and Hungary show a longer time development, it was possible to statistically express a prediction for a longer period of time - until 2030. In Poland, a reduction in beef consumption by 22.61% in 2014-2020 can be expected and game by 39.08%, and an increase in consumption of pork by 3.67% and poultry by 11.51%. In Hungary in 2014-2020, it is assumed that there will be a decrease in consumption of beef by 30.6% and pork by 4.04%, and an increase in consumption of poultry by 7.74% and game by 1.5%. In the years 2020-2030, a further reduction in the consumption of beef is expected by 49% and game by up to 107%, and an increase in the consumption of pork by 6% and poultry by 17.25%. In Hungary, a further decrease in consumption of beef by 73.5%, pork by 7.02%, and an increase in poultry by 11.97% and game by 2.47% can be expected.

Knowledge of the independent development and consumption of uniform types of meat in a regional sense is important in connection with consumer behaviour and with lifestyle, but the weight of importance must be linked to an indicator that is important for citizens. The present time points to the need for quality in a broader sense, not excluding the quality of life. The quality of life can also be expressed by the achieved average life expectancy, the results of which are shown in Figure 3.

	Slovak Republic	Czech Republic	Poland 2020	Poland 2030	Hungary 2020	Hungary 2030
Average life expentancy	77,27	80,12	76,73	78,21	73,85	74,87
Percentage change	0,0158	0,0209	0,0117	0,02	0,008	0,0138
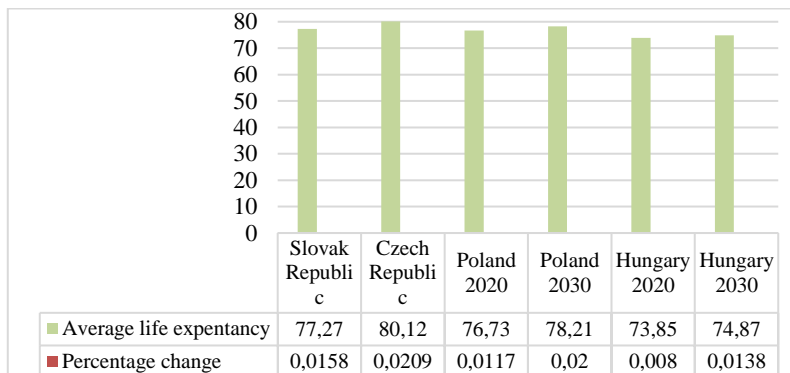
Figure 3. Comparison of development and changes in life expectancy in V4 countries

Source: own processing (2020)

In 2020, an increase in life expectancy is expected compared to 2014 in all compared V4 countries, but in a different manner in each one. In Slovakia, life expectancy should increase by 1.2 years (1.59%) to a life expectancy of 77.27, in the Czech Republic by 1.64 years (2.09%) to a life expectancy of 80.21, in Poland by 0.88 years (1.17%) to the level of 76.73 life expectancy and in Hungary by 0.61 years (0.84%) to the level of 73.85 life expectancy. In 2020-2030, a further increase in life expectancy in Poland is expected to rise by 1.47 years (2%) to a life expectancy of 78.21, and in Hungary by 1 year (1.39%) to a life expectancy of 74.88.

Based on the acquired extended knowledge, the authors sought an answer to the question asked: Is there a direct relationship between meat consumption and life expectancy? The authors of the paper have obtained a measurable answer by calculating the dependence, the results of which are shown in the following Table 1.

Table 1. Dependence of meat consumption with the development of life expectancy

Indicator	Slovakia	Czech Republic	Hungary	Poland
Multiple R	0.977168	0.9662969	0.9456096	0.985977
R Squared	0.954857	0.9337297	0.8941776	0.972151
Significance F	4.039E-2	3.1508E-1	5.981E-3	9.323E-5
Intercept	77.41682	83.973184	77.096824	69.97525
beef	-0.25076	-0.700954	-0.18929	-0.01976
pork	-0.05199	0.3761314	-0.008685	0.077349
poultry	-0.03026	-0.218404	0.0631573	0.307372
game	0.794355	1.1017188	1.1764757	1.099024

Source: own processing (2020)

Value Multiple R (multiple correlation coefficient): the closer the value is to 1, the stronger the dependence. In our example, there is a high degree of dependence of the relationship between average life expectancy and consumption of individual species of meat in all compared V4 countries. The value of R Square is the value of the coefficient of determination, which after multiplication by 100 (%) indicates, that the chosen regression function explains the variability in meat consumption to about that percentage; the rest represents unexplained variability, the influence of random factors, and other non-specific influences. In the ANOVA part, the null hypothesis is tested, which states that the chosen

model to explain the dependence (linear model) is not suitable, the alternative hypothesis states the opposite. An F test was used to evaluate this assertion.

Significance value F in SR = 4,039.10-15 <0.05. The authors reject H0, which means that the model was chosen correctly. The linear model was suitable for all V4 countries based on the significance value F.

The regression function of Slovakia: $y' = 77.41 - 0.25x_1 - 0.05x_2 - 0.03x_3 + 0.79x_4$

The regression function of Czechia: $y' = 79.94 - 0.98 x_1 + 0.26 x_2 - 0.38 x_3 + 0.62 x_4$

The regression function of Hungary: $y' = 75.14 - 0.26x_1 - 0.03x_2 + 0.01x_3 + 0.5x_4$

The regression function of Poland: $y' = 68.25 - 0.06x_1 + 0.04x_2 + 0.26x_3 - 0.74x_4$

The locating constant is statistically insignificant. This means that with zero consumption of individual types of meat, the authors of the article cannot expect an increase in average life expectancy. The P-value for the regression coefficient b1 (beef consumption in kg/person/year) is 7.55.10-5 <0.05 in Slovakia, which confirms the significance of this coefficient. Its real value is -0.25, which means that with an increase in beef consumption by 1 kg, a decrease in average life expectancy by 0.25 years is expected. In each of the V4 countries, the acquisition P-value is less than 0.05, which confirms the significance of this coefficient, the real values are also negative. In the Czech Republic, its value is -0.7, which means that with an increase in beef consumption by 1 kg, a decrease in average life expectancy by 0.7 years is expected, in Hungary a decrease in average life expectancy by 0.18 years is expected, and in Poland about a decrease by 0.01 year. The P-value for the regression coefficient b2 (game consumption in kg/person/year) in Slovakia is 7.02.10-6 <0.05, which confirms the significance of this coefficient. Its real value is 0.79, which means that with an increase in consumption of game by 1 kg, an increase in average life expectancy by 0.79 years is expected. In each of the V4 countries, the P-value is less than 0.05, which confirms the significance of this coefficient, but the real values are positive. In the Czech Republic, its value is 1, which means that with an increase in beef consumption by 1 kg, it is possible to expect an increase in average life expectancy by 1.1 years, in Hungary, an increase in average life expectancy by 1.17 years, and in Poland by 1, 09 years. The P-value for the regression coefficient b3 (pork consumption in kg/person /year) is 0.005 <0.05 in

Slovakia, which confirms the significance of this coefficient. Its real value is -0.05, which means that with an increase in pork consumption by 1 kg, it is possible to expect a decrease in the average life expectancy by 0.05 years. In the Czech Republic (0.37) and Poland (0.07), real values acquire positive values, which means that with an increase in consumption of pork by 1 kg, it is possible to expect an increase in the average life expectancy in the Czech Republic by 0.37 years, and in Poland by 0.07 years. Hungary (-0.008) has a negative coefficient of 0.008, which means that with an increase in consumption of pork by 1 kg, a decrease in average life expectancy by 0.008 years is expected. The P-value for the regression coefficient b4 (poultry meat consumption in kg/person/year) is 0.004 <0.05 in Slovakia, which confirms the significance of this coefficient. Its real value is -0.03, which means that with an increase in the consumption of poultry meat by 1 kg, it is possible to expect a decrease in the average life expectancy by 0.03 years. A similar situation is also in the Czech Republic, where the value of the coefficient is negative, namely - 0.21, which means that with an increase in the consumption of poultry meat by 1 kg, it is possible to assume a reduction in average life expectancy by 0.21 years. The situation is the opposite in Hungary (0.06) and Poland (0.3). With an increase in the consumption of poultry meat by 1 kg, the average life expectancy is expected to increase in Hungary by 0.06 years and in Poland by 0.3 years.

The results above presenting a high dependence between the examined indicators can be used in practice. One of the possibilities is to influence the modification of consumer behaviour through changing the view of meat pricing in the studied countries, of the

amount of expenses either related to distribution or promotion policies, which can ultimately have a positive effect on the objective side of quality of life. The objective aspect of quality of life is about fulfilling social and cultural needs depending on material sufficiency, social acceptance of the individual or physical health.

4 Discussion

Food as a concept and as a need is often multidisciplinary researched and published. It is linked to economic indicators that affect food consumption, such as household income and expenditure, developments and the level of consumer prices, etc. In the study Intelligent production management - progressive trends, a strong dependence of the development of the level of food expenditure on household income was statistically proven by regression and correlation analysis. Expenditures on food and non-alcoholic beverages account for the largest share of total expenditures, accounting for 19% (Majerník, et al. 2018). In the study Building food safety into the company culture: a look at Maple Leaf Foods, the authors Jespersen, Huffman focus on food safety and the introduction of sustainable food safety behaviour into the existing corporate culture. Decreased public confidence in the regulation and management of food safety in Europe and beyond and genetically modified foods have been addressed (e.g. Houghton et al., 2008), dioxins (Verbeke, 2001) and acrylamide (Marvin, 2009). Other authors have focused on finding and applying Hazard Analysis and Critical Control Points (HACCP) and Risk Analysis (RA) systems. The HACCP system is a systematic approach to the identification, evaluation and control of those steps in the field of food production that are crucial for product safety and is purposefully used in practice for the purpose of prevention, not control. (Luning, et al., 2002, van Asselt, et al. 2010).

From publicly available publication sources, the authors felt the causality of research, absence of published studies that would be devoted to finding a broader connection with the concept, nature, and possibly, the consequence of inappropriate consumer behaviour in the market of selected foods and meat. It is true that the OECD database offers the most comprehensive source of comparable statistics from different economic sectors in OECD countries. It is an essential tool for performing comparative analyses, but it is also necessary to use appropriate statistical mathematical methods, which are helpful in finding broader contexts and finding the causes of individual phenomena. The OECD has also published statistics on the health status of the population of OECD member countries in 2018. The online database of the publication "OECD Health Statistics 2018" is the most comprehensive source of comparable statistics on health status and health systems across OECD countries. Expenditure on health care increased in 2016 by an average of 3.4%, which is the highest rate since 2009, but still lower compared to the pre-crisis period. Health expenditure in OECD countries averaged 8.9% of GDP in 2016, which should remain unchanged in 2017. The highest health expenditure is in the US - up to 17.2% of GDP and the lowest in Turkey - only 4.2% GDP. In 2017, health care expenditures per capita should average $ 4069. This amount is about 70% higher than the amount that OECD countries allocate to the education of each population.

The knowledge and the results of the work, which have limits due to its scope, resulted in the formulation of conclusions, proposals and recommendations. The authors believe that they form an entity of scientific research that still needs to be further developed in space and time.

5 Conclusion

Based on the summarization and comparison of knowledge, it can be stated that, if the inhabitants of the Slovak Republic want to live up to the highest possible age, they should

prefer the consumption of game and limit or entirely avoid the consumption of pork. Based on the forecast from 2014 to 2020, the Slovak Republic will record a decrease in beef consumption by 113% and in game consumption an increase of 17.62%. The primary research of a representative sample of respondents shows that the Slovak population rarely buys game, but it is statistically proven that the frequency of purchase and consumption of this type of meat is welcome and healthiest in these conditions. In the Czech Republic, the population should consume pork and game, because on the basis of the forecast from 2014-2020, the Czech Republic had a change in game consumption by 9.99%. The people of Hungary should prefer the consumption of game and limit the consumption of pork. Based on the forecast from 2014 to 2020, Hungary had a change in game consumption by 1.5% and in 2020-2030 an increase in game consumption by 2.47%. In Poland, if people want to live up to an old age, they should prefer eating poultry and avoid eating game. Based on the forecast in 2014 to 2020, Poland recorded a change in game consumption, which fell by 39.08%, and in 2020-2030, game fell again by 107%. Suggestions and recommendations that should result in a change in consumer behaviour when eating meat.

In the case of Slovakia, with an increase in beef consumption by 1 kg, the average life expectancy will decrease by 0.25 years. If the consumption of pork increases by 1 kg, then the average life expectancy will decrease by 0.05 years. In the case of an increase in the consumption of poultry meat by 1 kg, the average life expectancy will decrease by 0.03 years and in the case of an increase in the consumption of game by 1 kg, the average life expectancy will increase by almost 1 year (0.79).

Taken into account Czech Republic, if beef consumption is increased by 1 kg, life expectancy will decrease by almost 1 year (0.98). If the consumption of pork increases by 1 kg, then the average life expectancy will increase by 0.26 years. If the consumption of poultry meat increases by 1 kg, then the average life expectancy will decrease by 0.38 years, and for wild game the average life expectancy will increase by 0.62 years.

By increasing the consumption of beef by 1 kg, the average life expectancy will be shortened by 0.26 years, in pork the average life expectancy will decrease by 0.03 years, the life expectancy will be extended by 0.01 year when poultry is consumed and by 0, 56 years of consuming beef in Hungary.

Finally, in the case of Poland, an increase in beef consumption by 1 kg will be reflected in a decrease in average life expectancy by 0.06years. Increased consumption of pork by 1 kg contributes to the extension of the average life expectancy by 0.04 years. Increased consumption of poultry meat by 1 kg, results in an increase in average life expectancy by 0.26 years. Higher consumption of game by 1 kg, contributes to the reduction of the average life expectancy by 0.74 years.

Acknowledgements

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The Role of Video and Social Networks in Marketing Adoption Strategies

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Abstract

Research background: In the past decade, the popularity of social networks has accelerated marketing perceptions. Social networks bring new challenges and opportunities for marketers to reach their customers. One-way advertising communication became two-way; businesses are changing marketing strategies, shifting from advertising messages to building relationships with audiences. It is then up to the company to create such messages for its target audience that must be relevant to satisfy their demands and needs and to choose such marketing channels where they spend most of their time.

Purpose of the article: We need to think about where the target audiences are, what they are reading and what they are doing. Recently, more and more people are using their mobile phones not only as a communication device, but also as a place where they spend their free time. The purpose of this study is to examine how social networks and video marketing can help companies improve marketing adoption strategies, customer engagement, and business performance.

Methods: The study is based on scientific publications, statistics, and other relevant sources dealing with video marketing. For the purposes of the article and to obtain the target information, the data was collected using an online questionnaire survey technique applied to 260 students representing the generation of social networks.

Findings & Value added: The article describes the practical advantages of using video for marketing purposes and ideas for different types of video content, which help companies find an accurate marketing strategy and attract a new and loyal audience.

Keywords: *digital marketing strategy; social media; video marketing; content marketing*

JEL Classification: *M31; M37; L81*

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1 Introduction

As the Internet has changed from a technological communication tool to a channel for customer relations and sales, companies have had to change their marketing strategies for their online presence. For the success and competitiveness of a company, it is crucial that its brand can be discovered in the virtual world. All businesses want to be as visible on the Internet as possible and to reach customers not only through computers but also via mobile phones.

Digital marketing is a wide range of channels that can be used to promote business interests to potential customers. There are many ways to manage digital marketing according to business needs and objectives. Especially in times of crisis and increased competition, companies focus on how to maximize their available marketing budget. The easiest way to reach consumers is by implementing user-centred approach marketing strategies. This strategy, called inbound marketing, focuses on creating a marketing style that people love. This means promoting companies through blogs, podcasts, videos, ebooks, electronic newsletters, white papers, SEO, social media marketing, and other content marketing methods. Inbound marketing means marketing activities that bring visitors in, earning the attention of consumers, making the business easy to be found, and also drawing customers to the website by generating stimulating content (Halligan, 2009).

Social media are one of the main drivers of today's website traffic. They have spread throughout the world and are an integral part of daily life for many people today. We currently live in a digital world and social networks are at the centre of this new reality. According to (Hootsuite and We are social, 2022), more than 4.7 billion people (59% of the world's population), of which 227 million are new users from the last 12 months, use social networks to communicate with others, share information, run, and manage a business, follow various brands and celebrities, capture what they do or how they feel. The average daily time spent using social networks is 2h 29m.

Therefore, this is a natural evolution of digitization of marketing efforts. For companies and brands, social media is becoming an integral part of their marketing activities and brand building and, as such, must be embedded in the development of any business or marketing strategy (Atherton, 2019; Li et al., 2021).

The purpose of this article is to present the main directions of modern digital marketing in the creation of digital content, when one of the most important factors is the understanding of customer behaviour and their preferences for spending their free time in the online environment.

For the competitiveness of companies in the age of globalization, it is very important that they create messages for their target group of customers that are relevant to satisfy their requirements and needs and that the company chooses marketing channels where their prospective customers spend most of their time.

2 Theoretical background

Getting found online by the right person, at the right time, is the key concept of a successful inbound marketing strategy (Halligan, 2009). The content needs to be useful, focused, clear, and compelling to the target audience. Whichever type of content you choose to create doesn't matter, what matters is that it is beneficial and meaningful. (Jefferson & Tanton, 2013). Content plays a major role in pulling people from one stage of the purchase funnel to another. This purchase funnel is defined as a series of contact points of various marketing channels and media through which customers go before, during, and after the purchase (Fishkin & Høgenhaven, 2013; Kranzbuhler et al., 2018; Lemon and Verhoef, 2016). Generating quality content requires observing the customer and their behaviours to be able

to meet their needs, because high-quality content is what creates value for customers, rather than merely promoting the company's products (Järvinen & Taiminen 2016). Therefore, the emphasis on creating quality content is crucial and creates another way to gain customers. Most consumer brands have social media profiles, and advertisers and marketers want to integrate social media into their digital strategies (Voorveld, 2019; Muninger et al., 2019).

There are many types of content that can be used by companies for their content marketing. The types of promotions are different depending on the products or services offered and the target customer. Digital content marketing consists of two broad activities, customer acquisition and customer optimization. Both are of fundamental importance to the bottom line of a company. Customer acquisition refers to activities that generate traffic – attract visitors to online properties; customer optimization means activities that improves user experience and converts more visitors into customers. The creation of purpose-oriented content is one of the most important parts of inbound marketing. The most prominent elements of digital inbound marketing are interactivity and engagement (Opreana & Vinerean, 2015).

The content marketing creation process starts with the attract stage of the purchase funnel. The goal of this phase is to attract the right people with valuable content that engages or creates a trusted advisor to solve their problem. Blogging, publishing content on social media and a well-optimized website make sure that the possible customer ends up finding your product or service (Fishkin & Høgenhaven, 2013; Lopes & Casais, 2022).

Marketers have several branding options in the social media landscape, including placing paid display advertising, participating in social media as a brand personality, developing customer engagement opportunities on social media, and publishing branded content (Ashley, 2015). Businesses can use social media marketing as an integral part of their marketing communications campaigns. Different platforms require contextualized contents since customer profiles are different on different platforms and the same content will not be efficient in different content communities (Lopes & Casais, 2022). The quality of content marketing on social media can be checked by an indicator of the engagement they feel with a company or brand – how people share their content and how they interact with it (Balio & Casais, 2021).

The role of format content, e.g. image, video, etc. can generate a different impact on user engagement behaviour. Video posts encourage users to actively engage with the fan page by sharing their opinions and comments on business posts, while photo content stimulates passive user engagement through likes (Shahbaznezhad & Rashidirad, 2021). Video production, particularly for the B2C context, has proven to be one of the most effective content marketing techniques (Lou et al., 2019).

In today's increasingly competitive market environment, it is very important to gain knowledge about customers, their perception of marketing content, which marketing channels are best to reach them, and what influences their buying attitudes. The objective is to improve marketing strategies, increase customer engagement, and business performance.

3 Research Methodology and Results

The basis of any good marketing strategy and the creation of quality content not only for social networks is to obtain as much information as possible about the target market, available marketing channels, knowledge about customers and their perception of marketing content.

The weakness of regularly published surveys is their limitation to the selection of the target group. These are mostly general surveys, and only sometimes with more detailed data, e.g., according to demographic parameters. For the purposes of this article, we prepared a questionnaire that focused on respondents' behaviour on social networks and

their content preferences. the data was collected using an online questionnaire survey technique applied to 260 students of the University of Pardubice. This target group represents the young generation, which we can also call the network generation. They are the key audience on social networks, which determines the future direction of the development of social networks. They tend to consume content on multiple platforms through multiple devices and are usually highly influenced by their social groups. Consequently, marketers should understand how these people consume information and how to reach them with appropriate marketing messages.

According to current statistical data published by Statista, 2022, there are 5.03 billion Internet users worldwide in 2022, of which 4.7 billion were social media users; mobile devices (excluding tablets) generated 58.99 percent of global website traffic. Smartphones now drive the overall increase in consumers' digital time and mobile is the fastest growing medium within digital marketing (Mulier, 2021).
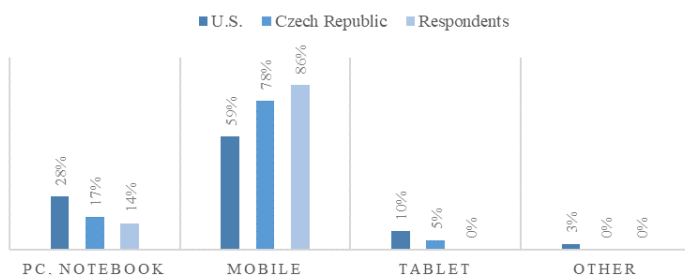
Figure 1. Most used devices

Source: Hubspot (2022); AmiDigital (2022); own research

According to the 2022 Social Media Industry Report (Stelzner, 2022), 85% of marketers indicated that their social media efforts have generated more exposure for their businesses. As the second major benefit of social media, they point out increased traffic. In the same report, marketers declared Instagram and Facebook the best platform for developing loyal fans.

For the preferred social networks comparison, we only bring in data from the Czech Republic, because there are large differences in user preferences in particular countries. For example, the social network Reddit, so popular in the US, or Weibo, the most used social network in China, are almost unknown in the Czech Republic.
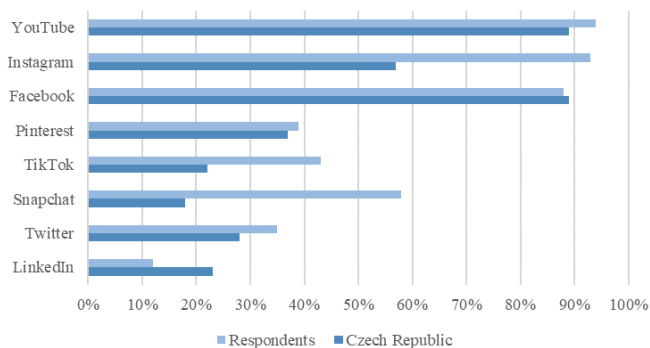
Figure 2. The most used social network in Czech Republic

Source: AmiDigital (2022); own research

YouTube and Facebook are consistently the most popular among social networks. However, the most dynamic Instagram is constantly catching up. TikTok and Snapchat, which influence content trends a lot, can become future stars (AmiDigital, 2022). Their popularity among the youngest and therefore most active users speaks in their favour This trend was also confirmed by our survey, as seen in Figure 2. The popularity of these networks inspires other competing networks. The content and formats used on it essentially affect trends on other networks, which take over the most popular content formats from them, such as the Stories format, which Instagram "stole" from Snapchat a few years ago.

According to a survey by AmiDigital (2022), visual content is the most popular among all user groups. Although posts with photos are the most frequently published content, short videos are growing in popularity. This is reflected in the expansion of formats such as Stories or Reels. Also, (Sedej, 2019) also highlights that video marketing is now one of the biggest opportunities to attract consumers in a real and authentic way because it can engage consumers' emotions and address their needs.

Video marketing is effective because it can quickly deliver more information in a short time and therefore better engage attention than just text or pictures. Video is quickly becoming the preferred tool for most marketers to connect with audiences and reach them. Each business uses video for a completely different goal, from increasing brand awareness, educate customers, and boosting SEO. It can be said that the video format is useful for all commercial objectives pursued by companies. Crestodina, (2018) points out the connection between the use of the video type and the first part of the marketing funnel. Figure 3 shows that people in different stages of awareness search for different places and different types of information and preferred different types of videos. While social media videos tend to attract attention, content-focused videos aim is to educate or explain certain topics and usually have a higher conversion effect.
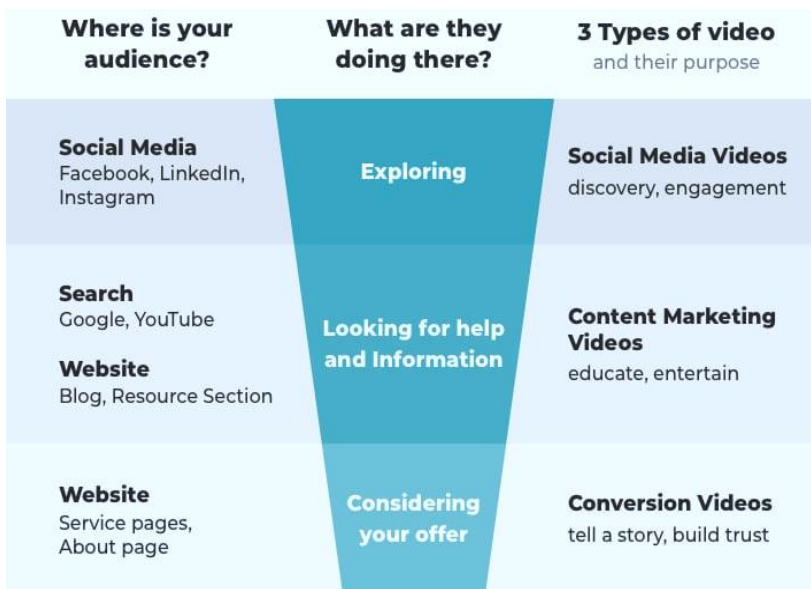
Figure 3. Types of the video in Inbound stage of the marketing funnel

Source: Crestodina (2018)

Stelzner in his survey (Stelzner, 2022) asked marketers to select the single most important video format for their business. The result of this survey is shown below in Figure 4.
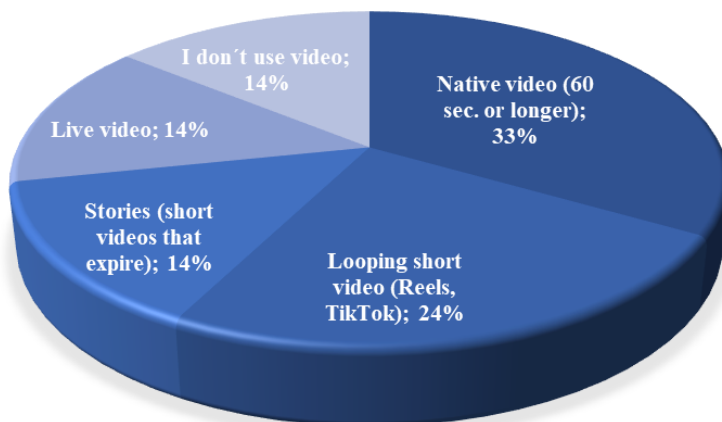
Figure 4. The most important video format for marketers

Source: Stelzner (2022)

In accordance with this survey, we asked our respondents to indicate which content they prefer on social networks and where they have the highest engagement rate. The results show that 80% of our respondents from the selected network generation prefer purely visual content (i.e., pictures and video) which is corresponding with the AmiDigital (2022) survey. Almost 40% of respondents prefer video content over image posts. An interesting fact is that almost half of the respondents prefer the Stories format, content with a short expiration.
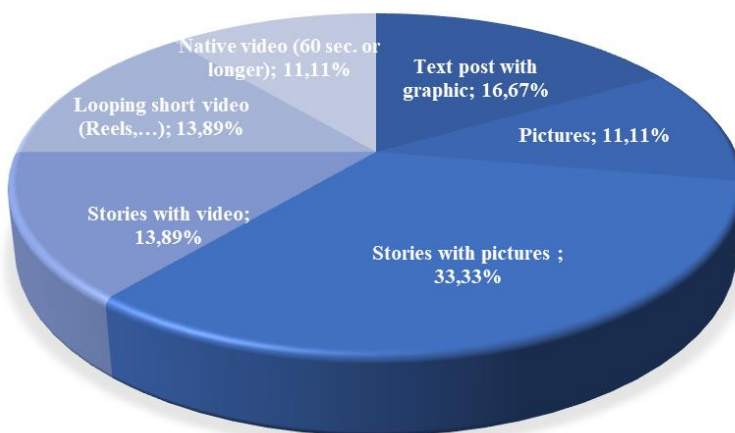
Figure 5. Preferred content on social networks

Source: own research

An interesting fact is that almost half of the respondents prefer the Stories format - content with a short expiration. For these posts, the quality of the content is very important, but the quality of the production is not that important. The adoption of "good enough" production quality leads to a massive amount of video content created ad-hoc on platforms such as Facebook, Instagram, Twitter, etc. Social media users explained that their preference for social media with short-form videos was due to convenience (LemonLight,

2021). This type of video is attractive and sharable, and many companies can easily execute it. The important thing is to post authentic content that people want to watch – content that can be simple, fun, up-to-date, and engaging. Plus, since video is dynamic, it grabs attention better than static images or walls of text.

Looping short-form video format like Reels is on the rise. According to many social media marketing experts, short videos are one of the best tools to take your business to the next level.

4 Conclusion

With the growth of the world's digital population, social media have become more and more widely used. Social networks are part of everyday life, and they continue to transform our global interaction, providing users with access to all kinds of information. Social media has changed the way marketers interact with consumers. It is very important for them to know where on this digital environment their audience is, what they are reading and doing there, and build a relationship with them.

This work has shown that the current young generation uses at least one social network daily. At the same time, we focused on the devices that are used to access the Internet and what kind of content published on social networks our respondents prefer. As well, our study confirmed the trends evident from the available statistical data. Reels (short-form videos) and Stories (visual content with a short expiration) are growing in popularity. Both formats, which recently appeared as news on the most widespread social networks Facebook, Instagram, Twitter, etc., were inspired by the young people's preferred networks TikTok and Snapchat. This is why we should monitor the behaviour and preferences of young generations, which affect future trends and direction for the development of digital marketing content, especially on social media marketing.

We believe that social media channels are a key component of any marketing initiative and video marketing is one of the most important channels to attract consumers. Their implementation in a company's digital marketing strategy can represent a great competitive advantage.

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Possibilities of using 3D printing for the sustainable development of Industry 4.0

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Abstract

Research background: 3D printing encompasses many forms of technologies and materials as 3D printing is being used in almost all industries. Currently, it's still unclear what impact additive manufacturing will have on globalization. Several trends are planned for as 3D printing increasingly permeates current manufacturing. Companies that had material shortages during the COVID-19 pandemic are gradually starting to use 3D printing options in their companies.

Purpose of the article: The main purpose of the contribution was to analyse the possibilities of using 3D printing in the manufacturing industry worldwide, and we conducted a questionnaire survey focused on the possibilities of using the technology procedures of 3D printing in the manufacturing industry in Slovakia.

Methods: In order to carry out the analysis, a questionnaire survey was carried out, the aim of which was to find out in which companies, areas and what is the application of 3D printing in Slovakia.

Findings & Value added: One of the main findings of the questionnaire survey was that 3D printing is primarily used for custom print production, which accounts for up to 48% of responses from the questionnaire survey. Companies do not produce a large number of products, but they have the opportunity to produce different variants, which is very close to 3D printing.

Keywords: i*ndustry 4.0; digitization; 3D printing; industrial engineering; analysis*

JEL Classification: *I25; O14; O49; L69*

1 Introduction

Technologies, rapid progress, innovation, automation are very important from the point of view of globalization. From this point of view, the topic of using 3D printing in the manufacturing industry is very topical. The COVID pandemic has changed everyone's view

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of the future. Companies that had shortages of material during the crisis are gradually starting to use the possibilities of 3D printing in their companies.

A possible reason for the increase in interest in 3D technology is the missing components in companies, without which workers cannot continue to work and make final products. (Mani, et al., 2022), (Tan, et al., 2022), (Grznar, 2022). Missing components that are not supplied by suppliers as a result of the pandemic that has hit us can temporarily suspend the production of production lines in companies.

These missing components could be replaced through 3D printing. 3D printing objects are created using an additive process. In the process, the desired object is created by gradually applying the material layer by layer to the base plate (Lee, et al., 2017), (Lee and Chua, 2017). (Choo, et al., 2020). This technological process is the exact opposite of cutting, where we cut pieces using a cutter material. Unlike traditional manufacturing, 3D printing allows us to create complex shapes using a minimal amount of material.

Additive manufacturing processes include various technologies, including 3D printing technology. (Lu, et al., 2018), (Rakyta, 2022). This technology, which includes a number of methods capable of producing 3D products, uses computer software (CAD) in which we can design products according to our own imagination. The computer hardware has the task of directing the material so that it is deposited layer by layer in the desired geometric shapes.

We define 3D printing as an additive manufacturing process in which products are produced based on a digital design. 3D printing produces a final product identical to the digital model (Flynt, 2020) (Bubenik, 2022). Using this technology, it is possible to produce more complex objects in less time and at lower costs. Today's 3D printing innovations allow us to process small and specific components in detail. This technology provides us with precision, speed high-quality manufactured products. Modern 3D printing provides multiple possibilities for using the remaining material, thus avoiding unnecessary losses. (Wilson, 2020), (Day and Speers, 2020), (Sukalova and Stofkova, 2022).

The use of 3D printing in mass production has still not found its perfect application. The reason is insufficient automation of this process. Industrial enterprises are constantly moving forward and trying to automate their lines as much as possible. Companies invest more and more money in the implementation of additive manufacturing. It's only a matter of time before 3D printing catches the attention of the wider public on a much larger scale. (Butt, 2020.)

2 Methods

The following chapter is focused on the analysis of the possibility of using 3D printing in the manufacturing industry, which was realized using:
- worldwide survey focused on 3D technologies,
- questionnaire survey focused on the possibilities of using 3D printing in the manufacturing industry (subchapter 2.2) and its evaluation
- information obtained from the event - Spring roadshow of 3D printing and 3D scanning.

2.1 Worldwide survey focused on 3D technologies

In 2020, Admasys created an international survey aimed at the use of 3D printing in companies in the Czech Republic, Slovakia, Hungary and Romania (Formlabs Form 3B+). Analysing the survey, they found that businesses that decided to use this technology were definitely satisfied with the results. This survey also showed them a big change in the spread of 3D printing technology over the past two years in the Czech Republic (Figure 1).

Thanks to this company and their initiative, 3D printing has spread much more in the Czech Republic, even to larger one's industrial enterprises.

In the coming years, a significant increase in interest in additive technologies such as 3D printing is expected on the global market. An annual increase of 33% is estimated, which was also confirmed by the companies involved in the Admasys survey. Industrial enterprises see the prospect in this field and highlight the immediate possibility of printing on demand.
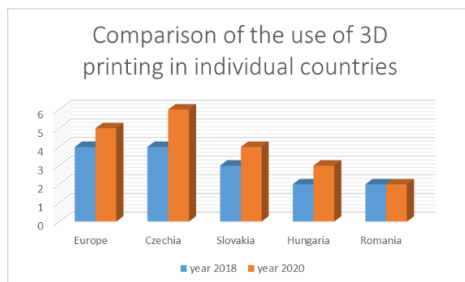
Figure 1. Comparison of the use of 3D printing in individual countries.

Source: author (2022)

We know that currently, the 3D printer is more advantageous for small-scale production. There is no need to make moulds and provide other special equipment. All necessary components can be printed on a printer. However, this cannot be said about mass production. The potential of using 3D printing in this production is currently focused more on smaller series with restrictions or the production of prototypes.

Automating 3D printing is not easy, despite the efforts to introduce large-volume printing into manufacturing industries, a human factor is still needed in its operation. The 3D printing production process requires manual steps such as turning on the printer, transferring files to the printer, inserting the appropriate material and finally starting. This procedure requires a lot of time but also the skills of the workers, and this causes the 3D printer not to be introduced into large-scale production.

2.2 Questionnaire survey focused on the possibilities of using 3D printing in the manufacturing industry

The subchapter contains a questionnaire survey, in which the effort was to find out information about the use of 3D printing in manufacturing companies throughout Slovakia. The questionnaire contains 14 questions, which are divided into three sections shown in Figure 2. 60 companies filled out the questionnaire.
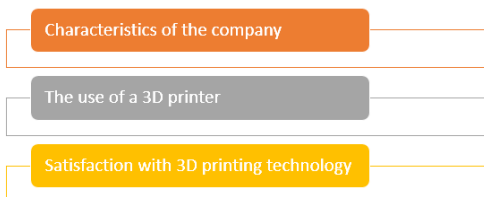
Figure 2. Main areas of questionnaire survey.

Source: author (2022)

In the first section, the questions focus on the characteristics of the company. In enterprises, we asked about categorization according to the number of employees, i.e. whether they belong to the group of micro-enterprises, small enterprises, medium-sized enterprises or large enterprises. The second question refers to the type of production introduced in the enterprise. There are options for small series, large series, custom and continuous production.

In order to be able to evaluate in which area of industrial enterprises among the respondents 3D printing technology is used, we chose as another question the area of operation of the given enterprise. The most likely industries to choose from are engineering, automotive and others. After answering these questions, the questionnaire will let us go to the second section, to questions focused on the use of the 3D printer.

Section number two contains 8 questions. As the first and key question of the entire questionnaire, we asked if the company had purchased a 3D printer. The choice was Yes/No. We consider this question to be crucial, because if the respondent answered negatively, the questionnaire directed him to finish, i.e. send the answers.

The second question of the 3D printer use section asks about the reason for purchasing a 3D printer, we have 5 answers to choose from, and the last one is to write a different reason than those listed in the options above. The following question does not have a choice of options, but it is necessary to add a short answer to the question of what type and brand of 3D printer the company purchased.

Another question is focused on the material used in their printer, there are four options to choose from: plastic, resin, metal, and colour 3D printing technology. Since the 3D printer has many advantages, in the following question we aimed precisely at a few of them. We asked manufacturing companies which of the advantages we listed in the options convinced them to purchase a 3D printer. If none of the options is suitable, the last option is to write your own thought. The question that is next in the sequence determines the possibilities of using 3D printing and therefore whether the company uses it for the production of spare parts, the production of prototypes or in the production of components in development and research. Of course, there is also the possibility to add your own possibility of use in their company.

Question number 11 should find out whether the costs of production using a 3D printer are lower or higher than the costs of producing the same components without the help of 3D printing, i.e. in the traditional production. The final question of this section explores the possibility of using 3D printing in corporate departments. He is trying to find out in which department of the company they see the application of 3D printing, such as the TPV department, production, maintenance or others. The last section, also called the Conclusion, finds out whether the companies that participated in this survey are satisfied with the purchase of a 3D printer. He also analyses whether they want to expand 3D printing or other additive technology in their company in the future. This question should determine the interest of businesses in 3D printing and additive technologies and their expansion in the near future. The last question of the questionnaire is optional, so only those who want to fill it out. A link is written in it where we can contact their company if necessary.

3 Results

Summary of the possibilities of using 3D printing from a questionnaire survey:
- According to the survey, micro-businesses use 3D printing the most in terms of business size (1 to 9 employees). This category is represented by up to 41%. This confirms to us that, according to the number of employees, 3D printing is used the most in smaller companies.

- The questionnaire survey showed that 3D printing is primarily used for custom production. Custom production accounts for up to 48% of responses from the questionnaire survey (Figure 3). It is the so-called custom production. Enterprises do not produce many products but have hey do the possibility to produce different variants, which is very close to 3D printing.
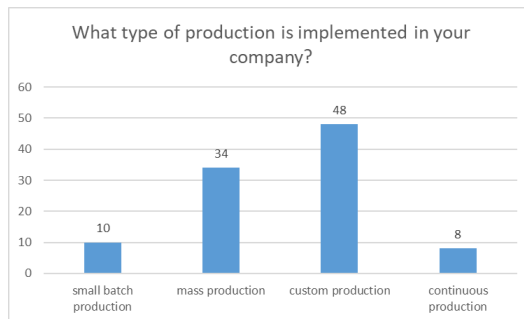
Figure 3. The type of production.

Source: author (2022)

- The largest percentage of enterprises (Figure 4) that participated in the survey in the field of production (activity) belongs to the engineering industry (31.33%).
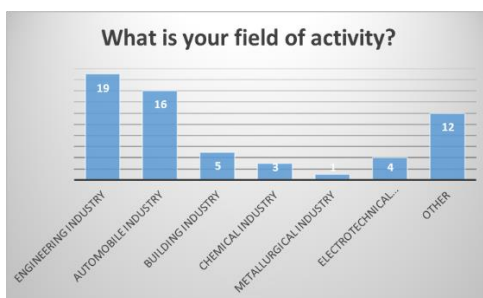
Figure 4. Main areas of questionnaire survey.

Source: author (2022)

- Up to 85% of the companies surveyed have purchased a 3D printer.
- The reasons for purchasing a 3D printer were special production, i.e. the sale of the device printers, due to the variety of shapes, printing spare parts for machines and equipment, individual printing according to your own design and others.
- The most frequently purchased printer brands in the survey were Prusa, Zotrax, Creality Ender or Markforged. Other brands were also mentioned here, for example, EOS, HP, Max Micron, Flyingbear, Trilab, Anycubic, Formlabs and more. There were several answers even such that it is their own production. One respondent stated that he printed the components on another printer and then assembled it to his liking ideas.
- According to the material point of view and the choice of filaments, most of these companies use plastic 3D printing technology (Figure 5). The reasons are its simple operation and unnecessary processing or other processing of the component.
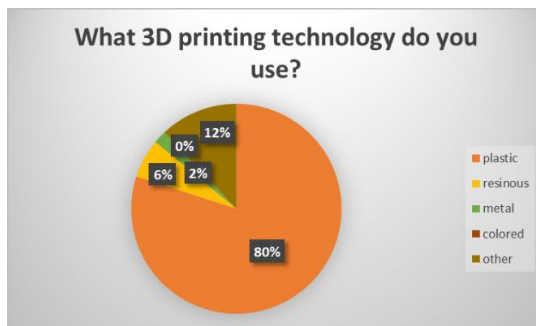
Figure 5. Advantages of 3D printers.

- Low production costs have convinced businesses to buy this 3D printing technology and used it in their production (Figure 6).
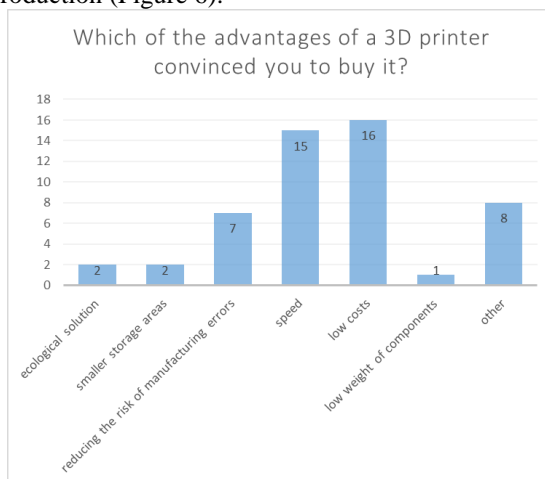
Figure 6. Advantages of 3D printers.

- The companies involved in the survey use 3D printing technology in the largest amount 53% for the production of prototypes.
- When comparing the costs of traditional production and production using 3D printing, it was shown that up to 92% of companies have lower production costs thanks to 3D printing than they had before it is using.
- By analysing the questionnaire, we obtained information that companies see the use and application of 3D printing, especially in development and research.
- The question of satisfaction with the choice and use of 3D printing evaluated up to 98% of success and satisfaction with its functioning and production.
- Currently, 3D printing technology is not as widespread in businesses as we would like to be imagined. However, up to 90% of companies want to continue expanding additive technology in their productions.

4 Conclusions

The development of 3D printing brings constant new possibilities of use in companies and helps in many types of industries. Today, it is technology at a highly professional level, which is adapted to the needs of users. People's desire for environmental friendliness is reflected in the choice of aspects such as food, waste, energy and even the choice of production technologies. One of these technologies is 3D printing, which is currently considered highly ecological.

   The main goal of the contribution was to analyse the possibilities of using 3D printing in the manufacturing industry. We analysed the global situation of 3D printing in the manufacturing industries using a survey from Admasys. We created a questionnaire survey focused on the possibilities of using 3D printing in the manufacturing industry in Slovakia. The results of the conducted questionnaire survey showed in which companies and areas 3D printing is used and is widely used in practice. Thanks to participation in the event - Spring roadshow of 3D printing and 3D scanning, we obtained information for those interested in introducing 3D printing in their company. It discusses the current situation of 3D printing in the manufacturing industry but also focuses on its future direction and progress.

Acknowledgements

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What effects will the advent of Industry 4.0 have on nations globally

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Abstract

Research background: Industry 4.0 was first mentioned in 2013. This phrase encapsulates the effect that emerging technology will have on the nation's entire economy. These technologies have an impact on a wide range of fields that must adjust to the trend as it eventually transforms into Industry 5.0.

Purpose of the article: Industry 4.0 has an impact in several domains. In order to successfully implement Industry 4.0 over the world, the article's goal is to concentrate on the most heavily advertised areas.

Methods: A bibliographic analysis will be utilized to determine which areas are most impacted by the implementation of Industry 4.0. This analysis will assess through a map which areas should be the main emphasis to make the implementation as effective as possible.

Findings & Value added: Countries will be able to develop a strategy that will assist them to transition to Industry 4.0 more quickly by doing bibliographic analysis and determining which sectors are most influenced by the application of contemporary technology to the general functioning of global economies. Based on the findings, it can be stated that Industry 4.0 is not just concerned with business, but also with the general welfare of the populace because it also has an impact on Smart Cities.

Keywords: *Industry 4.0; Bibliometric analysis; Industry 5.0; The nation's economy; Business*

JEL Classification: *L52; M20; P23*

1 Introduction

After a symposium in Germany in 2013, the phrase "Industry 4.0" started to be utilized. Lasi et al. (2014) they assert that this year marked a turning point since it started to discuss the digitalization of certain market categories. The goal of this digitalization was to reduce management, production, and management mistakes. Additionally, it was intended to help the company's departments come together (Xu et al., 2018), make individual operations more clear, make it easier to fix faults in specific parts, and free workers from physically

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taxing manual labour that might cause a variety of health issues. It is a really smart concept to link artificial intelligence with societal governance. According to Zhong et al. (2017), Novak et al., (2021), Lawrence & Durana (2021), Wade & Vochozka (2021) artificial intelligence has the ability to quickly assess many options and select the one that would be most useful in the given circumstance. Additionally, it frees workers from a variety of administrative responsibilities that hinder their productivity. According to Yin and Yu (2022), businesses that are connected and structured in this way are able to produce a lot more items since they have fewer processes that divert employees' attention from their main duties.

2 Literature Review

According to Zhong et al. (2017), Industry 4.0, the next generation of business, promises greater industrial flexibility together with mass customisation, improved quality, and enhanced efficiency. With a quick time to market and superior quality, it lets businesses to overcome the challenges of creating an increasing number of customized items. According to authors Lee et al. (2014), today's Industry 4.0 production has networked machines that work together as a community. Ghobakhloo (2020) these developments need the use of forecasting techniques to systematically transform data into knowledge that explains uncertainty and helps decision-makers make better "informed" choices. According to authors Lu (2017), Hopkins & Siekelova (2021), Rogers & Kalinova (2021), Kovacova & Lăzăroiu (2021), Hawkins (2021), Hamilton (2021), Zvarikova et al., (2021), Nica & Stehel (2021), Riley et al., (2021) Internet of Things (IoT), Cyber Physical Systems (CPS), Information and Communication Technology (ICT), Enterprise Architecture (EA), and Enterprise Integration are all strongly connected to Industry 4.0. (EI). A systematic and thorough assessment of the most recent research on Industry 4.0 is not yet accessible, even though it is an active field of study. The primary motivation behind doing the study you are currently reading was this research. Industry 4.0, also known as "intelligent manufacturing," "industrial internet," or "integrated industry," was coined by authors (Hofmann and Rusch, 2017). It is a hotly debated concept that has the potential to change entire industries by altering how products are created, produced, delivered, and paid for. Industry 4.0, often known as "Smart Manufacturing," is a recent development in the widespread application of information and communication technology in manufacturing processes that provides a preview of how the manufacturing industry will develop over the next several decades (Siqueira & Devis, 2021, Grant, 2021). Industrial Revolution 4.0 (IR 4.0), according to the authors Cheah et al. (2020), presents a chance to boost the effectiveness of solid waste management through the use of digital and mechanical applications, effective waste elimination, recovery, and reuse.

3 Materials and Methods

Collecting as much data as possible that will be useful and have a high volume of data will produce extremely accurate findings is important to achieve the objectives that were stated in the previous section of the article. This led to the decision to choose articles from the Web of Science collection that best represented the specific Industry 4.0 topic. The VosViewer tool was used to examine the more than 14,400 articles that were found once the keyword was picked. This produced a bibliographic map that was separated into clusters that further described the topic, in this instance Industry 4.0.

4 Results and Discussion

Since 2013, a growing number of scientists have begun to address the topic of Industry 4.0, working to enhance its general framework and so raise the tool's contribution to both business and personal well-being (Olesn and Tomlin, 2020). In an effort to address the various issues that may arise when using this tool, as well as to bring the use of this apparatus closer to eradicating errors and enhancing the overall position of the company in competitiveness, the following figure captures the countries that contribute the most to the improvement of Industry 4.0. As a result, some of the problems that prevent businesses from progressing will be resolved, and fewer checks will require the time of employees who may alternatively devote themselves to the success of the business. Because of this, there is now equal competition between firms that primarily focuses on factors like quality, pricing, marketing, and services. According to Neumann et al. (2022), one of the primary drivers of Industry 5.0 is the strain and demands that the quick technical advances of Industry 4.0 are placing on those who work in automation. Particularly, the creation of automation software for mechatronic systems is getting more and more difficult since high-quality and maintainable software need both domain expertise and programming abilities (Popescu et al., 2021).
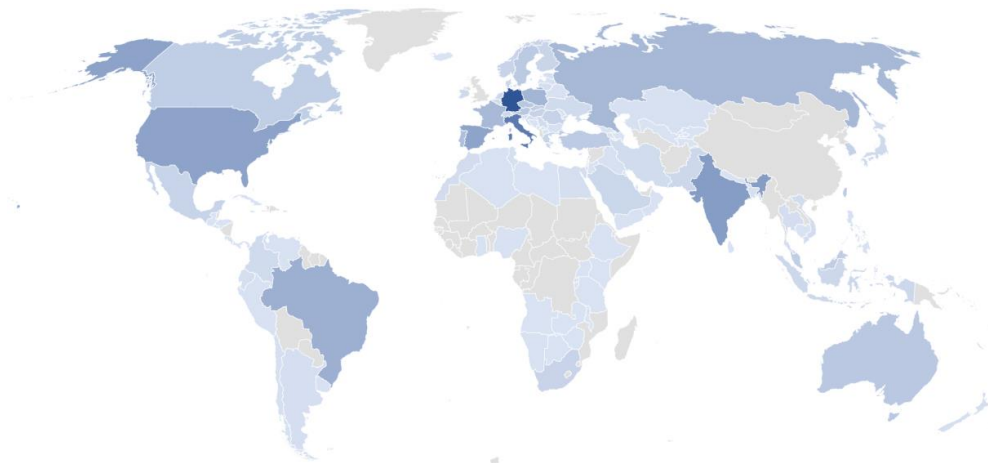
Figure 6. Map of nations producing content on Industry 4.0

Source: own processing according to Web of Science (2022)

The major contributors to this problem are Germany, Italy and China. For instance, India, the United States, Spain, England, Brazil, Poland, Slovakia, Czech Republic and other nations fall into the category of nations that create less articles than the top group. Another category includes nations like Saudi Arabia, the Netherlands, Finland, Denmark etc. Countries like Venezuela, Lebanon, Cyprus, Malta, Palestine, and others are included in the last group.

Table 1. The number of nations making the biggest contributions to the problem

	> 1,000	1,000 < > 200	200 < > 20	20 >
Amount	3	25	44	58

Source: own research

The phrase "industry 4.0" is frequently used, but it is increasingly morphing into "industry 5.0," which is also being discussed. Industry 5.0 is a relatively new idea, and in

order to implement it in a high-quality and accurate manner, individuals must be able to comprehend the substance and meaning of Industry 4.0. The writers of articles, research papers, and monographs examine a variety of Industry 4.0 issues, dangers, possibilities, and advantages. They will then produce a piece of useful literature that clarifies the many aspects of Industry 4.0 for readers all across the world.

Table 2. A summary of the procedures in the provided article

The search term that was entered	Monitored timeframe	Source lookup	Amount of articles	Looking through	Program
Industry 4.0	2012-2022	Web of Science™	> 14,400	Bibliometric Analysis	VosViewer

Source: own research

As a result, this article also covers the key components of the Industry 4.0 tool, which has emerged through time as the foundation of the entire system and has its roots in 2013. This examination of the word "Industry 4.0" was also done using bibliographic analysis, which was also used by the authors Hlawiczka et al. (2021) in their study. The following table of procedures was created in order to obtain the specified outcome, which is depicted in Figure 2, and to satisfy the proper classification of keywords.

Figure 7. Key words of the phrase "Industry 4.0" as analysed by the literature

Source: own research

According to bibliographical study, the most common keywords used when writing articles about Industry 4.0 include items like the *Internet of Things*, *Artificial Intelligence*, *Innovation*, and the *Future*. Each of these keywords is composed of additional components (keywords), which when combined provide the Industry 4.0 tool its overall orientation. These outcomes were attained using a compilation of all articles published in the Web of Science database. When generating a bibliographic analysis, researchers must employ as many papers as they can in order to obtain pertinent data. This requirement was satisfied, and the VosViewer software showed the key phrases that best describe the subject of the study.

Figure 8. Overview of the organizations who publish on Industry 4.0

Source: own research

A bibliographic analysis of companies that publish material on Industry 4.0 was subsequently produced. Organizations from V4 are also represented, as demonstrated by their participation in 1,468 publications to date.

5 Conclusions

The goal of this scientific contribution is to compile a bibliographic study of the Industry 4.0 idea. It was crucial to concentrate on this research so that scientific as well as technical and other authors, employees, or executives could understand Industry 4.0 as a help that can guide their company to better results. Industry 4.0 is a very interesting concept that has its roots in 2013 and has many advantages that benefit companies, competitiveness, and also workers in companies. Despite the fact that many individuals are familiar with the term "Industry 4.0", many have trouble understanding the specific problem at hand. Whether it is a broad grasp of Industry 4.0 or its subordinate keywords that complete the entire, the article refers to keywords and their lower levels of keywords that build the investigated idea and help the interested individual find the proper route in the provided issue. The categorization of individual terms into clusters may be seen in the following bibliographic analysis. This article can be used as a "springboard" for other writers as well as for a more in-depth analysis of certain aspects of Industry 4.0.

Acknowledgements

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The Globalization Process' Impact on the Natural Environment

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Abstract

Research background: Faced with the complexity and generosity of nature, man must orient himself towards respect in connection to the natural world. The primacy of the natural environment must be reconsidered by man. Our survival relies on our transformation, not the surroundings. In the era of globalization, many of the leaders of highly industrialized nations face sovereign disdain.

Purpose of the article: In light of these stipulations, the purpose of this paper is to examine the impact of the globalization process on the natural environment from the standpoint of value theory, recognizing that the value-utility theory attempted to replace working time with a more adequate physical support, but failed to explain differences in product value.

Methods: In all instances, the study that led to these axioms cantered on how the market disclosed the value in the form of exchange value.

Findings & Value added: The environment may be reflected in a company's financial sheet as land, in its important contribution via the low entropy represented by the inherent potential of minerals and raw materials, as well as in the uncountable goods: water, air, light, and solar heat. Typically, they are considered among the positive consequences of production and consumption.

Keywords: *globalization; sustainable development; growth; environment*

JEL Classification: *A11; A14; B16*

1 Introduction

The environment is present in the company's financial sheet, represented by land, in its important contribution via the low entropy represented by the natural potential of minerals and raw materials, as well as in the uncountable goods: water, air, light, and solar heat (Dima et al., 2020). These are among the positive outcomes of the production and consuming processes (Bran et al., 2019).

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Given the immense potential that exists in nature, the contribution of the environment to the economic process of the enterprise is highlighted as follows: the natural potential in the form of substance, energy, and information is brought into the enterprise through extraction, transport, and research energy in order to be used appropriately (Negescu Oancea, et al., 2019).

2 Current environmental condition – methodological analysis

The present status of the soil relates to the quality of the soil, water, and air in the region, as well as whether or not the business has technologies that use these environmental components. In this instance, the corporation must handle meteorological and research services of water and air quality, as well as geologists, soil scientists, and seismologists (Rădulescu et al., 2018).

In order to prevent legal and financial repercussions, it is necessary to analyse the ecological constraints placed on the activity area and beyond. This information determines establishment - development choices, as well as production decisions (Alpopi et al., 2018). In addition, they will describe the scale and organization of the consuming process.

At the company level, the consumption process aimed at recovering the environment is only partly addressed. The majority of it is for the firm, with financial contributions from the people and other businesses (Jianu et al., 2019).

The firm coordinates the following environmental activities: filtration, water treatment, garbage disposal, and regulated waste disposal facilities to decrease environmental contamination. These are investment-type endeavors. Scientific research efforts involving the redesign of technology and goods to minimize consumption of natural resources and harmful waste. (Bodislav et al., 2019).

Activities to repair the environment of the enterprise and its immediate surroundings, as well as remediation of ecological catastrophes caused by the company. These are transactions involving investments and financial payments. Another activity is the typical contribution to centralized ecological efforts via the payment of taxes, fines, and taxes (Angheluta et al., 2019).

2.1 The occurrence of value

The totality of the traits that give an item, a person, or a phenomena its price is its value. Value may also be interpreted as significance, price, and worth (Shevcenko, et al., 2016).

The value as a concept is defined in DEX as: "Acquisition of certain things, facts, ideas, and phenomena to correspond to the social needs and ideals generated by them; the sum of qualities that give value to an object, a being, or a phenomenon that is significant, valuable, worthy of appreciation, and esteem."

Aristotle defined value in terms of physical, mental, and moral or spiritual requirements, recognizing in economic value, exchange value, and use value: "The use of every object is of two types, and in both situations the work functions as such, but in different ways: one use is its own - as a utility, and the other... as a means of exchange (politics)."

Since ancient times, there have evolved two major orientations for defining value: value = usefulness and value = labour. In the first instance, the production procedure and producer's function predominated. In the second instance, the consumer process and consumer role gained prominence.

In all instances, the study that led to these axioms cantered on how the market disclosed the value in the form of exchange value (Ozalp, et al., 2018).

This acceptance allows for four forms of value. The direct value, which expresses the benefit obtained by the user, the indirect value, which expresses the benefit of an indirect

consumer, the optional value, which expresses the benefit felt by a consumer when he knows that a particular ecosystem will be preserved, and the value of existence, which expresses the benefit felt by the existence, but not the recovery, of certain ecosystems, resources, and landscapes. The entire economic value would equal the sum of these four values.

2.1.1 The process of acquiring value

The value is the consequence of the changes that occur within human-driven economic activities such as production, distribution, trade, and consumption. Human activity that enters the realm of the economy is related with the actions of individuals who are a part of systems such as the family, company, national economy, global economy, and cosmic economy (Waldron, et al., 2016). All of these systems include the human life system. They are in the dynamic states of production, distribution-exchange, and consumption, influenced by both internal and external influences.

The systems of the economy, society, and natural environment are accountable for the acquisition and management of value. Economic processes are externalized and manifest as economic, social, biological, chemical, and physical phenomena.

The complicated nature of the economic phenomena is a result of the inclusion of all these occurrences. In the form of the economic phenomenon of value, the system for acquiring and managing value contains the same sorts of occurrences.

In the history of economics, two approaches to defining value have been emphasized: the theory of value based on effort (TVM) and the theory of value based on utility (TVU).

According to the labor-value theory, value is produced throughout the production process, and its physical foundation is the length of time spent working (social time required). Several explanations for the creation of value have been offered in relation to this notion. Karl Marx believed that anything is valuable if it materializes human work.

Adam Smith believes that labour is the sole source of value and that human activity generates the quantity of products consumed annually, while Turgot views work as a manifestation of the degree of regard that man has for the many objects of his wishes.

The idea was established during a time when the technology was underdeveloped and the issue was to fulfil the requirements of a rising population (Schotter et al., 2017).

The value-utility hypothesis has attempted to substitute appropriate physical support for working time. This idea fails to explain the disparities in price between various items. The water-diamond conundrum is the most well-known paradox (Kohlhase, et al., 2020). The notion of rarity was used to describe this scenario.

3 Operations of the mechanism for generating value

In the mechanism for acquiring value, the economic processes of production and consumption, as well as the natural processes from the surrounding environment and the processes unique to social life, are significant. There are two sorts of processes inside the system for acquiring value: main and complicated.

The first fundamental process is transformation. Referring to the scenario of the Great Explosion, the original explosion was a process of change that resulted in the organization of matter and the emergence of low entropy.

Conservation is the second fundamental process. The particles and radiations created by the initial process have joined the conservation process of these main products as stable matter structures: substance, free energy, and information.

Observations of natural events allow us to propose the existence of a third main process, transfer. Through the transfer, the results of the previous two processes are shifted in space and time, becoming outputs for one system and inputs for another.

The first complicated process occurred when the equilibrium system of the universe acquired a dynamic state. The massive explosion converted the pure energy into particles and radiation, which were maintained as matter, free energy, and information. These have been transmitted over space and time, becoming training system raw materials.

Similar to the first complex process, the second complex process employs the three fundamental processes to create complex structures. Thus, this low entropy is perpetuated in material structure, motion, forces, and high entropy. These outcomes are the services that will be conveyed over time and space.

The third complicated process concludes the Universe's cycle. Systems that are far from equilibrium and those that are near to equilibrium are brought to equilibrium. The structural systems of nature are translated to a transformation process involving a complicated process (the Great Implosion). The transformation results in the conservation of pure energy, which is transported over space and time.

In conclusion, the fundamental processes and complicated processes unique to the general system of Nature are also present in the systems engaged in the mechanism for gaining and managing value in the following forms: the production process, the consuming process, and the liquidation process.

The dynamic states into which all natural systems (environment, society, economy) enter are identical: consumption, production, and dissolution. These complicated processes include, in varying proportions, the fundamental processes of transformation, conservation, and transfer.

4 Discussion and conclusion

In the era of globalization, many leaders of highly developed nations approach abnormalities in nature with sovereign disdain because they fail to see nature's actual depth. With such a perspective, it is not unexpected that the West has achieved unprecedented dominance over the natural environment and irresponsible manipulation. And the worldwide appreciation for these accomplishments is another threat to the life of the sphere that develops from the spread of this aggressive and self-centred approach to abandoning humanity's relationships with the natural environment. (Serban, 2013). In his study on economic worth, the late university professor Paul Bran said that the environment's function and size must be revaluated after its gradual demise. The notion of man as an escape from nature explains his persistent desire to be liberated from the constraints of natural circumstances. Paul Bran (2002) noted that, as a result of man's drive for independence from nature, he has succeeded in constructing a highly complex living environment, as seen by his dynamic heterogeneity (Habersang et al, 2018).

Not only the natural environment, but also the altered one, gets anthropomorphized. Continuous anthropization of the environment. Man is the creator of more complex artifacts that often degrade nature by contaminating it with byproducts of production and consumption. The human environment is very complicated. We do not know whether I was a part of a worldwide plot; yet, the guy examines the economic and ecological dimensions of governance.

The economy now has no cure. A first answer may be a new paradigm of ecological wisdom's significance. Believe the reality of human activity on a global and planetary scale, but don't employ the "oikos" property (the home of life) and don't consider it to be so magnificent that one day, nature's destructive forces will give it wings. created. Man does not need to prove that he can survive without other trophic networks. Everything has a

beginning, therefore we must refrain from self-destruction and allow nature to flourish so that we, too, may survive.

In the era of globalization as it relates to the development of phenomena, too few people comprehended that the 20th century shattered value scenarios. By value mechanism, we imply the intimate relationship between human civilization and the nature of the Earth's sphere.

Every human activity has an immediate effect on the natural environment. Our existence is contingent on our capacity to alter ourselves, rather than the environment. In the present day, governments must act not on the basis of false scenarios, but on the basis of an understanding that ignorance of the rules controlling the existence and operation of the industrial realm makes it difficult to devise innovative solutions to issues. Let us evaluate the ecology and spirituality of the world while it is still possible.

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Risks of social networks - Information technology as a globalization tool

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Abstract

Research background: The global nature of communication platforms is due to the fact that they are seen as a way to overcome state-controlled media and content. The current era is characterized by a high degree of polarization of society and an enormous increase in intolerance. Radical views are supported by the targeted presentation of minority views, social networks are perceived as a balancing force for less important individuals.
Purpose of the article: The purpose of the contribution was to find and compare research conclusions related to social networks and their global social significance, especially in the context of manipulating the opinions of individuals and groups. We also confront these conclusions with the frequency of occurrences of key words in media and scientific publications.
Methods: Heuristics and a comparison of the conclusions of available sources and subsequent synthesis were used for the contribution. At the same time, extreme and false information in the digital platforms' environment was mapped and confronted with a confrontation with the dynamics of information dissemination.
Findings and added value: The research conclusions and comparison with other sources confirm the strong radicalization of society and the increasing intolerance in society. Social networks have contributed in no small measure to this radicalization, mainly thanks to anonymity, but also, especially recently, in the form of targeted provocations and forgeries. The added value of the research is the heuristics performed on the ProQust portal and in the Scholarly Journals databases.

Keywords: g*lobalization; hoax; hate; social networks; Facebook*

JEL Classification: *F68; L86; M38*

1 Introduction

Currently, it may appear that globalization processes are dampened, especially as a result of the pandemic process and the intensification of the global bipolarity process, which is a consequence of the Russia-Ukraine conflict and the struggle for energy resources. This

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trend is visible above all in economic processes. Economic globalization is a historical process, the result of human innovation and technological progress. An integral, often overlooked aspect of globalization is the exchange of information, along with trade, movement of people, and movement of capital. Therefore, the multiplier effect of technological progress and the spread of knowledge across international borders is also an essential factor in current globalization processes. Subsequently, we can understand globalization as a form of sharing ideas and opinions. It is therefore evident that, in addition to the integration of economic processes, there may also be a globalization of authorities interest, transnational interests conditioned by the globalization of information processes. It can be stated that these processes are currently growing into a disinformation form, which is a typical element of the globalization concept of information dissemination. These processes are technologically supported, in particular, by the sharp increase in the spread of information through transnational social network platforms and the implementation of artificial intelligence in these processes. To understand the possible contradiction in the concept of the meaningful content of information that is disseminated through these networks, it is necessary to realize that anonymity, depersonalization of the confrontation and, in particular, the subjective interpretation of value criteria and the inability to define the values (moral, social, emotional, etc.) of humanity play a significant role here, different cultures and individuals. It is obvious that the discussion about the truth of the information is irrelevant, precisely because of subjective perception, similarly to the irrelevant discussion about truth and justice. However, it is possible to identify and discuss phenomena that are evoked by the current degree of globalization of information and the degree of anonymity, especially phenomena that lead to questioning the discussed content of the information or questioning the credibility of the source. At present, these phenomena can be traced to an increase in intolerance, aggressiveness, questioning of value standards, or reversal of the informational value of statements or provocations. For these reasons, the value of information and disinformation on social networks cannot be identified and quantified, as they are determined by subjective perception, worldview, belonging to social class and social status, social and political environment, and the ability to form one's own opinion (moral and socioeconomic factors). Therefore, only the use of information marketing means can be discussed, not the value measure. Even if social networks are not subject to standard forms of marketing and management, it can be stated that certain characteristic features of these fields are manifested in communication on these networks. In particular, networks are characterized by operator censorship, group policies and censorship, and targeted messages with advertising content. However, this advertising content is not only the supply and demand of goods and services, it is to an increasing extent mainly the paid promotion of purpose-oriented information, comments on social and societal phenomena, and economic problems (social marketing). In order to understand the handling of information content, it is also necessary to realize that we are dealing with Information Management (a sub-field of management), which has the task of standardizing procedures and processes in the handling of information, including the management and distribution of information to one or more users. We can talk about knowledge management from the point of view of managing human activity in general, based on the use of knowledge that effectively connects the bearer of knowledge with those who need the knowledge, by transforming personal (mostly hidden or tacit) knowledge into organizational (mostly explicit) or formal knowledge, in the form of partially anonymous communication, engaging in discussion in a defined knowledge environment and sharing opinions, thoughts, and ideas.

In essence, social networks are carriers of two basic levels of information work. The first level is the previously mentioned level of information and knowledge management, in which the globalization character is manifested and the targeted influence of recipients with

the distributed content of such information, which aims to influence the thinking of a specific community according to the requirements of the distribution source. The second level is the targeted sabotage and diversion of disseminated information, the bearers of which are mainly supporters of different ideological views, often purposefully manipulated and influenced by the first level (management). The aim of the research was to identify the frequency of phenomena that can be intentionally and purposefully used for the manipulation of information, to identify the current level of information manipulation in the environment of social networks, and to identify the social and societal distortions that can result from the manipulation of information on social networks, especially aggressiveness, intolerance, hatred, and chauvinism.

2 Literature revue

Prior to actual analysis, heuristics were performed based on available studies. O'Brien, & Alsmadi (2021), emphasize that: "...Just talking about this ever-shifting landscape is confusing, with terms like "misinformation," "disinformation" and "hoax" getting mixed up with buzzwords like "fake news"...", for this reason we distinguish between these terms according to the systematization of these authors. The fact that this is a truly global issue is proven by many studies, for example Barcelos et al. (2021) identified, based on information about Covid 19 available on social networks, that 20.1% of fake news related to politics, 19.5% related to epidemiology and relevant statistics on the spread of the pandemic. Matamoros-Fernandez & Farkas (2021) also state that social media dominates the socio-political environment in almost all corners of the world. The authors point out that new and old racist practices are increasingly taking place on these platforms. A typical example is abuse in the form of reliance on social media as a primary source of news in conjunction with support for racial politics (Lajevardi et al., 2022). Ndahinda & Mugabe (2022) mention specific cases where defamation (denigration) on social networks extend from global to local areas at the level of genocidal processes: "These self-reinforcing networks spread inflammatory nativist discourses, anti-Tutsi sentiments, dehumanizing language and calls for genocide". If social marketing and management were mentioned in the introduction as a form of globalization of the content of social networks, it is confirmed that hate speech appears as part of political activism on social networks (Melo Filho et al., 2022).

However, the targeted influence on the younger (adolescent) population is also starting to become a fundamental problem. Increasingly, there is a specific feature of social networks referred to as "cyberbullying" (Thun et al., 2022). This can be a serious problem in the future, because aggressive adolescents can be recruited into the core of social groups with antisocial behaviour. If we are dealing with methods suitable for analysing social networks, we can state that "hate speech on online social media platforms is now at a level that has been considered a serious concern by governments, media outlets, and scientists, especially because it is easily spread , promoting harm to individuals and society, and made it virtually impossible to tackle using just human analysis" (Nascimento et al., 2022). As very suitable for analysing data and facts that are widely disseminated through social media shows, analytical descriptive research appears to be (Lekik et al., 2020). In their study, Wani & Jabin (2022) tried to show the possibilities of comparative tools for these identifications. The previously mentioned global forms of content manipulation highly count on, and even encourage, this form of amoral behaviour, which can be traced to relatively little (if any) accountability of social network providers or network group administrators for fake profiles. The authors use standard cluster analysis based on user profile information to detect links between profiles and to identify fake profiles to detect suspicious links within user communities. A qualitatively higher level of analysis consists

of morphological analyses, statistically significant differences between classes found in fake and real news articles were used by Kapusta et al. (2020). Due to the dynamic development of social networks, it is difficult to apply longitudinal analysis methods; there are studies using this approach (Shin, 2022), even if the study compares values at only two time points, the research conclusions prove that communication in social networks is primarily tied with the circle of friends and social background, and for a better understanding of the influence of the environment, it is necessary to expand the research by examining social relationships outside the framework of friends. In addition to identifying profiles, it is also necessary to identify comments, currently there is a significant increase not only in false information, but especially in hateful comments, referred to as cyber-aggressive comments. Detection of these social media comments using machine learning and text mining was performed by Rasel et al. (2018). The proliferation of aggressive tweets, statuses, and comments on the social networks is gradually increasing. People use social media as a virtual platform to troll, blame, blaspheme, and slander each other. These activities spread hatred between race, religion, etc. Therefore, these comments should be identified and blocked on social media. An analysis through descriptive metrics of scholarly production on hate speech and social media and an exploration of the interdisciplinarity of these approaches was conducted by Ramirez-Garcia et al. (2022) in a bibliometric study based on works indexed in the Scopus database related to the binomial "hate speech" and "social media" for the period 2001 to 2020. A similar descriptive metric based on the occurrence of characteristic bigrams (two words) was carried out by Rashid MMO, (2022) who processed 3,200,747 Facebook comments and identified the frequency of expressions labelled as "toxic slander". A rather fundamental starting point can be found in a study published by Olaniran (2020), the author examines how social media has become a platform for fake news and propaganda that influences a certain audience towards a certain way of thinking. In particular, it is an alarming fact that social networks such as Twitter, Facebook, and Google have the potential to change civic engagement and thereby essentially distort democracy by influencing individuals towards a certain way of thinking. In this author's study, there are more than 50 references to sources that can also serve as starting points for similar research and that confirm that social media is currently a globalizing tool, expanding the opinion reach of a few like-minded individuals in a way that shapes policies for societies and nations as a whole. An important feature of social networks is the manipulation of empathies, especially the manipulation of feelings in the form of purposefully emotionally distorted information, by subverting feelings, changing the ability to recognize and understand emotions experienced by individuals and groups in the form of hiding or amplifying emotional stimuli. In the context of global influences, he published the results of four studies by Santos et al. (2022), where, based on research on empathy in intra-party communication and communication between parties (which can be compared to communication within/outside the group in a social network environment), he identifies, among other things, specific tendencies in manipulation (for example, the effort to dialogue is labelled as weakness and concession, or the bearer of the effort to dialogue is labelled as an agent of a group with a different opinion, or as a collaborator). Therefore, many authors openly point to the need to identify disinformation links and targeted fictitious tools (fake profiles, false information, targeted forwarding and mass forwarding of information, etc.).

3 Methods and data

The actual method consisted of identifying the occurrence of publication outputs based on a combination of keywords in the Proquest database. Keywords were compared according to their occurrence in the entire database and then according to their occurrence in

professional scientific journals. The data was mined in an interval of three consecutive years, then the total value was determined. The keyword database was a combination of social platform affiliation (Facebook, social networks, social media). Furthermore, the occurrences of terms related to misinformation and intolerance in the social media environment ("hoax", "hate, "populism", "anonymity") were investigated. The identification of the monitored terms was subsequently carried out in the context of the link to the keywords "globalization" and "analysis". Following globalization trends, the occurrences of the terms "marketing" and "management" were also investigated in connection with the frequency of the term "globalization" and the occurrence of the relevant type of misinformation. To finalize the obtained data, MS Excel tools were used, in particular, statistical function, contingency tables and contingency charts were used. Based on publication data in scientific journals, a percentage of scientific interest was identified. The data were normalized to the interval <0.1>, whereby the maximum detected value for each combination was transformed to the value "1", the value "0" was given as a real zero value. For individual combinations of keywords, the increase and dynamics of the frequency of individual occurrences of keywords were identified using the SLOPE function (1). This function returns the direction of the regression line through the specified points in the y_array and x_array regions. The slope is the vertical distance divided by the horizontal distance between two points on the line and expresses the rate of change along the regression line.

$$SLOPE(known\_y's, known\_x's) \tag{1}$$

where "known_x's" is the sequence of years between which the increase/decrease of values is observed, "known_y's" are the observed values of frequency of occurrence for individual combinations of keywords. The SLOPE function calculates the slope of the regression curve based on formula (2). A linear function (straight line) was used as a regression curve. The values of the last three years were used as data points to determine the current trend; the data intervals for determining the frequency are from September 25 of the previous year to September 24 of the current year; the data is based on the update given by the maximum possible times deadline available for data collection.

$$b = \frac{\sum(x-\bar{x})(y-\bar{y})}{\sum(x-\bar{x})^2} \tag{2}$$

On the basis of the slope, the dynamics of the increase in the value of the frequency of occurrence of the relevant combination in the last three years is determined. Using the direction and the intersection with the Y-axis (INTERCEPT function (3)), the relative distance of the maximum value on the x-axis can then be calculated by the direction shape of the line (4), which identifies the general dynamics over the entire period in which the given combination of key terms can be observed, it indicates, how long the relevant combination of key terms would take to reach the value of the grand total at the current growth rate.

$$a = INTERCEPT(known\_y's, known\_x's) = \bar{y} - \frac{\sum(x-\bar{x})(y-\bar{y})}{\sum(x-\bar{x})^2}\bar{x} = \bar{y} - SLOPE()\bar{x} \tag{3}$$

$$x = = \frac{y-INTERCEPT()}{SLOPE()} \tag{4}$$

4 Results and Discussions

Based on the analyses, it was found that in the Proquest database, the term "social media" (635662 occurrences) is most often represented in the context of the analysed keywords, followed by the term "social networks" (500852) and "globalization" (98433). In the

scientific literature, these terms were mentioned in 90.17% of the total occurrences, 84.07% and 83.06% respectively, the combination "analysis globalization" (83.97%) had a larger percentage share than the term "globalization". If we compare the occurrence in the last year, then the term "Facebook" is in third place in terms of frequency ("social media" - 96756x, "social networks" - 71957x, "Facebook" - 9520x", "globalization" - 8734x). The percentage order remained the same as for the overall values. In the discussion, it is necessary to return to the original nature of social networks, they are a democratic environment for alternative information sharing, which was originally intended to serve as a counterpoint to state-regulated media. Unfortunately, the anonymity and distortion of the meaning of "freedom of expression" creates fertile ground for ideological and political activism that can sometimes fuel violent hateful debates that turn these environments into dangerous and toxic places (Melo Filho et al., 2022). The fact that peer-to-peer structures of social media platforms shape public discourse and increase the likelihood that citizens will be exposed to unregulated, false and harmful content is quite often pointed out in the discussion (Lajevardi et al., 2022). Building on this discussion about freedom of expression, we examined the occurrence of information sources related to the terms "hoax", "globalization" and "anonymity". The term "anonymity" appeared on the "Facebook" platform in 1,173 cases, "hoax" in 843. In "social networks" the frequency was 3,925 and 3,258, "social media" 4,230 and 4,023. It is evident that restrictions on Facebook lead to a smaller proportion of the term "hoax". Furthermore, the term "anonymity" was linked to the term "hate" in 933 cases, the term "hoax" was then linked to "populism and hate" in 30 cases.

Despite the fact that social networks such as YouTube, Facebook, and Twitter have internal regulatory policies regarding hate speech and have signed a Code of Conduct for the Regulation of Unlawful Hate Speech with the European Commission (Alkiviadou, 2019), studies on social networks agree on alarming share hate and misinformation content in these media. The proliferation of hateful content on social media facilitates interactions between various actors, including leaders of armed groups, public officials, and diaspora communities, emerging cross-border identity networks where hateful narratives and conspiracy theories are created, enhanced, and disseminated (Ndahinda & Mugabe, 2022). If we compare disinformation and hateful content and the scope of coverage according to combinations of expressions, then in connection with/without the concept of "globalization" the frequency for "anonymity" is 14538/0, for "hate" 10190/114555, for the combination of "hate and anonymity" 3000 /0, "hate and hoax and populism" 106/0, "hate and populism" 1278/0, for "hoax" 0/14074, "populism" 4855/26055 and for "no information" there are 565137/1202069 occurrences. Research confirms the relevance and extent of the social problem and confirms the need to implement proactive measures (Ramírez-García et al., 2022). The identification of user behaviour in relation to the distribution of information confirms the conclusions mentioned by Olaniran (2022), especially the fact that social networks have evolved into a platform for fake news and propaganda, which reinforce negative and anti-social sentiments. Alarming is the recommendation that appears in several studies that it is necessary to find a way to maintain reasonable dialogues that support democratic principles. As an example of the influence and importance of disinformation, some authors cite the fact that the alternative right group was able to manipulate the election of President Trump, Brexit, or was able to shift public rhetoric (Olaniran, 2022). Currently, these tendencies can be observed in the Russia-Ukraine conflict, or in the opinion pressure on the democratic perception of the Hungarian Prime Minister Orbán. The influence of social networks in the area of the Green Deal and the energy crisis is also indisputable. An analysis of information distribution proved Olaniran's (2022) claim about the degree of manipulability. Analysis of the following group of keywords "populism analysis hoax hate globalization", "populism Facebook analysis hoax

hate globalization", "populism social networks analysis hoax hate globalization" and "populism social media analysis hoax hate globalization" identified 30, 19, 27 and 30 respectively occurrences in the database. If we narrow the selection to scientific publications, then the frequencies are 6,5,4,6. In scientific publications, there was no publication in any group of keywords in the last year, during the previous year 12,9,12,12 publications were published in the entire database, in the scientific literature 1 publication was recorded for all these combinations (Pérez-Curiel & García-Gordillo, 2021), which demonstrates misinformation and hateful reactions in a global environment. This is how our research demonstrates the suitability of targeted keyword mining in publication databases. A significant feature of the current trend of disinformation and the targeted dissemination of a specific type of information (Hoaxes) to targeted groups is the combination with automation, such as robots, where social media becomes a tool for digital forms of propaganda. These forms can be compared to the very known fact of Goebbels propaganda, where disinformation targeted at individuals led to a change of thinking across society, provocateurs played the same role in this propaganda, comparable to today's trolling. A typical sign of social media manipulation is also the targeted distribution of fake news and propaganda (for example, fake stories spread from fake, fictitious or stolen user accounts), which is able to generate more engagement than content from real news sources. The subsequent sharing of false stories has a synergistic effect, where there is not only an avalanche spread, but also the effect that users are not interested in any news that disagreed with or deviated from their accepted assumptions and conclusions (PBS Newshour, 2016). Subsequently, people continue to actively seek out and present unknowingly false information if it supports their opinion spectrum. In this sense, the global marketing of information hoaxes is characterized in particular by the effort to convince with its importance, or by the effort to present shocking information, new dangers. They are also characterized by an effort to convince that the information (warnings about certain forms of danger, typically for example about the harmfulness of the Covid vaccination, about refugees, about the Bolsheviks, about the USA, etc.) is distributed by trustworthy sources, or that the warning comes from trustworthy sources ("WHO warns...", "the government warns..." etc.). Very often in global information marketing it is possible to identify information that is disseminated as an alternative to official information. In this case, it is usually suggested to the recipient that this unofficial version is censored in some form by default, and the recipient is offered "original", uncensored information. This information is characterized by an avalanche-like spread in specific groups. Very often, the information is emotionally tinged ("attacks feelings"). The nature of a hoax is supported by the content of lies and half-truths that an uninitiated person cannot assess with certainty, contains inaccurate, distorting information, purposefully edited half-truths or a mixture of half-truths and lies. Some authors (Shin, 2022) even use the term "social contagion". Also Rasel et al. (2018) states already in 2018 that the spread of aggressive tweets, statuses and comments on the social network is gradually increasing. People use social media as a virtual platform to troll, blame, blaspheme and slander each other. These activities spread hatred between race, religion, etc. Therefore, these comments should be identified and blocked on social media. In this context, we can therefore talk about marketing and management in digital platforms. If we gradually compare the frequencies in relation to the term marketing, we observed occurrences in the combinations "globalization", "globalization Facebook", "globalization social networks" and "globalization social media". The number of occurrences was relatively high for management: 62647 (52035), 4570 (2703), 3386 (26430) and 35824 (28295), the value in parentheses indicates the number of identified references in scientific publications. For marketing, the number of occurrences was 23957 (18746), 2813 (1548), 15000 (10814), 16309 (12017).

Comparing with the previously mentioned data, it can be seen that the combination "marketing-globalization" has a similar number of occurrences as "Facebook" (62647/65555). The identification of relationships and connections is quite complex in social networks, in order to detect suspicious links within user communities, there is a set of classification systems based on the identification of fake profiles, the degree of agreement with the content of shared information, or on the coefficient of mutual clustering and profile information of users (Wani & Jabin, 2022). Profile information helps find similarities between users. A considerable number of studies point to the necessity of identifying hate speech and intensive intervention against such speech. The method of automatic detection of hate speech in posts on social networks is often challenged by the complexity of capturing the context of user expression with potential hateful intent. Senarath & Purohit (2020) note that semantic features can help enrich the contextual representation of word meanings in a social media post for machine learning algorithms. And make a significant contribution to the suppression of hateful and disinformation processes on social networks. We can recommend these trends for the most frequent occurrences of our research: "social media" (635662 occurrences), "social networks" (500852), "Facebook" (65555), "globalization" (98433), "analysis globalization" (81766), "management globalization" (62647), "globalization social media" (49281), "analysis globalization social media" (45,018), "globalization social networks" (43400) and "analysis globalization social networks" (40419). There are also studies that question the importance of misinformation in social media. For example, Allen et al. (2021) states that fake news makes up only 0.15% of Americans' daily media diet. The authors directly state: "Fake news, broadly defined as false or misleading information masquerading as legitimate news, is frequently asserted to be pervasive online with serious consequences for democracy. Using a unique multimode dataset that comprises a nationally representative sample of mobile, desktop, and television consumption, we refute this conventional wisdom".

However, our research and the frequency of published studies on this issue indicate otherwise. There are also studies that rely on the personal responsibility of network users and assume that a combination of implemented security rules in the network and an active civic approach of users (reporting of misinformation and hoaxes, a sense of personal responsibility) will enable the elimination of hate and misinformation in the networks in the future (Gagrcin, 2022). , however, this method is problematic because, as was said in the introduction, the standard truth is not unambiguously declared and can be interpreted differently by different groups. Some authors call for the creation of a formula for moderating content on which platforms and public institutions collaborate, from the field of corporate social responsibility or public diplomacy (Doncel-Martin et al., 2022). the authors analyse, in the case of the European Union, its "Code of conduct to counteract illegal online hate speech", which included the involvement of different social media companies. It is debatable whether the introduction of self-censorship, censorship, or even legislation to determine what is safe content is a democratic practice, as it is nothing more than the introduction of global rules to dictate what is right and what is not. Our analysis did not confirm a trend in the context of the dynamics of publishing the terms "management" and "marketing", which would indicate content moderation from a position of social responsibility. By comparing the slope of the lines for individual occurrences in the given time interval, combinations of terms containing "marketing" and "management" have slopes below the average value (average of 0.152 for the entire database and 0.171 for scientific publications). The combination of "management globalization social media" (0.143 and 0.148), "marketing globalization social media" (0.137 and 0.146) had the highest value. In general, as was said in the introduction, it is very difficult to distinguish between information and disinformation, it is not an exception that information about

disinformation is labelled as disinformation, as happened, for example, in a discussion on the Twitter network with the source O'Brien & Alsmadi (2021).

Conclusion

Some authors (Wani & Jabin, 2022) propose a classification system mapping four basic and easily accessible functions, work(w); education(s); home city (ht) and current city (cc). However, it turns out that mapping is not enough with classic methods of analysis, with cluster analysis, rather it is necessary to apply methods of machine reading, artificial intelligence and knowledge analysis. Our research showed that the scientific publications recorded the greatest dynamics in combinations of keywords, especially "populism social networks analysis hoax hate globalization" (slope of the line 0.250), "populism Facebook analysis" (0.229), "hoax Facebook" (0.223), "populism Facebook" (0.221), "hoax Facebook analysis" (0.220), "populism Facebook analysis globalization" (0.217), "populism social media analysis hate globalization" (0.212), "populism Facebook analysis hate globalization" (0.208) and "populism social networks analysis hate globalization" (0.206). Similarly, if we were to observe how many years we would need under the current dynamics to achieve the same number of published outputs as the current number of all published scientific outputs for the relevant group of keywords, then within five years it would be groups of "hoax" and " populism" in combination with "Facebook" and "social networks", respectively with the keyword "analysis". This fact is alarming, because it points to a significant dynamism and acceleration of the very means of expression that are used for misinformation, attacks, insults and intolerance. It is obvious that an ethical process will have to take place in the environment of digital platforms, but the question is whether the environment of these platforms does not only reflect the image of the current times. The negative bias of the media was also confirmed, giving prominence to a rhetoric of disinformation that overlaps with the theory of populism.

Acknowledgements

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Effects of Inflation on Gastronomic Establishments

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Abstract

Research background: The previous two summers, i.e., the summers of 2020 and 2021, were not very favourable for tourism. According to the media and researchers, the global Covid-19 pandemic has hit tourism the hardest of all industries. After the forced closure of tourist businesses and countries, the war in Ukraine has hit the global economy, bringing many problems to the global world. Currently, the gastronomy sector, as one of the components of the tourism industry, faces not only a lack of qualified labour but also an energy crisis and rising inflation, which fundamentally affect the competitiveness of businesses and the demand for gastronomic services. After the initial positive development after the pandemic, due to inflation, the hospitality services market is once again in trouble, and this development can be liquidated for many businesses.
Purpose of the article: The purpose of this article is to analyse the development of factors that influence the activity of gastronomic services in the Czech Republic, primarily in the context of the development of the price level and then the connection between the development of inflation and the number of visitors to restaurant establishments.
Methods: The research results will be based on the comparison of hard data, which will be processed using mathematical-statistical data. The basis for the analysis and comparison was quarterly data for the period 2019–2022 from the Eurostat database, the Czech Statistical Office, etc. Furthermore, the conclusions will be supported by primary research clarifying attitudes towards restaurant attendance at a time of increasing inflation.
Findings & Value added: Although there is an increase in sales in gastronomy, it is clear that this increase is caused by an increase in prices. Increasing consumer prices in the hospitality industry and the financial burden of meeting basic needs lead to a decrease in demand for restaurant services. The decrease in attendance is also the result of the formation of new habits that were already formed during the global Covid pandemic.

Keywords: *gastronomy; inflation; Czech Republic; demand*

JEL Classification: *C19; L83; P44*

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1 Introduction

After a relatively long period of paralyzing tourism, all restrictions were terminated at the end of 2021 (beginning of the pandemic 11.3.2020 - 5.5.2021 end of the pandemic state of emergency), and tourism (hotel services, gastronomy) could fully resume. The initial increase in restaurant footfall after the end of covid restrictions was partly dampened by the adoption of new behaviour patterns by the clientele. As a result of covid measures, many customers stopped visiting restaurants and started spending more time at home with friends, many of them started preparing food at home, thinking it was better and cheaper or stuck with boxed food. The optimistic outlook for the new start of the economy and tourism was again interrupted by new circumstances; the covid period was replaced by the war in Ukraine and the energy crisis and a dynamically increasing inflation rate. The results of the study by Khana et al. (2022), show that terrorism, which hinders peace and security, the amount of expenditure and rising inflation have a strong impact on the tourism sector. Tourism is very sensitive to economic fluctuations and trends in the world economy. According to the WEF (hereafter World Economic Forum 2019), the top nine global economic risks include: "*asset bubbles; deflation; the failure of a significant financial mechanism or institution; failure/lack of critical infrastructure; fiscal crisis in key economies; high structural unemployment or underemployment; illegal trade; strong energy shock; unmanageable inflation*" (Asgary and Ozdemir (2019). At present, the European market is struggling with rising inflation and energy price shocks (propellants, gas, and electricity). Inflation is an increase in consumer prices, according to Erosa and Ventura (2002) it is a regressive consumption tax. The increase in prices in tourism is caused on the one hand by the demand for tourism; on the other hand, supply inflation pushes tourism prices up. Supply inflation is caused by rising input prices (energy, fuel, etc.), seasonality or inelasticity of supply.

2 Research literature

The issue of the impact of inflation on restaurant facilities was addressed by Uddin and colleagues (2020), the authors' group indicated that the American restaurant sector responds to shocks from food price fluctuations, food price fluctuations will undermine the performance of the restaurant sector and have homogeneous effects on its performance. They state that overall inflation may pose less of a risk to the restaurant sector from a customer perspective than fluctuations in food prices. According to Nakamura (2022), an increase in inflation leads to a loss of welfare, studies show that inflation affects people on the poverty line and the middle class the most, which will lead to the possible collapse of many restaurants In the event that inflation continues to rise, it may mean a constant increase in prices, which will lead to the denial of goods that are not absolutely necessary (accommodation, vacations, and other expendable goods). A similar development of the decline in tourism was manifested in connection with the financial crisis of 2007, when there were fears of a recession, the rise in fuel prices, and rising inflation led to a reduction. Research confirms that the effects of inflation on catering services are part of the effects of inflation on services in general. When analysing dining in restaurants, 55.41% of people said that the price of food is the main factor before the quality of restaurant service. This shows that inflation has led people to emphasize the price of food over the type of cuisine, novelty, and specific menu item. In general, 53.50% of the respondents felt the need to switch to lower-quality foods due to high prices. This shows that inflation has caused people to place a high priority on the price of food over its quality. The authors compare their results with the Nielsen Inflation Survey, which assesses the impact of inflation on the middle class around the world. In this survey, 85% of the respondents said that rising costs

have affected their choice of food products, and many said that it affects spending on activities such as dining, snacks and entertainment. Based on a questionnaire survey, Asgary and Ozdemir (2019) stated that respondents consider the economic threats of tourism with serious impacts of uncontrolled inflation, strong energy shocks and fiscal problems in key economies; from a geopolitical point of view, it is a global conflict with regional consequences and a failure of governance, which are the focus of economic threats. Research on factors affecting the sustainability in BRI countries identified a positive relationship between sustainability and tourism, per capita income (closer to Iftikhar et al., 2022), and a negative relationship between sustainability and inflation in both short and long term. It is obvious that the consumption of the population is one of the important factors of sustainability; the level of income and the price level determine consumption. It is not possible to look at inflation only from the perspective of customer priorities (price of food, price of services, purchasing power per capita). It is necessary to see that an important factor for the use of the service (eating in a restaurant facility) is the necessary existence of this service, i.e., the sustainability of the service itself, i.e., the sustainability of the restaurant operation. From this perspective, Kim et al. (2019) investigated mergers and acquisitions of restaurants and accommodation establishments, based on 16 macroeconomic factors, the authors showed that inflation (along with the factors "total activity", "market value", "cost of debt", etc.) significantly affected the frequency of deals in the segment hospitality. From the customer's point of view, they confirm the fact that restaurant establishments can undergo restructuring in times of inflation and maintain an acceptable price level of services for the customer in the event that inflation is at an acceptable level for both the customer and the operator. It is necessary to see that an important factor for the use of the service (eating in a restaurant facility) is the necessary existence of this service, i.e. the sustainability of the service itself, i.e. the sustainability of the restaurant operation.

3 Data and Method

The aim of the contribution was to analyse the influence of current economic events on the development of gastronomic services. Above all, this is about the development of inflation. The data for the preparation of the article were obtained from a search of the professional literature and the database of the Czech Statistical Office (Public Database CSO), as well as from the database of the Czech National Bank (ARAD, CNB). Research results are based on a descriptive analysis of quarterly year-on-year changes from 2019 to 2022. Due to the availability of data, the time series ends in July 2022. The relationship analysis was then determined based on the Spearman correlation coefficient (1), which allows one to analyse the link of data that do not have Student distribution. Correlation analysis was performed using the SPSS software tool. Acceptance of the relationship is determined on the basis of the p-value, if the p-value is less than the significance level of 0.05, then the correlation coefficient can be considered statistically significant. The correlation coefficient takes on the value of the interval $\langle -1; 1 \rangle$. The value of the correlation coefficient then indicates the strength of the relationship, where values up to $\left|0.7\right|$ indicate a strong relationship, on the contrary, values up to $\left|0.5\right|$ indicate a medium strength of the relationship, and coefficients smaller than $\left|0.5\right|$ represent weak or no linear dependencies. If there is no relationship between the variables, then it is impossible to deny the relationship, using correlation analysis we accept the statement that there is a negative (negative value of the correlation coefficient) or positive (positive correlation coefficient) linear relationship between the variables (closer Janse, 2021). Furthermore, the research conclusions were expanded to include surveys of attitudes toward the attendance of restaurant establishments

depending on the increase in the price level, which were carried out by renowned companies and by our own preliminary research, in which 50 respondents.

$$r_s = 1 - \frac{6\sum_{i=1}^{n} d_{i=1}^{n}}{n(n^2-1)} = \frac{6\sum_{i=1}^{n}(x_i y_i - n\overline{x_i y_i})}{n(n^2-1)} \tag{1}$$

Where: rs – correlation coefficient, n – number of observations, sx/sy standard deviation, x, y = variables

4 Results

As can be seen from the graph of sales in gastronomy and catering, the year-over-year development (SOPR =100) records an increase in sales. The restart of Czech gastronomy was recorded in the second quarter of 2021, specifically in April 2021. This increase was mainly associated with the revival of the economy, and the end of restrictions on restaurant establishments. Hunger for social life and long isolation caused the return of guests to restaurant facilities. The rise in prices in gastronomy was driven by demand (Hradil, 2022). Accordingly, the new trends identified above manifested themselves here. At the end of 2021 and the beginning of 2022, the situation in restaurant establishments began to improve, restaurants recorded an increase in visitors, mainly guests went to standard restaurants and beer food establishments (49%), followed by classic pubs and pubs (41%), and the lowest increase was then cafes and café bars (35%). The situation in the restaurant segment was better than in hotel services.

However, the increase in sales in recent quarters is more associated with price increases on the supply side than with an increase in demand; inflationary pressures cause this from energy and food prices. A similar development was noted by the American research of Rizwan (2021), when it was found that with the growth of inflation there was a reduction in the number of items on receipts (from 3.8 to 3.5); however, sales in gastronomy recorded growth.
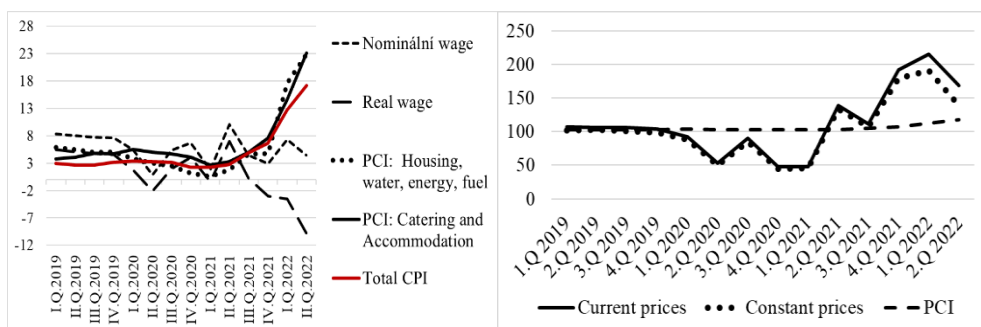
Figure 9. Development of the economic situation of households in the Czech Republic (left) and catering and hospitality sales, inflation rate (right)

Source: own processing, data Public Database CSO (2022), CNB ARAD (2022)

Nevertheless, it is necessary to state that the growth of prices in gastronomy is not as fast as, for example, the growth of fuel, and the prices of gastronomic services are growing more slowly than the prices of accommodation services. However, Czech inflation is currently the highest since 1993 (Inflation - 2022, rate of inflation and its development in the Czech Republic - maximum, 2022, 1993 = 18.2%). According to the Hloch report (2022), although the number of customers was increasing, the beginning of 2022 was already associated with a decrease in sales in gastronomy. The increased number of

customers did not lead to increases in sales, many customers began to reduce spending, and the decline in sales between 4Q 2021/1Q2022 was up to 3%. Today, many clients give priority to quality and quantity, there are more customers who order only the main meal and forego soup and dessert (TTG, 2022).

The main cause of the decrease in sales in restaurants is the cautious behaviour of visitors, who are forced to face the current development of inflation, especially the rise in energy and food prices, and the rise in mortgage interest rates, which greatly drain the financial budgets of households. At the expense of other goods, the reason being the gradual increase in the price of gastronomic services. Another serious factor limiting gastronomic services is the development of real wages of residents, even if there is an annual increase in wages, this is an increase in nominal wages, and real wages are decreasing year-on-year (see Figure 1). , 2Q/2022-2021: drop in real wages by approx. 10%). The positive development in gastronomy is not supported by the situation where more and more households in the Czech Republic fall to the poverty line due to the economy. Since 2019, the level of material poverty in the Czech Republic has almost doubled (Košlerová, 2022) and we can state that if the government's decisions are not preserved, poverty in the Czech Republic will continue to deepen.

Based on the correlation analysis (Table 1), it is clear that a decrease in real wages (r_s = 0.485, p=0.08) will result in a decrease in sales in hospitality and hospitality. The correlation coefficient did not confirm a linear relationship. It was also not confirmed between the year-on-year change in sales in catering services and hospitality and the year-on-year growth in nominal wages, the year-on-year change in sales in gastronomy, and the year-on-year growth in sales price increase, Telephone products, Household appliances, Food and beverages (alcoholic and non-alcoholic), and Food and hospitality. Reverse binding (r_s = -0.708 p =0,005) was "education", it is replaced by the fact that in the event of an increase in the possible costs of education, citizens will limit their visits to the restaurant. On the contrary, sales growth is related to inflation growth, linear links were also confirmed within the growth of the items listed in table (1).The year-on-year increase (inflation rate) is most pronounced in transport (2Q/2022, 124%), which also showed the highest correlation value (r_s = 0.86 p = 0.001). It is obvious that if the prices of the products listed below rise due to the influence of gastronomy as a multidisciplinary industry, the costs of companies will also increase, which will be reflected in the prices of gastronomic services.

Table 1. Results of the correlation analysis of the relationship between sales and year-on-year inflation of selected consumer prices

	Inflation rate	Housing, energy, water, gas	Health
Coefficient	0,646*	0,675**	0,576*
p-value	0,013	0,008	0,031
	Transport	Education	Other
Coefficient	0,701**	-0,708**	0,602*
p-value	0,005	0,005	0,023

Source: own processing

4.1 Customer attitudes towards the visitation of gastronomic establishments at a time of increasing inflation

The problem with price increases is no longer only low-income groups, and single mothers, but even now the lower middle class also suffers from financial problems (CT24, 2022). The fact that the situation for Czech gastronomic businesses will not improve in any way is confirmed by a questionnaire survey by Generali Investment (CT24, 2022), and Portal Seznam.cz also came up with similar results (1,034 respondents, Czechs and inflation,

2022). Both studies indicate that with an increase in the price of common necessities, the inhabitants of the Czech Republic will reduce their expenses, primarily by limiting visits to gastronomic establishments (see Table 2). Likewise, the Prima STEM survey for CNN NEWS states that high prices discourage up to 7 out of 10 potential visitors from visiting a restaurant (Idnes, 2022).

Table 2. The impact of inflation on the consumption of services by households

Generali Investment *	List of News (How they see their situation at the time of rising inflation) *	STEM*:
<u>Visits to restaurants</u> **Buying clothes** **Smoking and alcohol** **Holiday** **Grocery shopping** **Culture** **Presents** **Sport**	<u>Visits to restaurants or cultural events (52%)</u> Buying clothes (46%) Grocery shopping (41%) Heating (37%) Transportation expenses (26%) They will not feel the effects of inflation (24%) Call expenses, internet (12%) Will have problems repaying the mortgage, loans (5%) Will need to borrow funds (2%)	Shopping for groceries (69%) <u>Restaurant visits (68%)</u> Energy consumption (66%) Buying clothes (65%) Sports and culture (65%)

Source: own processing, CT24 (2022), Češi a inflace, (2022), CNN Prima News, (2022). * Research question: Which areas will the citizens of the Czech Republic restrict?

Our own research shows similar results, where up to 80% of people have reduced their visits (50% definitely agree, 29% "agree" with the statement that they have reduced their visits to restaurants), and only 9% did not have to reduce the frequency of visits anyway, and 11% took a neutral position on the matter. Of the 80% of the respondents who reduced restaurant visits, only 7.1% of the respondents remained within the original range of drink consumption, and 57% were inclined to limit food consumption. Of those who have already reduced attendance continuously, they have reduced restaurant attendance due to business closure during the pandemic (8.9% of respondents).

5 Discussion and Conclusion

Restrictions on restaurant operations are clearly related to a decrease in spending on consumer goods during the period of rising prices (Ryngaert, 2022). A decrease in the number of clients, a decrease in sales, and an increase in operating costs will clearly lead to a decline of hospitality and hospitality operations. The issue of effective business operations is addressed by a number of authors, e.g. in 2012, Munjal and Sharma (2012) published a study where they draw attention to the need to look for mechanisms that will maintain revenue growth in the restaurant services sector. At the same time, the authors point out that this need is more pronounced in the segment of cheap restaurants. The authors recommend innovations and innovative practices for the acquisition of beverages, food, and related raw materials as a tool for the survival of the analysed market segment. The authors directly state: "*The research helps owners and operators draw on innovative practices and approaches used to achieve better fiscal performance when it comes to managing food costs without adversely impacting the customer experience and overall business profitability*".

For the sustainability of customers, it is therefore necessary to look for new strategies and pricing practices that the customer will be willing to accept. For example, Webb et al. (2022) directly suggest that in order to retain the customer it is necessary to differentiate the price offer and the service offer, the authors propose the application of the Priority Mixed Bundle (PMB) strategy, which solves the possibility of customer segmentation, price

differentiation and price discrimination (restriction of part services to less solvent customers). Customers can make reservations if they are willing to commit to dining on the prix fixe menu, while patrons can dine A la Carte. In this way, in the event of a decrease in the customer's solvency due to inflation, acceptable services can still be provided.

In a number of studies, it can be traced that not only the quality of services but also the so-called price fairness can be an important factor in maintaining attendance. Along with food quality, service quality (employee service quality), and physical environment quality, these are important factors for customer retention (Singh, 2022). The emphasis on the fairness of prices and the quality of services aimed at increasing customer satisfaction is also stated by Ahmed et al. (2022), who also mention the term "customer loyalty" in this context, this factor can play a significant role in the customer's willingness to use restaurant services even in times of inflation.

Acknowledgments

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Looking forward: Digital transformation as a path to resilience

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Abstract

Research background: This growing wave of digital transformation gains more and more strength, especially with regard to accounting practice and research. The prestigious literature rarely provides evidence of the impact of digital transformation on accounting practice and research in an emerging economy.

Purpose of the article: In this article, we tested a research framework capable of capturing the relationships between digital transformation and the resilience of accounting practices and research in an emerging economy, such as Brazil, during the COVID 19 pandemic.

Methods: Primary survey-based data were collected from multinational companies and federal public universities. The survey was applied to 41 experts with experience in accounting and 41 researchers from Brazilian federal public universities. Data were treated using data mining techniques. Spearman's correlation analysis was used to show the effects of digital transformation (dynamic capabilities) for resilience research and practice in accounting. The R software was used to perform the tests.

Findings & Value added: The results of our research are as follows: (i) the resilience of accounting research and practice has been affected by digital transformation in the COVID 19 pandemic period; (ii) planning and problem solving skills were the most relevant for accounting practice in multinational companies; (iii) planning and learning capabilities were the most relevant for accounting research. Finally, the results can serve as a guide to improve the performance of accounting practices and research from digital transformation.

Keywords: *digital transformation; accounting practice and research; resilience*

JEL Classification: *A11; A14; B16*

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1 Introduction

The COVID-19 pandemic took the world by surprise in early 2020, and the economy continues to experience a substantial slowdown, with implications for organizations. These abrupt changes (such as the one caused by COVID 19) helped to accelerate the processes of digital transformation of organizations and their network (Queiroz and Fosso Wamba, 2021) by seeking to develop resources and capabilities to enable and improve the resilience of organizations. In light of the unprecedented global crisis caused by the COVID-19 pandemic, resilient organizations are the most likely to transition into the post-COVID era (Hadjielias et.al., 2022). Business research and practices have been highlighted in the mainstream literature as highly desirable because it addresses the urgency of investigating vulnerability situations. In this context, accounting, as a mechanism providing information to different stakeholders, was one of the activities that most suffered the impacts of new technologies since the fourth industrial revolution (Geerts et. al., 2013). These new technologies favour greater accuracy and interpretation of financial (Alhtaybat and von Alberti-Alhtaybat, 2018), social and environmental information to support the decision-making process in organizations. In this sense, the growing wave of digital transformation is increasingly gaining strength, especially with regard to accounting practice and research.

Digital technologies (blockchain, IoT, Big Data, AI, etc.) are relevant enablers in this process because they can substantially influence business performance. In addition, the literature indicates the positive effects of digital transformation to add value to businesses (Oliveira and Trento, 2021). Gong and Ribiere (2021) included dynamic capabilities as a determining mechanism in defining digital transformation. Thus, he argues that the results of accounting practices and research can be improved through dynamic capabilities. And this is relevant because it can enhance the quality of information provided by accounting to support the decision-making process (customers, shareholders, suppliers, government and other stakeholders). Specifically, this study relates the dynamic capabilities and performance of accounting practices in multinational companies and accounting research performance in Brazilian public universities. These double collaborative results can enhance the role of accounting, guiding organizations in their best performance: economic, social and environmental.

Thus, there is an urgency to identify the most relevant dynamic capabilities to make accounting practice and research more resilient in their purposes, such as creating value for customers and other stakeholders (shareholders, suppliers, investors, communities, governments, etc.). Therefore, this research aims to highlight the main impacts of digital transformation for the resilience of accounting practices of multinational companies from different sectors and for accounting research in Brazilian public universities. There are few studies that address the effects of digital transformations in the field of accounting (Al-Htaybat et. al., 2018; Geerts et.al., 2013; Burritt and Christ, 2019). This study is original and presents contributions: a) it improves the understanding of priorities of dynamic capabilities to achieve the resilience of accounting practices and, with that, improve the quality of information for decision makers; b) improves understanding of dynamic capabilities priorities for better accounting research performance; c) improves the understanding of the priorities of dynamic capabilities necessary for managers to focus their efforts on enhancing the role of accounting as a facilitating mechanism for decision-making in organizations; d) improves the importance of understanding the aligned and collaborative role between universities (research) and Brazilian multinational companies (accounting practice) to achieve more resilient performance; e) allows advancing the body of knowledge in the field of accounting practice and research. This article is structured according to the following sections: Digital transformation, dynamic capabilities and resilience ; methodology, results and analysis; and conclusions.

2 Digital transformation, dynamic capabilities and resilience

The prestigious literature highlights some definitions of digital transformation (Ashmarina et al., 2020). However, its meaning lacks an exact description (Haffke, Kalgovas and Benlian, 2016, 2017.) However, this transformation is usually defined by researchers as the organization revolution driven by the development of digital technology changing the way business is conducted. Reddy and Reinartz (2017) suggest that digital transformation (DT) can be conceptualized under two strands of literature, the first refers to the traditional sense that relates digital transformation to the technological advancement of computers and the internet to carry out a job efficient and effective, the second approaches the broader knowledge of the transformation from the point of view of organizational performance in order to analyse the impacts of its application through the way in which they started to carry out their activities, observing the generation of their wealth by through this process. As a complement, this process is denoted as the integration of digital technology and enterprise resources in a digital economy (Liu et. al., 2011) outlining a new way of carrying out activities that provide sources of value (Bumann and Peter, 2019) .

Gong and Ribiere (2021) unified the concept of digital transformation including technologies; human, knowledge and financial resources; digital and dynamic capabilities. From this definition, this study adopts dynamic capabilities as the definition of digital transformation. According to Teece, Pisano and Shuen (1997), dynamic capabilities is the ability to integrate, configure and build a series of resources and external competences to deal with sudden changes in the environment, being classified as an "intensely entrepreneurial" dimension because in addition to adapt, companies shape themselves through innovations to business ecosystems, being subdivided into 03 processes (Teece, 2007): ability to detect and shape threats and opportunities (Sensing), ability to enjoy (take advantage of) the opportunities found (Seizing) and the Ability to Maintain Competitiveness through Transforming the Resource Base (Transforming). For Gong and Ribiere (2021), dynamic capabilities can be considered strategic assets to initiate or accelerate the digital transformation journey, when they can be leveraged, reused, combined and safely shared with stakeholders. This study adopted the definition of digital transformation proposed by Gong and Ribiere (2021), who consider technologies; human, knowledge and financial resources; and dynamic and digital capabilities as an integral part of this definition. This study adopts dynamic capabilities as a definition for digital transformation. That is, this study partially adopts the definition of Gong and Rubiere (2021).

The dynamic capabilities adopted in this research are as follows (Teece, 2018; Day and Schoemaker, 2016; Teece, Pisano and Shuen, 1997): adaptation, problem solving, entrepreneurship, innovation, planning, critical thinking, leadership, uncertainty management, strategy, conflict management, learning and digital. In this way, we believe that digital transformation, represented by dynamic capabilities. can positively affect the resilience of research and accounting practice. Resilience can be defined as the ability of socioecological systems to absorb disturbances and reorganize in the face of change (Kennedy, Martina, and Linnernluecke, 2022). Academic resilience research has the potential to improve the learning outcomes of students at risk of school failure, but there is no standard approach to measuring it (Rudd et.al., 2021). The pressures brought on by the global COVID-19 pandemic in 2020 have amplified the importance of academic resilience and highlight the importance of a shared view of academic experiences (Cohrssen et.al., 2022). Responses to academic papers in this context have received little research attention, despite their universality during the pandemic. Failing to recognize or "invisible" the roles and needs of academics during a pandemic is a significant concern (Cohrssen et.al., 2022).

Firm-level resilience is associated with the ability of organizations to respond and recover faster (Kennedy, Martina, and Linnernluecke, 2022).

Thus, companies are increasingly trying to increase their ability to improve organizational resilience in companies and respond to crises, as was the case with the COVID 19 pandemic (Aksay and Şendoğdu, 2022). The concept of resilience suggests the ability to emerge stronger from difficulties (Bryce et al., 2020). In summary, the term organizational resilience has been used to explain the organization's ability to respond and recover quickly against unexpected environmental turmoil and events such as economic crises, epidemics and disasters (Denyer, 2017; Aksay and Şendoğdu, 2022). In this study, the term resilience is represented by global performance (Khalil and Belitski, 2020; Makkonen et.al., 2014) for research in federal public universities and accounting practice in companies. The dominant literature (Akpan, Johnny, and Sylva, 2021) highlights that dynamic capabilities are positively correlated with measures of organizational resilience. Thus, we believe that dynamic capabilities increase resilience in companies and in accounting research. Thus, we present the following hypothesis:

H: Dynamic capabilities positively impact the performance of accounting research and practice.

3 Methodology

A systematic literature review was carried out to identify the definition of digital transformation. As highlighted in the literature review, this study adopts the proposed definition by Gong and Ribiere (2021), in which the authors dedicated their investigation to finding a definition for digital transformation. 134 definitions for digital transformation were raised and from these results, the authors presented the following unified definition for digital transformation: A fundamental change process, made possible by the innovative use of digital technologies accompanied by the strategic leverage of key resources and capabilities, with the objective of radically improving an entity and redefining its value proposition for its stakeholders (An entity can be: an organization, a business network, an industry or society). From this definition, the approach of this research was based exclusively on dynamic capabilities. The next step was to select the main dynamic capabilities from the main literatures (Teece, 2018; Warner and Wager, 2019, Helfat and Winter, 2011). Finally, in the literature (Khalil and Belitski, 2020; Makkonen et.al., 2014; Day and Schoemaker, 2016, Schilke, 2014) the different metrics for evaluating capabilities performance were identified. This study was dedicated to global performance for both research and accounting business practice purposes.

Once the research was carried out based on the referenced literature, the next step was to prepare the questionnaire to carry out a field research aimed at evaluating the effects of the independent variables (dynamic capabilities) in relation to the dependent variables (global performance) through of consultation to respondents. Thus, the questionnaire was prepared based on the literature, in which capacities and performance were integral parts of the aforementioned data collection instrument. The questionnaire was structured in two parts: general information and technical information regarding the effects of abilities on performance. It is worth mentioning that we sought to maintain the objectivity and simplicity of the research instrument, which had, in its characteristics, being semi-open and having mostly objective questions. In summary, the data collection instruments were systematized in two sections: The first section in both questionnaires was intended for the collection of contact data of the professionals of the companies and researchers and general information, and the second section was responsible for the evaluation of the effects of Digital Capabilities for Research and Practice in Accounting, containing 12 questions asked using the Likert scale, as mentioned above, in addition to a discursive question regarding

the impacts of digital transformation on the work/research environment. Regarding general information for professionals in the accounting practice, the following were requested: sector of activity, position in the company in which they work, time of experience in the company, size of the company in which they work, company name, state and municipality where the entity is located. For the questionnaire carried out with PhD professors, an optional discursive question was added so that these professionals could discuss their process of adapting to technological advances in the midst of the Covid-19 pandemic.

Regarding general information for researchers, the following information was requested: Maximum degree, area of training, time of work at the university as a researcher, last research developed and state and municipality in which it operates. Before sending it to the professionals, three (03) pre-tests were carried out in order to eliminate inconsistencies identified by the respondents. Soon after this procedure, two invitation letters were prepared and sent to the researchers of the HEIs (Universities) and also to the professionals who work in the accounting activities of the Companies. Mappings were carried out to facilitate the identification of professionals who work in accounting practice and also of professors involved with research at HEIs. Thus, two field surveys were applied using the scalar-type questionnaire (Likert), with degrees from one (1) to five (5), with one (1) as the lowest degree of impact and five (5) the highest degree. of impact. Thus, at first, data collection was carried out from the professionals of the companies using the professional network LinkedIn, in which the professionals were selected by technical-scientific criteria, with vast experience and extensive knowledge about this research object. In this way, questionnaires were submitted to 280 experts during the months of November (2021), December (2021) and January (2022). Of this total, 41 questionnaires were answered. In order to obtain a greater number of consistent responses, the questionnaires were sent back three times to the experts who did not provide any feedback. Therefore, professionals in the accounting area such as: Accountants, Auditors, Controllers, Accounting Data Analysts and Accounting Managers, etc., who work in the state of Rio de Janeiro, São Paulo and Rio Grande do Sul in small, medium and large, with a view to evaluating the effects of dynamic capabilities in relation to business performance.

Data collection from HEI researchers was carried out with the objective of verifying the influence of dynamic capabilities in relation to research performance, it was developed through various contacts with federal universities. We emphasize that these professionals were also selected through technical-scientific criteria, with vast experience and extensive knowledge about this research object. Questionnaires were submitted to 453 researchers during the months of November (2021), December (2021) and January (2022). A total of 49 answered instruments were returned, that is, returns were obtained from researchers from 10 federal public universities, most of them PhD professors who have been working in the research area for more than 6 years, trained in Applied Social Sciences. Questionnaires were resubmitted three times to experts who did not provide any feedback. Soon after this procedure, data from the characteristics of the sample obtained using descriptive statistics and Spearman's correlation analysis were analysed.

4 Results and Analysis

In this section, the results obtained through the application of field research and the underlying analysis of the study will be presented, aiming to evaluate the impact of digital transformation from the perspective of independent and dependent variables, as described in the methodological procedures section. Thus, at first, the opinions collected from accounting professionals and researchers from higher education institutions will be exposed and then the results will be presented and analysed. These procedures are detailed below.

4.1 Analysis of the effects of digital capabilities for accounting practice

4.1.1 Presentation of general information of accounting professionals

Through the information collected by the professionals through the elaborated questionnaire, it was possible to obtain consistent and detailed results. The provision of this information was important to support and support the results of the present research, considering that these parameters demonstrate the professional competence of the participants, being able to determine a level of coherence and consistency of the answers provided. The data on the characteristics of the sample obtained are detailed below (Table 1).

Table 1. Presentation of General Information for Accounting Professionals.

Accounting Professionals (n = 41)	Frequency	(%)
Company size		
Small	24	58,54
Medium	10	24,39
Great	7	17,07
Business Sector		
Financial	20	48,78
Accounting	8	19,51
Audit	6	14,63
Board of Directors	4	9,76
Automation	3	7,32
Position in the company		
Counter	26	63,41
CEO	8	19,51
Controller	5	12,2
Accounting Data Analyst	1	2,44
Tax manager	1	2,44
Time of Operation in the Company		
More than 10 years	9	21,95
5 to 10 years	7	17,07
1 to 5 years	15	36,59
Up to 1 year	10	24,39
Brazilian State	37	90,24
Rio de Janeiro	3	7,32
Sao Paulo	1	2,44

When performing a detailed analysis of the information received by accounting professionals through the online questionnaire, it was noted that:

- Regarding business size, it was found that most accounting professionals are part of small companies, corresponding to 58.54%, with 24.39% belonging to medium-sized companies and 17.07% belonging to companies for the most part, this being the smallest group of respondents to this questionnaire.
- Regarding the sector of activity, it was observed that 48.78% of respondents belong to the financial sector, 19.51% are from the accounting sector, 14.63% refer to the audit sector, 9.76% are from the management sector and 7.32% are part of the automation sector. Thus, most of these professionals are from the financial sector and the minority from the automation sector.
- Regarding the occupation, it is possible to affirm that the respondents are accountants (63.41%), CEO (19.51%), auditors (12.20%), accounting data analysts (2.44%) and tax managers (2.44%). Thus, we can conclude that the majority are accountants and the minority are accounting data analysts and tax managers.

- From the point of view of time working in the company, it was found that 36.59% are from 1 to 5 years in the company they currently work, however 24.39% are less than 1 year, 21.95% are more than 10 years and 17.07% are between 5 and 10 years.
- Referring to the state in which they live, it was observed that the largest number of respondents are from Rio de Janeiro (90.24%), but we obtained responses from people who live in São Paulo (7.32%) and Rio Grande do Sul (2.44%).

Thus, based on the responses of the 41 respondents and the parameters indicated in Table 1, the vast majority of accounting professionals who responded to the questionnaire work in small companies, work in the financial sector, are accountants, practice their duties from 1 to 5 years old and are from Rio de Janeiro. The parameters analysed showed that these professionals are highly qualified to provide coherent and consistent information, providing a basis and support for the results obtained in this research.

4.2 Analysis of the effects of digital capabilities for accounting research

4.2.1 Presentation of the researchers' general information

The objective of this topic was to identify, through the developed form, general information about the respondents. In this way, educators from Federal Public Universities were asked to provide some specific data for a robust and relevant analysis, since it is necessary that the respondents have knowledge about the subject addressed in order to demonstrate that the results achieved are reliable. Thus, Table 2 highlights general information about the researchers.

Table 2. General Information of Researchers.

Researchers (n = 49)	Frequency	(%)
Degree		
Doctorate degree	32	65,31
Master's degree	11	22,45
Post doctoral	6	12,24
Training		
Applied Social Sciences	47	95,92
engineering	1	2,04
Human Sciences	1	2,04
Time of experience as a Researcher		
more than 10 years	29	59,18
6 to 10 years	15	30,61
1 to 5 years	4	8,16
up to 1 year	1	2,04
Brazilian State		
Rio de Janeiro	16	32,65
Federal District	6	12,24
Holy Spirit	6	12,24
Minas Gerais	5	10,20
Paraná	3	6,12
Paraíba	3	6,12
Sao Paulo	3	6,12
Bahia	3	6,12
Rio Grande do Sul	2	4,08
Santa Catarina	2	4,08

When examining the responses received by the researchers, using an online questionnaire, it was noted that:

- Based on the degree of accounting researchers, it was found that most have a doctorate degree as the highest degree, which corresponds to 65.31%, with 22.45% composed of researchers who have a master's degree and 12.24% belonging to the respondents, who hold a postdoctoral degree, which is the smallest group in this questionnaire.
- Regarding training, it was observed that 95.92% of respondents are trained in applied social sciences, 2.04% belong to researchers who graduated in the area of engineering and 2.04% refer to those trained in the area of human sciences. Thus, most of these professionals graduated in applied social sciences and the minority in the human sciences.
- From the point of view of time of experience as a researcher, it was found that 59.18% have been working as researchers for more than 10 years, however 30.61% are from 6 to 10 years, 8.16% are from 1 to 5 years and 2.04% are less than 1 year conducting research.
- Referring to the state in which they live, it was observed that the largest number of respondents is from Rio de Janeiro (32.65%), but we obtained responses from people who live in the Federal District (12.24%), in Espírito Santo. Santo (12.24%), in Minas Gerais (10.20%), in Paraná (6.12%), in Paraíba (6.12%), in São Paulo (6.12%), in Bahia (6 .12%), in Rio Grande do Sul (4.08%) and in Santa Catarina (4.08%).

Based on the responses of the 49 respondents and the parameters highlighted in Table 2, the vast majority of accounting professionals who responded to the questionnaire are PhDs, trained in applied social sciences and have worked as researchers for more than 10 years in the institution in which they operate.

4.3 Evaluation of the performance of results

Table 3 shows the robustness test results using descriptive statistics for the impacts of dynamic capabilities on the resilience (performance) of research and accounting practice. A legend is presented for the dynamic capabilities – LEGEND: C1-adaptation, C2 - problems solution, C3 - entrepreneurship, C4 - innovation, C5 - planning, C6 - critical thinking, C7 - leadership, C8 - uncertainty management, C9 - conflict management, C10 - organizational, C11 - learning, and C12 - digital.

Table 3. Descriptive results of dynamic capabilities and resilience in accounting research.

Dynamics capabilities (N = 49)	M	DP	α
Learning	4.0	0.9	0.8
Planning	3.9	1.0	0.8
Critical thinking Entrepreneurship	3.7	0.9	0.8
Problems solution	3.6	0.9	0.7
Innovation	3.5	0.9	0.7
Organizational	3.4	0.9	0.8
Digital	3.2	1.0	0.8
Adaptation	3.2	1.0	0.7
Leadership	3.1	1.1	0.8
Uncertainty management	3.0	1.1	0.8
Conflict management	3.0	0.9	0.8
Entrepreneurship	2.9	1.0	0.9

The results indicated in Table 3 show that capacities have a moderately strong impact on the resilience of accounting research, with emphasis on learning (M=4.0) and planning (M=3.9) capacities. The internal consistency of the questionnaire, measured by Cronbach's alpha, was substantial (M=0.78) as indicated by Landis and Koch (1977). In parallel with the calculations performed for the mean and standard deviation, the Shapiro Wilk test was performed to verify the existence of a normal distribution of the data. In case of statistical

significance, the null hypothesis (H0) is rejected and there is evidence that the tested data are not from a normally distributed population. For this technique, all capacities had their null hypothesis rejected ($p < 0.05$) and do not show a normally distributed population. In this way, it was possible to apply the Spearman correlation test. Table 4 shows the results of correlations (Spearman's coefficient) of dynamic capabilities and research resilience.

Table 4. Correlation coefficient (Spearman) between capabilities and resilience in accounting research

Capabilities	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11
C2	0,7*										
C3	0,5*	0,7*									
C4	0,4*	0,5*	0,6*								
C5	0,5*	0,5*	0,5*	0,8*							
C6	0,6*	0,6*	0,5*	0,6*	0,8*						
C7	0,7*	0,5*	0,4*	0,4*	0,4*	0,6*					
C8	0,3*	0,4*	0,2*	0,4*	0,4*	0,4*	0,4*				
C9	0,4*	0,3*	0,1	0,3*	0,3*	0,3*	0,5*	0,4*			
C10	0,4*	0,1	0,3	0,2	0,2*	0,3*	0,5*	0,3*	0,5*		
C11	0,6*	0,5*	0,4*	0,2*	0,3*	0,5*	0,5*	0,2*	0,4*	0,5*	
C12	0,5*	0,4*	0,4*	0,3*	0,3*	0,4*	0,4*	0,3*	0,5*	0,4*	0,6*

Note: * significant correlation ($p < 0.05$)

Most correlations are positive ($p>0$) and statistically significant ($p<0.05$) (Table 2); that is, when one of the capabilities increases its value, the other capability also increases in the same proportion. The strongest positive and significant correlations are between: C4 - innovation and C5 - planning; C5 - planning and C6 - critical thinking; C1-adaptation and C2 - problems solution; C1-adaptation and C7 - leadership; C2 - problems solution and C3 - Entrepreneurship. Some capabilities are positive, but not significant ($p>0.05$): C2 - problems solution and C10 - organizational; C3 - entrepreneurship and C9 - conflict management; C3 - entrepreneurship and C10 - organizational; C4 - innovation and C10 - organizational. Table 5 shows the descriptive results: mean (M), standard deviation (SD) and Cronbach's alpha internal consistency coefficient (α) of capabilities and resilience in accounting practices.

Table 5. Descriptive results of capabilities and resilience in accounting practices

Capabilities (N = 41)	M	DP	α
Planning	4,1	1,1	0,9
Problems solution	4	1	0,8
Adaptation	3,8	0,9	0,8
Learning	3,7	1	0,8
Digital	3,6	1	0,9
Innovation	3,6	1,1	0,8
Organizational	3,5	1	0,9
Leadership	3,4	1	0,8
Critical thinking	3,4	0,9	0,9
Entrepreneurship	3,2	1,1	0,9
Uncertainty management	3,1	1,1	0,9
Conflict management	3	1	0,8

The results highlighted in Table 5 show that planning (M=4.1) and problem solving (M=4.0) capabilities are the most influential for the resilience of accounting practices. The internal consistency of the questionnaire is greater than $\alpha > 0.8$, which is considered substantial (Landis and Koch, 1977).

Table 6. Correlation coefficient (Spearman) between dynamic capabilities and resilience in accounting practices

Capabilities	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11
C2	0,5*										
C3	0,3*	0,5*									
C4	0,3*	0,4*	0,4*								
C5	0,3*	0,4*	0,4*	0,7*							
C6	0,4*	0,4*	0,3*	0,4*	0,6*						
C7	0,5*	0,2	0,2	0,5*	0,5*	0,4*					
C8	0,5*	0,5*	0,3*	0,4*	0,4*	0,6*	0,4*				
C9	0,4*	0,3*	0,4*	0,5*	0,4*	0,4*	0,6*	0,5*			
C10	0,4*	0,3*	0,5*	0,4*	0,4*	0,5*	0,6*	0,5*	0,7*		
C11	0,4*	0,2*	0,3	0,4*	0,3*	0,4*	0,6*	0,3*	0,7*	0,7*	
C12	0,5*	0,3*	0,4*	0,5*	0,4*	0,5*	0,5*	0,4*	0,5*	0,6*	0,6*

Note: * significant correlation ($p < 0.05$)

The results indicated in Table 6 indicate that practically all abilities present positive ($p > 0$) and significant ($p < 0.05$) correlations. That is, when one capability increases its value, the other capability also increases its value in the same proportion. The positive and significant correlations that present stronger relationships with accounting practices are between the capacities: C4 - innovation and C5 - planning; C9 - conflict management and C10 - organizational; C9 - conflict management and C11 - learning; C10 - organizational and C11 - learning. Correlations between C2 - problems solution and C7 - leadership skills; C3 – entrepreneurship and C7 – leadership, are positive and not statistically significant ($p > 0.05$). Thus, when one capability increases in value, the other capability decreases in value.

5 Conclusions

This study examined the impacts of digital transformation for resilience on accounting research and practice in an emerging economy, Brazil. Using the definition of digital transformation proposed by Gong and Ribiere (2021): technologies, resources, dynamic and digital capabilities; this study adopted related the dynamic capabilities and performance of resilience in research and accounting practice in an emerging economy, in this case, Brazil. Research hypothesis H: dynamic capabilities positively impact the resilience/performance of research and accounting practice, was confirmed through the application of a survey addressed to federal public universities (research) and Brazilian multinational companies (practical). The results suggest that dynamic capabilities substantially improve the performance of accounting practice and accounting research, with emphasis on accounting practices. Learning and planning capabilities are the most influential for resilience in accounting research. On the other hand, planning and problem-solving capabilities are the most relevant for the resilience of accounting practices. The findings showed that the correlations between innovation and planning capabilities; planning and critical thinking are positive and meaningful, with strong relationships to accounting research performance. On the other hand, the capabilities that showed the strongest relationships with accounting practices are among the capabilities: innovation and planning; conflict and organizational management; and learning and organizational.

This study starts from a gap in the literature and presents implications for management practice, as it indicates which capabilities should be prioritized to achieve resilience for accounting practices and research. These results serve as a guide for researchers to focus their efforts on well-defined strategies to achieve the intended results; and prioritize the search and sharing of new knowledge. For managers, in addition to focusing their efforts on appropriate strategies, it is important to adopt appropriate arrangements to solve problems. Thus, digital transformation (dynamic capabilities) were crucial for universities and multinational companies to achieve resilience during the COVID 19 pandemic. However, this research is not free from limitations, as the scope of the sample is limited, since it applies surveys only with researchers from federal public universities and with accounting professionals only in the context of Brazilian multinational companies. Thus, it would be interesting to investigate other universities and multinationals from other countries to compare the results. This is a static sample, that is, reflecting the current situation. Thus, it would be interesting to develop a longitudinal study. In this study, dynamic capabilities were adopted as the definition of digital transformation. It is recommended to include the dimensions: technology, human and financial resources and digital knowledge and capabilities in future studies.

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The Rebound of the European and American Designs During the Economic Crisis

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Abstract

Research background: In Europe, there are five types of economic systems: the social democratic system (which includes the Nordic countries), the conservative system (continental Europe), the liberal welfare system, which includes the Anglo-Saxon countries, the Mediterranean system, which includes the southern countries, and the "catching-up" system, which includes the new member states and former communist countries, the latter two being adopted by EU member states.

Purpose of the article: This study article underscores the fact that, following the economic crisis of 2007, the economies of the United States and Europe rebalanced differently. The objective was to establish a clear link between how economic submodels affect Europe's growth rate (the well-known concept of a Europe with two gears) and if the ultra-competitive American economy might be held responsible for the lack of global leadership.

Methods: The European model consists of three elements: economic growth, political freedom, and social cohesiveness, whereas the American model only consists of economic growth and political freedom. As can be observed from the perspective of political freedom, American and European models are founded on individual discretion, and in terms of economic development orientation, American and European models entirely rely on competitive market processes for resource allocation.

Findings & Value added: As has been seen throughout this research, the state's engagement in social issues in the United States is modest and only occurs when no other viable solutions exist. Notable is also the fact that the help provided aims to be materially constrained, with an increasing emphasis on employment or professional conversion.

Keywords: *submodels; economic development; growth*

JEL Classification: *A11; A14; B16*

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1 Introduction

In Europe, there are five types of economic systems: the social democratic system (which includes the Nordic countries), the conservative system (continental Europe), the liberal welfare system, which includes the Anglo-Saxon countries, the Mediterranean system, which includes the southern countries, and the "catching-up" system, which includes the new member states and former communist countries, the latter two being adopted by EU member states (Bodislav et al., 2020a, b).

The world is today confronted with three models of economy and society, which are also models of economic and social development: the European model, the American model, and the Asian model (Negescu Oancea, et al., 2020).

The European model consists of three elements: economic growth, political freedom, and social cohesiveness, whereas the American model only consists of economic growth and political freedom (Profiroiu et al., 2020a, b). As can be observed from the perspective of political freedom, American and European models are founded on individual discretion, and in terms of economic development orientation, American and European models entirely rely on competitive market processes for resource allocation (Profiroiu et al., 2020c).

2 Subtypes of economic models – methodological approach

The Nordic submodel inside the European Union has shown to be the most effective submodel in terms of creating social justice and macroeconomic efficiency (Radulescu et al., 2020c)

The Nordic sub-model (Scandinavian) consists of Sweden, the Netherlands, Denmark, and Finland and is characterized by a high degree of redistribution, the most effective social protection system, social inclusion promotion, the provision of social assistance services to all categories of citizens, and openness to social dialogue and cooperation between social partners and government (Angheluta et al., 2019).

The Anglo-Saxon sub-model (Great Britain and Ireland) displays a liberal approach to the welfare system, where social aid is restricted and the obligation of the state is shifted to the care of the person, such that he is well-insured against any danger.

France, Germany, Austria, Belgium, and Luxembourg are included in the continental submodel. In this paradigm, employment is the basis for social transfers, and benefits are significantly reduced based on prior earning. The state regulates the labour market so as to decrease the flexibility of employees (Belostecinic et al., 2022).

Greece, Italy, Spain, Portugal, Malta, and Cyprus are included in the southern submodel. In providing social benefits to only a subset of the population, the state plays a modest role in ensuring social security. The state controls the labour market, which is highly fragmented and inflexible. The wage-setting process is centralized. In this submodel, the family assumes a portion of the state's responsibilities. The family plays a significant role both socially and economically. Long-term, the unemployment rate among young people is notably high, notwithstanding the low budget for social spending. The labour market is stiff because the government is responsible for its regulation.

The Central and Eastern Europe (CEE) catching up sub-model includes the Czech Republic, Slovakia, Slovenia, Hungary, Poland, Estonia, Lithuania, Latvia, and Romania. Despite the fact that all of these economies have undergone a transition to a market economy, there are still substantial disparities in the structure of national welfare systems (Burlacu et al., 2021; Alpopi et al., 2022). Some nations, such as Hungary and Slovenia, have opted to increase social protection spending, whereas others, such as the Baltic states, have relied on keeping social protection spending at a low level and stimulating the process

of closing development gaps by promoting a taxation system similar to the Anglo-Saxon submodel.

Since 2000, the European Union has initiated a phase of substantial economic system reform.

The prevailing paradigm is inclusive and characterized by economic expansion, social harmony, and political liberty. Its approach to economic growth prioritizes competitive market mechanisms and freedom of choice. The European model offers help for people and serves a social purpose, contingent on social cohesiveness (Popescu et al. 2021). With 115 individuals per square meter, the European Union is the most urbanized region in the world; it has cheap labour and a social framework founded on cultural values (Profiroiu et al., 2020).

Five sub-models may be distinguished within the EU based on the current disparities in terms of poverty reduction, labour market participation, and protection against labour market hazards. The Nordic region is more compatible with the framework of the modernized European social model enacted by the Lisbon Strategy. This, also known as the Lisbon Agenda or the Lisbon Process, was an action and development plan for the European Union's economy between 2000 and 2010 that was drafted in 2000. This strategy's declared objective is to revitalize Community policies, which serve as a buffer against two significant issues impacting the economy and society: globalization and the rapid expansion of the information society. Globalization entails intensifying rivalry in every area of the economy (Bran et al., 2020). The rise of the information society necessitates a major overhaul of the European educational system and the provision of lifelong learning opportunities for European people (Angheluta et al., 2021).

These are the five economic submodels:

1. Nordic submodel
2. Anglo-Saxon submodel
3. The continental submodel
4. Southern submodel
5. The catching-up submodel

2.1. The American design

The American market economic model is situated at the intersection of two major theoretical models: the neoclassical model (in which state intervention is ruled out) and the Keynesian model (in which state intervention is only accepted as a decision-making agent).

The 1970s recession exemplifies how prior errors and the Keynesian crises have contributed to America's strength.

In addition to its economic growth, the country under discussion also exerts global dominance. This relates to international organizations such as the International Monetary Fund, the World Bank, the World Trade Organization, and NATO, the leading international military organization.

The favourable fund, or the privileges from which the U.S. economy would have profited, consists mostly of the following:

1.   Since the end of World War II, the United States has never stopped accumulating capital, resulting in an unrivalled stockpile. Within its boundaries, the United States boasts a vast, modern infrastructure: airports, highways, colleges, industry, and real estate. Outside the boundaries, US companies own enormous assets that are grossly undervalued due to accounting practices that frequently disregard current revaluations.

2.   In terms of technology, the United States has a significant edge. The most accomplished researchers, engineers, and students travelled to the United States to work. They contribute that renowned capital that everyone thinks is the most valuable: the grey

matter, or intellectual capital. From this perspective, the United States speculates on the worldwide labour market by obtaining the most qualified professionals from other nations.

The financial advantage, which proves crucial. Since 1945, the dollar has functioned as the international currency of reference. It is also the principal reserve currency held by the majority of central banks.

3 Educational systems in the EU vs the US, main findings

Increasing investments in human capital is one strategy for ensuring the international competitiveness of the economy (Kohlhase, Pierk, 2020). The consequences are not instantaneous, but may be witnessed over time; hence, more education investment is required to develop a more qualified workforce.

Regarding the extent of state funding devoted to education, there is a substantial disparity between the EU and the United States in terms of the proportion of GDP spent on public education. In 2012, the average unemployment rate in the EU was 5.4%, whereas in the United States it reached 7.3%. Denmark led Europe by allocating 7.9 percent of its gross domestic product to education.

These discrepancies between the EU and the United States are the outcome of education systems that share very few aspects, particularly in higher education.

3.1 The European Union's academic systems

The educational systems in the EU do not reflect the needs of the job market. There are a significant number of graduates, but there are also a large number of unemployed since education does not fulfil market demands. In March 2013, the unemployment rate for young people under the age of 25 in the EU reached 23,5 percent, despite the fact that almost 2 million vacancies could not be filled due to a lack of young people with the necessary skills.

Increasing the duration of school is one strategy to improve education. The average length of an education in Europe is 17.2 years (it is included throughout the period when a young student is studying, including preschool education).

3.2 The United States' academic system

The US education system - is one of the world's most lucrative investments. The United States dominates the official rankings of the most prestigious educational institutions in the world. By obtaining an education in the United States, one may anticipate a good career in any nation.

The university system in the United States is regarded as the most sophisticated and effective in the world. It consists of about 4,300 postsecondary and higher education institutions that educate almost 14 million students.

3.3 American vs European productivity, unemployment and pensions

Europe's economy is deteriorating and losing strength daily. Spending cannot increase because Europeans are still attempting to pay off their debts, and aging populations have a negative effect on consumption. Simultaneously, governments struggle to cut their deficits and replace economic development incentives with austerity budgets.

However, the true issue is low production. Ten years have passed without Europe achieving a productivity increase comparable to the United States' rise in a single year.

The disparity can also be attributed to the lack of skilled personnel in Europe and the absence of technology in businesses.

It has been established that investments in research and development generate productivity growth at both the micro and macro levels. Over the past two decades, R&D spending in the EU has been much lower than in the United States.

The economic crisis has been one of the most significant contributors to unemployment rate hikes. We have decided to examine the unemployment situation since 2007 for this reason. Thus, we will examine the consequences of the crisis in the United States and Europe by assessing the composition and length of unemployment, as well as the size and development of the labour market in each country.

The rate of long-term unemployment in the United States has risen dramatically, reaching levels comparable to those in the European Union. The US labour market has lost its vitality, as not only have dismissal rates increased as a result of the recession, but also employment rates have fallen substantially. The question was whether these factors indicate that the US labour market will increasingly resemble the European labour market.

The United States felt the effects of the financial crisis on unemployment sooner and more strongly than the European Union. In less than two years, the unemployment rate in the United States doubled, from 4.6 percent of the labour force (June 2017) to 10.4 percent (July 2017).

The most recent unemployment statistics in Europe are alarming, and it is probable that the number of jobless will continue to rise considerably by the end of the year, given that the expected limits for economic development will not be realized.

The primary issue facing the world today is that the global economy is not expanding quickly enough to produce the tens of millions of jobs that the jobless are counting on.

The most recent statistics from the Eurostat Statistical Office reveals that the continent's worsening economic slump is rapidly manifesting itself in growing unemployment and a declining standard of life.

Comparing Europe, the unemployment rate has decreased due to the number of employed individuals, as well as the removal of individuals from the labour force.

The unemployment rate fell from 7.6 percent in June to 7.4 percent in July, the lowest level since January 2019, as the number of jobs in the US economy, excluding the agriculture sector, climbed by 362,000.

However, employers may be impacted since the continual expansion of the economy drives businesses to hire.

Pension systems are generally governed by individual Member States, limiting the EU's pension system competence. Regarding pensions under pillar I (public), the EU's responsibility is mostly confined to ensuring that individuals exercising their right to free movement do not lose anti-discrimination protections. In addition to these concerns, there are additional regulations controlling pensions in pillars II (occupational) and III (staff) due to their pre-funded character and connections with the single market. These regulations are primarily to prudential requirements and the protection of employees and consumers.

In 2005, the World Bank established the pension pillar, which was implemented by numerous countries in Central and Eastern Europe.

Due of the uncertainties surrounding life expectancy and financial market risks, Pillar I focuses on low earnings and insufficient planning horizons.

Pillar II is a system encompassing pension funds and defined contribution plans that is funded by beneficiaries and employers.

The third pillar addresses privately financed volunteer accounts, as well as individual savings plans and insurance.

To further illustrate the pension system in a European nation, we will select two countries, one from the former Soviet bloc and one from Western Europe.

Therefore, a person may apply for retirement in Germany when he or she reaches the retirement age, has a particular time of qualifying, and satisfies specific insurance criteria.

4 Conclusion

Europe is confronted with obvious but painful options. The first is to address jointly the immediate task of recovery and long-term difficulties - globalization, resource pressures, and aging - to compensate for recent losses, to become competitive again, to increase productivity, and to establish the EU on a road to ascending prosperity ("sustainable recovery").

As has been seen throughout this research, the state's engagement in social issues in the United States is modest and only occurs when no other viable solutions exist. Notable is also the fact that the help provided aims to be materially constrained, with an increasing emphasis on employment or professional conversion. The American social model differs from the European one by placing equal importance on the market and the person.

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COVID-19 measures and rail transport market in Slovakia - impacts and consequences

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Abstract

Research background: The rail transport sector is an important part of mobility within the EU economy. The COVID-19 pandemic had a major impact on the supply, demand, and economic performance of rail transport. With its impact, it significantly influenced not only the development of rail transport in Slovakia, but also the European railway markets in passenger mobility and freight transport, especially in the first half of 2020. Railway passenger and freight transport decreased significantly due to mobility restrictions and the subsequent lower demand for transport. The number of passengers in domestic rail transport fell by up to 90% in 2020 compared to the previous year. Several operators, particularly those new to the rail market, have had to shut down.

Purpose of the article: To face the negative economic effects of the outbreak of the COVID-19 pandemic, railway companies needed financial support. The paper deals with the identification of COVID-19 measures introduced in railway transport and their impact on railway operations in the Slovak Republic.

Methods: Outgoing and perspectives related to the operation of rail transport in the future during the next closure measures. The methods used to address this issue were based on the analysis, synthesis and comparison of data obtained by primary and secondary research, as well as the use of methods of deduction and induction, to draw general and specific conclusions related to the topic.

Findings & Value added: The results of the evaluation reveal the complexity and complexity of the introduced Covid measures, but the added value of solving this problem is obtaining important data for the rational setting of measures during the pandemic.

Keywords: *COVID-19 pandemic; rail transport market; COVID-19 measures; railway transport*

JEL Classification: *L91; L92; L97*

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1 Introduction

The COVID-19 pandemic in Slovakia is part of the global pandemic of the infectious disease COVID-19, which is caused by the SARS-CoV-2 virus. The first case was confirmed in Slovakia on March 6, 2020 (Dedík et al., 2022). The year 2020 was historically recorded in the history of all mankind, in which the COVID-19 pandemic spread across all continents. As a result of the coronavirus pandemic, many protective measures were taken around the world in the spring of 2020. This has greatly changed our daily life and our mobility (Beck, et al., 2020; Ivanov, 2020). It is questionable whether and how the pandemic and lockdown affected the use of transport modes, attitudes towards transport modes and ownership of individual mobility options during the lockdown period (Eisenmann et al., 2021; Abdullah et al., 2021). Restriction and suspension of transport, commercial or international trains, the deliberate reduction of passenger mobility with the aim of mitigating the pandemic significantly affected the development of sales in 2020 (Przybylowski et al., 2021; Anke et al., 2021). Significant changes occurred in the purchasing behaviour of customers who chose train transportation only in the most necessary cases (Ding and Zhang, 2021; Vickermann, 2021). In 2020, ZSSK transported 40% fewer passengers than in 2019. Passengers who chose the trains of the state carrier ZSSK for their essential transportation travel significantly shorter distances. In domestic transport alone, in some months the average transport distance fell by up to 16 kilometres on average. The biggest year-on-year decrease in sales -82% was recorded in the month of April, when interstate transport, transport by commercial trains and domestic trains were suspended for the whole month according to the Saturday timetable (Bulková et al., 2022).

2 Materials and Methods

Monitoring the development of the railway market is an important tool for obtaining up-to-date information on individual segments of the railway market and analysing it. This analysis is focused on the comparison of performances in rail freight transport (train kilometres, gross tonne kilometres, sales) and in passenger transport (passenger kilometres, sales). The data and information presented in this article are used from the analyses and documents of the infrastructure manager and from the information available from railway undertakings at the end of 2020, focusing on the monitored indicators of the impact of the pandemic during 2020 (Slovak Republic, 2020).

The COVID-19 pandemic crisis has had a major impact on the supply, demand and economic performance of rail transport. The largest impact was recorded in the second quarter of 2020, from April to June (De Vos, 2020). Passenger transport was more affected than freight transport, with international transport falling by an average of 85% in the second quarter of 2020, domestic transport falling by 18%, while freight transport fell by 14% in the second quarter of 2020 (Dedík et al., 2022). The reduction in rail transport in the first months of the crisis was a direct consequence of the public authorities' response to the COVID-19 crisis (restrictions on passenger mobility) as well as the impact of the global economic slowdown, which generally led to a reduction in transport demand (Zhang et al., 2021; Marra et al., 2022). The number of passenger trains within the public service operated in the network in the period from January to September 2021 is comparable to the number for the same period in 2019, while in 2020 it was by 7.8% compared to 2019 lower. However, the number of commercial passenger trains between January and September 2021 was still 21.5% lower than in the same period in 2019, which means that compared to the same period in 2020, when it was 23.3% lower in compared to 2019, there has been no recovery. The number of freight trains operating on the network was still 2.5% lower than in the corresponding period in 2019.

In passenger transport, performances were significantly affected by the pandemic, which results from the restriction of passenger transport trains, where it was set from March 2020 by changing the schedule of public transport, the so-called Saturday's performance regime. The highest decrease in output was recorded in April 2020. Output (train kilometres) in the given month decreased by 37.60% compared to 2019. The most significant decrease in train kilometres was recorded in international transport due to restrictions, even disruption, of international rail transport (ZSSK, 2020). Figure 1 shows the development of total transport performance in rail passenger transport.
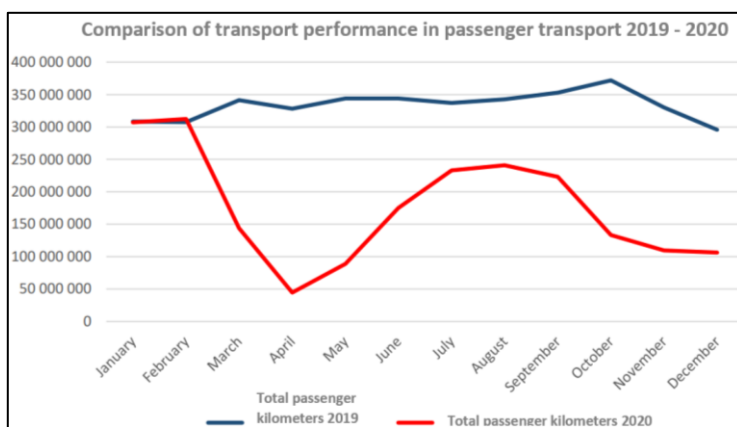
Figure 1. Comparison of transport performance in passenger transport in 2019 and 2020.

Source: Slovak Republic (2020)

Performance in passenger kilometres in rail transport also shows that the most significant decrease was recorded in April 2020. Overall, passenger transport performance in 2020 in the above indicator decreased by as much as 47.10% compared to the previous year 2019. During the first wave of the pandemic (COVID-19), passenger transport saw significant declines in the number of passengers transported in national and international transport. The number of transported persons in domestic transport decreased by 60.90% compared to 2019 and in international transport by 67.32% (figure 2). The negative value in April represents the return of the fare. The development of the number of transported persons in international transport is shown in Figure 2.

Figure 2. Development of number of passengers carried in international transport.

Source: Slovak Republic (2020)

The performance in freight transport was not affected by the pandemic situation to such an extent that it significantly affects the performance of this market segment in the monitored indicators. Nevertheless, the development of performance before and during the pandemic was reduced in terms of train kilometres and gross tonne kilometres in 2020 compared to the previous period, while the indicators were not at the level of the freight transport performance plan. The overall decrease in freight transport performance in 2020 compared to 2019 was by 7.2%. in the train kilometres indicator (Slovak Republic, 2020). The total performance in freight transport, expressed in gross tonne kilometres for 2019 and 2020, is shown in Figure 3.
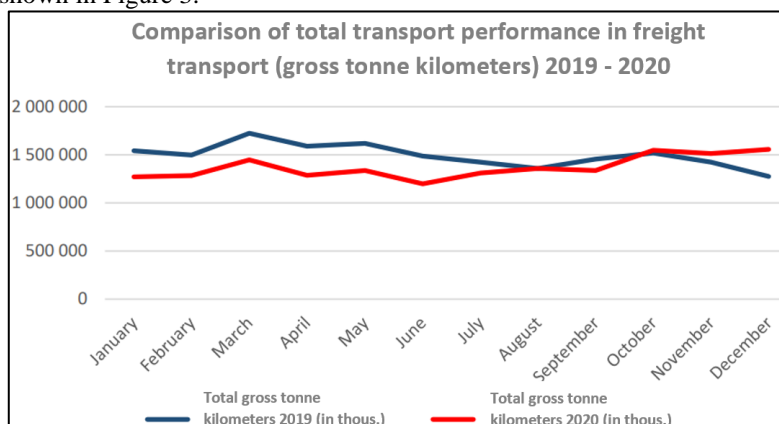
Figure 3. Comparison of total transport performance in freight transport in 2019 and 2020.

Source: Slovak Republic (2020)

The COVID-19 pandemic also affects the management of the ZSSK in 2021. In the months of January and February 2021, compared to 2020 (January and February 2020 were not yet marked by a pandemic), we transported 7.9 mil. passengers less (-65.24%), which corresponds to a shortfall in revenues from passenger transport in the amount of 9.2 mil. EUR (-71.24%) (ZSSK, 2021)

2.1 Transportation of passengers by the state carrier ZSSK

In 2020, the 46,657,000 people were transported in passenger transport, which was 30,700,000 passengers less than last year, a year-on-year decrease of 39.69%, of which:
- A year-on-year decrease of 27,432 thousand persons (-37.84%) was recorded in domestic transport, of which a decrease of 587 thousand persons (-71.76%) was recorded in commercial trains (ZSSK, 2021).
- In international transport there was a year-on-year decrease of 3,338 thousand persons (-25.27%). Significant changes occurred in the purchasing behaviour of customers who chose train transportation only in the most necessary cases. The year-on-year decrease in the number of transported passengers was also reflected in the decrease in transportation performance in passenger kilometres, which in 2020 reached a total volume of 2,117,957 thousand passenger kilometres. Compared to 2019, this is 1,885,774 thousand passenger kilometres less (-47.10%). Transport performance in train kilometres, including alternative bus transport, reached a total of 32,455 thousand train kilometres in 2020. Compared to last year, traffic performance decreased by 2,048 thousand train kilometres (-5.94%) (ZSSK, 2021).

The development of transport performance in railway passenger transport of the carrier ZSSK is shown in Table 1.

Table 1. Development of transport performance in railway passenger transport of the carrier ZSSK.

Total rail passenger transport	Transport performance (mld. Passenger kilometres)	Passengers (mld. Passengers)	Transport performance (mld. Train kilometres)
2006	2,194.20	47.021	32.068
2007	2,147.96	45.598	32.060
2008	2,278.66	47.184	32.002
2009	2,249.07	45.342	31.980
2010	2,291.27	45.004	32.048
2011	2,431.72	45.959	31.331
2012	2,413.49	43.445	30.559
2013	2,421.95	44.287	30.438
2014	2,503.13	47.286	30.791
2015	3,081.25	57.275	31.856
2016	3,193.72	65.606	31.477
2017	3,759.92	72.473	32.641
2018	3,815.15	73.808	33.649
2019	4,003.73	77.357	34.503
2020	**2,117.96**	**46.657**	**32.455**

Source: ZSSK (2021)

Table 1 provides an overview of performance in railway passenger transport of the carrier ZSSK, where we can see the development of transport performance in passenger kilometres, in the number of transported passengers and in train kilometres. In 2020, we see a significant decrease in traffic performance, as a lockdown was introduced and the carrier ZSSK had to cancel a large number of trains.

3 Results and Discussion

The spread of the COVID-19 crisis has had a serious impact on rail carriers due to a significant reduction in demand for rail transport services. Some carriers face significant liquidity problems, large losses and, in extreme cases, the risk of bankruptcy. As a result of these adverse changes, Regulation (EU) No 182/2011 of the European Parliament and of the Council has been issued. 2020/1429 of 7 October 2020 laying down measures for a sustainable railway market regarding the spread of COVID-19 (Haspra, 2021). All the measures below have been defined for national rail passenger services. No restrictions have been and are not imposed on rail freight.

3.1 Measures of EU for a sustainable rail market

Regulation no. 2020/1429 addresses the issue where many railway undertakings in the context of this emergency may not always be able to pay infrastructure access charges (or the cost of using the track). One of the tools to mitigate the negative economic impact on passenger or freight transport should be to allow these charges to be reduced, waived or deferred. According to Article 31 par. According to Article 3 of Directive 2012/34 / EU of the European Parliament and of the Council, infrastructure access charges shall not be lower than the costs incurred in operating the rail service (European Union, 2020). However, in order to mitigate the impact of the COVID-19 crisis, Member States should be able to allow infrastructure managers to reduce, waive or defer such charges in a transparent, objective and non-discriminatory manner over a defined reference period (Haspra, 2021). In a similar way, the issue of track mark-ups should be addressed, and

infrastructure managers should be able to assess the market segment's ability to bear this burden in times of crisis, or to reduce, waive or postpone these mark-ups. The spread of the pandemic in terms of restricting population movements has caused serious disruption to rail transport, which in turn has caused widespread disruption of train paths, leading to temporarily lower capacity utilization. Even in this case, infrastructure managers should have a relevant option not to collect these charges during the specified reference period (Haspra, 2021). A reduction in charges granted by Member States in accordance with this Regulation would lead to a drawdown of part of the funds on the revenue side of infrastructure managers.

3.2 Measures of ZSSK in national and international rail transport

Measures taken by ZSSK in relation to customers:
- Increased frequency of disinfection of all railway vehicles beyond normal cleaning (except toilets, disinfection of handles, buttons, door handles, trash cans);
- Complete disinfection of the interior of vehicles with ozone, disinfection of vehicles with chlorine;
- Increased frequency of disinfection of wagons (one to three times per 24 hours);
- Campaign: WE TAKE RESPONSIBILITY BY TRAIN - #slusnevlakom (COVID-19);
- Support for safe travel, informing about the measures taken and the implementation of interventions - air, surfaces, personnel (ZSSK, 2021).
    Measures introduced in restaurant wagons:
- The entrance to the restaurant car is in the OP mode (vaccination – overcoming), ie persons vaccinated or after overcoming Covid.
- Customers' seating in the wagon is limited so that every other table is free to maintain the prescribed distance. Cross-seating also applies in the bar area of the wagon.
- Occupancy of one table for a maximum of 4 people or people from one household.
- Consumption of drinks and meals is only possible in the seating area, in order to ensure a controlled distribution of people.
- Passengers have the opportunity to take To Go food or order it from their seat via the Najedzsavovlaku.sk application and it is brought to them by the staff to their place.
- The possibility to order food through the application Najedzsavovlaku.sk is possible only in domestic suburban transport.
    The company has also introduced a series of temporary measures related to off-train services:
- Closure of all customer centres;
- Closure of the reservation centre for personal equipment;
- Closure of selected points of sale;
- Stopping the transport of consignments marked COURIER;
- Suspension of the admission of luggage to the depository;
- Ban on sending and handing over found items on the train.
    Passengers were allowed to reimburse the full amount of tickets and seats they purchased after the introduction of these measures from March 2020. From December 2021 until the end of the pandemic, ZSSK limited the transport of more than 350 trains. In national trains, restaurant cars were not occupied during the transfer. Passengers had the option of taking food To Go or ordering it from their seat via the "Najedzsavovlaku.sk" application. Passengers were advised to buy tickets without waiting in line through the e-shop or the mobile app Ideme vlakom.

3.3 Measures of Slovak infrastructure manager ŽSR

The measures put in place by the infrastructure manager to slow down the spread of the COVID-19 virus, which have been analysed since 2020, are arranged chronologically. For passengers, the measures are identical to those used in all spheres of public life during the 2020 to 2021 pandemic, namely cleaning and disinfection of railway station areas, in particular the surfaces touched by people (door controls, handles, handrails, armrests , tables and the like) (ŽSR, 2020).

ŽSR also plans to create premises for the shutdown of trains or their wagons for the needs of an unexpected shutdown. Employees coming into possible close contact with the traveling public on the platforms, the dispatchers, as well as the affected switches, shall be equipped to perform their activities with protective drapes, protective gloves and hand disinfectants, the distribution of which to the affected workplaces is regularly carried out (ŽSR, 2020).

ŽSR tightened measures in the fight against the COVID-19 pandemic by suspending the sale of travel tickets by employees at 67 stations in the Slovak Republic. These are stations where sales do not take place through ZSSK, until now sales were mediated by ŽSR employees on the basis of contracts (ŽSR, 2020). Those interested in traveling by train from the mentioned stations are advised to purchase tickets electronically. The infrastructure manager has enabled employees who are permitted by the nature of their activities to work from home. Even at workplaces where the conditions and nature of the work allow it, the number of employees present was reduced as part of the change (ŽSR, 2020). Another change is characterized by a return to the travel schedule before the start of the pandemic situation, or by adapting it to the current pandemic situation. Anti-pandemic measures were designed and implemented based on the number of infectious people, when the Ministry of Health introduced the so-called COVID machine. Covid Automat is a system for monitoring the development of the epidemic and taking anti-epidemic measures depending on the intensity of the spread of SARS-CoV-2. The task of the Covid Automat monitoring and signalling system is to provide an early warning against the uncontrolled spread of the disease so that the (public) healthcare system can take the necessary preventive steps and prevent the uncontrolled spread of the disease in advance, as well as contribute to its stabilization and gradual improvement during the ongoing critical situation. The aim of this system is to ensure measures that are: simple, understandable, predictable, targeted, feasible, safe and in accordance with the legislation. Since the epidemic situation can be different within the individual districts of the Slovak Republic, the measures reflect the differences in the needs of the individual measures at the district level. Figure 4 shows the setting of the Covid machine according to the Office of Public Health, based on which the established Covid measures are implemented and their impact on mobility.

COVID automat 7 degree				COVID automat 5 degree			
Colour	Risk	Description	Level of Risk	Colour	Risk	Description	Level of Risk
Green	Monitoring	Unlimited	0				
Yellow	1st level of wariness	Recommended home-office	1				
Orange	2nd level of wariness	Recommended home-office	1	Green	Monitoring	Unlimited	0
Pink	1st level of warning	Recommended home-office	1	Orange	Wariness	Unlimited	0
Red	2nd level of warning	Highly recommended home-office	2	Red	1st level of threat	OTP mode	1
Burgundy	3rd level of warning	Ordered home-office wherever possible	3	Burgundy	2nd level of threat	OTP mode	1
Black	4th level of warning	Ordered home-office wherever possible	3	Black	3rd level of threat	OTP mode	1

OTP mode   vaccinated - testing - overcoming

Figure 4. Comparison of total transport performance in freight transport in 2019 and 2020.

Source: authors, according to Ministry of Health of the Slovak Republic

Covid Automat is designed for the Slovak Republic and evaluates and informs about the current epidemiological situation in a combined way. It informs about risk at the level of individual districts. Grades in the Covid Automat are defined by colours and scores. As the score increases, the degree of risk increases and stricter measures are applied. Based on a predefined COVID machine, all established Covid measures affecting the mobility of the population in railway passenger transport were comprehensively evaluated. These measures are evaluated at weekly intervals according to the risk and degree of risk of infection within each district of the Slovak Republic.

As an example of the use of the Covid machine, we can cite the evaluation of Covid measures in the Žilina region. Figure 5 shows the execution of the established measures under the Covid machine during the second wave of the pandemic.

Measure: Entry into employment / Žilina Region		16.8.–22.8.2021	23.8.–29.8.2021	30.8.–5.9.2021	6.9.–12.9.2021	13.9.–19.9.2021	20.9.–26.9.2021	27.9.–3.10.2021	4.10.–10.10.2021	11.10.–17.10.2021	18.10.–24.10.2021	25.10.–31.10.2021	1.11.–7.11.2021	8.11.–15.11.2021	16.11.–24.11.2021
District	designation														
Bytča	BY	0	0	0	0	1	1	1	1	1	1	1	1	1	4
Čadca	CA	0	0	0	0	0	0	1	1	1	1	1	1	1	4
Dolný Kubín	DK	0	0	0	0	0	0	1	1	1	1	1	1	1	3
Kysucké Nové Mesto	KM	0	0	0	0	0	0	1	1	1	1	1	1	1	4
Liptovský Mikuláš	LM	0	0	0	0	0	0	0	1	1	1	1	1	1	4
Martin	MT	0	0	0	0	0	1	1	1	1	1	1	1	1	4
Námestovo	NO	0	0	0	0	0	0	1	1	1	1	1	1	1	4
Ružomberok	RK	0	0	0	0	0	0	1	1	1	1	1	1	1	3
Turčianske Teplice	TR	0	0	0	0	0	0	0	0	0	1		1	1	4
Tvrdošín	TS	0	0	0	0	0	0	1	1	1	1	1	1	1	4
Žilina	ZA	0	0	0	0	0	1	1	1	1	1	1	1	1	3

Figure 5. Evaluation Covid measures in districts of Žilina region according to the COVID automat.

Source: authors

During the first wave of the pandemic, rail transport in Slovakia suffered a significant drop in transport performance. With the declaration of the global pandemic and a state of emergency in the Slovak Republic in March 2020, an average drop in performance on all routes by 61% was observed. The sharp decline in output continued until April, when it stopped at an average of 87%, compared to the previous year before the pandemic, the positive trends in rail transport in the Slovak Republic had been evident for several years. The number of passengers grew every year before 2020, and it can be assumed that after the end of the pandemic, the growth trend will resume. Functioning railway connections within the Slovak Republic offer a suitable alternative to the individual automobile transport for transfer between regional cities. There is a presumption that with the resurgence of cars on the roads, potential passengers will find their way back to rail transport. The EU's efforts to reduce emissions through the financing of greener modes of transport provided by rail can also contribute to long-term positive developments. With the gradual reconstruction of lines from sources partially provided by the European Union, the competitiveness of train transport in Slovakia may increase.

4 Conclusion

The negative effects of the pandemic are more of a short-term threat to rail transport. Weakened passenger confidence in the sterility of trains and stations is unlikely to persist

for more than half a year after the end of the pandemic. The transfer of passengers to the individual automobile transport, combined with the effort to avoid human contact, will no longer be an attractive option with many cars returning to the roads and opening up the economy. Regular contact with people at work and leisure is overshadowed by the fear of contact with unknown passengers during the train journey. The biggest threat to the smooth development of railway transport in the Slovak Republic is the shortage of financial resources caused by more than an annual decrease in passengers. The national carrier ZSSK has an almost monopoly position on the railway transport market within the Slovak Republic. For this reason, the losses caused by the pandemic could be covered by a state subsidy. However, it is not clear whether the Slovak government will be prepared to spend sufficient funds to cover the losses incurred.

Currently, based on this assessment, further research is underway to accurately evaluate how the introduced Covid measures have affected the mobility of the population in rail passenger transport in the Slovak Republic. This research are supported by detailed mathematical and statistical analyses, and their result should be a model that will define the mobility of the population during a pandemic and then set up a system or a package of anti-pandemic measures.

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Business Strategies for Increasing Competitiveness by Integrating Sustainable Innovation

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Abstract

Research background: The current state of the global economy and the predictions for mid-2022 show that the world economy could be on the verge of another crisis. The war in Ukraine has thrown the fragile global recovery off balance. It has caused a terrible humanitarian crisis in Europe, pushed up food and commodity prices, slowed down global growth, and made inflationary pressures worse around the world. Uncertainties in geopolitics and the economy make people less likely to invest or do business, which makes the short-term economic outlook even worse.

Purpose of the article: The aim of our research is to highlight trends relevant to the strategic orientation towards sustainability in business administration.

Methods: The main research method is documentary analysis. In order to achieve the proposed objective, we analysed several sustainability strategies according to the correlation with the business strategy. Then we correlated the obtained results with sustainable performance assessment methods to identify a possible relationship between innovation and sustainability.

Findings & Value added: Following the research carried out, we found that the variables that keep the need for expertise in this subject at a high level are the extraordinary relevance of the integration of sustainability in the company, as well as the complexity of this process. The data analysed, although presented through a large number of researches, brought to light some aspects that are not fully understood, which could help to integrate sustainability in business more quickly. The value of the results obtained by us consists in the presentation of directions and support tools for management that can evaluate risks and possibilities and, finally, allow the development of viable business strategies to increase competitiveness through the integration of sustainable innovation.

Keywords: *sustainable innovation; competitiveness; business strategies*

JEL Classification: *O32; Q01; F60*

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1 Introduction

The current state of the global economy and projections for the middle of 2022 indicate that another economic crisis may be just around the corner for the global economy (Burlacu et al., 2022). The conflict in Ukraine has derailed the fragile global recovery, which has resulted in a catastrophic humanitarian catastrophe in Europe, a rise in the costs of food and other commodities, a slowdown in global economy (Rădulescu et al., 2022a), and an intensification of inflationary pressures around the world (Rădulescu et al., 2022b). The short-term economic prognosis is made even worse by the presence of geopolitical and economic uncertainties, which reduces trust in the business and investment sectors (Ladaru et al., 2022). Commodity markets have been thrown into disarray as a direct result of the conflict in Ukraine and the sanctions imposed against the Russian Federation, which has further exacerbated supply shocks (Belostecinic et al., 2022). After a significant improvement in 2021, it is anticipated that the expansion of global commerce would decelerate significantly in 2022 (Burlacu et al., 2021a). Energy, food, and commodity prices all rose since exports of crude oil, natural gas, grains, fertilizers, and metals were all directly impacted by the conflict (Figure 1). Russia and Ukraine are major exporters of food stuffs, providing 25% of the world's wheat, 16% of the corn, and 56% of the sunflower oil .
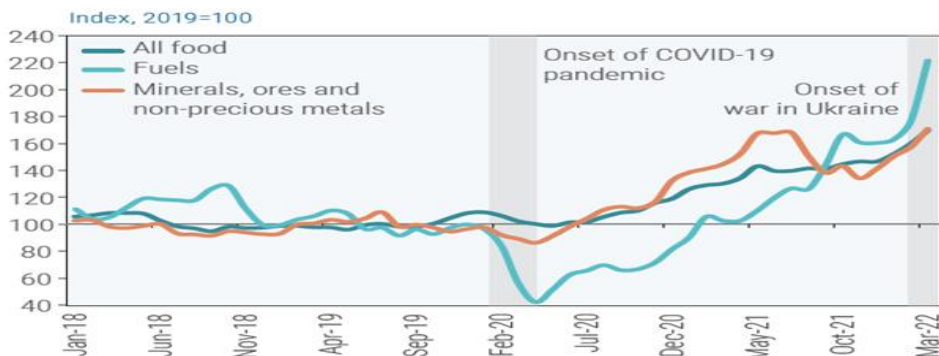
Figure 1. Major commodity prices, January 2018 to March 2022

Source: UNCTAD

It is estimated that global growth will slow from 5.7 percent in 2021 to 2.9 percent in 2022, which is much lower than the 4.1 percent that was forecast in January 2022. It is anticipated that it will proceed at approximately this rate. During the years 2023 and 2024, the conflict in Ukraine will cause short-term activity, investment, and commerce to be disrupted. As a result, retained demand will decrease, and the government will stop adjusting their fiscal and monetary policy (Mogos et al., 2021).

This year, the level of per capita income in developing economies will be about 5 percent lower than the trend that existed prior to the epidemic. This shortfall is due to the fact that the virus and the war both did significant harm (Burlacu et al., 2021b).

Russia's invasion of Ukraine has made the global economy slow down even more, adding to the damage caused by the COVID-19 pandemic (Popescu et al. 2021; Radulescu et al., 2021). According to the latest World Bank report on the global economic outlook, this could be the start of a long period of low growth and high inflation. This raises the chance of stagflation, which could be bad for both middle-income and low-income economies (Balu et al., 2021; Sarbu et al., 2021). The conflict in Ukraine has resulted in an expensive humanitarian situation that needs to be resolved through peaceful means. At the same time, the economic damage produced by the conflict will contribute to a considerable slowdown in global growth in 2022 and will contribute to rising inflation. Both effects are

expected to come about because of the fight. The most vulnerable communities in low-income countries have been affected the hardest by the rapid rise in the prices of fuel and food.

After 2023, it is anticipated that the rate of global growth will slow down to approximately 3.3 percent over the medium term. Because of rising price pressures and the impact that war has had on commodity prices, economists now predict that industrialized economies will have an inflation rate of 5.7% in 2022, while emerging and developing economies will experience an inflation rate of 8.7%.

2 Methods

The main research method is documentary analysis. In order to achieve the proposed objective, we analysed several sustainability strategies according to the correlation with the business strategy. Then we correlated the obtained results with sustainable performance assessment methods to identify a possible relationship between innovation and sustainability.

2.1 Sustainable development strategies

Climate change, population growth, the spread of disease, global food security, and the availability of fossil fuels and raw materials are all global problems that need long-term solutions (Profiroiu et al., 2020a,b). These problems can only be solved by research, new technologies, and spreading innovations (Negescu Oancea, et al., 2020). So, some countries have come up with and put into action strategies for sustainable development that can be used as models by all governments around the world (Bodislav et al., 2020). Next, we'll look at three strategies that have helped not only with economic and social growth, but also with protecting the environment (Bran et al., 2020). These are the plans for sustainable development that Germany, Finland, and China have chosen.

According to Boons and Lüdeke-Freund (2013), the normative prerequisites for sustainable innovation at the level of the business model are as follows: the value proposition supplies the economic value, as well as the social and environmental values, and all of these values are measurable; the value proposition summarizes the outcomes of the "conversation" that took place between the firm and the society; products already on the market: an equilibrium is achieved when the behaviours of those involved in manufacturing and consumption are taken into account; producers, consumers, and other stakeholders are all actively seeking a balance in terms of new product development.

It is expected of suppliers to assume duties comparable to those of the company, which may involve entering into agreements to comply with voluntary norms about working conditions, usage of materials, and other matters pertinent to sustainability (Bodislav et al., 2020). The interaction with customers and consumers encourages those individuals to assume responsibility for their consumption but does so without shifting those duties to the company (Radulescu et al., 2020). The financial model considers not only the implications for the environment and society, but also the appropriate distribution of monetary costs and gains among the various parties involved (Jianu et al., 2019).

Sustainable business models identified in the specialized literature could be grouped in the following categories: "The base of the pyramid", Environmental supply management, "From swing to swing", Industrial symbiosis and Product-service systems (Angheluta et al., 2019)

1. The base of the pyramid

Businesses that are sustainable and produce social and societal value are typically included in BOP (bottom of the pyramid) models, which target underdeveloped nations where the potential for development is the highest. Many businesses have been able to prove that low-income markets present an unprecedented opportunity for the growth and success of their respective companies by employing cutting-edge business models, enduring financial losses for a few years, and taking on responsibilities in the areas of education and awareness. sustainable development.

The "base of the pyramid" is comprised of an incredible number of consumers, over 4 billion persons, who have very modest incomes (less than $1.5 / day). This section of the pyramid is also known as "the bottom of the pyramid." It has been calculated that the combined purchasing power of Brazil's 25 million poorest households amounts to 73 billion dollars annually. Because poor purchasing power is just one of many obstacles, the success of the BOP company requires a complete rethinking of the business model that has been used up until now.

2. Environmental supply management

By substituting materials and increasing the fraction of recycled materials in use, the goal is to reduce the amount of material that is consumed and the amount of pollution that is produced. The development of environmentally friendly manufacturing and recycling technology has been a driving force behind the widespread adoption of the model. The methodology makes it possible to improve supply stability by fortifying connections with select suppliers and decreasing the impact of price changes.

IKEA made use of this approach for the IWAY initiative, which formalizes the company's philosophy of design, which is centred on pragmatism and reducing the amount of material usage as much as possible. According to him, the design of the product is developed with the product's price, manufacturing, and logistics serving as the beginning point, and then subsequent adjustments are made according to this benchmark. IWAY was initially applied to components that were required for the creation of products, but its scope was eventually broadened to include those that were not immediately connected to production. Collaboration with many different organizations allowed for the successful implementation of IWAY. For instance, UNICEF has aided the company in order to ensure that it does not buy any materials or goods that involve the use of child labour. In addition, the organization assisted prospective vendors in implementing the necessary adjustments so that they could fulfil the prerequisites of the IWAY standard.

3. From cradle to cradle (C2C)

It is a way of conducting business with the objective of improving product qualities that are important for preserving the natural environment (safety, reuse, recycling). The ecological principle that states that each substance created by one creature must be able to be used by at least one other organism requires that the materials used in the production of the products be capable of being utilized by biological or technological systems. To achieve a cyclical transformation should always be the first step in the design process for both products and processes. "Waste is food," "maximizing the utilization of solar energy," and "diversity conservation" are the principles that underpin the C2C initiative. If all enterprises were to conform with the C2C principles, then the economy would follow the natural pattern, which would prevent the depletion of resources and the destruction of the environment.

4. Industrial symbiosis

Industrial symbiosis is similar to the C2C model in that it promotes cyclicality in the use of materials but is more complex through the emphasis on business relationships. Industrial symbiosis (also called industrial ecosystem) is a group of companies that cooperate to make the best use of resources by mutually recovering the waste they generate (waste produced at

one company is used as a raw material at another company). At the level of symbiosis that minimizes resource consumption and pollution. The formalization of collaborative relationships is often preceded by their formation through the model of environmental supply management or C2C.

5. Product-service systems (PSS)

SPS stands for "sets of products and services that fulfil the needs of the consumer," and the primary objective of these bundles is to promote the usefulness of the underlying product. Within the context of the SPS, the connection between product and service shifts depending on which aspect contributes more to satisfying customer requirements. The physical delivery of the product is being replaced by the supply of a combination of goods and services that are tailored to the requirements of the customer. The manufacturer develops an interest in all stages of the product's life cycle, including pre-production, production, distribution, use, and decommissioning, in addition to other products and services that may influence how beneficial the product is.

PSSs are not sustainable in and of themselves, but they have a high potential to provide sustainable solutions. This is because optimizing SPSs requires an approach that considers the system, which enables the expansion of the innovation space and the identification of opportunities for architectural innovation. SPS are regarded as the most promising "green" sustainable business models at the European level since they represent alternatives to the sale of products or services. The significant potential of PSS to contribute to the growth of sustainable business was also one of the conditions for creating and promoting the circular economy model (Burlacu et al., 2018a). This was one of the prerequisites for establishing and promoting the circular economy model.

3 Results

A successful implementation of sustainable innovation is dependent on the following factors: a familiarity with both the market and the regulations; the ability of consumers to have the desire and financial means to buy the end-result products or services, the existence of legislative restrictions on environmental impact and social protection, and educational campaigns to develop a culture of sustainability in society are all necessary conditions for sustainable innovation; cooperation across functional boundaries; it is necessary to provide the conditions for interactions that could potentially be synergistic not only between departments but also between stakeholders; education with a focus on innovation; aims to remove cultural barriers that may prevent the identification of market opportunities for products or services that integrate sustainable innovation; the action that ensures the premises of the learning process is the critical analysis of one's own actions and the identification of possibilities for improvement; the funding of research and development activities (Burlacu et al., 2018b; Bodislav et al., 2019).

Organizations need to make investments in research to develop new technologies, but also in order to create new products or services; investments in research must aim at recycling materials, using materials obtained through recycling, extending the life of products, reducing energy consumption, and other similar goals (Radulescu et al., 2018).

Figure 2. Global trade trends

Source: https://unctad.org/

Figure 2 shows that the increase in exports from developing nations was around 30 percent higher than in the same period in 2020, whilst the increase in exports from affluent countries was just 15 percent. As the price of commodities climbed, growth was stronger in regions that were major exporters of commodities.

In 2021, the value of global trade hit a new high of $28.5 trillion, although this figure is expected to fall in 2022. The fourth quarter of 2021 saw a surge in imports and exports above the levels seen before to the pandemic in all of the main economies that engage in international trade. Trade in goods increased more rapidly in the developing world than it did in the affluent countries. The levels of imports and exports in 2019 were significantly higher than they were before the epidemic in every major trading economy. The developing world has seen more growth in the volume of goods traded as compared to the industrialized countries

4 Discussion

Most of the significant adjustments necessitated by sustainable development's socioeconomic concerns also have far-reaching financial ramifications. The following are some current developments in business administration that bear on the strategic orientation towards sustainability: paying special attention to how income inequality reflects structural inequalities in terms of gender, race, and age; if economic growth is accomplished without new job opportunities being created, then the expansion will be unsustainable. As a result of a lack of leadership at the international level, the world has failed to effectively handle numerous pressing issues in recent years. Increased pollution in emerging nations because of industrialization, mirroring trends in the industrialized world. Climate change is increasing the frequency of extreme weather events. Rising nationalist sentiment as a means of shielding communities and their values from the unequal benefits of globalization-driven economic prosperity. The water situation has worsened as a result of rising populations, diminishing supplies, and widespread poverty. By widening the scope of empirical research, continuing to organize knowledge, and putting certain ideas and theories to the test, we think it's important to learn more about: how a business's field of activity, size, and financial performance affect its long-term strategy; the link between a strategy for sustainability and being competitive; companies that don't want to incorporate sustainability into their business; how to do research on how to talk about sustainability; how stakeholders are affected by communication plans for sustainability; factors that affect how

sustainable leadership shows up and how a sustainable organizational culture grows; competitiveness and sustainability, both in terms of what "cause" means and what "type" of cause it is; the effects of new, sustainable competitors on existing ones, broken down by sector; the integration of sustainability into business in Romania and how it could help raise the country's level of competitiveness; innovative, sustainable business models can be copied in different ways depending on the industry and the country's social and economic situation; putting together open innovation ecosystems to help businesses be more sustainable.

In conclusion, the variables that retain the need for expertise in this subject at a high level are the tremendous relevance of integrating sustainability in company, as well as the complexity of this process. The data that were analysed, while being presented by a very large number of research, brought to light several issues that are not fully understood, which could assist a faster integration of sustainability into business. In addition to this, there was a demand for the development of management support tools that could evaluate risks and possibilities as well as establish strategies for the sustainability of businesses.

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Analysis of interdependences between public and private financial subsystem

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Abstract

Research background: In terms of its economic content, the financial system is presented as a set of financial relations that manifests itself in the process of formation, distribution and use of funds. Thus, there are two major subsystems: the public financial subsystem, which represents the set of financial relations through which public funds are formed, distributed and used, with the public authorities managing these funds in the public interest; the private financial subsystem, considered as a set of financial relations through which private financial funds are formed, distributed and used, having in the foreground the entities and private persons that manage the respective funds in private interest.

Purpose of the article: This paper proposes to present the most important theoretical and practical aspects of the two opposing systems, but also related in many respects, namely the public and the private. By comparison, we can see interdependencies between the two, but also their impact at the macroeconomic level.

Methods: Mix research technique has been used. While qualitative research entails in-depth literature readings and reports, quantitative analysis entails presenting data via graphs and tables.

Findings & Value added: Following these researches, the connection between the public and the private system was found and the magnitude they brought to the economic phenomenon, both at national and global level. The article adds value through the analysis performed at European and Romanian level and through the interpretation of statistical data related to these interdependent sectors.

Keywords: *banks; economy; financial system; resources*

JEL Classification: *B52; F65; G32*

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1 Introduction

In Romania, for a long time there was no well-cohesive and organized financial system. Concerns for financial science have existed since the nineteenth century, Dimitrie Sturdza, Petre Carp and Ion Ghica, being among the first to try to define the notion of finance (Jianu et al., 2019).

Thus, the following financial subsystems are distinguished: the public financial subsystem and the private financial subsystem, which can be characterized both at the individual level and from the perspective of their interdependence (Radulescu et al., 2020; Francu et al., 2021).

Corporate finance is a subsystem that expresses the financial relationships, through which the capital and the funds managed by these entities are set up, used (Acemoglu et al., 2019; Burlacu et al., 2021). Those who participate in these relations are enterprises or economic and social entities (Allen et al., 2020; Bodislav et al., 2021; Burlacu et al., 2022)

The state budget and local budgets represent certain relations of redistribution of GDP regarding the establishment of budgetary funds but also their distribution, all to meet public needs (Ghardallou, 2021). Here the participants are individuals and legal entities only as taxpayers (Burlacu et al., 2021; Srinivas, 2021). The private financial system seen as a whole through the financial relations through which the private financial funds are constituted, distributed and used, having in the foreground, as participants, the private entities and persons that manage the respective funds in private interest (Javheri & Gawali, 2022).

The bank loan aims at mobilizing financial resources but also redistributing them through the principle of repayability and interest payment for the borrowed amounts (Sacchi & Salotti, 2015). Here are found natural and legal persons in the role of creditor or in the role of debtor, private financial-banking institutions having the role of financial intermediaries (Curran et al, 2019).

Household finances include financial relationships involving institutional entities (families, singles, various consumer communities, etc.) that generate income and use it according to their needs to procure the goods and services needed for consumption, including saving and investing money (Hassan et al., 2022).

2 Methodology

This paper proposes to present the most important theoretical and practical aspects of the two opposing systems, but also related in many respects, namely the public and the private. By comparison, we can see interdependencies between the two, but also their impact at the macroeconomic level. Mix research technique has been used. While qualitative research entails in-depth literature readings and reports, quantitative analysis entails presenting data via graphs and tables

3 Results - Analysis of the functioning of the public financial system

Table 1- The state budgets

Name	Year	2017	2018	2019	2020	2021
	Incomes	76.485,1	78.698,1	144.012,1	97.846,2	141.023,2

Source: General State Budget for the analysed period for revenues

As can be seen in the period analysed from the point of view of income, the year that had a maximum threshold was 2019, as a result of some regulations, we have a minimum threshold at the beginning of the period.

During the analysed period, there is a gradual increase in the first 3 years, and a declining step in 2020, and then to increase spending due to certain external factors, in 2021 the year of the pandemic, spending was needed from the state budget to counter this pandemic. (Kolodiziev, O., Telnova H., et al., 2021).

The execution of the budgets of institutions and public activities financed entirely or partially from own revenues follows an upward trend, as shown in the table above.

Thus, revenues increased by 45.3% compared to 2018 and 14.6% compared to 2018, and expenditures increased by 48.3% compared to 2017 and 16.7% compared to 2018.

Significant increases compared to the previous year in these budgets are in personnel expenses (+2 billion lei) and capital expenditures (+1 billion lei), increases that are located mainly in the field of health, respectively in the health units under the coordination of the authorities. local public administration (Andrews et al., 2017).
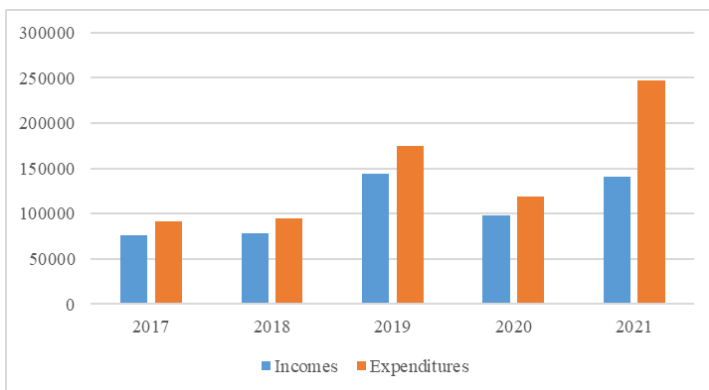
Figure 1. Revenues and expenditures from the state budget

Source: Data taken from the State Budget (MFP)

At the same time, these budgets registered in 2020 a surplus of 107 million lei, lower than the surplus at the end of 2019 which was 286 million lei. The internal and external credit budget is decreasing compared to 2019, respectively by 6.5 percentage points.
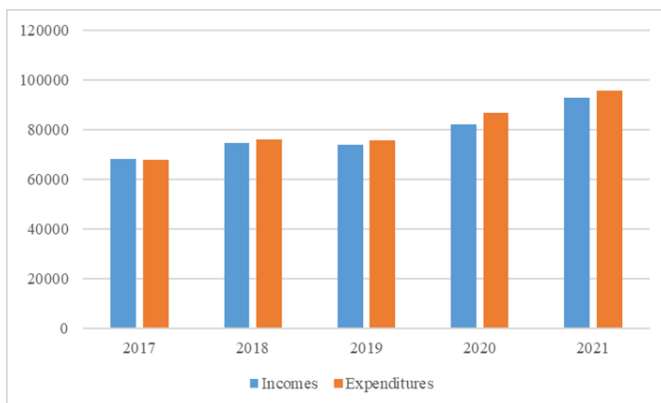
Figure 2. Upward and downward trends in income and expenditure

Source: Data taken from the State Budget (MFP)

Compared to 2019, when 51.6% of these loans were used to refinance local government debt (loan repayments and interest and commission payments), in 2020, the amounts of loans were used to make public investments of interest for the pre-financing and/or co-financing of projects benefiting from external non-reimbursable funds from the European Union and for the payment of subsidies related to the supply of thermal energy to the population in the cold season (Alford et al., 2017). The phrase local budgets include all local budgets of communes, cities, municipalities and the own budget of the county, respectively of the sectors and of the municipality of Bucharest (Profiroiu et al., 2020).

The chart above shows the upward and downward trends in revenue and expenditure. for certain needs in the areas of the residences. In terms of the surplus, the year 2017 was 521 million lei, compared to the previous year, on the one hand, the local budgets registered a higher surplus in 2017 by 818 million lei, and on the other hand the expenditure on loans decreased by 68.7%, so that the deficit induced by these expenses was significantly lower.

2.1. Social Security Budgets

Table 2. Data processing for income and expenditure

Year Name	2016	2017	2018	2019	2020
Incomes	39.325	42.700	63.800	45.068	80.766
Expenditures	39.095	42.554	63.560	46.303	82.360

Source: Data taken from the State Budget (MFP)

During the analysed period, it observes an ascending trend for revenues in the first three years, following in 2019 a decrease of 18,732 million lei, and then to have an increase in 2021. From the point of view of expenses and income, there are small differences for the analysed period, which is why the contribution to CAS, related to the public pension system equivalent to 10.5% of the taxpayer's gross salary, did not affect the budget much.
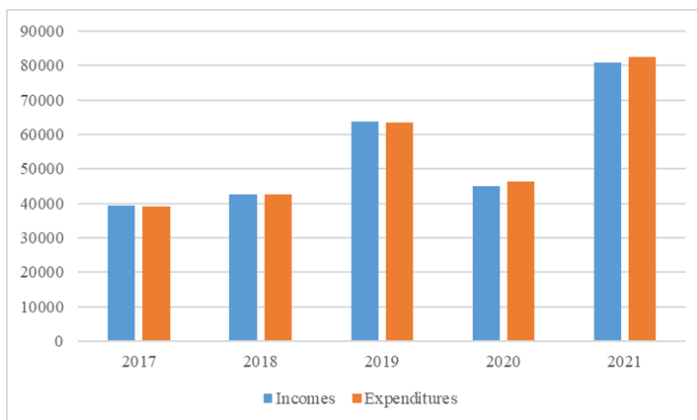
Figure 3. Evolutions and involutions of the social budget

Source*: Data taken from the State Budget (MFP)

The graph above shows the evolutions and involutions of the social budget, the biggest pillar is represented by the year 2021, in which the difference between the two (income and expenditure) represented a deficit of 1,594, due to technical unemployment, and certain availability of population at work.

2.2 Analysis of the functioning of the private financial system

The Commission for the Supervision of the Private Pension System CSSPP is the body designated by the Romanian Parliament, under whose control it is, as the autonomous administrative authority for the regulation and prudential supervision of the private pension system (Profiroiu et al., 2019).

The pension system in Romania is structured on three pillars of pensions, as follows:
- Pillar I - public pension system (state contribution)
- Pillar II - privately managed pension funds

The system of compulsory pensions administered privately is regulated by Law no. 411/2004 on privately managed pension funds amended and supplemented by Law no. 23/2007

They are mandatory for persons up to 35 years of age, who are insured according to the provisions of art. 6 para. (1) of Law no. 263/2010 on the unitary public pension system, as subsequently amended and supplemented, and contributes to the public and voluntary pension system for persons up to the age of 45, who are already insured and contribute to the public pension system.
- Pillar III - optional pensions.

Voluntary contributions, you save in an account opened in your name. Private pensions can be provided by banks and other pension funds (Dirzyte & Patapas, 2022). The average contribution to the mandatory private pension is currently about RON 106, which in a period of 20-30 years, at an average annual return of 5% means an accumulated asset of 53,000-116,000 lei. Total assets related to privately managed pension funds (Pillar II) started an upward trend at the beginning of 2020, but later, starting in March, all pension funds decreased their total assets compared to the value at the beginning of the year.

Since the beginning of May 2020, the assets of private pension funds have reached the level before the outbreak of the COVID-19 pandemic, maintaining a growing trend so far (Radulescu, C.V., Burlacu, S.; et al., 2021).
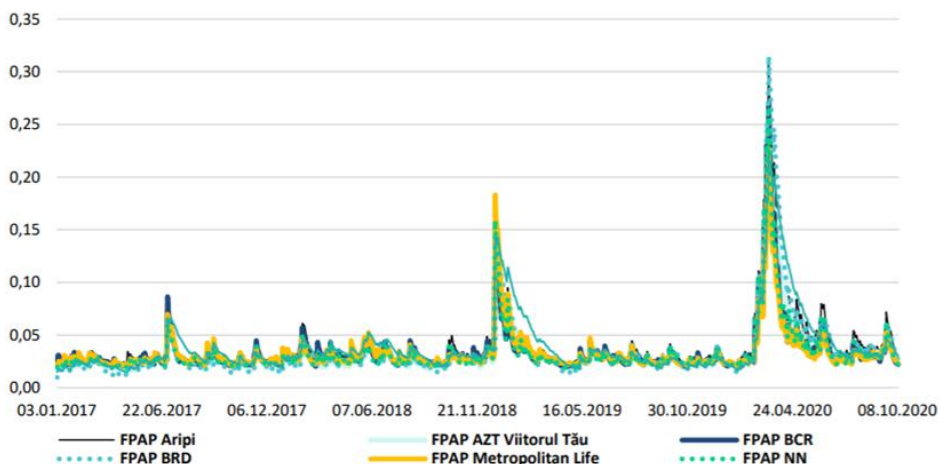
Figure 4. Pillar III - optional pensions

Source: Own processing after State Budget (MFP)

2.2.1 Family budget

The budget generally refers to a list of all revenues and expenditures (Andrews, et al., 2017). Budget is an important concept in microeconomics and is represented graphically by

a line to illustrate the exchange between two or more goods. Budgets are increasingly seen as old-fashioned and are being replaced by complementary or monthly forecasts (Burlacu et al., 2019).

Personal budgeting is one of the most important concepts in private finance (Hepburn, O'Callaghan, et al., 2020). All sources of income and expenses are identified in a personal budget and a plan is developed for excess income to be spent or saved, or is a source of funding in the event of a shortage (Belostecinic et al., 2022). The family budget is the difference between a family's income and expenses (Burlacu et al., 2021).

In addition to short-term purchasing decisions, there are major financial decisions that most people will have to make over a lifetime when starting a family (Mohanty, 2022).

To make a budget correctly, you need to see, and in this case, what the income-expenditure ratio is, this time at the family level (Balu et al., 2021). First, a record is made of the income that can result from: the salary of both spouses, collaborations, interests, dividends, income from rents or leases, children's allowances. After recording the amounts of these incomes, calculate the total disposable income per family.

Then there are the expenses: food, maintenance, utilities, transportation (from transportation passes to daily gas), rent, consumer loans (e.g. car loans or credit card instalments), or mortgage, children's schooling, doctor, dentist, entertainment, clothing, others. If you differentiate between total income and total expenses, you will get the amount that your family can save or invest to achieve a major goal (Sarbu et al., 2021).

2.3. Comparative analysis of the two financial subsystems

The difference between the public and the private financial system takes into account both the form of ownership in which the respective assets are managed and the type of interests that satisfy the financial relations (Radulescu et al., 2021).

Corporate finance is a major provider of public financial resources in its forms: taxes, fees, social security contributions. Such an example will be presented in the field of transport (Litra & Burlacu, 2014).

C.F.R. - Passengers - S.A

CFR Călători is a state-owned railway passenger transport company in Romania. It receives over one billion lei annually from the state budget in order to ensure the activity of rail passenger transport.

Table 3. Budget for the period 2017-2020

Years	2017	2018	2019	2020
Name				
Incomes	2.232.524	2.271.997	2.093.709	2.277.660
Expenditures	2.231.289	2.270.522	2.454.499	2.632.169

Source*:* CFR Statistics

Transferoviar Passengers

A subsidiary of Transferoviar Grup is a private railway operator in Romania whose main activity is public passenger transport which is provided on 7 non-interoperable lines as well as on interoperable infrastructure (public administration).

The difference between the two companies is primarily the type of funding, so CFR Passenger is underfunded by the state, while TFC Passenger is funded from their own budgets. CFR is auctioning off sections of railways that are no longer profitable, and has been managed by private companies.

And in their case, in our case TFC pays the rent to CFR. Apart from TFC, there are other private companies that operate on the railway sections of the state company.

3 Conclusion

In short, private financing is believed to be the foundation of the whole financial system, provided that they are organically integrated and play a key role in the economic process, so as to create new value in the activities of the private sector that are affected by financial distribution.

Financial relationships are based on the fact that they are made as new resources that create value (respectively as a gross national product-GDP). It includes both private and public funds, which justifies the consideration that the performance of public finances depends on their activities. These directly involve private funding. In this respect, this performance of public finances is a prerequisite for the activities supported by private finance.

On this basis, the funds will come mainly from public funds, and the latter will be allocated and spent on actions and objectives considered to be in the public interest.

As a specialized agency for the central public administration, the Ministry of Finance is responsible for coordinating the entire financial activity and implementing governance strategies and plans in the field of public finance; fulfilling the functions of the State Finance Administration; ensuring financial functions and foreign exchange leverage in the context of market economy requirements. In our country, many people choose private services, thanks to a much better and more efficient system than the public one. An example is the medical system.

The private medical system compared to the public one is much more efficient, due to the material provided by the specialized hospitals or clinics, the ones there are few consultations settled by CNAS, but the conditions are better.

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Conceptual approaches of smart specialization in Romanian labour market development

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Abstract

Research background: Intelligent and economic specialization is a national priority in the development of Romania both at the national and regional level, with a major impact on the labour market.

Purpose of the article: We propose to review the strategic objectives of intelligent and economic specialization in Romania. In the context of Romania's economic development for the 2021-2027 strategic cycle, intelligent and economic specialization for regional development is a priority. The purpose of the article is the analysis of the labour market in Romania and the EU countries and the elaboration of methodological proposals in order to build a model of the labour market.

Methods: The study and development of methodological constructions for the development of a new model of the labour market. Analysis of the concept of intelligent specialization and economic specialization with the reflection of comparative advantage, with arguments linking specialization to economic development. The research method is the dynamic statistical analysis of the main indicators of the labour market, the bibliographic study of the specialized literature in the field, the methodological elaboration of the proposals. In the study, we mentioned that new technological systems have the potential to change the way people work.

Findings & Value added: Disruption is an opportunity, a challenge, with new opportunities from digital technologies. In the methodological construction for the development of the modern labour market, an important role belongs to innovation in regional and local development, by controlling variables specific to the region, by means of skills of the workforce, for various social groups, supporting and promoting creative work.

Keywords: *smart specialization; labour market; regional development; technology; knowledge*

JEL Classification: *J01; J21; O1; O32; P11*

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1 Introduction

In the context of the new global transformations, the Covid-19 coronavirus epidemic, and the war in Ukraine, multiple changes are taking place. Our systems need to adapt as we go along. These are both social and economic systems, which have long been looking for functional balance. We are constantly looking for new paradigms, new opportunities and new strategies and policies that would help us design viable and functional strategies. To promote real economic and social policies, with results for the population that is waiting for results from government institutions and central, regional and local administrations. In this article, we aim to review the evolution of EU labour market results with an increased focus on the Romanian labour market. We aim to highlight employment in the field of technology and knowledge. We set out to reflect the concept of smart and economic specialization in the development of labour markets. In this context, we reviewed the National Strategy for Research, Innovation and Smart Specialization 2021-2027 (SNCISI) addition; we must mention that at present all the development regions of Romania have elaborated the Regional Strategies of intelligent specialization.

At the level of the development regions, the Regional Smart Specialization Strategies is the policy instrument that is part of the favourable conditions for accessing European funding available within the political objective of the European Union's Cohesion Policy "An intelligent Europe" for the period 2021-2027. Regional actors supported, with the aim of identifying and creating development mechanisms through innovation and knowledge, starting from existing resources and potential in research-development-innovation. At the regional level of all development regions in Romania, the regional strategies for intelligent specialization developed for the period 2021 - 2027, correlated with the National Strategy for Research, Innovation and Intelligent Specialization (SNCISI) 2021-2027 based on regional partnerships. In the South-West Oltenia region, the Smart Specialization Strategy for the period 2021-2027 establishes the priority areas of development, focused on investments in the EU cohesion policy, correlated with the National Strategy for Research and Innovation and Smart Specialization (SNCISI) 2021-2027. Based on the regional partnership of the South-West Oltenia Regional Development Agency with regional actors, important in identifying the development of the region, the priority directions specific to the field of Research - Development - Innovation for the years 2021-2027 are established. In the North-East Region, an important moment is the Strategic vision of development for the period 2021-2027 of the region, (the scenario with intervention) transfers, creates and transposes innovation in a systemic manner, in four key sectors: 1. The agro-food sector, 2. Clothing-textiles, 3. IT&C, 4. Biotechnologies. In the North-West region, the North-West Smart Specialization Strategy 2021-2027 aims to define the directions of interdisciplinary innovation that lead to obtaining differentiated products and services based on local resources. The Strategic Objective is economic transformation through innovation, based on sectors and economic activities that have innovative potential, and results in the field of research and development. For the West Region it is characteristic that the Smart Specialization Regional Strategy, 2021-2027. (RIS West) is at the foundation of the innovation policy in the West Region. For the coming years, it has the role of promoting the contributions of research - innovation for regional economic development. The main objective is to recover the productivity and competitiveness gap of the West Region economy compared to the EU, by focusing on: the development of the regional ecosystem, stimulating and supporting Research-Development-Innovation; Building the competitive advantages of the fields of activity with great potential for regional development, of increasing the benefit of production/services. In the South-East Region, the Smart Specialization Strategy of the South-East Region (RIS3) 2021-2027 supports the related fields and subfields, identified through consultations with regional partners, which ensure

intelligent specialization and the potential for the development of priority fields: 1.Transport systems. 2. Industrial and materials engineering. 3. The agro-food industry, which includes food safety, nutritional optimization. 4. Health and wellness, promoting a healthy lifestyle. The vision - the South-East Region is oriented towards the vector of development trends at the national level and supporting the improvement of the capacities and abilities of representatives of the academic environment. In the Centre region, the Smart specialization Strategy covers the period 2021 – 2027, developed by the Centre Regional Development Agency, in collaboration with strategic regional partners. The strategy includes the measures programmed for building the economic culture of innovation, identifying areas of excellence for the intelligent development of the Central Region. For the South-Muntenia region, the Smart Specialization Strategy for the years 2021-2027, comes with innovative change, for regional economic development, with the strategic approach to development by supporting research and innovation. The vision "South Muntenia Region is the innovation and development of economic competitiveness, the development of the innovative regional ecosystem, the development of green and digital transition skills, towards a circular economy, the improvement of conditions for the support and development of intelligent specialization". The Bucharest - Ilfov region represents a developed labour market, with an activity rate of 91.5%, and is the national average. The region has the highest share of higher education graduates, the highest percentage of the population of working age, with higher education, above the national and European average, and represents the favourable factor of economic development based on knowledge, with the support of intelligent specialization. The Smart Specialization Strategy of region Bucharest-Ilfov in accordance with the classification of the regional innovation scoreboard, the Bucharest-Ilfov region classified as an Emergent Plus+ innovator in 2021. The table evaluates the performance of the level of innovation in European development. In comparison to the other regions of the country, the Bucharest-Ilfov region is the most developed, although the continuous values reduced compared to the level of developed countries in the EU.

2 The evolution of the labour market in the European Union in the period 2012-2021

2.1. The evolution of the labour market in the European Union

The evolution of the labour market in the European Union. Labour markets across Europe are currently facing various systemic crisis problems, the aftermath of the Covid-19 pandemic crisis, and the effects of the regional crisis (Burlacu et al., 2020; Radulescu et al., 2021). The evolution of the number of employees in EU countries was increasing in the period 2012-2021 from 183.244.1 mil employees. The highest number of employees recorded in 2019, reaching 194,892.2 million employees, with a small drop in 2020 to 191,805.7 million employees, caused by pandemic restrictions, and an insignificant return to 192,962.3 million employees in 2021 (Eurostat).

Table 1. Evolution of unemployment rates în EU in period 2012 – 2021 (%)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
EU - 27 / from 2020	10.9	11.4	10.9	10.1	9.1	8.2	7.3	6.7	7.1	7.0

Source*:* Eurostat, Evolution of unemployment rates by sex, age, level of education and NUTS 2 regions (%)

Despite the positive performance of the labour market, the percentage of long-term unemployed among the unemployment population remained high (45.4% in 2012). In this context, the PES provided free and impartial services to reintegrate jobseekers in the labour market and to support a better alignment between labour supply and labour demand. In EU countries, unemployment rates registered a continuous decrease in the period 2012-2021 from 10.9% in 2012, to 7.1 in 2020 and 7.0% in 2021. In the year 2022, it is the forecast of 6.7% and 6, 5 % in 2023. Ukrainian citizens who migrated to the EU due to the war are gradually integrating into EU countries and gradually entering the labour market, the tangible effect will reflected in next year's labour market statistics. In the EU, it estimated to increase the remuneration of employees per capita by 3.9% in 2022, by 3.6% in 2023. As in 2021, the respective growth rates are much higher those recorded in previous years, being below the level of inflation growth.

2.2 The evolution of the Romanian labour market in Romania by macro-regions and development regions
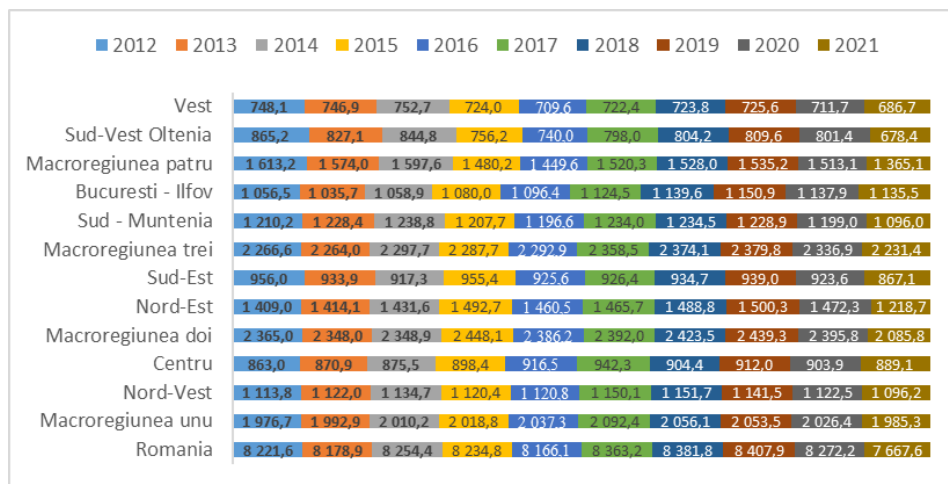
Figure 2. Employment by sex, age, economic activity and NUTS 2 regions 15 - 64 ani

Source: Eurostat, Employment by sex, age, economic activity and NUTS 2 regions (NACE Rev. 2)

In Romania, the unemployment rate reached 5% in September 2021, decreasing by 0.2% compared to the previous month, according to the information of the National Institute of Statistics. [18]. According to the INS, the estimated number of unemployed in September 2021 was 416,000, 12,000 less than in August. For the 25-74 age group, the unemployment rate estimated at 4.1% for September 2021 (4.2% for men and 3.9% for women). The number of unemployed aged 25-74 represents 76.6% of the total number of unemployed, which estimated for September 2021. Unemployment rate for men, from 5.3% (exceeded by 0.6%) compared to the percentage rate for women - 4.7%. The high level of the unemployment rate in the social group of young people (15-24 years old) of 19.5% remains high. By sex, the unemployment rate for women exceeded 0.1%, the rate for men (from 5.8% for women, and 5.7% for men), and the unemployment rate among young people (15-24 years) 22. 0 %. The table below reflects the evolution of the unemployment rate by macro-regions and by development regions of Romania.

Table 2. Evolution of the unemployment rates in period 2012 – 2021

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Romania	6.8	7.1	6.8	6.8	5.9	4.9	4.2	3.9	5.9	5.6
Macro region 1	6.8	6.5	6.2	5.9	4.7	3.9	3.4	4	5.3	4
North-West	4.6	4.1	3.8	4.6	4.3	3.6	2.9	3	3.8	3.1
Centre	9.5	9.5	9.2	7.4	5.2	4.2	4.2	5.3	7.1	5.1
Macro region 2	6.3	6.5	6.6	5.8	4.8	4.3	3.8	3.7	4.7	6.5
North-East	4.2	4.4	4.2	3.6	3.0	2.9	2.4	2.1	3.0	6.8
South Est	9.4	9.5	10.4	9.0	7.7	6.5	6.1	6.4	7.4	6.0
Macro region 3	8.1	8.9	8.2	8.0	7.0	5.7	4.6	3.7	5.3	5.6
South-Muntenia	9.5	9.5	9.0	10.3	8.9	6.8	5.5	4.7	5.9	7.7
Bucharest-Ilfov	6.5	8.0	7.2	5.3	4.7	4.3	3.6	2.5	4.7	3.5
Macro region 4	5.7	6.2	5.7	7.9	7.6	6.2	5.1	4.4	4.8	6.4
South-west Oltenia	6.1	7.0	6.5	10.1	9.9	7.7	6.4	5.3	5.0	9.2
West	5.1	5.2	4.8	5.4	4.9	4.4	3.6	3.4	4.6	3.5

Source*:* Unemployment rates by sex, age, level of education and NUTS 2 regions (%) (on-line data code: LFST_R_LFU3RT)

The national population number of 20,060,182 in 2021 decreased to 19,706,424 in 2016, with an employment percentage of 61.1% in 2012, 66.2% in 2016. In 2019, Romania's population was 19,483 .840 citizens, with an employment share of 68.7%, respectively, in 2020 constituted 19,269,469 with an employment share of 69.1%. On macro-regions. Macro region 1, in 2012, had a population of 4,957,457 people, with an employment share of 64.7%, it has decreased to the figure of 4,852,258, with an employment share of 72.7%. North-West region – 2,597,160 in 2012, to 2,542,829 in 2020, with the share of employment from 66.7% in 2012 to 73% in 2020. In the Centre region, from 2,360,297 in 2012, to 2,542,829 in 2020, the respective share of employment has evolved from 62.6% in 2012 to 72.4% in 2020. Macro region 2. In 2012, from 5,818,277 to 5,539,441, respectively with an employment share of 52.4% in 2012, to 60.9% in 2020. In macro region 3, in 2012, 5,399,624 citizens, in 2020 5,210,574, South-Muntenia Region, registered 3,118,827 in 2012, respectively in 2020 2,885,895, with a share of the employed population of 56.9 % in 2012, to 61.3% in 2020.

Table 3. The evolution of the Romanian population, the employment of the labour force by macro-regions and development regions

	2012	%	2016	%	2018	%	2020	%
Total	20060182	61,1	19706424	66,2	19483840	68,7	19269469	69,1
Macro region I	4957457	64,7	4911070	70	4879620	72,5	4852258	72,7
North-West	2597160	66,7	2573079	70,4	2557114	72,7	2542829	73,0
Region Centre	2360297	62,6	2337991	69,5	2322506	72,3	2309429	72,4
Macro region 2	5818277	52,4	5707921	58	5624713	60,3	5539441	60,9
Northeast	3286812	50,8	3248746	55,5	3213370	57,7	3174470	58,1
Southeast	2531465	54,6	2459175	61,1	2411343	63,8	2364971	64,6
Macro region 3	5399624	66,9	5305939	71,6	5259097	74,1	5210574	74,5
South-Mountenia	3118827	56,9	3018161	58,2	2948743	61,1	2885895	61,3
Bucharest – Ilfov	2280797	80,3	2287778	88	2310354	89,4	2324679	89,4
Ilfov	399617	69,4	452460	58,8	479467	60,9	495236	60,3
City of Bucharest	1881180	82,3	1835318	95,5	1830887	97,2	1829443	97,6
Macro region 4	3884824	62,2	3781494	65,8	3720410	68,3	3667196	68,5
SW Oltenia	2058288	59	1983727	60,9	1939012	64,6	1901748	65,3
West Region	1826536	65,9	1797767	70,9	1781398	72,1	1765448	71,9

Source: www.insse.ro

The Bucharest - Ilfov region, with a population of 2,280,797 in 2012, to 2,324,679 in 2020, has the highest share of employment, from 80.3% in 2012 to 89.4% in 2020. In the municipality of Bucharest, the population decreased from 1,881,180 in 2012 to 1,829,443 in 2020, the share of the respective population evolved from 82.3% in 2021 to 97.6% in 2020. In Ilfov county, the population increased from 399,617 in 2012 to 495,236 in 2020, respectively the share of employment, from 69.4% a decrease to 60.3%. In macro-region 4, in 2012 the population registered with a figure of 3,884,824, and in 2020 it decreased to 3,667,196, respectively, in employment 62.2% registered in 2012, and 68, 5% in 2020. The South-West Oltenia region registered a population of 2,058,288 in 2012, and in 2020, a decrease recorded, registering a number of 1,901,748.

2.3 Employment in the field of technology and knowledge

New technological systems have the potential to change the way people work. Disruption is both a new opportunity and a new challenge, given the new opportunities in the field of digital technologies, digital platforms. The education system is not yet facing the radical changes of digitization and implementation of new technologies. In the EU, the number of employees in the field of new technologies has increased from 5,830,000 in 2017 to 7,291,600 in 2021, in Germany from 1,703,700 employees to 2,223,300 employees. In Romania, from 256,800 employees, in 2017, it increased to 263,600 in 2021 (Eurostat).

According to Eurostat information, the number of IT specialists in EU countries increased by 50.5% from 2012 to 2021, almost 8 times more than the 6.3% increase in total employment. In 2021, 80.9% of men employed in Information Technology in EU countries, compared to 19.1% of women. About two thirds of information technology specialists (about 64.5%) in 2021 in EU countries have a tertiary level of education.

Table 4. Employment in technology and knowledge-intensive sectors by NUTS 2

	2017	2018	2019	2020	2021
Euro area - 19 countries (from 2015)	5,838.0	5,988.3	6,253.4	6,909.7	7,291.6
Romania	256.8	259.8	249.6	259.7	262.6

Source: Eurostat, Employment in technology and knowledge-intensive sectors by NUTS 2 regions

In the context of the information presented above, from Eurostat data, in the table below, according to the same Eurostat sources, we present evolution of Romania's employment, in the field of high technologies and knowledge in the period 2017 – 2021 (Table 5).

Table 5. Evolution of Romania's employment, in the field of high technologies and knowledge

	2017	2018	2019	2020	2021
Romania	256.8	259.8	249.6	259.7	262.6
Macroregion one	56.9	52.4	48.7	55.1	51.0
Northwest	29.9	31.3	29.4	33.6	33.1
Center	27.0	21.1	19.3	21.5	17.8
Macroregion two	26.5	27.4	30.6	32.1	30.9
North –East	15.8	18.1	22.9	23.2	23.7
South –East	10.7	9.2	7.7	9.0	7.1
Macroregion three	123.6	124.2	121.4	131.7	138.9
South – Muntenia	15.4	14.6	14.0	17.0	16.9
Bucharest – Ilfov	108.1	109.6	107.4	114.7	122.0
Macroregion four	49.8	55.8	48.9	40.7	41.9
South-West Oltenia	6.6	8.9	:	:	7.2
West	43.2	47.0	42.7	35.5	34.7

Source www.eurostat.eu

3 Results and discussion - bibliographic study of a new model of the labour market at local level

Consequences of differences in outcomes in different labour markets at the local level. Author (Moretti et al., 2011) examines the causes and consequences of differences in local labour market outcomes and labour markets in a country. The author emphasizes the long-term general equilibrium framework, where workers and firms are free to move to localities, and local prices adjusted to maintain balance. The author has developed a general, adaptable equilibrium framework for local labour markets. *The concept of intelligent specialization*. (Dzemydaitė, 2021) argues: "The concept of smart specialization was implemented in EU countries in 2014, with the statements that regions must specify areas of specialization for the development of innovations". (Muštra et al., 2017) analyse the effects of smart specialization on regional economic resilience in the EU. The term popular economic resilience (RER) is quite popular, it addresses the issue of understanding how regional economies it handles the consequences of high levels of economic dynamism. The smart specialization (SS) approach offers a number of advantages for the appropriate design and development of innovation policies from the perspective of regional policy. The SS approach is compatible with the key features of the regional economy. The resilience and investigation of its effects on the RER offers new perspectives in the RER literature. Authors (Gill et al., 2013), argue, today Europe is a continent with shrinking labour markets. The differences between countries, the existence of a "European model" of work: almost every European economy has stricter labour protection, generous social benefits, in North America, Oceania and East Asia. This has led to low labour force participation, high unemployment, especially among young people, underdeveloped labour markets, and the rapid onset of population aging. The authors are of the opinion: "It is necessary to change employment policies. Europe could lose around one million workers every year for the next five decades, especially after 2030." It is necessary to reform the labour market in close correlation with social protection. Reforming these policies can prevent some of the decline in the European labour force, particularly by increasing the participation rate of older workers and women. The transition from "traditional" regional policies, aimed at bringing about regional convergence, to new approaches, exploiting the economic development potential of regions, is the focus of the authors (Vanthillo et al., 2021), which presents the changing context of regional economic development, the progress of political thinking, the analysis of the respective problems. Special attention paid to regional development strategies in this process, where "regions" can defined more functionally than administratively. Authors (McCann and Ortega-Argilés, 2013) examine the nature, rationale and logic of cohesion policy reforms in the EU. A particular emphasis placed on the concept of smart specialization, on using the concept to facilitate the results-oriented policy agenda. The arguments behind the reforms relate in part to modern thinking about the role of industrial policy. They relate, in part, to advances in understanding the relationships between economic geography, technology and institutions. Authors (Dobrzański and Grabowski, 2019) analyse the structural and productivity changes of the countries of Central and Eastern Europe (CEE), (the research period covers the years following the accession to the European Union, 2004-2018). The respective study aims to answer the question: What are the effects resulting from integration into the European Union in terms of the sphere of productivity? The analysis covers two main categories of labour productivity growth: pure labour productivity growth and structural labour productivity growth. Both structural and pure productivity growth driven by research and development spending, imports of information and communication technology (ICT) goods, and trade openness. The author (Venturini, 2022) describes the fourth industrial revolution (4IR), with an increasing number of studies investigating the effects of the latest

generation of new technologies (artificial intelligence (AI), flexible automation, manufacturing, big data, etc.) defined as smart technologies, considered cutting-edge innovations, with important effects on different dimensions of economic activity. Transformations influenced by new technologies can have revolutionary effects on employment, productivity and other dimensions of the economy. The growing ability of artificial intelligence (AI), robots, etc., to perform tasks with human-like capabilities – especially manual, routine jobs, cognitive tasks in the fields of voice recognition, visual image recognition, translations – explains why the literature specialized focused primarily on the occupational field. Authors (Evangelista et al., 2018), explore the specialization of European Union (EU) regions in key enabling technologies (KETs), assess whether specialization in these technology areas has an effect on regional growth. The evidence presented reflects that the regions specialized in KET are concentrated in central Europe. During the considered period (1996–2011), the less innovative and peripheral EU regions increased their specialization in these technological fields at the expense of the more advanced regions. There is evidence that spatial diffusion of KETs occurs in regions adjacent to each other. The authors (Couture, V., 2015) propose a micro-foundation for spreading knowledge. Modelling within a city, where free knowledge transfers auctioned by experts, to entrepreneurs, who auction jobs. The offers of that knowledge resemble the proposition of consultants to the potential client. Underpinning the model are two fundamental properties of knowledge: First, disclosure of knowledge is necessary to demonstrate its value. Second, knowledge is freely reproducible. Bigger cities generate more meetings between experts and entrepreneurs, resulting in more opportunities for consultation, information, learning and better results. The importance and extent of smart specialization strategies (Lankauskienė et al., 2022) carried out in a short period of cohesion policy in the period 2014-2020, the evaluation of the effect of this complex process on economic development, mobilization through the implementation of intelligent specialization of the regions are still pending. The ecological transformations accelerated by the European Green Deal have highlighted the fact that the strategies for intelligent specialization of the EU regions is to avoid fragmentation, to reach some complementarities in achieving the EU's common ambition - climate neutrality by 2050. The study's authors set out to demonstrate how to identify region-specific pathways for ecological transformation, aligning them with smart specialization strategies focused on the European Green Deal in the regions. The conclusions of the study based on the moderate experience from the two interconnected projects in the area, "LARS" and "GRETA", implemented in the Baltic Sea region (October 2017/September 2021). The research proposes how moderated learning, knowledge transfer between mature innovators and young innovators, embodies place-based path identification, and supports the development of course recommendations for ecological transformation, solving homogeneity issues of smart specialization strategies. Technological diversification, associated with more opportunity discoveries (Aksoy et al., 2022) proximity, diversified technologies in decline is associated with the reduced number of revenue-generating licenses. In the second case, when proximity and high technological diversification are associated with more discoveries and opportunities, with more spreads. In the third case, low technological proximity and high technological diversification are associated with the best performance during the revenue-generating licensing period. The authors claim that: "regional decision-makers, who intend to attract universities as an engine of innovation and regional economic growth, must consider policies and initiatives aimed at reducing the cognitive gap between university and industry, by increasing technological proximities, by reducing cognitive distances, by funding organizations of organizations that cross boundaries."

Research progress in the humanities over the past decade (Feng and Zeng, 2022) has highlighted the robustness of digital methods, ranging from basic data processing

techniques to complex tasks. Some of the humanities disciplines have demonstrated tendencies to depend on digital methods, for examining existing theories/hypotheses, to participate in the development of skills in dealing with practical problems. The authors (Zhao et al., 2022) argue that in the last decade, text-as-data methods have gained popularity among social scientists, digital humanities, business, and governance researchers. The priority objectives, in the fields of digital learning, vocational training and social sciences, directed towards, the use of new tools, educational platforms, software used. To make predictions about the present and future human behaviour in the field of digitization, robotics, which, through interdisciplinary and transdisciplinary approaches, it will contribute substantially to the paradigm changes of the future of social sciences, finding new solutions for social aspects and in the field of the labour market. Authors (Ruffner and Spescha, 2018)**,** combine two rich firm-level data sets to analyse the effect of dense geographic concentration of industries on firm innovation and productivity. The results show that the increased concentration of labour in the same industry is associated with a higher output of innovation, a higher productivity.

The authors (Castellano et al., 2022) state: "Innovation is seen as a crucial factor for regional economic growth. Many branches of literature have investigated the role of the externalities of the agglomeration, of the skills of the workers in the capacity of innovation of the territory without taking into account their interaction. Using Poisson regression, models with fixed effects, on official data for 2014–2019 in the Italian regions, this paper aims to double. (Braunerhjelm et al. 2020) used the unique data set on Sweden, correlated "employer-employee", combined with data on patent applications at company level, and provided new evidence that the mobility of knowledge workers has a positive and significant impact on the company's innovation, measured by companies' patent applications. The effect is statistically and economically significant for knowledge workers who have previously worked in a patent firm, while only a limited impact could detected for companies that lose knowledge workers.

According to the authors (Quintero, S., et al. 2022) the learning approach, understood as the process by which agribusiness creates knowledge and develops capabilities, is the core of understanding the firm's effort to acquire the necessary capabilities to compete in the agricultural innovation system (AIS) to improve the transition to sustainability. Agent-based modelling (ABM) has proven to be a suitable analysis method for the respective phenomena. It made it possible to study the dynamics of local learning, the emergence of specialization models, the improvement of transfer, the adoption of technologies - smart agriculture, increasing productivity, sustainability and reducing the impact on the environment in the agricultural innovation system. According to scientific research, (Zhang et al., 2022) adding value to agricultural commodities helps reduce CO_2 emissions in polluted countries like the United States. Additionally, it was relevant that the amount of CO_2 released per unit of energy spent was positively associated with the amount of energy consumed. Research has shown that adopting renewable energy can help mitigate environmental damage. The smart specialization in the field will support the actions and smart management techniques of technological and operational management. (Ng, M.K. et al., 2022) propose analytical framework to review the critical mode of smart city development to assess sustainability outcomes from a spatial planning perspective. The authors argue that historical context and modes of governance, together with holistic knowledge, provide important clues to understanding the visions, goals, subsequent objectives, processes and content of smart city initiatives. Importance of creative industries (Meyer et al., 2022), studied sustainable tourism which in the South Baltic Sea region is a priority sector, and belongs to the sustainable development model of the Baltic Region (BSR). The paper proposes the reflection of conceptual ways and practices for the political, administrative, corporate, business management of SMEs in the revitalization of sustainable

regional tourism, focused on cultural and creative industries (CCI) that contribute to sustainable development and economic ecosystems. The author (Komninos,2022), focused on research on a green digital transition, the transformations of industrial ecosystems in cities and regions, the identification of ecosystems and ecology based on digital platforms. Opportunities and enabling methods investigated public administrations and SMEs to contribute to the current industrial transformation of cities, regions in full process of digital and ecological transformations and innovations.

3.1 Methodological constructions for the elaboration of a new model of the labour market

Economic specialization reflects the comparative advantage in this field, with arguments linking specialization to economic development. For the formation of smart specialization strategies, the priority issue is to facilitate the success of new future economic activities. Some regions of the EU have applied the LQ index in the context of the analysis of specialization in the formation of the smart specialization strategy. Economic specialization refers to location coefficients, regional concentration of skills and knowledge. It is necessary to investigate the impact of economic specialization on the development of regional and local economies, which offer perspectives for identifying prospective areas in regional economies. The processes of economic specialization, diversification took place in the EU regions, with a different impact on economic growth. The relative specialization index of the location coefficient highlights the degree of economic specialization.

By controlling for region-specific variables, the way in which the complementarity of workforce skills and the productive structure stimulates innovation explored. Second, the investigation of how innovation processes depend on alternative configurations that derive from the interactions between the productive structure and the skills of the workers.

Collaborative innovation in labour market inclusion. This article uses the concept of "collaborative innovation" to discuss the experiences of key stakeholders and service users on innovative labour market inclusion services. *Creative work*. Given the high content of creative work, expertise ensures the competitiveness of companies, acts as a driving force in economic development. Geographical proximity, together with technology, occupies an essential place in the functioning of the local labour market, but for the non-market segment of knowledge flows. *Modelling the optimal search strategies for the unemployed,* models the optimal strategies for finding the unemployed in space to characterize local labour markets. The methodology allows relationships between different areas, while maintaining manoeuvrability. It is, estimated that labour markets are local, and the attractiveness of jobs for applicants suddenly decreases with distance. *Resilience in the local labour market.* The resilience characteristics of local labour markets usually measured in terms of employment growth rates, whether absolute or relative to the EU average. Their skills and typology, participation in the process of generating innovation in the context of MAR specialization, connected skills positively affect the performance of innovation. Guidance provided, to help decision-makers and managers who increasingly need place-based regional approaches to stimulate innovation. The authors found that the local concentration of the creative class has predictive power for the economic development of a region; it tends to go beyond traditional indicators of human capital. The results do not support Florida's claim that creative workers gather where bohemians are.

4 Conclusions

Restructuring of high school and university education systems, adapted to the needs of the market on digital training and technical and technological sciences, mathematics, physics,

and natural sciences. It is necessary to penetrate digitization in other sciences on digital history and archives, digitized geography, digital cultural management, public administration and digitization, sociology and digitization, archaeology and digitization, agricultural and forestry sciences with digitization services. Cooperation with social sciences related to sociology, visual arts, visual arts, have not kept pace with the changing nature of work, which has led to many employers saying they cannot find enough workers with the skills they need. In the vocational schools the penetration of digitalization and programming of computers and robotics in industry, construction, agriculture, transport, and trade. Digital technologies will replace many jobs, but will also create new jobs in industries, services, agriculture, construction, and transportation, in the Smart administration of cities and rural localities. Digital technology will drive sustainable development, support the green economy, and green jobs, support creativity and innovation. From a social point of view, through the easy access of social groups in difficulty, they will be able to support them through access to mobile telephony, access to computers and internet, which will be able to support access to various information related to access to public services, education and culture, medical and social services. For localities in difficulty in areas underdeveloped through digital platforms, it will be possible to ensure access to online platforms for marketing, promotion and sales, information and vocational education, entrepreneurial education that will allow new forms of entrepreneurial activity.

Acknowledgements

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Design and Implementation of an Artificial Intelligence Business Model to Address the Challenges of Global Warming in Agriculture.

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Abstract

Research background: Given the challenges that global warming is bringing into the agricultural sector especially in developing countries is important to use the tools available in order to provide farmers with more options to find alternatives to the current ways of producing the land while reducing the gap of knowledge and techniques between farmers in the developed and developing world.

Purpose of the article: The current state of the agricultural methods in developing countries is anything but modern, that being said the incorporation of AI for better prediction and account of several factors can provide these farmers with a better solution to improve their conditions and ultimately improve their standards of living.

Methods: Collaboration with local University experts and an international network of collaborators will allow us to collect data from the different areas to construct the different models that can help us all together to provide the best outcome to the final users of our model those being the farmers.

Findings & Value added: The different models of AI models such as Machine Learning unsupervised and supervised ones or Neuronal Networks among others provide a level of analysis of data so far widely spread in the IT industry with applications ranging from translators to Image Analysis. Farmers in developing countries possess a really low level of education that ultimately limits their possibilities to implement such models by themselves, this generates an opportunity not only to improve their standard of living but also the access to modern tools to help them in their daily activities.

Keywords: *artificial intelligence; developing world; global warming; agriculture*

JEL Classification: *Q54; Q200; O350*

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1 Introduction

With the now more than ever hard reality of climate change, it has become clear that finding ways how to minimize and perhaps adapt to it is one of, if not the most important task in the coming years. This is unfortunately more time sensitive in developing countries. During the last decades, it has become the norm rather than the exception to have several climate events around the globe. Poor countries are more heavily affected by extreme weather events and future climate changes than rich countries. One of the reasons for this is the so-called adaptation deficit, which limits the ability of poorer countries to adapt and be resilient to these events (Fankhauser and McDermott, 2014).

It is a sad, but the reality is that higher income countries are far better prepared than their less developed counterparts to implement measures to minimize the effect of global warming. If two countries face the same level of hazard one should expect that the one with higher income to spend more in precautionary and hence suffer fewer loses if a natural disaster occurs. (Schumacher and Strobl, 2011).

All these facts combined are causing that the effects in agriculture to worsen by the day, this is clearly explained in Jagermeyr et al. (2021) when the say that potential climate-related impacts on future crop yield are a major societal concern, furthermore that maize productivity could shift from +5% to -6% wheat +9% to +18% potentially linked to stronger CO_2 content in the soil which is directly related to the effect of climate change.

Having outlined that climate change and its effect are affecting in a disproportionate measure developing countries already and even more in the future, the question remains what can we do to help our farmers and be able to bring new technologies to their processes while improving their lifestyle without overexploiting the available resources. After all, farms in developed economies grow until the owner reaches the limit of his or her managerial capacity, which is clearly determined by a combination of personal intelligence, education and tools available to their disposal (Bruntrup and Heidhues, 2002).

To address these challenges, the complex, multivariate and unpredictable agricultural ecosystems need to be better understood by monitoring, measuring and analysing continuously various physical aspects and phenomena. This implies analysis of big agricultural data (Kamilaris, 2017)

Table 1. Areas where small farmers need technical advice, in percent.

	Today	Want More Support
Business Planning and Farm Management	48	31
Agronomy and Livestock	49	62
Processing Technologies	13	7

Source: WORLD BANK SURVEY in Moldova, 2000 (LERMAN 2001)

The table above clearly reflects the idea that Business and Planning is one of the main technical areas in which farmers in developing countries might want and require support in order to improve their overall economic conditions given the specific circumstances that they are facing right now and will most definitely face in the future.

Over the current paper we will present the categorization that can helps us better understand the different factors that are affecting the outputs of the crop yields. Later we will present a few widely known machine learning models and we will be summarizing the models and their effectiveness to better understand which ones can helps us with the categories previously described.

2 Methodological Framework

There have been several studies that focus on developing artificial intelligence models such as fusing different arterial intelligence algorithms and its application on specific areas, such as food security for farm households (Wijk et al., 2014), or on the other hand the economic impact (Ngoune and Shelton, 2020). But so far there hasn't been a multi-model, multi-area approach that would take into account all the factors that can affect farmers. Such a model can potentially become the tool that will bring to the farmers new tools and information to better manage their farms from a business standpoint and that will take in to account potential effect of climate change in their business model.

2.1 Clear definition of the different factors.

There are several factors that play a role in crop and agriculture production. We can categorize these factors into three categories which are technological, biological, and environmental (Ngoune and Shelton, 2020). Different approaches in several countries to minimize the effects of these categories in their crop yield outputs might vary from the increase in land area to the intensification of cropland management techniques such as irrigation, and inorganic fertilizers among others. These 3 factors are the ones that will be analysed and presented in the current paper.

2.1.1 Environmental Factors.

The environmental factors are perhaps the most visible ones since these are directly related with global warming, which leads to climate change Abiotic stresses adversely affect growth and productivity. Whereas the opposite is given by biotic factors. Variations in annual rainfall, average temperature global increase of atmospheric CO_2 and fluctuations in sea levels are some of the major manifestations of climate change, which negatively impact crop yields (Metclfe and Elkings 1980).
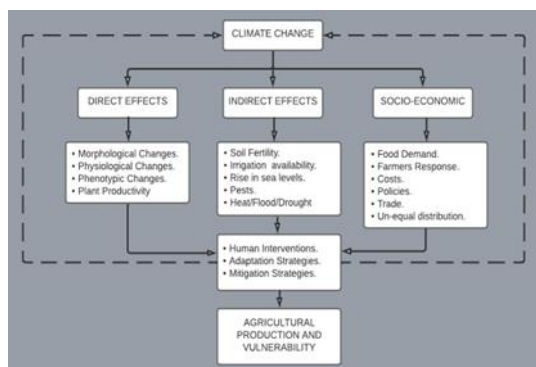
Figure 1. General effects in agricultural production.

These factors are also related to abiotic factors. These ones can potentially have devastating effects on plant growth and crop yield which can affect directly, indirectly, and socio-economically speaking reduce crop yields by up to 70%. Weather variations present positive and negative effects in the environment with very high expressions of negative effects (Raza A et al. 2019).

2.1.2 Biotic Factors.

This are living organisms that affect their environments, a good example of this are microorganisms and although this are perhaps not related directly to climate change are indeed affected by it, examples of this are plant diseases which are caused by several micro-organisms, unfortunately, these organisms see their multiplying capabilities enhanced by the variations in climate conditions.

In other words, climate change is affecting the biotic factors affecting the crop yields of our farmers. Furthermore, the change in temperatures is bringing new types of diseases and pests for which we don't have any controls yet, an example of this is maize lethal necrosis (MLN) has become one of the most devastating diseases in Central Africa causing a yield reduction between 30% to 100% (Karanja et al. 2018).
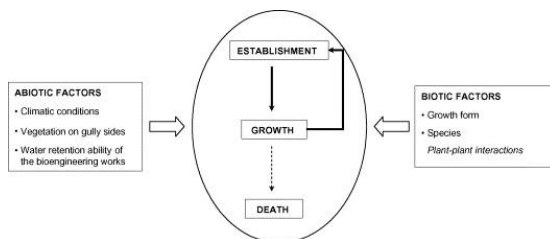
Figure 2. Relations between biotic and abiotic factors.

Source: (Burylo et al. 2007)

2.1.3 Technological Factors.

Over the years there have been a big number of technological factors like genetic improvements, and fertilizer technology just to mention a few. This innovation has caused not only positive changes but also several negative ones, an example is the case in the Philippines where sugarcane fields develop lime year in the subsoil and banana fields have excessive potash which ultimately created an imbalance ratio of potassium and magnesium.

In brief, the application of inappropriate agronomic practices such as untimely planting, incorrect plant spacing, wrong method of planting, poor sowing depth, delayed weeding, ineffective pest and disease control, inappropriate use of fertilizers, untimely harvesting and use of low-yielding varieties, will always significantly reduce crop yields (Ngoune and Shelton 2020).

2.2 Proposed Machine Learning Techniques.

We haves outlined 3 categories that directly affect the overall output of our yields, now we need to define the best approaches that will helps us determine the most adequate model that will fit our needs and provide the best output possible.

2.2.1 Artificial Neural Network.

An Artificial Neural Network (ANN) is a network of artificial neurons. It is based on the human brain's biological processes. The neural network must be trained once, thereafter similar patterns in future data can be predicted, for instance, meaningful problem solutions can be produced even if the input data is incorrect/ incomplete (Mishra et al. 2016).
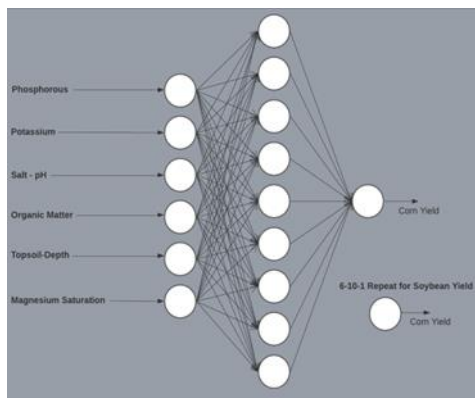
Figure 3. Yield Prediction Model

Source: Drummond et.al (1995)

2.2.2 Information Fuzzy Network.

An Information fuzzy network (IFN) is a greedy machine learning algorithm for supervised learning. The data structure produced by the learning algorithm is also called Info Fuzzy Network. IFN construction is quite similar to decision trees' construction. However, IFN constructs a directed graph and not a tree.

2.2.3 Decision Tree.

The decision tree goes over a model that includes several different concepts like nodes, branches, terminal values, strategy, payoff distribution, certain equivalents, and the rollback. There are usually three kinds of nodes and two kinds of branches when designing a decision tree.
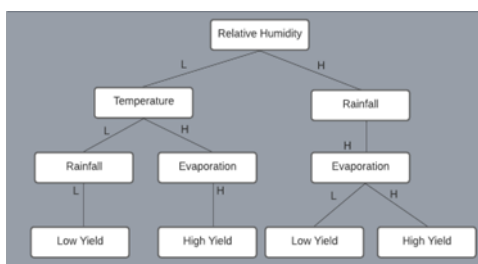
Figure 4. Decision tree for influence of climatic factors on soybean yield.

Source: Veenadhari et.al (2011)

2.2.4 Clustering.

Cluster analysis or clustering is the process of identifying objects that are similar to each other but different from individuals in other groups. It is mainly used for data analysis. Clustering is used in many fields such as machine learning, pattern recognition, image analysis, information retrieval, agriculture, etc. There are various clustering algorithms are there such as k-means, k-medoid, etc. but the common and important clustering algorithm is k-means. (Mishra et al. 2016).

2.2.5 Bayesian Belief Network.

A Bayesian belief network is a graphical representation of the underlying probabilistic relationships of a complex system. These networks are used for reasoning with uncertainty, such as in decision support systems. This requires probabilistic inference with Bayesian belief networks.

2.2.6 Time Series Analysis.

Time series analysis is the method to analyse time on parametric, series data to extract meaningful statistics and other characteristics of the data. Basically, time series forecasting is a model to predict future values based on previously observed values. There are various types of time series analysis methods such as frequency domain and time domain, parametric or non-parametric, which may be linear or nonlinear, univariate and multivariate. Which one will be the best for your use case will depend on the specifics of your case.

3 Comparison of the different Algorithms - Results

There have been several studies considering one or more of the algorithms that have been described in this paper. In the table below we summarize some of the studies carried out and the conclusions that those studies have drawn on the application of the given algorithm to the study.

Table 2. Summary table of the different algorithms.

Model	Application Area	Studies	Conclusion
Artificial Neuronal Network (ANN)	Corn and Soybean Yield Prediction	Consideration of Rainfall in the yield for corn and soybean. Compared the ANN approach vs the multi-linear regression model (Kaul, et al. 2005).	ANN gives more accurate yields.
	Forecasting Thailand Rice Exports	Forecasting of rice exports in Thailand between ANN, exponential smoothing, and ARIMA models (Co and Boosarawongse 2007).	During the prediction of unseen data, the models performance was poor, as it was able to track the non-linearities the model performance improved.
Information Fuzzy Network (IFN)	Agriculture-based web decision support system	Creating a decision support system for crop selection based on the impact of climate change in Malaysia (Salleh 2012).	Good results were achieved in the recovery of planting material breeders ultimately thanks to good policy decision-making thanks to the support system.
	Crop Selection	Prototype tool to help Canadian farmers for their crop selection (Daryl et al. 2012).	Results were mixed, data contribution was limited, advocating for more prototype tools in order to increase the amount of data points.

Model	Application Area	Studies	Conclusion
Decision Tree	Soybean Productivity Modelling.	Soybean Productivity for Bhopal District (India) (Veenadhari et al. 2011).	Good results determining major influencers on Soybean productivity. Mayor Drawback was identified by only being able to detect low and high predictions of yield but not middle points.
Clustering	Crop Prediction	Comparison of crop prediction K-means algorithm vs modified k-means and K-means ++ (Utkarsha et al. 2014).	Modified K-means achieved the highest number of good-quality clusters.
Bayesian Belief Network	Effects of climate change on potato production.	Assessing the effects that climate change and hence weather conditions had on potato crop production (Yiqun et al. 1994).	Efficiency was higher by using the Bayesian Belief Network.
Time Series Analysis	Impact of Climate Condition on Yield.	Evaluating the Climate conditions effects over the province of Liaonning, China from 1949-2005 (Hong et al. 2012).	The moving average model was regarded as the best option for the forecasting model. And the biggest plus was that it doesn't require a big set of data.

4 Discussion and Conclusion

Implementation of Machine Learning and Artificial Intelligence models in agriculture is still not widespread, hence the level of understanding and applications are still in its early stages.

The extensive review of the different case studies, their results and recommendations it was determined that although there is more than one algorithm that can fulfil our model requirements for a given area and crop in particular, the application of more than one of them will bring more resilience to our model. Now-a-days a growing number of applications of machine learning techniques in agriculture are required for which a large amount of data is currently available from many resources this can facilitate the validation and training of our models in order to validate our research idea.

Moreover, as per the results observed in the studies is clear that there is not such a thing as "one model fits all" approach, hence throughout the course of our research we might find that the chosen path at any given time might need to be revisited and perhaps even re-taught in order to create the best combination of algorithms that will ultimately bring the best result possible.

Building up a suitable model will have certain merits over the traditional forecasting method moreover it is important that for the field to keep growing researchers should share their datasets through different platforms for others to use it for testing, training and validation of their own models.

Acknowledgements

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Perspectives of environmental hazards and disasters in the context of globalization

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Abstract

Research background: In recent years, the concept of hazards associated to human-induced, natural, and technological has been the topic of scientific study. This insight occurs at a crucial point in the evolution of humanity when the planet is becoming more reliant and fragile. Numerous hypotheses support the increased chance of causing natural occurrences with significant societal consequences. Experts in insurance and reinsurance see human-caused climate change as the primary cause of imbalance as it becomes more pronounced.
Purpose of the article: The purpose of this presentation is to emphasize the environmental dangers posed by globalization.
Methods: The documentary study corroborated the view of experts who brought attention to the fact that catastrophic natural occurrences may have global, human-wide repercussions and consequences.
Findings & Value added: Globalization expands the reach of multi-risk impacts beyond the borders of countries, so that in many cases impacted they are immediately affected by hazards and disasters. If a calamity strikes a poor country, the international community will react with human and material aid. The detrimental consequences of natural catastrophes in least developed nations are felt more in deep across the global economy, as indicated by significant financial losses.

Keywords: *development; environmental protection; globalization; climate change; hazard*

JEL Classification: *A11; A14; B16*

1 Introduction

According to the processes for evaluating ecological or environmental risk outlined in official documents, this risk refers to the possible effect of human activities on abiotic flora, fauna, and environmental elements (setac.org). When it comes to disaster risk, the United Nations Office for Disaster Risk Reduction associate to this concept 'the potential loss of life, injury, or destroyed or damaged assets which could occur to a system, society or a

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community in a specific period of time, determined probabilistically as a function of hazard, exposure, vulnerability and capacity' (UNDRR).

In contrast, environmental risk in the business context is defined as the unpredictability or severity of the financial or non-financial consequences of an environmental hazard (Bran, et al., 2018). Therefore, we believe that environmental risks may be described as the effects of natural or anthropogenic hazards that have a negative impact on the environment and ecological systems (plants, animals, crops, settlements, etc.) (Rădulescu et al., 2018). Numerous hypotheses support the increased chance of causing natural occurrences with significant societal consequences (Burlacu & Jiroveanu, 2009). Specialists in insurance and reinsurance are increasingly pointing to human-caused climate change as the primary cause of a disturbance-causing imbalance (Dima, et al, 2020).

In recent years, insurance industry estimates have been verified (Smolka, 2004). The tsunami wave in Southeast Asia, Hurricane Katrina, the earthquake in Kashmir, and, more locally, the extreme floods of 2005 and 2006 are examples of occurrences that support these data. Add famine in Niger, Mali, and Mozambique to the list of natural calamities (Bodislav, et al, 2019).

The tsunami in Southeast Asia, the earthquake in Kashmir, and the floods in Romania exposed the fragility and vulnerability of emerging and transitioning economies, since the number of casualties was astronomically high. In contrast, Hurricane Katrina drew attention to the worldwide economic implications of catastrophic climatic events as well as the larger impact on the underprivileged people. In the not-too-distant future, we may anticipate several catastrophic catastrophes every year with thousands of fatalities and significant property loss.

Thus, in the last period of time climate change effects are having a direct impact on well-being at societal level. The IPCC (2022) acknowledge the need to take urgent actions due to global and regional risks generated by climate change and increased levels of global warming.

2 Methods

The documentary study corroborated the view of experts who brought attention to the fact that catastrophic natural occurrences may have global, human-wide repercussions and consequences.

2.1 Fundamental research

In this context, we investigate the intriguing structural characteristics associated with various types of natural hazards and risks. Regarding earthquakes, therefore, experts concur that the likelihood of human intervention is quite low. The occurrence of volcanism and earthquakes is the result of plate tectonics dynamics, which is formed by processes that occur over millions of years. Till now, there are insufficient data collected to establish even local projections or evaluations of the future development. However, in some cases there are exceptions, especially when the position of the activity of the seismic centre is already known like in the case of Vrancea Region (Romania). The effects of the seismic activity manifested also in the earthquakes in Bucharest area. Based on field observations, researchers believe that here earthquakes occur with remarkable regularity for such occurrences, with a 30-year gap between large earthquakes.

3 Results

When we examine climate threats, the perspective is also changing. Severe occurrences occur with a far greater frequency, and many times due to human-caused activities or due to natural disturbances. Climate data can validate some of these hypotheses.

1. Tropical cyclones are present. Since 1960, the number of tropical cyclones of categories 4 and 5 has increased. This may potentially be the consequence of non-periodic variability, although global climate models clearly show the positive effect of the ocean's consistent warming on this phenomenon.
2. Storms. Rising sea and ocean levels do not pose a threat of flooding. It is not an overnight procedure that happens in silence. Strong storms have a negative impact on the material assets and existence of coastal towns. Experts predict that by the end of the century, incidents with a frequency of 1/60 years will be considered normal, since they will occur every two years (Weather, 2006).

Climate is one of the most variable environmental elements. Although elaborate models were developed, experts were unable to distinguish between anthropogenic and nonperiodic fluctuations. In this aspect, the El Nino phenomena presents a difficulty in being estimated in terms of occurrence being unpredictable. The phenomena happen every three to seven years because to the extreme warming of the Pacific Ocean's waters. It results in harsh weather conditions. El Nino caused record flooding in Chile in 1997, severe drought in Indonesia, heavy rainfall in the United States, a dramatic decline in fish catches in Peru, and spectacular growth in Chile. Over 2,000 people were killed and over 33 billion dollars' worth of property was destroyed as a result of these catastrophes.
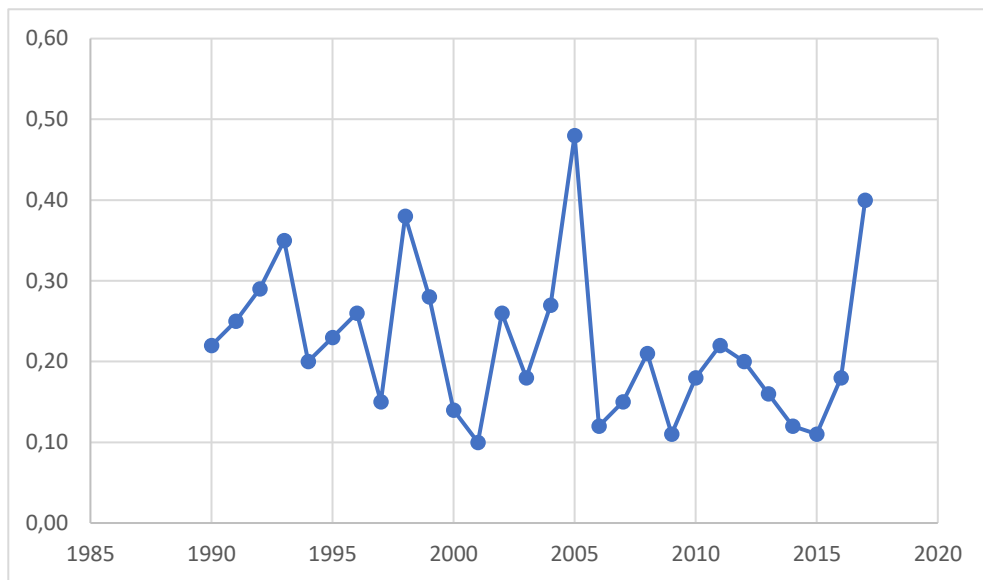
Figure 1. Weather disaster losses as % of global GDP (Munich Re) (% of global GDP).

Source: Adaptation according to the data of Pielke (2018).

3.1 Information flow analysis

Analysing the information included in a list created by the U.S. Disaster Centre about the occurrences that have caused the most material damage, we find that floods rank first in

terms of both the magnitude of the damage and the frequency of the danger (the number of events in the top 100 of the hazards).

Enhanced susceptibility. Vulnerability, i.e., the degree of exposure of human lives and material goods to the occurrence that happens, is an additional key factor in resolving the challenges associated with natural disasters, among others. Population expansion and urbanization, particularly the emergence of megacities in recent decades, environmental deterioration and anthropogenic changes are among the characteristics of the globalization period (Burlacu, et al., 2019).

The population is becoming more concentrated in metropolitan areas (Alpopi, et al, 2018). In 2007, for the first time in human history, more people will reside in urban regions than in rural ones (Burlacu, S. et al., 2018). These developments have made populations more vulnerable to natural disasters. The Disaster Centre's rating becomes meaningful from this perspective as well. The pace of rise in the worth of the damages rose dramatically from year to year (Jianu, et al., 2019).

The most 'expensive" incident was the 1995 earthquake in Japan, which caused over $175 billion in material damage. The escalation of risk exposure has insurance firms more anxious. The capacity of these organizations to endure the strain of rising risks and vulnerabilities is shown by a 2000 research. Hurricanes, storms, and earthquakes are ranked according to the insured value of the property (table 1).

Table 1. The costliest natural disasters.

No.	The event	The region	Date	Generated losses (billion dollars)
1.	Hurricane Katrina	US	2005	167,5
2.	Hurricane Harvey	US	2017	130,0
3.	Hurricane Maria	US, Puerto Rico & Rep. Dominican	2017	93,6
4.	Hurricane Sandy	US	2012	73,5
5.	Hurricane Irma	US	2017	52
6.	Hurricane Andrew	US	1992	50
7.	Drought in California	US	1988	44,2
8.	Flooding centre of the US (Midwest)	US	1993	37,7
9.	Hurricane Ike	US / Caribbean	2008	36,3
10	Drought in California	US	2012	33,9

Source: https://www.investopedia.com/financial-edge/0311/the-financial-effects-of-a-natural-disaster.aspx

The escalation of risk exposure has insurance firms more anxious. The capacity of these organizations to endure the strain of rising risks and vulnerabilities is shown by a 2000 research. Hurricanes, storms, and earthquakes are ranked according to the insured value of the property (table 1).

Ioniţă et al. (2009) found that environmental deterioration and anthropogenic changes also increase susceptibility. For instance, agriculture diminishes the soil's absorption capacity, which exacerbates the effects of floods, even if the severity of the meteorological processes remains constant. Destruction of mangrove swamps in Sri Lanka has made coastal towns more susceptible to tsunami surges. Changes in rainfall distribution and infiltration may be caused by deforestation, increasing the catastrophic potential of floods (Burlacu, et al., 2018). There is evidence that environmental changes in the Himalayan Mountain region increased the quantity of debris and catastrophic floods that caused over

$2 million in damage to Bangladesh in 1988, 1991, and 1998. In Cameroon, unstable slopes were constructed on the hills around the towns, resulting in hundreds of casualties from landslides every rainy season. In 1999, because to a lack of urban planning in Venezuela, almost 30,000 people perished in the most advanced towers.

The tsunami that occurred in December 2004 was seen as a warning signal. This catastrophe directly impacted eleven nations and caused damages in more than fifty states, including those incurred by visitors from northern countries. The oil price was impacted by Hurricane Katrina for many months; however, the worldwide financial impact was short-lived.

Scientists call attention to the reality that catastrophic natural occurrences may have global ramifications and repercussions, affecting all of mankind. Extreme events occur with extremely low frequency, and their potential consequences include a global economic crisis, tens of millions of victims, the catastrophic and irreversible destruction of megacities, the endangerment of global food reserves, the disruption of transportation and communication systems, and widespread pollution. In addition, these impacts will result in starvation, diseases, political conflicts, the breakdown of social order and national and international institutions, war, and perhaps the extinction of humankind.

The rising effect of natural disasters must be seen in the perspective of an increasingly complex, interconnected, and vulnerable global community. Changes resulting from human activity and the increased susceptibility of communities are the primary drivers of economic expansion. However, human-induced climate change is considered a potential contributor to the rise in the frequency of severe occurrences (Burlacu, Georgescu et al., 2022).

4 Discussion and Conclusion

In recent years, the hazard of severe hazards and risks occurrences has been the topic of scientific community. This insight occurs at a crucial point in the evolution of humanity, when the planet is becoming more reliant and fragile. Globalization looks to be an irreversible phenomenon, with collaboration, international accords, and the global community gaining popularity (Alpopi, Burcea, et al, 2022). The countries have participated in cooperative efforts to address key issues.

This worldwide endeavour has both good and bad examples. The international cooperation through the Montreal Protocol for the Protection of the Ozone Layer is seen as a success by both the world community and experts. On the other side, the Kyoto Protocol remains contentious.

The foundations of success are scientific certainty, the participation of developed and transitioning nations, and substitutability. The foundations of failure include scientific ambiguity, bigger dimensions, deep economic repercussions, and restricted physical, economic, and political substitutability. Principal obstacles are high prices, the decrease of emissions from big emerging nations (China, India), and adherence to the precautionary principle.

Globalization extends the impacts of chance beyond the boundaries of countries immediately impacted (Rădulescu et al., 2022). If the tragedy happens in underdeveloped nations, the international community reacts with material and human aid as well as solidarity. If catastrophes occur in affluent nations, the negative repercussions are perceived on a global scale, manifesting as significant financial losses.

Globalization process increases the interconnections and risks exposures on communities and societies, regions and countries. In this regard, the degree of adaptation and mitigation processes could address the global challenges and opportunities related to climate change. Therefore, finding suitable solutions to various types of hazards and risks

is important to increase the degree of preparedness through developing collaboration and partnerships at national and international levels.

The reach of multi-risk impacts is extended beyond the borders of countries as a result of globalization. As a result, countries that are impacted are in many cases instantly impacted by hazards and disasters. If a disaster befalls a developing nation, the international community will respond by sending both people and material relief. Significant monetary losses are one indication that the negative effects that natural disasters have on the economies of the world's least developed countries are felt more profoundly across the economy.

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Development of the investment to the living environment protection in Slovakia from the view of globalization process

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Abstract

Research background: The growing environmental problems with a global impact on the quality of the environment require attention from all countries, having international and worldwide dimension, and the urgent adoption and implementation of established measures to protect the environment.

Purpose of the article: The presented contribution points to the necessity of financial resources in the process of improving the environment. It aims to analyse public expenditures and investments spent on the environment in the European Union, compared with the situation in Slovak Republic, as well as to identify the main environmental areas that are supported by investment funds. The aim is also to assess the effectiveness of the funds spent in the relation to the selected indicators, focused on the waste management.

Methods: The main approach to make the determined research is the analysis of the state and the development of public expenditures and investments, as well as the analysis of the ways and approaches, municipality uses for municipal waste management.

Findings & Value added: The contribution results in the finding the trend of the investment to the protection of the living environment in Slovakia that can be used for green economy management. The results can be used for public administration, as well as private investment considering to the living environment.

Keywords: *public expenses; investment to the living environment protection; waste economy; energetic evaluation*

JEL Classification: *F64; H83; Q56*

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1 Introduction

The pillar of the implementation of Agenda 2030 in the EU is the 8th Environmental Action Program, which is a plan for people, the planet, and prosperity. The pillar stresses the need to improve the implementation of European environmental legislation, increase awareness and communication with the public, ensure the systemic nature of Europe's climate and environmental challenges, (Belanová, 2005) as well as the need to accelerate the transition to a resource-efficient, safe and sustainable economy, production and consumption. Sustainable product policy can make a significant contribution to reducing waste. Where waste generation cannot be avoided, its economic value should be exploited and its impact on the environment should be eliminated or at least minimized (Zaharova, 2019; Mlynárová, 2021).

These facts need to be addressed at a global level, as the amount of waste is constantly increasing, and waste is thus becoming one of the most pressing problems of human existence. This is also indicated in the World Bank's forecast, which estimates that global waste production will increase to 2.58 billion tons by 2030, and 3.40 billion tons by 2050, which presents more than double the growth of the population over the same period. A rapid increase in waste is expected in low-income countries, where the waste will increase more than triple by 2050, mainly in East and South Asia and Sub-Saharan Africa. It should be noted that in these countries, more than half of the waste is currently landfilled and the growth of waste will have huge consequences for the environment, health, and prosperity. Mainly solid waste arising from construction activities is a grave concern in many economies, with heavy regulations by authorities. Vivian and Tam (2013) tried to evaluate new policies based on the latest waste management philosophies available (e.g., the reduction, reuse, and recycle principle, and the polluter pays principle) having an effective impact on the sustainable development of the living environment (see also Mihaliková et al., 2018). Environmental policies are on the agenda of almost all countries of the world, connected with modern innovative technologies, used in the area of waste treatment; however, not all countries and communities give the same priority to environmental policy (Ladaru et al., 2019; Lobova et al., 2022).

In accordance with the Agency 2030 (EEA, 2020 and Envirostrategy, 2019) for sustainable development, Slovakia uses the strategic documents. Slovakia, as well as other member EU states, is trying to maintain and observe long-term competitiveness and to provide sustainable development in accord with all environmental aspects. The European Union is also paying close attention to the issue of waste since from 2012 to 2018; there was a 6.34% increase in waste in the EU. Although municipal waste does not account for a large proportion of waste in many countries, it is the most difficult to manage due to its diversity. The investment to the living environment protection is connected with presently emphasized circular economy, impacted the living environment as well (Busu, 2019 ; Andabaka et al., 2019).

2 Methods

The environment presents a public good that is financed from public budgets. The base of the paper is to evaluate public expenditures and investment to the living environment in Slovak Republic, as well as to identify the main environmental areas, to which the financial sources flow. The main goal is to evaluate effectiveness of the investment in relation to the communal waste.

Therefore, during the research we resulted from the data from Ministry of Environment in the Slovak Republic, where on average, more than two thirds of all expenditures of the Ministry of the Environment and the Environmental Fund come from EU sources, including

co-financing. By environmental protection expenditure, we mean funds for all activities related to the prevention, reduction and elimination of any pollution. The aim of expenditure is to maintain or improve the quality of the environment, or to reduce adverse effects.

We considered environmental costs spent on reducing and eliminating environmental pollution, as well as on prevention itself. These are expenditures arising from air and climate protection, wastewater management, waste management, soil protection and remediation, groundwater and surface water, noise and vibration reduction, biodiversity and landscape protection, radiation protection, research and development (Mihaliková et al., 2018). Their monitoring and analysis is helpful due to the evaluation and monitoring of environmental policy itself and from the point of view of ensuring coordination between the policies of individual member states. In addition to the environmental expenditures of the Ministry of the Environment, the Statistical Office of the Slovak Republic (Statistical Office SR, 2020) also systematically monitors financial indicators of environmental protection for enterprises. The total environmental protection costs and revenues related to the sale of products, devices, components and technologies intended for environmental protection, the sale of by-products or waste products and revenues from the provision of environmental protection services to other entities are evaluated.

The source of the other necessary data for the analysis were data from Eurostat databases, Public Administration Budgets, published by the Ministry of Finance of the Slovak Republic, statistical databases published by the Statistical Office of the Slovak Republic. In the frame of single analysis, we resulted from the continuously published values of chosen indexes from the portal https://ec.europa.eu/eurostat/data/database in available years (Eurostat, 2020). Collected data had been registered, sorted and adjusted in database in MS Excel according to the demand of statistical software JMP, to which adjusted data had been transported and consequently analysed.

3 Results and Discussions

3.1 Investment of the municipalities to the waste economy

From the point of monitoring by the Statistical Office, economic instruments for environmental protection also include investments in environmental protection. Investments for the protection of the environment are considered as investments made for the acquisition of long-term assets used for the protection of the environment (machinery, equipment, land, etc.) in the form of purchase or own creation, including technical improvement. The data of investment are given in the following table 1.

Investments in environmental protection as well as investments in waste management were volatile. The highest investments were in 2012, followed by a significant decline the following year. After 2016, however, it is possible to follow their growing trend again. Overall, it can be stated that the investments of municipalities in the field of waste management have a relatively strong share, from 31% in 2014 to 65.5% in 2016.

Table 1. Investments of the municipalities to the living environment protection, especially to the waste management (thousand Euro)

	2012		2013		2014		2015	
	Value	%	Value	%	Value	%	Value	%
Investment to the living environment	62054		41046		33727		40998	
Investments – waste management	33347	53,7	13752	33,5	10488	31,1	24437	59,6

	2016		2017		2018		2019	
	Value	%	Value	%	Value	%	Value	%
Investment to the living environment	17129		32944,0		58497		52160	
Investments – waste management	11214	65,5	11983	36,4	26708	45,7	24729	47,4

Source: own processing according to data from Statistical Office, SR

The next development till 2019 is given in Figure 1, where we can see fluctuant trend.
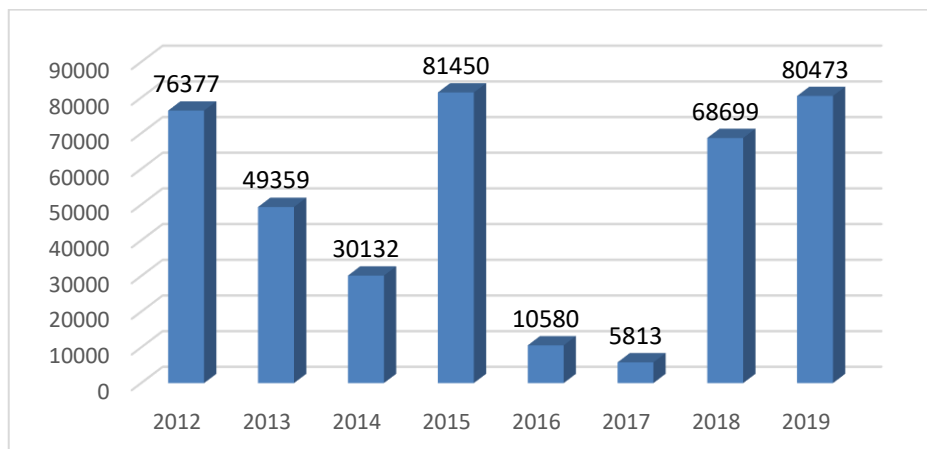
Figure 1. Development of Ministry of Environment expenses to waste economy in Slovakia

Source: own processing according to the data from Ministry of Finance, Slovak republic, Budget of public administration, SR (2012–2019).

3.2 Subsidies to the municipalities from the Environmental fund

Economic instruments are important in the implementation of environmental policy. Through them, negative effects on the environment of individual polluters can be compensated. Economic instruments can be negative (fees, fines) or positive (preferential taxes and levies, loans and subsidies). Among the positive economic instruments to which we will pay more detailed attention are the subsidies provided for environmental protection. They contribute to a positive change in the behaviour of polluters. This type of economic instrument is also indicated in the Database of Economic Instruments used in the implementation of environmental and natural resources management policy, which is maintained by the Organization for Economic Aid and Development and the European Environment Agency (EEA, 2020). At the same time, this is pointed out in the Act, which states that legal or natural persons who protect the environment or use natural resources in accordance with the principles of sustainable development may benefit from adjustments to taxes and levies or the provision of loans and subsidies.

Economic instruments in waste management follow the economic instruments of environmental policy, which use the price mechanism to achieve environmental goals. Their aim is to stimulate waste producers to apply environmentally friendly technologies, more efficiently using production inputs, to support waste recycling and composting (Čulková et al., 2016). Ofuji (2015) states that economic instruments aim at meeting the environmental goal, namely the reduction of waste, as well as the elimination of landfills, which adversely affect natural resources as well as human health. On the one hand, they can

economically burden the environmentally negative activities of the business sphere or, on the contrary, favour their ecological behaviour.

Subsidies are generally non-refundable funds that a grant applicant receives, under defined conditions, mostly for a specific purpose. If they are provided from the state budget of the Slovak Republic, resp. from the funds of the European Communities, it is necessary to understand them as one of the forms of state, resp. European support for identified priorities or development programs. If the state is the provider of the subsidy, the state may specify the specified conditions, or may determine other conditions that will ensure maximum economy and efficiency of the subsidy and is obliged to clearly define the purpose for which the subsidy is provided (Act 523/2004). It should be noted that in the case of drawing public funds, any provision of subsidies is subject to many conditions and criteria in order to maintain the effectiveness, efficiency and economy of expenditure. Subsidies are also used in environmental policy to directly or indirectly limit the use of something that has a demonstrable negative impact on the environment. In waste management, they can be used to promote better waste management, waste reduction and investment in improved waste management. They can take the form of direct subsidies or tax exemptions. Governments often use incentives and subsidies to induce certain behaviours between businesses and households. In particular, subsidies and tax exemptions are often used to support investment in improved waste management infrastructure. Other incentives include, for example, financial payments to municipalities and waste treatment facilities that improve the efficiency of waste treatment, municipalities that agree to a landfill (Israel), payments to companies or households to promote recycling and proper waste management (Environmental Fund, 2022).

The Environmental Fund was established in order to implement state support for environmental care and environmental creation on the principles of sustainable development. The main mission of the fund is to provide funds to applicants in the form of subsidies or loans to support projects aimed at achieving the objectives of state environmental policy. The following table 2 provides an overview of requested and provided subsidies to the Environmental Fund.

The starting point for the provision of support in the form of a subsidy to applicants is the annual publication of the specification of support for activities in the form of a subsidy for which applicants can submit applications. During the analysed period, there were the most applicants in 2017 and in last two years there has been a significant decrease in applicants for subsidies. However, it should be noted that in terms of the number of applicants to whom the subsidy was also provided, the situation has improved significantly over the years. The table 4 shows the annual increase in the number of applicants who received the subsidy, up to 35.95%.

Table 2. Support of waste economy by subsidies in Slovakia

	2012	**2013**	**2014**	**2015**
Number of applicants	299	290	288	227
Applied sum	47 381 246	46 071 650	52 290 815	28 841 277
% from applied subsidies to waste economy from total subsidies	11,65	11,96	10,07	9,303
Number of approved subsidies	1	22	35	32
Provided sum	281 139	2 170 348	2 638 758	2 797 526
% from provided subsidies to waste economy on total subsidies	0,87	10,28	6,91	12,55

	2016	**2017**	**2018**	**2019**
Number of applicants	231	362	120	153
Applied sum	30 466 931	49 804 635	8 437 045	10 630 076
% from applied subsidies to waste economy from total subsidies	10,49	15,265	6,55	9,43
Number of approved subsidies	49	47	37	55
Provided sum	5 512 876	4 262 058	2 570 370	3 279 741
% from provided subsidies to waste economy on total subsidies	14,9	22,338	7,81	8,489

Source: own processing according to Environmental Fund 2022

In terms of the required amount of subsidies, subsidies for the area of waste management were requested on average at the level of 10.58% of the total requested subsidies registered by the Environmental Fund. The highest value was required in 2017, on the contrary the lowest in the following year 2018. The provided subsidies for waste management amounted to approximately the same percentage, on average 10.51% of the total subsidies provided by the environmental fund. The highest value of subsidies was allocated to waste management from the total subsidies in 2017. The following table 3 shows the success of applicants and subsidies received.

Table 3. Success of applied projects (%)

Success	2012	2013	2014	2015	2016	2017	2018	2019
Value	0,59	4,71	5,05	9,7	18,09	8,56	30,47	30,85
Number	0,33	7,59	12,15	14,1	21,21	12,98	30,83	35,95

Source: own processing according to Environmental Fund 2022

The presented results point to an improvement of the situation. Thirty percent of the requested funds were also provided in the last two years, although it should be noted that the value of subsidies decreased compared to 2016 and 2017. Although the situation is improving in terms of the number of applicants and subsidies provided, many applications are still rejected. The reason is often the delivery of incorrect documents or failure to meet the deadline or it happens that the applications do not fall within the submitted call. The application assessment process consists of the first stage of checking the completeness and formal correctness of the applications. Applicants with incomplete or incorrectly completed applications are invited to complete them within the set deadline. Complete applications are submitted for evaluation by fund staff and external evaluators. After evaluation, they are submitted to a meeting of the fund's board, which has a recommendation character for the minister. The Minister decides on the allocation of the subsidy in the form of a written decision on the provision of support in the form of a subsidy. (Environmental Fund, 2012 - 2019). The development of applied and provided subsidies to the area of waste economy from European Fund is given in Figure 2.
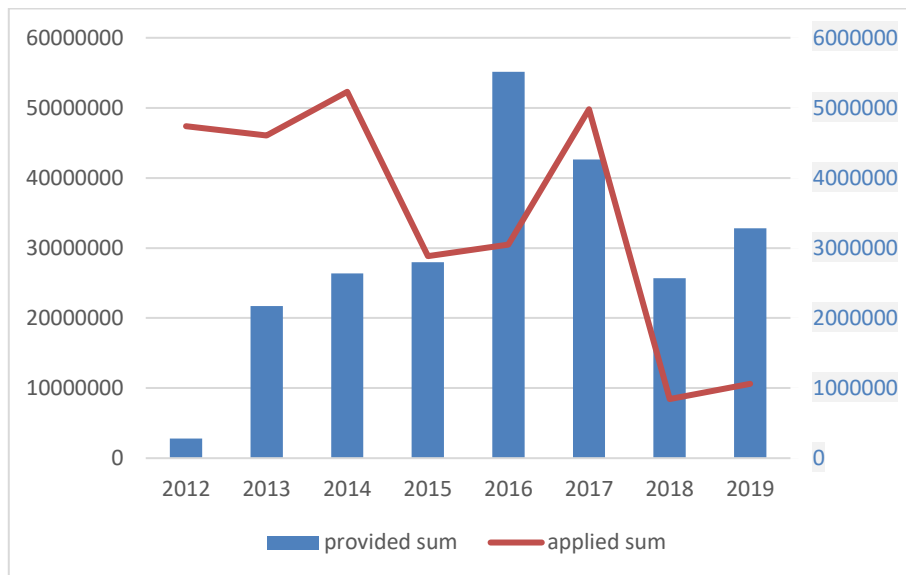
Figure 2. Applied and provided subsidies in area of waste economy from the Environmental Fund

Source: own processing according to Environmental Fund 2022

Finally, we compared the situation in Slovakia with EU countries. As we can see in Table 4 the range of the published data for individual indexes are significantly different, while the volume of data connects with data incompleteness in the countries.

Table 4. Structure of data collection in EU

Index	Number of measurements	Analysed period
Investment to the living environment in mil.€	2928	2006 - 2019
National expenses to the living environment protection	3555	2006 - 2020
Environmental donation	77574	2011 -2019
Expenses to the living environment protection per inhabitant	14796	1995 - 2013
Communal waste	21927	1995 - 2020

4 Conclusions

In the content analysis of the paper, we pointed out the importance of investing in environmental protection and one of the environmental problems—the growing amount of waste. We have defined public spending and investment in the environment and pointed to many authors who have researched this aspect in their scientific papers. The main part of the paper was devoted to the analysis of trends and comparison of public expenditures and investments in the EU and Slovakia in individual areas of the environment.

Public spending on the environment presents one of the important economic tools for achieving environmental policy objectives and can positively influence polluters' behaviour.

The presented paper examined public expenditures and investments in environmental protection in the EU and the Slovak Republic and the efficiency of their spending in

relation to waste management. This category of investment was chosen because one of the factors that significantly affect the environment in the Slovak Republic and Slovakia still lags behind the EU average in the evaluation of their indicators is waste. In Slovakia, the amount of municipal waste is growing at a relatively fast pace, and their high landfill rate is a negative phenomenon. The main goal of the formulated measures within the environmental policy is to complete the waste management infrastructure focused on improving the collection and sorting of municipal waste and, subsequently, on their recovery, especially material waste. Funding for the mentioned activities comes mainly from the EU structural funds (90%) and the Environmental Fund (10%) (Bak et al., 2020). However, financing of the living environment protection is not possible only from public sources, but demanding also private partnership (Gao et al., 2022).

The aim of the paper was also to point out the relationship between public expenditure and the rate of recovery of municipal waste. The paper consists of the analysis of the dependence in EU countries, and it confirmed that with the growth of public expenditure on waste management, the rate of recovery of municipal waste also increases. This is a signal of the efficient use of funds to improve waste management indicators. Based on this, we can conclude the need to evaluate the indicators expressing the management of municipal waste with a link to the use of funds spent on improving the waste management system. This will help to assess their effective implementation and the fulfilment of environmental objectives.

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Cultural globalization and film policy in small film distribution markets in the Baltic States: towards mission economy approach

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Abstract

Research background: With the expansion of digital technologies audio-visual content started to be produced in large amounts and distributed on variety of digital platforms. For instance, feature films are distributed on video-on-demand platforms already more than 10 years and this release window became a global channel for media content and brought more competitiveness for cinema theatres. Consequently, media conglomerates put considerable efforts into developing better mechanisms for controlling where, when, and how audio-visual content is circulated. However, media company control crystallizes into a market concentration problem, which is highly noticeable in the film distribution sector across Europe where Hollywood film production dominates in European cinema multiplexes and video-on-demand platforms.
Purpose of the article: The aim of the paper is to question the impact of cultural globalization for the distribution of national film production in Europe and especially for small film distribution markets such as in the Baltic States that are constantly challenged and dominated by Hollywood films and provide new approach and orientation from political economy towards mission economy.
Methods: Methodology is based on critical analysis of statistical data taken from official sources –from Estonian Film Institute, Lithuanian Film Centre and National Film Centre of Latvia.
Findings & Value added: Since national film production and distribution in Europe is heavily influenced by film policy it requires new approach in order to bring innovations in fostering national film production and its distribution through collective process, market shaping, long-term financing and possible partnerships between public and private sectors.

Keywords: *globalization; film policy; film distribution; mission economy; culture*

JEL Classification: *H0; D40; P16; Z18*

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1 Introduction

Since the film industry is the target of national cultural policies in many countries (Crane, 2014), the dominance of Hollywood film industry in a global film market is considered as an example of cultural globalization. Looking from political economy perspective, cultural globalization is associated with cultural imperialism and it questions how political and economic organisation of media industries affects the production and circulation of meaning and what consequences different ways of financing and organizing cultural production can have for public domain and audiences' access (Golding and Murdock, 2000). Therefore, political economists focus on ownership, finance and support mechanisms, and on how the policies of governments influence and affect media content (Hardy, 2014).

Governments engage in media (film) policy in three main ways – through legislation, regulation and subsidizing. Public support (subsidizing) of the film industry is often defended on the grounds it promotes the national culture and at the same time protects it from dominance of other cultures (McKenzie, 2022). In Europe there is a long tradition of state intervention through all these ways and at the same time the risk of national film production is transferred to the state (Morawetz et al., 2007). On the other hand, film policies started to be reconsidered in terms of globalised cultural economy where small national cinema is constantly challenged by the discourses of transnationalism and regionalism (Hill and Kawashima, 2016).

One of the examples could be Hollywood film production and its influence over European national film production and its distribution. There is an argument if European audiences do exercise free choice in selecting U.S. films over local productions, because Hollywood control film distribution market (Pardo and Tabernero, 2012). Since the traditional major studios are international conglomerates that take advantage of economies of scale and scope and especially in distribution, globalization can be seen as a menace in terms of standardization of cultural products (Chisholm et al., 2015). Particularly Eastern European filmmaking was and still may be in a disadvantaged position in regard to international distribution, because a project may be supported on the production level, but not necessarily on distribution (Iordanova, 2002; McKenzie, 2022).

Since film distribution involves not only the choosing a release date of the film, but also the design and implementation of advertising campaigns (McKenzie, 2012) and marketing (Kerrigan and Ozbilgin, 2004), more and more it is considered as a policy (Harris, 2016). In fact, film distribution is the key zone for profit while in Europe only film policy support for the production is constantly emphasized.

Another important factor and a challenge for film policies is that traditional film value chain is challenged by digital disruption, social digital technology that demonstrates its value as a product, and a service and as a means of distribution (Franklin et al.,2013). The digital market is growing rapidly, but the EU internal market couldn't benefit economically if the single market wouldn't be maintained (Pelkmans, 2016) and this is a difficult problem since European film industries are fragmented due to multiple languages, cultures and traditions and composed of hundreds of small and medium-sized enterprises that can only operate at the national level, and the national markets for most European films are too small to make big-budget productions worthwhile (Richeri, 2016).

If we look at a small media markets, they must deal with the following hardships: (1) the shortage of resources, (2) a small audience and small advertising, (3) dependence and (4) vulnerability. First, small media markets face limitations on the production side, and then there are limits on the sales side, because the production costs are similar in small and in big countries, and the revenues realized from the sales of audio-visual

production and advertising are too small for the development of audio-visual production (Puppis, 2009).

The Baltic States and their media markets are among the small ones and still in the development stage since all Eastern European film industries experienced massive cuts and withdrawal of secure funding early in the 1990s (Iordanova, 1999). Later on when the states became more rich with the development of their economies they could allocate more financial support for national and regional production.

On the other hand, if financial support is allocated only for film production while forgetting film distribution, a significant part of European films might not even be presented to national audiences. Consequently, film policies in the Baltic States have to be reconsidered and updated in accordance with a new initiatives that already matched the 100th anniversary of the Baltic States in 2018 where the focus was put not only on allocating more financial support for national film production, but distribution as well.

This initiative to finance more national film production and distribution could lead to mission economy orientation since political economy even though stresses the state's intentions toward media industries in regard to growth, competition and distribution of its products, but new political economy (Mazzucato, 2021) is suggested, because of new approach to public policy, which influence business (Kattel and Mazzucato, 2018) and also:

- value and the collective process involving business, government and civil society,
- markets and market shaping with co-creating and co-shaping them,
- organizations and organizational change through co-operation,
- finance and long-term financing oriented towards societal goals and dynamic institutions,
- distribution and inclusive growth,
- partnership between business and the state,
- participation and co-creation within creation process, discussions and debates.

For instance, value, markets, long-term financing, partnership between business and the state and participation and co-creation are interconnected processes in public sector that could be aligned to foster new areas of markets and focus more not on facilitating change, but rather on creating change (Mazzucato, 2016). Therefore, there is a need to set a priority and after setting it (a transformative activity), there should be policy instruments to support the exploration of the new areas of opportunities as well as coordination devices to assist the formation of networks and partnerships (Foray, 2018). In regard to film policy not only quantity of investment has to be considered while developing national film production and distribution, but quality in the underlying governance mechanisms as well.

2 Methodology and Methods

2.1 Research aim

The aim of this paper is to question the impact of cultural globalization for the distribution of national film production in small film distribution markets such as in the Baltic States that are constantly challenged and dominated by Hollywood films and provide new approach and orientation from political economy towards mission economy.

2.2 Methodology of the research

The calculations of Lithuanian, Latvian and Estonian film distribution and its support are based on yearly official statistics from Lithuanian Film Centre, National Film Centre of Latvia and Estonian Film Institute and also secondary statistical source.

3 Results and Discussion

At first it is important to notice that all three institutions (Lithuanian Film Centre, National Film Centre of Latvia, Estonian Film Institute) responsible for the formation and implementation of film policy in the Baltic States introduced new strategies and regulations to support distribution of national films in 2017 and 2018 that could be associated with mission-oriented approach. National Film Centre of Latvia established film visual identity, popularization and accessibility strategy called "Latvian films for Latvian Centenary" in 2017. Estonian Film Institute and Lithuanian Film Centre issued conditions and procedures for supporting the distribution of national films in 2018.
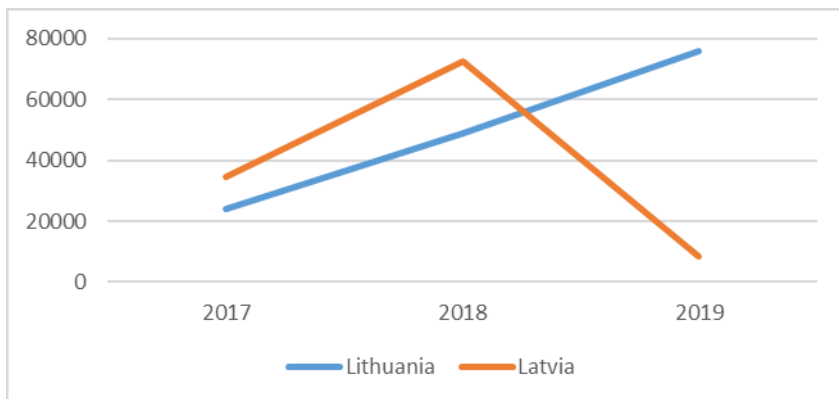
Figure 1. Financial support for national film distribution in Lithuania and Latvia 2017-2019 (in Euros)

Source: author's calculations according to Lithuanian Film Centre and National Film Centre of Latvia (2022)

Estonian Film Institute provides information about amount of support for national film distribution only from the year of 2020 where 23000 EUR were allocated (Estonian Film Institute, 2022).

Table 1. Market share by admissions of national films in Lithuania, Latvia and Estonia in 2017-2019

	2017	2018	2019
Lithuania	21,47 %	27,41 %	19,03 %
Latvia	7,84 %	22,06 %	20,16 %
Estonia	8,04 %	17,85 %	23 %

Source: Facts & Figures 2020

While comparing the amount of financial support for national film distribution in Lithuania and Latvia it is possible to identify that at least one national film, which distribution was supported by Lithuanian Film Centre was among top-10 most watched films in cinema theatres that year respectively in 2017, 2018 and 2019 while in Latvia only one film, which distribution was supported by National Film Centre of Latvia reached top-10 position among most watched films in cinema theatres in 2018 (Facts & Figures, 2020).

The market share of national films in cinema theatres in Latvia and Estonia have significantly risen between the year of 2017 and after financial support for distribution was started to be allocated according to new regulations (Table 1). In Lithuanian case the market share of national films was already higher and even decreased in 2019 despite the rising financial support.

4 Conclusions

Hollywood film industry's domination in a sense of film production and distribution is an example of cultural globalization that affect small media and film industries. This dominance is challenging for Eastern European and particularly the Baltic film industries that are still developing their film policies.

The year of 2018 was a breaking point for Lithuanian, Latvian and Estonian film policy development since more financial support was allocated not only for national film production, but distribution as well. National Film Centre of Latvia was the first one to introduce the strategy to promote national films through distribution while Lithuanian Film Centre and Estonian Film Institute issued conditions and procedures for supporting national film distribution. These film policy measures are the examples how public institutions can participate in shaping and co-creating markets and start long-term financing oriented towards societal goals that are also connected to fostering national culture. There is still left space for the value creation as such, partnerships between business and state and participation and discussions in film policy since the growth of financial support for film distribution is only one of the financial instruments that helps to co-create the market and focus more on mission-oriented approach.

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Auto-evaluation of English language skills of management students in the context of global education

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Abstract

Research background: At present, work practice increasingly requires competencies or skills that add value to the general education of employees. Global education contributes to the awareness of global themes that affect each individual, develops their critical thinking, and deepens their understanding of areas and topics that affect the whole world. Global education often requires foreign language skills that can be understood as part of intercultural and global competences.
Purpose of the article: The aim of the paper is to present the results of the needs analysis of management students to describe the specifics of foreign language teaching to develop soft skills for practice in a global environment. It illustrates the changing needs of the student population.
Methods: At the end of the winter semester of the academic year 2021/2022, a questionnaire survey was conducted among Master's degree management students aimed at auto-evaluation of their foreign language skills and weaknesses.
Findings & Value added: Master's students assessed their foreign language skills in the middle of the assessment scale, with respondents with poorer English proficiency also identifying a higher number of areas in which they see their weaknesses and slightly accumulating the causes of these shortcomings. The results of the survey illustrate the expectations of management students which can serve as a basis for the LSP course aimed at the development of global and intercultural competences.

Keywords: *global competence; intercultural competence; foreign language skills; auto-evaluation; LSP*

JEL Classification: *A12; A20; A22*

1 Introduction

Academic literature dealing with foreign language communication has increasingly focused on topics such as intercultural competence or intercultural communication, which could be

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also seen in a rising number of university textbooks devoted to intercultural communication (Jeleňová 2014; Ali Taha 2015; Slivková 2015, 2017; Dančišinová, 2022). Many authors (Průcha, 2010; Wang, 2020; Yurtsever and Özel, 2021; Kalaja and Pitkänen-Huhta, 2020) believe that foreign language knowledge is part of intercultural competence and dedicate their research to the development of models of intercultural competence that would not only focus on becoming an effective speaker but also interpreter (Valencia Álvarez and Michelson, 2022; Pondelíková, 2022). From the overview of current literature on intercultural competence, an obvious tendency to analyse intercultural communication in the environment of international trade can be seen.

The current dynamic nature of society's life and the need for sustainable development also place demands on the way students are taught and prepared for practice. The idea of global education is increasingly used in national and international education programmes, while the beginnings of global education in Slovakia as a response to globalisation processes are associated with non-governmental organizations (Globálnevzdelelávanie.sk, 2019). Although there is not a homogeneous definition of global education, the website Globalnevzdelavanie.sk (2019), created as part of a consortium project of three non-governmental organizations (Človek v ohrození, PDCS, and CEEV Živica) and a representative of the university environment (Faculty of Education, Matej Bel University), defines this educational approach as "cross-cutting discipline covering topics in the field of sustainable development, human rights, ecological, multicultural, global education." The aim of this type of education is to understand the relationships between people from developed and developing countries and to support international cooperation (Globálnevzdelávanie.sk, 2019). Global education highlights the global context in learning.

In the current globalised multicultural Europe, it is impossible to function without adequate intercultural communication competence of citizens (Kostková 2012, p. 9). Lustig and Koester (2010, p. 1-3) add that in the post-millennial world, people have no choice whether or not they want to communicate or cooperate with members of other cultures, but individuals must learn to communicate in the right way and understand the importance that culture plays in communication. Demographic, technological, economic, and political changes create a world dominated by cultural differences in a global environment (Osler, 2020; Thesing, Gerritsen and Van Mulken, 2021; Negedu and Ojomah, 2021).

Monceri (2022) claims that intercultural communication is a discipline within a system of science. Pondelíková (2020, p. 57) describes intercultural competence as the ability of an individual in an intercultural environment to react appropriately and effectively. Many authors (Slušná 2012; Abarca Millán, 2021; Ahmadi Safa and Tofighi, 2022; Roiha and Sommier, 2021; Okken, 2022) claim that there are special methodological procedures in intercultural education that contribute to the development of intercultural competence, and the teaching of foreign languages is its important aspect. The aim of the paper is to present the results of the needs analysis of management students to describe the specifics of foreign language teaching to management students to develop global and intercultural competences and soft skills for practice in a global environment.

2 Methods

At the end of the winter semester of the academic year of 2021/2022, a questionnaire survey aimed at auto-evaluation of foreign language skills was conducted among students of the Master's degree of study at the Faculty of Management and Business of the University of Presov (FMB UP). The respondents were management students in the first and second years of study in full-time and part-time forms of study. The questionnaire was distributed in an electronic form via the MS Teams platform and was accessible to all students who enrolled in the Applied Foreign Language for Managers (English) 1 and 3

courses. 177 students were willing to complete the questionnaire; the distribution was as follows:
- full-time students, 1st year: 79 (45% of the total number of submitted questionnaires);
- part-time students, 1st year: 9 (5%);
- full-time students, 2nd year: 70 (39%);
- part-time students, 2nd year: 19 (11%).

The total number of students asked to complete the questionnaire was 349. There were 367 enrolled students, but 18 part-time students attended courses in the first as well as the second year of study. Applied Foreign Language 1 (English) was enrolled by 134 full-time students and 26 part-time students and Applied Foreign Language 3 (English) was enrolled by 156 full-time students and 51 part-time students. The questionnaire was filled in by 50.7% of the total number of full-time and part-time students enrolled in courses; the distribution was as follows:
- 59% of the first year of full-time study (enrolled in the course);
- 35% of the first year of part-time study;
- 45% of the second year of full-time study;
- 37% of the second year of part-time study.

We consider it a representative sample as each student had equal access to the questionnaire and the reluctance to fill in the questionnaire would also be reflected in the information quality of the answers. However, the information value is higher for the full-time form of study.

3 Analysis of results

In the first entry of the questionnaire, students should evaluate their English language skills on a scale from 1 to 5. The chosen rating scale corresponds to the grading scale used at primary and secondary schools in Slovakia, i.e., grade 1 is the best, and the quality worsens towards grade 5, which is the worst rating. The resulting evaluation was an average grade of 2.47, which corresponds to the average quality of knowledge in the middle of the rating scale. The best grade 1 was marked by 27 students and the worst grade 5 by only one student. Better grades of 1 or 2 were marked by 46% of respondents and worse marks of 4 and 5 were marked by 7% of respondents.
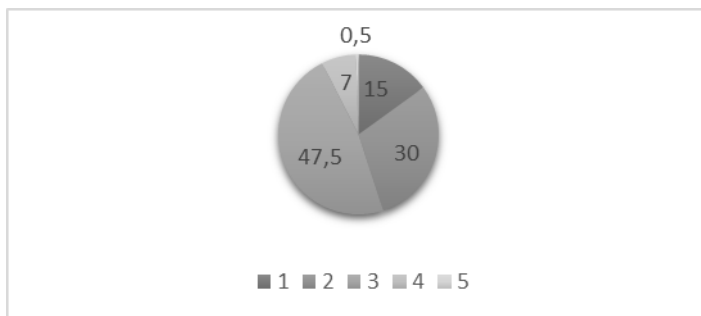
Figure 1. Auto-evaluation of English language skills (%).

Source: own processing

The second entry of the questionnaire focused on the self-assessment of English knowledge in the context of its use when students could agree (yes) or disagree (no) with the statement: I think that my knowledge of English is sufficient for the purpose of its use. The majority of students (77%) agreed with this statement. In relation to the previous entry

of the questionnaire, it can be stated that even if students evaluate their knowledge of English as average, they consider the level of their knowledge to be sufficient in the context of its use. Analysis of the answers to the first two questions revealed that 90% of people who rated their English language skills with 1 or 2 grades (46% of the total number of respondents) agreed with the statement that their knowledge was sufficient for what they were using it for. These were mainly students in the first year of full-time study (48% of students who marked 1 or 2 grade).

The third question of the questionnaire was aimed at finding out the purpose of using the English language, while students could mark more options. The options and the percentage of the total number of respondents were as follows:
− at school: 86%;
− for travel: 65,5%;
− at work: 34.5%;
− social media: 73%;
− playing games: 29%;
− watching movies, series: 79%;
− reading books in English: 21%;
− other: 7%.

Entries 4 and 5 of the questionnaire identified perceived weaknesses and their causes and students could mark more options. In the fourth entry, students were asked to indicate one or more options concerning their weaknesses as far as their English language skills are concerned. The options and their percentages were as follows:
− grammar: 57%;
− vocabulary: 56.5%;
− pronunciation: 37%;
− reading comprehension: 14%;
− conversation: 42% ;
− writing: 13.5%;
− listening comprehension: 22%;
− other: 2.3%.

Students predominantly marked their weaknesses in the area of grammar and vocabulary, slightly less in conversation and pronunciation. These are traditional areas of foreign language teaching.

The identified causes of the lack of knowledge, with the options and their percentage of the total number of respondents, were as follows:
− teacher: 3%;
− lack of motivation to learn: 29%;
− laziness: 43%;
− wrong coursebook: 8.5%;
− few opportunities for improvement: 27%;
− fear of mistakes (ashamed of making a mistake): 51%;
− 'I don't have the cells': 16%;
− it is not necessary for me: 2.3%;
− I don't like the English language: 3.4%;
− other: 7%.

The most common cause of the lack of knowledge regarding the English language was a feeling of shame and fear of mistakes, which gives interesting information to the teacher about the affective motivation of students or their emotional stance towards foreign language learning. Other most identified reasons were also laziness, lack of motivation, and

few opportunities for improvement. These options are mainly related to motivation to learn and are of affective nature.

We were also interested in the correlation between the auto-evaluation of student´s knowledge of the English language (entry no. 1), the identification of weaknesses (no. 4), and their causes (no. 5). We tested the interdependence through a linear sequential correlation (Kendall's sequential correlation coefficient) using the Statgraphics XVIII program.

Table 1. Results of the Kendall correlation coefficient.

		Question 1	Question 4	Question 5
Question 1	rK		0.3828*	0.2553*
	n		(177)	(177)
Question 4	rK	0.3828*		0.4468*
	n	(177)		(177)
Question 5	rK	0.2553*	0.4468*	
	n	(177)	(177)	

* significant at the level of significance $\alpha < 0.01$
Source: own processing

Based on the results of the Kendall correlation coefficient, we can formulate the following conclusions:

1. Respondents with worse auto-evaluation of English knowledge (entry no. 1) see their weaknesses (no. 4) in a larger number of areas; or respondents with better auto-evaluation of the knowledge of English see their weaknesses more specifically, i.e., in a smaller number of areas.

2. With the worsening auto-evaluation of the English knowledge (entry no. 1), respondents slightly cumulate the causes of these weaknesses (entry no. 5), i.e., the worse auto-evaluation of the knowledge does not have only one or two reasons, but there are several identified causes of weaknesses related to the English language knowledge.

3. Causes (entry no. 5) and weaknesses (entry no. 4) related to the lack of knowledge are positively interrelated, i.e., more causes mean more weaknesses.

In the sixth entry, students should express their expectations about the outcomes of learning English in the university course of English. They were given several options concerning the areas on which the teaching should focus, and they could mark more options. The areas were selected regarding the purpose of teaching and the professional focus of the students. The options and the percentages were as follows:

− vocabulary: 52%;
− writing a professional text in English: 23%;
− reading comprehension: 35%;
− speaking fluently: 56.5%;
− specifics of English business communication: 48%;
− searching for information in English for professional purposes: 25.4%;
− writing an abstract (final thesis): 21%;
− reading professional texts in the field of management: 18%;
− other: 1.1%.

According to the respondents, the most common area in which foreign language teaching at universities should focus is teaching students to speak fluently. It's a rather naive expectation. Professional vocabulary and specifics of business communication, as the other most frequently identified areas, are already related to the professional focus of

respondents, and have a rational basis. Approximately one-third of students also gave importance to reading comprehension.

4 Conclusion

In accordance with the requirement to develop intercultural and global competences, the LSP courses at the universities should be designed to meet the requirements of the practice. To design a suitable LSP course, a needs analysis was used to assess the foreign language skills of management students at the FMB UP. The questionnaire was distributed to all groups of Master's students in both years and forms of study. However, the largest group of respondents consisted of full-time students in the first year of study (45%). The resultant assessment of their knowledge of English was a grade of 2.47, with respondents agreeing that this level of knowledge is sufficient for what they use it for. The most common purpose of using a foreign language in this group of respondents was for school, in connection with the mass media, and for travelling. The identified areas of their weaknesses regarding the knowledge of English were grammar, vocabulary, and conversation, and the most common causes of the identified weaknesses were fear of mistakes and shame, laziness, a lack of motivation, and few opportunities for improvement. By correlation analysis of the relationships between the auto-evaluation of English, identification of weaknesses, and their causes, we found out that respondents with worse self-assessment see their weaknesses in a larger number of areas, accumulate the causes of these weaknesses, and more causes mean more weaknesses. Students expect English teaching at the university to expand their vocabulary, improve their ability to have fluent conversations, and develop knowledge of the specifics of English business communication.

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Sustainable Development and globalization

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Abstract

Research background: There is still much debate about whether or not globalization and economic growth are interrelated, and how governments and industrial societies in advanced economies are affected, with the end result being a connection between globalization and corporate and state welfare in terms of development in the long term. A network economy without hierarchies is defined as globalization, and this leads us to hypothesize that global economic growth would be responsible for deindustrialization, income inequality, or change in the welfare of advanced states as a result of globalization.

Purpose of the article: Our research aims to answer the question of whether worldwide syncope is not the result of globalization, what causes them, and also highlight the main characteristics of sustainable development.

Methods: The main research method is the review of specialized literature in order to understand how globalization has been debated in its causal relationship with economic trends and what conclusions have been reached so far. This was doubled by a documentary analysis to highlight the main characteristics of sustainable development.

Findings & Value added: The findings of our research were that globalization has led to a lack of appreciation for the authentic dimension of human nature by many leaders of highly developed countries. If respect for nature was essential to Eastern philosophy, Western philosophy would only recognize respect for man and his demiurgic characteristics. It would therefore come as no surprise that the West has enjoyed unprecedented freedom to plunder, dominate, and desecrate the natural world. Because of this aggressive and selfish approach to humanity's relationship with the natural environment, another threat to the continued existence of the ecosphere would be the management of the planet. The added value resulting from our research is given by highlighting the characteristics of successful businesses and the impact of these businesses on the sustainable development of society.

Keywords: *education level; employees; graduates*; *micro-credentials*

JEL classification: *I21; I25; J21*

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1 Introduction

There are a number of studies that test the correlation between globalization and the global economy, but there are also a lot of studies that test the result that was obtained: the effect of globalization on governments and on stratification in advanced economies among industrial societies. This type of research has as its final deliverable the correlation between globalization and corporate and state welfare from the perspective of sustainable development (Bran et al., 2018; Bodislav et al., 2019; Profiroiu et al., 2020; Rădulescu et al., 2020a). The idea that globalization represents the framework of a network economy is one that emerges from the academic definitions of globalization (without hierarchies). As a result of this, we are led to the realization that the expansion of the world economy is to blame for phenomena such as deindustrialization, the widening of income disparities, and the alteration of the standard of living in developed countries.

Bran et al., 2019, acknowledge that globalization is not the root cause of the global syncope that we are currently experiencing. The question that naturally arises next is what is causing these global syncopes. Since the 1980s, the global transformation has been observable, particularly in the United States, where a series of political reforms led to the deregulatory of certain economic activities as well as an attempt to dismantle state welfare in favour of corporate welfare. In the United Kingdom, a series of political reforms led to the deregulatory of certain economic activities and an attempt to dismantle state welfare in favour of corporate welfare. To put it another way, the welfare of corporations has essentially taken the place of the welfare of the state. A hybrid model of transformation through global interconnection was created starting with the first syncopation, which was the crisis of the 1970s. This crisis led to the lobbyist empowerment of Main Street by creating productive but marginally streamlined super conglomerates through corporate mergers, plant and utility company closures, and national and corporate downsizing that pursued globalization (Bodislav et al., 2020). This model was based on the transfer of responsibility for the execution of state financial policy to Main Street and Wall Street. Wall Street was tasked with being responsible for the financial execution of Main Street's operations. Main (with a short-term vision) (with a short-term vision). It was determined that the economy of the United States required a significant amount of upheaval because of the adversarial nature of the relationship that the United States maintains with Japan. This conclusion was reached. The difficulties brought on by competition between states could be reframed as opportunities to quicken the rate at which goods and services are distributed all over the world. When viewed in this light, the concept of global competition that has been brought about as a result of globalization can be considered to be a resultant concept (Sarbu et al., 2021). This is a fact that has led to the pursuit of creating artificial competitive advantages (without any real basis), in order to maintain a visible position on the map of the global economic landscape. You can see that the situation has completely changed from what it was like in the 1970s by looking at the diagram that illustrates the current state of the economy in the United States of America (Bran et al., 2019).

2 Methods

Our research aims to provide an answer to the question of whether or not worldwide syncopes are the result of globalization, as well as to the question of what causes them, and it also aims to highlight the primary characteristics of sustainable development. The primary research method involves conducting a review of specialized literature in order to gain an understanding of how globalization has been debated in regard to its causal relationship with economic trends and the conclusions that have been reached so far. This

was supported by a documentary analysis that aimed to shed light on the most essential aspects of sustainable development.

3 Results

In their study titled "Globalization, Governance, and the Environment in the Next Decade," Bran et al. (2019) propose that globalization has broken up into three distinct processes, which are as follows:

1. The expansion of international trade is the first step in the process that characterizes globalization. As a result of this development, companies are no longer competing with each other within their own national economies (which are closed), but instead with all countries that are able to produce a good that is comparable to the one that is traded by the local company. This alters the global competitive model (at the firm level). Additionally, it is a challenge for businesses that are under the impression that outsourcing production is the one and only way for them to expand their profit margin while simultaneously decreasing their production costs (the transfer of work from the developed area, which includes transaction costs, to the emerging or preemerging area).

2. The second process that defines globalization, which includes the Asian Tigers and the inefficiency costs they cause for the United States of America and other developed countries, is also a problem for these businesses. Even though the global economic crisis has slowed the rapid expansion of the Asian Tigers, these nations have still benefited from approximately twenty years' worth of foreign direct investment (FDI) in the target states that have constructed today's high-performing infrastructure, massive investment in human resources, political stability, and trade linkages;

3. The global financial flow is the final aspect that defines globalization. This aspect includes things such as accumulated external debt, equity in global transactions, and currency exchange risk. All of these factors combine to make the national economic system more susceptible to unpredictability, which is why the nation's central banks need to devise new guidelines for the management of exchange rates and put an end to policies that contribute to the build-up of inflationary pressures (the interest rate is directly proportional to the inflation rate and they attract speculators to the market).

It has been hypothesized that additional factors, such as globalization and the use of computers for economic translation, may have a detrimental effect on countries that are still in the process of developing their economies (Wade, 1990; Shaiken, 1993). This would result in the loss of employment based on real production, as well as the loss of people with low levels of specialization, making it difficult for them to be re-employed and producing "ballast" in the labour market, which would lead to lower wages. The loss of employment based on real production would also result in the loss of people with low levels of specialization. In addition to this, this would result in the reduction of employment opportunities based on actual production (Burlacu et al., 2021; Ladaru et al., 2022; Belostecinic et al., 2022; Rădulescu et al.,2021)

Second, the jobs that are being created as a direct result of the expansion of the global economy call for a higher level of education than the jobs that are traditionally referred to as "blue collar" jobs. "Knowledge workers" is the term that's used to refer to people like these (Reich, 1992 apud Bran et al., 2019). The fact that these workers have achieved a higher level of education makes them eligible for a position that pays more, which, in turn, increases the amount of work that they produce (Fligstein, 1999 apud Bran et al., 2019). Both of these factors, in their own unique way, are detrimental to the state of the economy. Because investments in human capital have an inverse relationship to the distribution of skills, individuals who possess fundamental capabilities that are not currently in high demand are still located at the bottom of the distribution (Bran et al., 2020). This leads to an

unequal distribution of income and forces the government to spend money on people who are considered to be "outside the game," also known as misfits. In other words, it forces the government to spend money on people who don't fit in.

As a consequence of this, two aspects of globalization emerge that deceive governments into falling victim to their traps (Burlacu et al., 2020). As a result of widespread layoffs (which have a multiplicative effect because we need to include the families of those who are fired in the discussion of the problem), as well as an increase in requests for assistance from families with low incomes, the need for state protection is growing. In order to provide assistance to these groups, the government implements what are known as "expansive fiscal policies," which ultimately leads to the emergence of new challenges. Governments have difficulty raising taxes and are unable to benefit from these increases because of the theory of optimal taxation, also known as Laffer's curve, as well as the fact that corporations will move their headquarters from a tax execution location to an offshore location if given the opportunity. This is going to happen as a result of companies moving their headquarters out of areas where taxes are being executed and into offshore locations. The process of deindustrialization is ultimately sped up by the fact that globalization makes it harder for individuals to start new businesses (Popescu et al. 2021). Large budget deficits are therefore the result of social pressure and the inability to implement economic policies, both of which cause the value of the national currency to decrease as the deficits get larger. Because of this, interest rates on foreign markets will rise, making it more difficult and expensive to finance the government's deficit spending (Burlacu et al., 2019). When interest rates are high, there is a corresponding slowdown in the economy (Negescu Oancea et al., 2020).

The governments of the world are caught in the web of globalization, which both causes and forces deindustrialization on the national level and exacerbates social inequality. Globalization also leads to and compels deindustrialization on the international level (Rădulescu et al., 2020a). The only way out of this predicament is for the national economy to become more attractive to international investments (globalization is a two-way street). This can be accomplished by having a fiscal policy that is constrained, having a legal framework that is efficient and respected, having clearly defined property rights, and having optimal monetary policy. This is the only way to extricate yourself from this sticky situation (optimal in the sense of maintaining low inflation). The only thing that the government can do to stimulate economic growth and bring in foreign investment is to maintain its level of financial investment in the country's educational system. This is the only option available to them (Angheluta et al., 2021; Burlacu et al., 2021).

The widespread effects that globalization has on an economy have led to the emergence of a new type of capitalism, one in which social inequality is growing, governments are powerless to do anything to fix the problems caused by globalization (due to the fact that State Unions limit the number of things that can be done to maintain a steady rate of economic growth), and the pressure of meritocracy will be the defining characteristic of globalized capitalism in the coming years. However, in order to make sense of the changes and problems that globalization brings, the emerging or soon-to-emerge area needs an argumentative norm.

There are two normative issues that could be brought up: first, the globalization's resistance to openness can be explained by pro-social economic policies that are meant to protect the internal market; and second, there is the potential for a normative gap. Both of these normative issues have the potential to be problematic (the labour market, in particular). However, free trade is the engine of economic growth for national companies (as long as there are competitive trade relationships, the companies will benefit) and the wealth of nations. There is no empirical evidence to suggest that eliminating the social safety net will lead to systemic social insecurity (the creation of a sense of social fear, the

fear that tomorrow's existence will be limited), which will slow down economic growth. This is due to the fact that the free trade system guarantees that companies will engage in competitive trade relationships with one another.

4 Discussion and Conclusion

A prosperous enterprise is one that is built to last by producing goods and services that are competitive in the market, attend to the requirements and pursuits of customers, and generate profits for the enterprise. To have a competitive advantage, a company needs to increase the number of customers it has and improve the quality of the goods and services it offers. All of this is predicated on the fact that the production process generates more value than the capital components it employs (Porter, 1990).

Because in business, decisions are followed by actions and the result is either a successful or an unsuccessful one, the environment of business is very different from the academic environment the political environment, and the bureaucratic environment. To get the most out of your efforts to be successful, you should take the risk of failing about the same on both sides. However, the success that the company has achieved is a contributor to global economic risk, which is developed as a result of the accumulation of all potential scenarios involving gains and losses. If you want to be a cog in the machine that drives the global economy, you have to base your choices on how morally sound they are. If you do not, you might find yourself in a situation where the immoral economic agent is removed from the market in the long run. This is the worst-case scenario. This is due to the fact that the modern economy is structured like a network, which demonstrates how interconnected various economic agents are (either individuals or corporations).

Quantum physics lends credence to the theory that the realities of different subatomic particles are distinct from one another; however, each subatomic particle also possesses its own interactions, which are derived from the potential properties of the particles and not from the particles themselves. Whether or not they can be seen, the world and all of its components are composed of the substance and energy that make up the universe. A holistic understanding of the world is necessary to have complete sensory perception. The stuff that makes up the world is called matter, but it can also take the form of energy (Wheatley, 1999).

The animal spirit is what drives passions and interests, and they have a significant advantage over moral values in that our brains contain more reward receptors for passions and interests than they do for moral values. A culture that prioritizes "self-interest considered from the perspective of the whole" over decisions made by individuals or groups has been shown to be fostered by globalization (Akerlof & Schiller, 2010).

The culture of globalization, which encourages gluttony, was the driving force behind the rise of a consumer-driven economy (Bell, 1978). Due to their greed, they had a desire to "possess," rather than "create." Outside the middle class, "adolescence" can be understood to represent globalization. This is a phenomenon that has emerged in the modern era. On the other hand, the modern definition of "adolescence" promotes apathy, unrestrained consumption, and a lack of responsibility, all of which contribute to the deterioration of the situation over time (Young, 2009).

"Adolescent" globalization was led by Americans, particularly baby boomers, who succumbed to the greed of those who took advantage of the lack of information to do bad things. This occurred because there was a lack of information at the time (Enron and WorldCom). At the beginning of the third millennium, individuals are characterized by their desire to possess things, and moral values are made to serve the "golden calf" of unrestrained consumption.

According to the findings of our study, globalization has resulted in many leaders of highly developed countries having a diminished appreciation for the genuine aspects of human nature. If reverence for the natural world were central to Eastern philosophical thought, then respect for man and his demiurgical qualities would be the sole focus of Western philosophical thought. As a result, it should not come as a surprise that the Western world has enjoyed a level of freedom that has never been seen before, allowing them to pillage, dominate, and desecrate the natural world. The management of the planet presents yet another danger to the ecosphere's ability to continue existing as it has done so for as long as it has because of humanity's aggressive and self-centred approach to its relationship with the natural environment. The contribution that our research makes to society in terms of added value comes from the fact that it sheds light on the qualities that define successful businesses and the influence that these businesses have on the long-term growth of society. These companies would be sustainable because they would produce competitive goods and services that meet the requirements and interests of their clientele while also achieving economic success. In this day and age of globalization, it is essential to take into consideration the importance of striking a balance between the socioeconomic requirements of humanity, the natural and financial resources of the earth, and the preservation of the planet as a whole to achieve sustainable development.

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International Business of Railway Undertakings on the single European Railway Market and its Current Form

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Abstract

Research background: Introduction of the law related to the creation of the single European railway area has brought with it a deregulation of the market for entities based in a Member State, meeting the criteria set for the business in railway transport. With the gradual opening of the market, the number of railway undertakings providing their services abroad has been increasing. It concerns both the state and private railway operators, in the segment of open access services, and in recent years increasingly also in the field of public services subsidized by the public authority.

Purpose of the article: In this article we focused on the share of international business in railway transport services in some selected EU countries. The main aim is to determine the strengths and weaknesses of the current single European railway area from the perspective of degree of market opening for foreign entities and transparent conditions of access to the railway infrastructure.

Methods: To achieve the purpose of the paper, authors used the simple multi-criterial analysis for evaluating the level of international business of railway undertakings in chosen EU countries.

Findings & Value added: Based on the final score from multicriteria analysis it is possible to consider the impact of the individual market indicators on the overall result in the analysis. The resulting market rate is depended mainly on the market deregulation level and market share of foreign railway undertakings on the performance indicators. On the other side, the model of vertical structure is the least influencing factor. The boom of this type of business can come especially with the gradual introduction of public tenders for provision of PSO.

Keywords: *international business; passenger railway transport; railway market deregulation; market share*

JEL Classification: *F23; R40; K23*

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1 Introduction

International business of enterprises is in the current global market more and more popular in the field of the transport as well. Establishment of the single European railway area through the railway reforms has led to the deregulation of the railway market in Member States, firstly in the segment of commercial, usually long-distance, and high-speed services. Uniform conditions for licensing the railway undertakings in EU made it easier for foreign entities to enter the domestic market as well. There are still several barriers concerning the different models of structural reforms in individual Member States and regulatory issues in the process of the railway network capacity allocation. Entry of new entities to the segment of international passenger railway transport services can help fulfil the aims of the EU related to the sustainable mobility and quality improvement of the railway transport services. It also helps to create a healthy competitive environment on the market, which increases the efficiency of public transport and will bring benefits to end customers – passengers.

In this paper we have mapped the international business of railway undertakings on the single European railway market. The main aim is to determine the strengths and weaknesses of the current single European railway area from the perspective of degree of market opening for foreign entities and transparent conditions of access to the railway infrastructure. This is performed by using the multicriterial weight method for evaluating these several factors in chosen Member States.

Several authors addressed in their studies the topic of railway market deregulation and access conditions to the railway infrastructure for railway undertakings. Solina & Abramović (2022) evaluate the effects of railway market liberalisation from the EU perspective. Guillen (2022) dealt with a similar topic with focus on new challanges for future public service contracts. His paper analysed the new legal challenges that public service contracts will encounter and what their impact will be on the process of liberalisation or the EU passenger rail market. Alexandersson and Rigas described the process of railway reforms in Sweden from vertical separation to the entry of the first railway companies into the market in open access (Alexandersson & Rigas, 2013). Virgen focused specifically on the entry of new RU´s into the market in open access and the impact of open competition on price developments (Virgen, 2017). A similar study was carried out in Central European countries (Czech Republic, Slovakia, and Austria) by Tomeš and Jandová, taking into account changes in prices and revenues of railway undertakings and also the range of services operated by individual RU´s (Tomeš & Jandová, 2018). Zou et al. (2021) dealt with the issue of market access to the high-speed railways and the economic growth main Chinese prefecture-level cities. Thompson (2021) made a handbook on railway regulation in terms of concepts and market practice. Knorr & Eisenkopf (2022) introduced an alternative regulatory approch for long-distance passenger rail services on the example of Germany. Railways regulation model applied in the United States was adressed by Russell (2020). Jecny & Kaderabkova (2022) wrote about the role of state in railway operation in interaction with development of economic in the Czech Republic.

Topic of international business of railway undertakings brought Altieri et al. (2022) when determining differences in railway strategies on the empirical case of private, public-owned and third-sector railways in Japan. Jiang et al. (2022) dealt with the role of boundary-spanning commitment in international joint ventures companies. The complexity of international business in general has been addressed by Casson and Li (2022) in their paper. Bauer and Friesl (2022) evaluated the synergy effects in mergers and acquisitions. Ma et al. (2022) focused on newcomers in the international business, in terms of the issue of old capital.

2 Theoretical backgrounds

In the field of international business in railway passenger transport we divide between various forms of businesses of railway undertakings. In most cases, they establish their branch in a foreign country in the form of a subsidiary and provide passenger transport services on their own licence and security certificate issued by the regulation authority of the country. Otherwise, there are another business models used, based on the nature of the services and companies participating in their operation. In Table 1 we summarize individual forms of international business in railway transport known in European Union member states.

Table 1. Different international business models of passenger transport in EU

Model	Characteristic	Example of RU/country
direct participation	foreign RU operate services through the parent company abroad	*Regio Jet* – Czech private RU operating open access services in Slovakia, Austria and Hungary *Trenitalia* – Italian incumbent operating open access services in France *NS International* – RU with seat in the Netherlands operating international services to Germany, Belgium, UK, France
subsidiary	establishment of the local branch abroad	*Arriva* – German RU with own subsidiaries in the whole Europe (Arriva trains, Arriva mobility solution…) *Flix train* – German private RU with the subsidiary established in Sweden (Hector Rail) *SNCF* – French incumbent with subsidiary operating high-speed trains in Spain (Ouigo Espana)
joint venture	cooperation of two and more RU by establishment of company with a partial share	*Eurostar, Thalys* – high-speed branch with the share of national incumbents in Belgium, France, and the Netherlands *Trenord* – Lombardian (Italy) railway company cooperate on international services with incumbents in Germany and Austria (DB, OeBB)
franchising	provision of the railway infrastructure and vehicles to the RU under the local brand	model extended in the UK

Source: authors

International business is extended mainly in the segment of open access services, with the participation of both incumbent and private RU´s. In recent years, they also started penetrating to the market with PSO, generally using the model of subsidiary, which is the most appropriate model due to the necessity of the accounting separation of operated services for the purposes of expense reporting and compensation payment. Joint venture business model is usually used when two or more companies operate international trains in open access regime, or they are trying to enter as a competitor with new brand into foreign market.

3 Methods

For the evaluation of the level of railway market opening for foreign railway undertakings in individual states, the method of multi-criteria analysis will be used. The main role of the techniques of multi-criteria analysis is to deal with the difficulties that human decision-makers have been shown to have in handling large amounts of complex information in a consistent way. MCA techniques can be used to identify a single most preferred option, to rank options, to short-list a limited number of options for subsequent detailed appraisal, or simply to distinguish acceptable from unacceptable possibilities (Multi-Criteria Analysis: A Manual, 2009). For applying the MDCA, these steps are necessary in the order:

−   establish the decision context,
−   identification of the options,
−   identification of objectives and criteria,
−   scoring,
−   weighting,
−   examination of results,
−   analysis of sensitivity (Iuga et al., 2018).

3.1 Criteria determination

Criteria for the evaluation have been chosen according to the current requirements on the market with passenger rail transport services in the context of its deregulation and transparent competitive environment on the market. We also divide between two basic types of providing services by foreign railway undertakings (RU´s), which are open access on the commercial basis and participation on the public tenders for provision of PSO. For both modes we determine these evaluation criteria:

−   market share of foreign RU´s on the total operational performance in train-km,
−   market share of foreign RU´s on the total transport performance in passenger-km,
−   number of foreign RU´s acting on the domestic market,
−   vertical structure of RU´s in the country – separated or integrated model (binomial),
−   degree of market deregulation in country – expressed by the liberalization index (LIB index).

3.2 Weighting and scoring

Determination of weights for individual criterion is an issue, considering that a higher degree of subjectivity is present. For this reason, we choose the method of pairwise comparison of criteria to calculate the appropriate weight (Tab. 2). It means that when comparing two criteria, the more significant criterion is rated "1", less important criterion "0". Final weight is calculated as a proportion of the row sum of the criterion and the sum

of all row scores. Formula (1) below is used for the calculation of weight of each criterion w_j, where n represents the number of criteria and f_j a row sum of the criterion possibilities (Multi-Criteria Analysis: A Manual, 2009).

$$w_j = \frac{f_j}{\dfrac{n(n-1)}{2}} \quad , j = 1, 2, \ldots, n$$

(1)

Table 2. Set of weights of criteria using the pairwise comparison.

	market share - tkm	market share - pkm	number of RU´s	verctical structure	market deregulation degree	sum	weight
market share - tkm	-	0	1	1	0	2	0,2
market share - pkm	1	-	1	1	0	3	0,3
number of RU´s	0	0	-	1	0	1	0,1
verctical structure	0	0	0	-	1	1	0,1
market deregulation degree	1	1	1	0	-	3	0,3
					sum	10	1,0

Source: authors

In the case of non-binomial criteria, the score for each criterion is assigned based on the objective expression of given quantity obtained from the available data and statistic databases. Binomial criteria are expressed by values of 0 and 1, whereas 0 is in general assigned to the lower/weaker level of the criterion. For example, the criterion of vertical structure of RU´s assigns a value of zero in case of integrated model and a value of one for the separated model (because of the lower transparency of capacity allocation when the infrastructure manager and carrier are a part of the same holding company).

Table 3. Set of criteria for multicriterial evaluation.

	character	weight	variable	score scale (0-5)
market share - tkm	numeric	0.2	percentual share expressed as a decimal number	0, (0;0.1>,(0.1;0.2>,(0.2;0.3>,(0.3;0.4>
market share - pkm	numeric	0.3	percentual share expressed as a decimal number	0, (0;0.1>,(0.1;0.2>,(0.2;0.3>,(0.3;0.4>
number of RU´s	numeric	0.1	number of foreign railway undertakings with trains in operation	0, (0;1>, (1;3>, (3;5>,(5;n)
vertical structure	binomial	0.1	0/1 - integrated model/separated model	2.5 for "0"; 5 for "1"
market deregulation degree	numeric	0.3	lib index	(400;500>,(500;600>,(600;700>,(700;800>,(800;900>

Source: authors

Set of the criteria for further evaluation is presented in Table 3. For each of them we can see the character of the variable, value of the weight according to the calculation (1) and score scale, when based on the intervals of variable the final score will be assigned. The final score is calculated as a weighted sum of scores assigned to each criterion.

4 Results

For purposes of this analysis, we have chosen several EU Member State with various conditions of the access to the railway market. Some of them are the example of fully legally opened market (Sweden, Germany), in other cases is the process of liberalization of

railway market in country still not finished at the required level (Hungary). Overview of the market conditions in individual countries based on our criteria from chapter 3 is presented in Table 4 (all data are belonged to the year 2020). The market share of foreign railway undertakings expressed in train-kilometres and passenger-kilometres usually does not exceed the share of 10 % with a few exceptions as Sweden wit 34 % market share or Germany and The Netherlands with approx. 15 % market share. While in Sweden we can see international business mostly in open access segment, in other cases are foreign RU´s interested into PSO services which are in Germany and The Netherlands assigned using public tenders. 5 % share of foreign carriers in Slovakia is represented by Czech railway undertakings Regio Jet and Leo Express, which are providing their international trains between Czech Republic and Slovakia as open access services. In Hungary or Spain, there were not any international business provided by foreign railway undertakings, caused primarily by difficult access to infrastructure (which is also reflected in the value of their liberalization index)

Table 4. Overview of market conditions in chosen Member States based on our criteria

	market share - tkm	market share - pkm	number of foreign RU´s	vertical structure	lib index
Austria	< 1 %	< 1 %	1	integrated	784
Czech republic	< 1 %	<1 %	1	separated	726
France	< 1 %	<1 %	1	integrated	602
Germany	14%	9%	>5	integrated	819
Hungary	0%	0%	0	integrated	616
Italy	<1%	<1%	1	integrated	722
Poland	<1%	<1%	1	integrated	720
Slovakia	5%	7%	2	separated	708
Spain	0%	0%	0	separated	554
Sweden	34%	34%	2	separated	850
The Netherlands	16%	5%	2	separated	799

Source: authors by IRG-Rail (2022), IRG-Rail (2021), Rail Liberalisation Index 2011 (2012)

Final score for each country calculated according to the used methodology and scores for individual criteria are listed in Table 5 below. As we can see, the highest score reaches Sweden, followed by Germany and The Netherlands. We can find most of countries in the score interval between 2 and 3. The lowest values belong to Spain and Hungary.

Table 5. Results of multi-criteria analysis

	market share - tkm	market share - pkm	number of foreign RU´s	vertical structure	lib index	total score	order
weight	*0.2*	*0.3*	*0.1*	*0.1*	*0.3*	-	-
Austria	2	2	2	2.5	4	**2.65**	6.
Czech republic	2	2	2	5	4	**2.9**	5.
France	2	2	2	2.5	3	**2.35**	7.
Germany	3	2	5	2.5	5	**3.45**	2.
Hungary	1	1	1	2.5	3	**1.75**	8.
Italy	2	2	2	2.5	4	**2.65**	6.
Poland	2	2	2	2.5	4	**2.65**	6.
Slovakia	2	2	3	5	4	**3**	4.
Spain	1	1	1	5	2	**1.7**	9.
Sweden	5	5	3	5	5	**4.8**	1.
The Netherlands	3	2	3	5	4	**3.2**	3.

Source: authors

5 Discussion

From the results of the multi-criteria analysis an order of evaluated countries based on their total score was achieved. Based on this score and the score of individual criteria it is possible to consider the impact of the individual market indicators on the overall result in this analysis and discuss the international business of railway undertakings in context of market conditions and the access to railway infrastructure in individual Member States.

A combination of vertical separated model with high level of market deregulation usually led to higher number of carriers entering the passenger railway market, while part of them is also in one of the forms of international business. We can see this fact from the final score of Sweden which belongs to one of the most opened markets in the EU. Despite of this, in case of vertical integrated model in Germany we also record a high market rate. We can attribute this to the fact that all long-distance services in Germany are operated in open access mode and therefore international services are in most cases provided by foreign incumbents. On the example of Hungary and Spain as the lowest rated countries based on our results, it is possible to conclude that insufficient market access conditions do not create a suitable environment for international business of railway undertakings in any known form.

In this paper, we firstly made an overview of current forms of international business of railway undertakings in the EU. Using the multi-criterial evaluation, we demonstrate the various levels of market access conditions and the current situation with international business on a sample of selected Member States. From all criteria, we can consider the vertical structure model as the least significant factor involved in the resulting score. The resulting market rate is depended mainly on the market deregulation level and market share of foreign railway undertakings on the performance indicators (train-km or passenger-km). There is still a space for the development of the international business segment, which, however, has been increasing in recent years along with the continuous opening of the market. The boom of this type of business can come especially with the gradual introduction of public tenders for provision of PSO.

For the further research, a comprehensive evaluation of the market conditions for international business in all Member States will be required, which also brings the requirement for a sufficient amount of quantitatively expressible data and use of more accurate methods for the evaluation. The relatively short duration of the deregulation process in the EU on a practical level is also an issue we will have to deal with.

Acknowledgements

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Comparative analysis of labour productivity in agriculture in 8 ex-communist countries in Europe

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Abstract

Research background: Across the European Union, the variations the in agricultural labour productivity are significant among countries. The large disparities in agricultural productivity levels between European countries and regions have been a challenge for the CAP since its inception. Despite the EU funding and the market opportunities, the EU countries that were communist before 1989 have a low labour productivity in agriculture, all of them being under the EU average of 19.900 EUR / full time equivalent. These differences may have been generated by the technological capital used across the Eu in agriculture, by the dynamics in the use of land and the share of share of the labour force employed in agriculture at national level.

Purpose of the article: The purpose of these article is to compare the labour productivity among 8 EU ex-communist countries: Bulgaria, Croatia, Czech Republic, Hungary, Romania, Poland, Slovakia, and Slovenia - in the context of globalization – pointing out the socio-economic circumstances that determined the differences.

Methods: We did a comparative analysis of the indicators provided by The World Bank and the Eurostat, that may have impacted the labour productivity in agriculture.

Findings & Value added: The paper may bring insights related to the major differences among these 8 EU ex-communist countries in terms of labour productivity in agriculture, that may be used in improving the EU and the national policies impacting agriculture.

Keywords: agriculture; *labour productivity; land use; ex-communist countries in the EU; farm machinery*

JEL Classification: *O13; J43; P52, E24*

1 Introduction

The main land user in the European Union is agriculture (Profiroiu et al., 2020; Rădulescu et al., 2022). It occupies 174.6 million hectares, or 40% of the total land area (Eurostat, 2017a). The number of agricultural holdings has been steadily declining for several

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decades, but the size of the farms shows a trend toward greater holdings. In the EU-27, the typical farm size rose from 11.5 ha in 2003 to 16.2 ha in 2013. (Eurostat, 2017a)

As a result of the privatization and redistribution of agricultural land, eastern European countries show the highest rates of loss in the number of farm holdings (e.g., Slovakia: 65.8 percent) (Eurostat, 2017a). Between 2003 and 2013, the EU-27's total agricultural labour force, measured in annual work units (AWU), which accounts for part-time and seasonal employment, declined by 34% (Eurostat 2017a; 2018); the average AWU per farm holding fell from 0.91 in 2003 to 0.88 in 2013. (Eurostat 2017a, 2018). However, the productiveness of the remaining agricultural employment has grown: the average EU standard output (SO) created per yearly work unit, which may be used as a proxy for agricultural labour productivity, grew from 24,101 Euro in 2007 to 34,830 Euro in 2013 (at current prices) (Eurostat, 2017a). The three countries with the largest improvements in agricultural labour productivity between 2007 and 2013 were Slovakia (158%), Bulgaria (123%), and Latvia (112%) (Eurostat, 2017a).

Europe-wide variations in agricultural labour productivity are significant (Ladaru et al., 2022; Popescu et al., 2022). The continental northern-central countries and the continental peripheries, including the Mediterranean, Eastern Europe, and Scandinavia, are shown to have important disparities (Radulescu et al., 2021). For instance, Denmark, Belgium, and Luxembourg have the greatest standard production per annual work unit (155,717 Euro/AWU from 2007 to 2013), while Romania (5958 Euro/AWU) and Bulgaria (6704 Euro/AWU) have the lowest (Eurostat, 2017a). A barrier to fulfilling the territorial cohesion goals outlined in the Lisbon Treaty is the size of the territorial asymmetries in labour productivity throughout the EU (Ezcurra et al., 2008), which are substantially bigger in agriculture than in the secondary and tertiary sectors (European Commission, 2008a). Through financial assistance for farm restructuring and modernization (Hennis, 2005; Dumitrache et al., 2020), the Common Agricultural Policy (CAP) has over the years sought to increase agricultural productivity as one of its main goals. However, the large disparities in agricultural productivity levels between European countries and regions have been a challenge for the CAP since its inception.

It is feasible to spot similar patterns for achieving high economic output per labour unit in agriculture (Dumitrache et al., 2021), even while there isn't a specific set of physical, technological, and human capital components and situations that boost agricultural labour productivity (Giannakis and Bruggeman, 2018; Bran et al., 2021). Moreover, when comparing countries with similar backgrounds like the 8 ex-communist EU countries, it is even easier to stop the patterns by analysing both the similarities and the differences between the 8 countries.

2 Methods

The purpose of these article is to compare the labour productivity among 8 EU ex-communist countries: Bulgaria, Croatia, Czech Republic, Hungary, Romania, Poland, Slovakia, and Slovenia - in the context of globalization – pointing out the socio-economic circumstances that determined the differences.

Analysing figure 1 we can see that in 2019, the country with the most productive labour in agriculture was The Netherlands around 72.600 EUR/ Full Time Equivalent (FTE). Also, the least productive was Romania having only around 5.200 EUR/ FTE. The EU average was around 19.900 EUR/FTE.
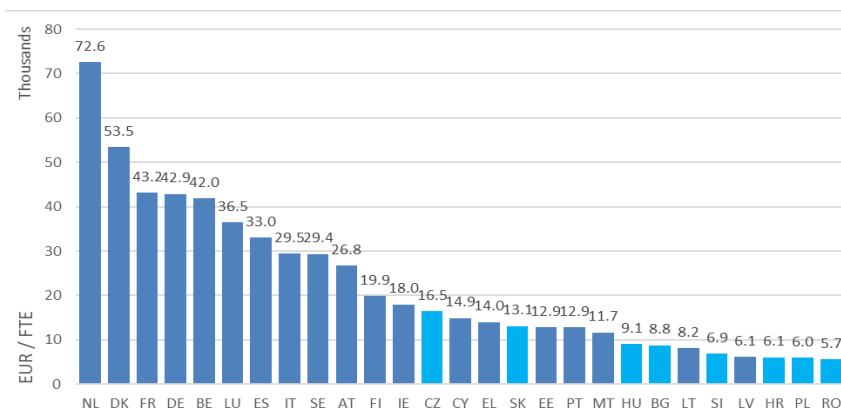
Figure 1. Labour productivity in agriculture by Member State (EUR/FTE) in 2019

Source: the authors, using data from https://agridata.ec.europa.eu

The 8 EU ex-communist countries that are the subject of this analysis are marked with light blue in figure 1. We can observe that all of them are below the EU average of 19.900 EUR/FTE. However, there is a significant gap between the highest performer of the 8 – Czech Republic with 16.500 EUR/FTE – and the poorest performer – Romania with 5.700 EUR/FTE. From a different perspective, the output of 3 full time workers in agriculture in Romania is produced by only 1 full time workers in Czech Republic.

Further analysing what caused these differences and gaps, we will make a comparative analysis of several indicators developed by The World Bank:

− Labour force working in agriculture
− Share of the labour force employed in agriculture
− Changes in agricultural labour and land use
− Share of agriculture in GDP vs GDP per capita
− Farm machinery per unit of agricultural land

The analysis is made on data from "Employment in Agriculture" report, published online at OurWorldInData.org.

3 Findings

One of the causes of the low labour productivity in agriculture in the 8 EU ex-communist countries can be related to the number of workers from this sector and how this number fluctuated. Figure 2 shows us the share of people of working age who were engaged in any activity to produce goods or provide services for pay or profit in the agriculture sector. All of them being emergent economies in the '90s, the 8 EU ex-communist countries lowered the share of labour force employed in agriculture most likely due to the intensification of industrialization. In the 1991 they formed 2 clusters: Czech Republic, Slovakia, Slovenia and Hungary having around 10% of the people of working age engaged in agriculture, and Bulgaria, Croatia, Poland and Romania having around 25% of the people of working age engaged in agriculture. By 2019, the 7 countries clustered together at an average of 6% (ranging from 2,66% in Czech Republic to 9,15% in Poland). Only Romania reached 21,24% after almost 3 decades of fluctuations.
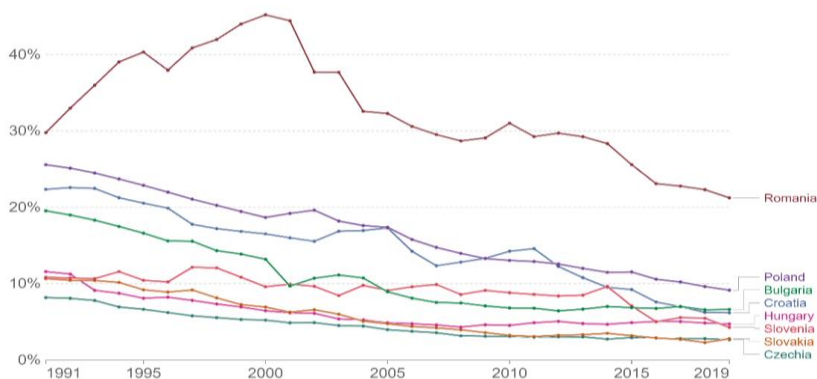
Figure 2. Share of the labour force employed in agriculture, 1991 - 2019

Source: "Employment in Agriculture" report, published online at OurWorldInData.org.

Surprisingly, from 1991 to 2000, Romania increased the share of people of working age engaged in agriculture each year (exception 1996). In 2000, 45,21% of the working age population in Romania was engaged in agriculture. For almost 10 years, Romania was not aligned to the trends in the region but was doing the opposite. There are few reasons why the Romanian work age population had such a great appetite for agriculture: on one hand the collapse of the industry, high inflation rates and high unemployment oriented the work age population to subsistence agriculture done in small size family farms; on the other hand, the fall of communism, when the agricultural land was mostly state-owned, brought the agricultural land back to people. The high level of fragmentation of the agricultural land and the lack of associativeness were generated by a misconception. The novelty of private property, the freedom of choosing how to exploit the land and the expectation of becoming reach by doing agriculture determined more and more Romanians to do subsistence agriculture in the '90s.

The productivity of agriculture might have been influenced by the variation of the land used in agriculture. As we can see in figure 3, only Romania and Slovenia kept exploiting roughly the same total area as in 1991. All the other countries lowered the surface of land used for agriculture, maybe relying more on machinery and technology for a more intensive agriculture, thus increasing their labour productivity.
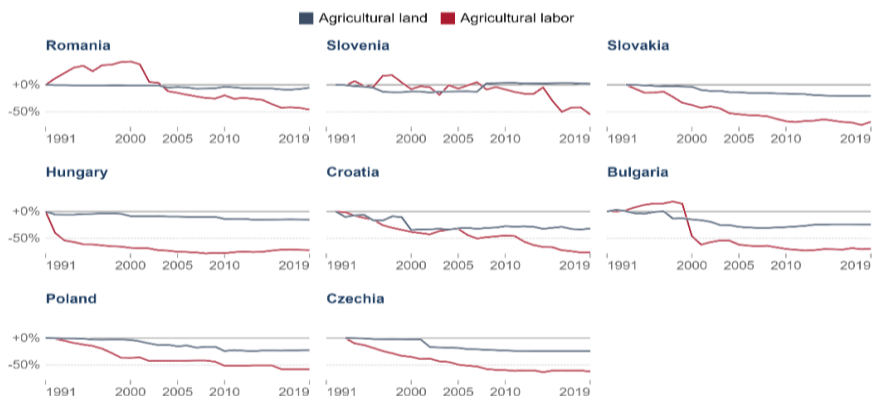
Figure 3. Changes in agricultural labour and land use, 1991 - 2019

Source: "Employment in Agriculture" report, published online at OurWorldInData.org.

Figure 4 shows us how the wealthiest countries are also the least dependent on agriculture. For example, Czech Republic - having the highest productivity in agriculture among the 8 EU ex-communist countries, estimated at 16.500 EUR/FTE in 2019 – has also the highest GDP/capita and one of the lowest contributions of agriculture to GDP.
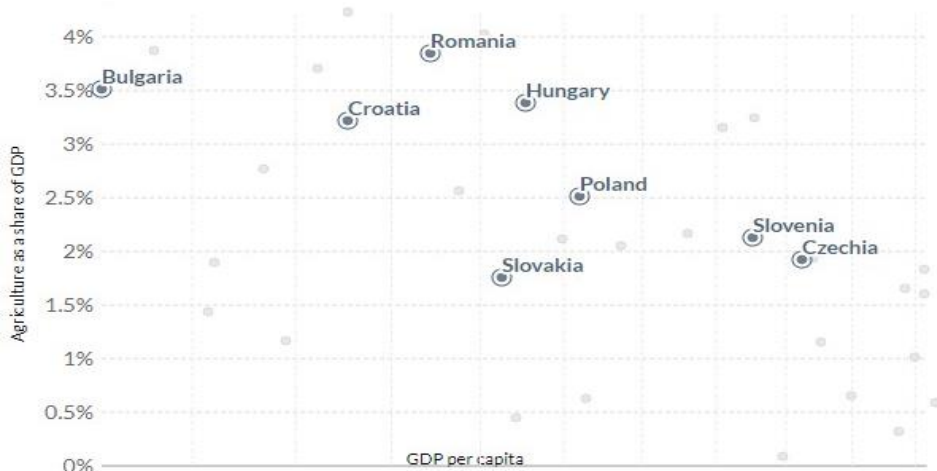
Figure 4. Share of agriculture in GDP vs GDP per capita, 2020

Source: "Employment in Agriculture" report, published online at OurWorldInData.org.

Figure 4 may also suggest that the more complex and performant an economy is in the other sectors, the more performant it is in agriculture too.

Another variable that may influence the labour productivity in the field of agriculture is the technological capital used in the agricultural production. It is widely known that in any field technology increases the productivity.
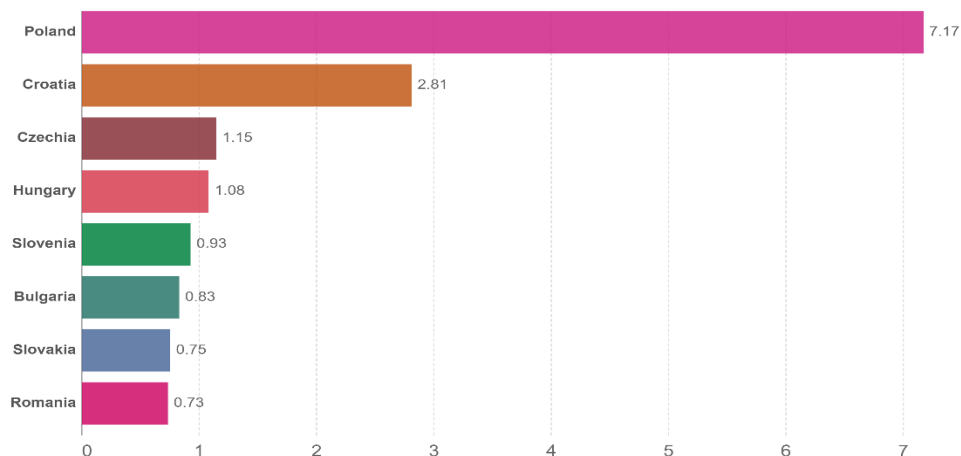
Figure 5. Farm machinery per unit of agricultural land, 2019

Source: "Employment in Agriculture" report, published online at OurWorldInData.org.

Farm machinery is measured in units of horsepower. This is divided by total agricultural land to give the average machinery use per 1000 hectares of agricultural land. This

indicator is presented in figure 5 which shows us that Romania and Slovakia are the least technologized with only 0,73 respectively 0,75 horsepower unit per 1000 hectares. As figure 5 shows, the most technologized country is Poland with 7,17 horsepower units per 1000 hectares, followed by Croatia with 2,81.

Analysing both figure 5 and figure 1 we can see that there is no correlation between the amount of technology (in this case farm machinery) used in agriculture and the labour productivity. For example, 1 worker in agriculture in Czech Republic produces 2.75 times more than and worker from Poland, using 6,23 times less farm machinery than the worker from Poland (measured in horsepower units/1000 hectares).

4 Discussion and conclusions

In this article we compared the labour productivity among 8 EU ex-communist countries: Bulgaria, Croatia, Czech Republic, Hungary, Romania, Poland, Slovakia, and Slovenia - in the context of globalization – trying to point out the socio-economic circumstances that determined the differences. Even if the labour productivity gaps between the 8 countries are significant (i.e., 1 worker from Czech Republic generates as much output as 3 workers from Romania), all of them are below the EU average.

We analysed 5 main variables that may have been causing these differences and gaps. It turned out that the high share of the labour force working in agriculture can be an explanation only for the case of Romania. It does not explain the poor performance of the other countries. Also, as most of the 8 countries – excepting Romania and Slovenia - lowered the surface of land used for agriculture, maybe relied more on machinery and technology for a more intensive agriculture, thus increasing their labour productivity. This variation of the land used in agriculture does not explain the poor performance of Poland, Croatia, Bulgaria and Hungary.

The technological capital used in agriculture in each country does not influence the labour productivity. It may explain the situation from Romania which has the lowest ranking both in farm machinery and in labour productivity in agriculture, but it does not explain many other cases. For example, according to the available data, 1 worker in agriculture in Czech Republic produces 2.75 times more than and worker from Poland, using 6,23 times less farm machinery than the worker from Poland.

We also compared the share of agriculture in GDP vs GDP per capita of the 8 EU ex-communist countries. The data suggest that the more complex and performant an economy is in the other sectors, the more performant it is in agriculture too. We need more evidence to support this as a conclusion. Maybe there are other variables that influence the labour productivity horizontally, across sectors. Further research may take into consideration the structure of the labour force employed in agriculture.

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Impact of the global COVID-19 pandemic on corporate performance in the hospitality industry

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Abstract

Research background: Financial stability is very important for each enterprise. A financially stable enterprise can resist or handle unpleasant situations. Such situations can be a test of the existence, endurance, or the question of whether an enterprise can recover from such a difficult state. The main topic is the issue of ratio indicators and the impact of the COVID-19 pandemic on the hospitality sector.
Purpose of the article: The main aim of the paper is to describe and quantify the impact of the global COVID-19 pandemic on the hospitality industry and to assess crucial changes in the financial performance and stability of the sector considering the significant financial indicators of ex-post analysis.
Methods: To achieve the main aim of the paper, ratio analysis was used and the development of the financial indicators was measured over a 4-year horizon and mapped using a graphical analysis.
Findings & Value added: Analysis and subsequent monitoring of the development of ratio financial indicators is an important step towards knowing the extent to which the industry is financially healthy and how its activities are affected by the global coronavirus pandemic. By exposing the weaknesses, the problems can be prevented in the future, not only in the context of funds, but it can also lead to the setting out of short-term and long-term strategies and goals that will make the sector more stable and competitive even in times of crisis.

Keywords: *corporate performance; financial stability; COVID-19; hospitality sector*

JEL Classification: *G17; F60; L25*

1 Introduction

Financial stability is very important for the company. A financially stable company can withstand or handle emergency situations for him. Such situations can be for businesses a

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test of their existence, endurance or the question of whether they can recover from such a difficult situation. Companies that are financially secure can respond more flexibly and better to changing surroundings, the situation or legislation, but also to changes in the company itself. For such businesses, the probability of possible bankruptcy is reduced and the business risk is also minimized. By quickly and appropriately identifying the most decisive risk factors, the company could prevent adverse impacts on the company's economic results (Kliestik et al., 2022).

In order for the company to correctly evaluate its financial situation, it is necessary to carry out a thorough analysis of the company, i.e. a financial analysis, through which essential facts are determined. The company will thus find out which of these facts are its strengths and need to be further developed, or which are the weak points of the company and may be accompanied by financial problems in the future. From a time point of view, financial analysis provides a view into the past (ex-post), i.e., the company itself can evaluate how it developed, and into the future (ex-ante), which can help the company when compiling a short-term or long-term financial plan (Gajdosikova et al., 2022).

Financial analysis currently has justified importance. The COVID-19 pandemic has had significant but negative impacts on most economic sectors in all countries. Individual countries have established quarantine measures to prevent the spread of the COVID-19 pandemic and to minimize the negative effects of the pandemic (Valaskova et al., 2021). The sectors of the economy in Slovakia most affected by the pandemic include services, industry, and air transport. Gradually, operations in the production spheres were closed, as were some shops. Travel was more or less forbidden. Such a recession caused not only a high number of layoffs, a number of businesses at risk of bankruptcy, but mainly a large drop in gross domestic product in Slovakia. Businesses have been trying to survive this pandemic crisis with the smallest possible impact on their operations. They monitor the development of the financial situation regularly, i.e. at quarterly intervals, try to increase their productivity and monitor liquidity, activity, and profitability at least at their minimum sustainable values in order to stay on the market (Hlawiczka et al., 2021).

The aim of the paper is the description and quantification of the impacts of the COVID-19 pandemic on the hospitality sector and evaluate changes in the financial performance and stability of the monitored company and in comparison with the industry when monitoring ratio financial indicators in ex-post analysis.

Currently, the issue of financial analysis makes even more sense with regard to the new pandemic disease COVID-19. The COVID-19 pandemic poses a threat not only to humans, but also to small and large businesses, and thus to the global economy (Carracedo et al., 2021). The threat is made up of individual restrictions that have been set by countries around the world to try to stop the spread of the new disease, COVID-19. The goal was a vision of returning to the "good old" days before the pandemic (Castañeda-Navarrete et al., 2020).

Compared to the financial crisis of 2008, it is significantly different from the current pandemic crisis caused by the new disease of COVID-19. As Pardhan and Drydakis (2021) state, the current pandemic crisis is primarily characterized by a high decline in gross domestic product not only in developed countries, but in countries around the world. Currently, gross domestic product is said to have fallen by around 3% according to the International Monetary Fund, down from 0.1% during the financial crisis. Another difference is that the financial crisis affected all sectors of the economy negatively. During the pandemic crisis in 2020, some sectors of the economy were hit hard, such as tourism, services or the automotive industry, which were helped by the measures taken and also the closure of businesses. In contrast, however, there are sectors that have enjoyed great success and sales growth despite the pandemic, as these products were in demand. These

are sectors of the economy such as the pharmaceutical industry, the food industry, or the technology industry.

The impact of the COVID-19 pandemic, the impact on corporate finances and decision-making was addressed by Iyer and Simkins (2022), who state that such an investigation was not easy. A certain change was the publication of financial statements at quarterly intervals, i.e. the shortest possible monitored intervals, which complicated the collection of an adequate amount of information in order to create a true picture of the company's financial situation. Zhang and Zheng (2022) compared companies and found that companies with high cash reserves can face crises such as the global COVID-19 pandemic, compared to companies with insufficient cash reserves. If businesses cut payroll and investment, their cash reserves would increase during a crisis. Based on a survey of 1,400 US dividend-paying companies, Krieger et al. (2021) that 213 companies reduced the value of dividends and 93 companies did not pay dividends at all. The authors concluded that with this step of the companies, the authors concluded that these are companies that are efficient and know how to manage even in times of crisis.

Mirza et al. (2020) presented several stress frameworks that describe probabilistic phenomena in non-financial listed companies, such as an increase in the number of defaults, an increase in foreign liabilities on the liabilities side, or a decrease in asset coverage. The results of these studies indicate that the solvency of each business will deteriorate, with sales and total market value falling. The authors also investigated how they can maintain solvency and came up with the idea of deferring taxes. In the event of a downturn leading to the collapse of the business, there should be cross-support with liabilities and equity.

Ibn-Mohammed et al. (2021) addressed the impact of the global COVID-19 pandemic on the Sustainable Development Goals, which were adopted by the United Nations in 2015, to improve living conditions and nature by 2030. The goals were based on two assumptions: globalization and sustained economic growth. The authors' research pointed to the fact that current sustainable development goals are not stable against shocks caused by pandemics. The authors, Naidoo and Fisher (2020), state that two-thirds of the total goals will not be met by 2030 and even state that the fulfilment of some goals is threatened by the pandemic if they cannot mitigate the effects of the pandemic.

2 Methods

To achieve the main aim of the paper, ratio analysis of 580 Slovak enterprises operating in the sector NACE I (Accommodation and Food Service Activities) was used and the development of the financial indicators (liquidity, activity, indebtedness and rentability) was measured over a 4-year horizon. Friedman non-parametric test was used to reveal the differences in the development of the ratios and measure the impact of the global COVID-19 pandemic.

The following table (Table 1) summarizes the calculation of the financial indicators used in the analysis.

Analysing the data of all enterprises, the graphical analysis was used. The graphical analysis creates pictures of the data, and this will help to understand the patterns and also the correlation between process parameters. Often graphical analysis is the starting point for any problem-solving method. The process may be immediately understood by graphical analysis, which also improves communication and gives additional study a clear direction. It is a crucial tool for identifying the reasons of data fluctuation, which aids in understanding the process and its fundamental problems.

Table 1. Analysed financial ratios

Financial ratio	Abbreviation	Algorithm
Cash ratio	L1	Cash and cash equivalents to current liabilities
Quick ratio	L2	Current assets - inventory to current liabilities
Current ratio	L3	Current assets to current liabilities
Stock turnover period	STP	Stock to sales
Debt collection period	DCP	Debt to sales
Total assets turnover	TAT	Total assets to sales
Current assets turnover	CAT	Current assets to sales
Fixed assets turnover	FAT	Fixed assets to sales
Total indebtedness	TI	Current and non-current liabilities to total assets
Self-financing ratio	SF	Shareholders funds to total assets
Credit debt ratio	CD	Bank loans and overdrafts to total assets
Interest coverage ratio	IC	Earnings before interests and taxes to interests paid
Financial leverage	FL	Total assets to shareholders funds
Cash flow coverage ratio	CFC	Current and non-current liabilities to cash flow
Insolvency ratio	IR	Current and non-current liabilities to receivables
Return on assets	ROA	Earnings before interests and taxes to total assets
Return on equity	ROE	Earnings before interests and taxes to equity
Return on investments	ROI	Earnings before interests and taxes to invested capital
Return on sales	ROS	Earnings before interests and taxes to sales

Source: authors

3 Results and Discussion

Based on the analysis of ratio indicators in the monitored industry during the years 2017-2020, we would like to make suggestions and recommendations for the investigated sector to improve its financial situation. In general, it can be said that despite the ongoing pandemic, businesses managed to avoid bankruptcy and get through a difficult financial situation.

When illustrating the development of cash ratio (L1) during the monitored period, we considered that the monitored enterprises achieved the desired values of the indicator (calculated average values) in 2017 and 2018. In 2020, when the environment was affected by the COVID-19 pandemic, businesses did not reach the recommended values of the indicator. Our recommendation is that businesses should strive to increase the most liquid assets, e.g., by selling a certain part of the property or by maximizing the profit that the company would achieve, e.g., by expanding the offer of its products and services (Nagy and Lazaroiu, 2022). The development of the quick ratio (L2) took a negative direction, as the companies did not reach any of the recommended values in the monitored period in even one year. By suggesting how to improve these values, we came to the conclusion that it would be appropriate to reduce the receivables that the company has (using factoring or forfaiting services) (Kovacova, et al., 2022). The development of the current ratio (L3) was also negative, since the recommended values were not reached in any monitored year. The enterprise could achieve the recommended values by increasing the value of assets, especially current assets. A reduction in the volume of short-term liabilities will also contribute to increasing the liquidity of companies in general (Figure 1).
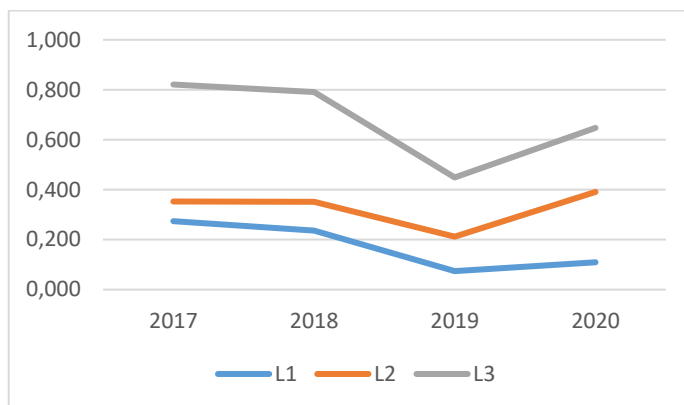
Figure 1. Liquidity ratios (development)

In the ratio analysis of activity, companies from this sector must work on measures that will either minimize turnover times of business items or maximize the turnover of business items (Gajdosikova and Valaskova, 2022). Turnover times of business items only increased year-on-year, which negatively reflects the financial situation of businesses. Although the sales produced by businesses grew until 2019, they fell deeply in 2020 due to the pandemic. Analysing the period of stock turnover (STP), the value of the material available to companies increased year-on-year. We recommend that it possibly minimize the value by selling this material, which would increase the company's funds and at the same time decrease the costs of managing them. Considering the debt collection period (DCP), we would again recommend to the company, as in the case of liquidity, using factoring or forfaiting for a quick purchase of receivables.

This would reduce the company's receivables payment times. During the turnover period of total assets, the highest values were reached, which can harm the company, even though the values of the indicator decreased until 2019, the maximum was reached in 2020. The turnover of total assets (TAT) developed positively until 2019, but in 2020 the value decreased by more than half. Businesses are advised to increase turnover, not to increase the volume of assets, and to use all the assets available to them. Businesses can do so when the pandemic measures are relaxed, which will also cause the expected increase in sales (Gregova et al., 2021). The turnover of current assets (CAT) had the same development. It is recommended that companies increase their financial accounts, e.g., through the sale of materials or accelerated payment of their receivables. The last ratio of activity indicators was the turnover of fixed assets (FAT), which developed similarly to the latest one (see Figure 2).

By analysing the indebtedness, we assessed that the total indebtedness (TI) is in the range of 49–59 %, which means that it reaches the recommended values, and thus the companies use their own and foreign capital in a balanced way. For the self-financing ratio (SF), the values decreased year-on-year, which was undesirable for companies. We therefore at least recommend that the company increase its share capital by the deposits of the owners of the company, despite the fact that equity capital is more expensive. In this case, it would have the advantage that if the company continued to borrow capital from creditors, it would not have to be considered a risky entity (Michalkova et al., 2021). The credit debt ratio (CD) followed a similar trend, which can be a warning signal for various creditors, while bank loans were primarily of a long-term nature. It is necessary not to increase the volume of loans.
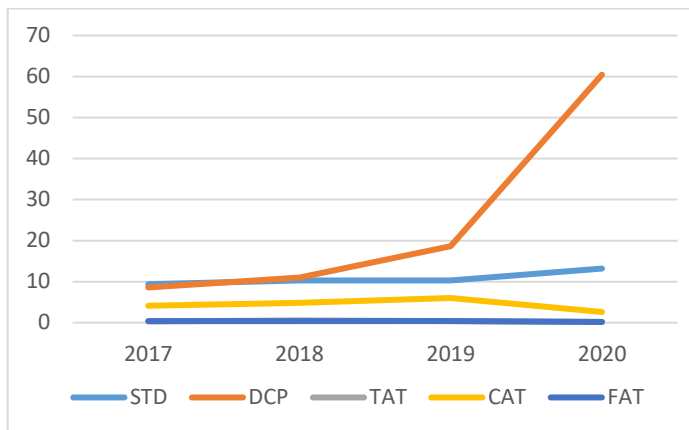
Figure 2. Activity ratios (development)

The interest coverage ratio (IC) which reaches high values, can be positively evaluated, which means that companies are able to repay loan interest. After evaluating the indicator of financial leverage (FL), it is possible to claim that companies should either increase the volume of their own resources, or increase the share capital with deposits by the business owner while maximizing the profit at the end of the next accounting year in order to avoid bankruptcy. Therefore, businesses should think about a marketing strategy that would attract more potential customers (Gajanova et al., 2021). The cash flow coverage ratio (CFC) shows high values of repayment of liabilities through cash flow for companies. Businesses are therefore advised to maximize their profits during the next period. The insolvency ratio (IR) of enterprises can be evaluated negatively, as values higher than 1 have been reached. This is the inability to pay their obligations, which was caused by the enterprises themselves. It would therefore be appropriate to reassess the volume of total liabilities or increase the receivables, e.g., by favouring payment conditions, which would achieve an advantage over the competition (Figures 3a and 3b).
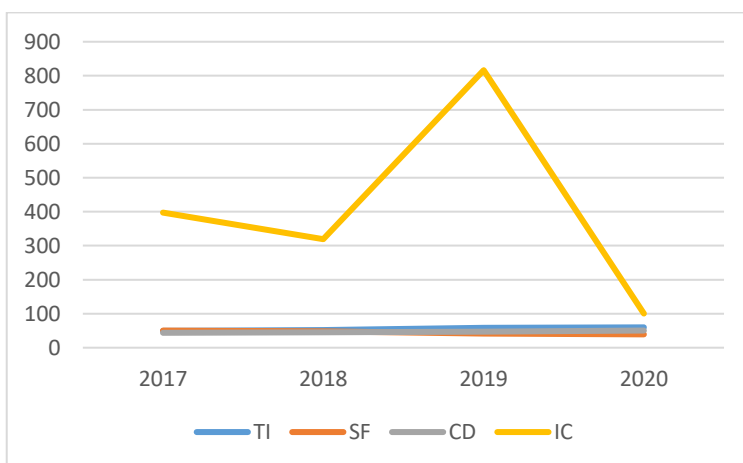
Figure 3a. Indebtedness ratios I (development)
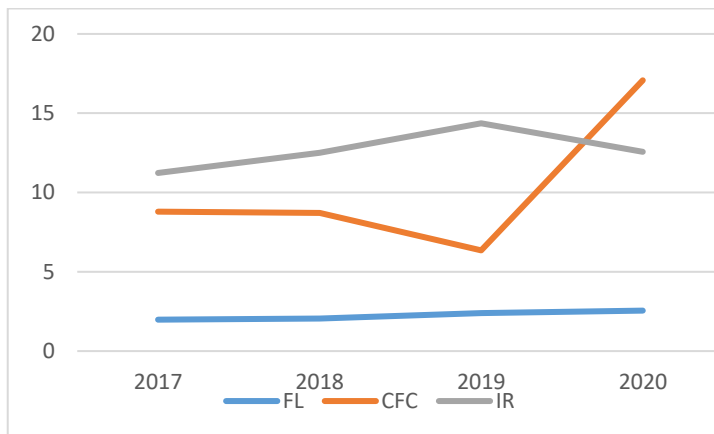
Figure 3b. Indebtedness ratios II (development)

In general, the achievement of favourable and high values of individual profitability indicators is largely influenced by the growth of corporate profits. Net profit growth can be achieved in various ways, e.g., expansion of the services offered to customers. Companies should consider what new methods or offers they can use to attract the attention of new potential customers (Ballerini et al., 2022). Furthermore, we suggest companies to increase the price for accommodation appropriately, so that it remains competitive and does not differ much from others. With this step, the company could slowly approach the financial situation it was in before the outbreak of the COVID-19 pandemic (Figure 4).
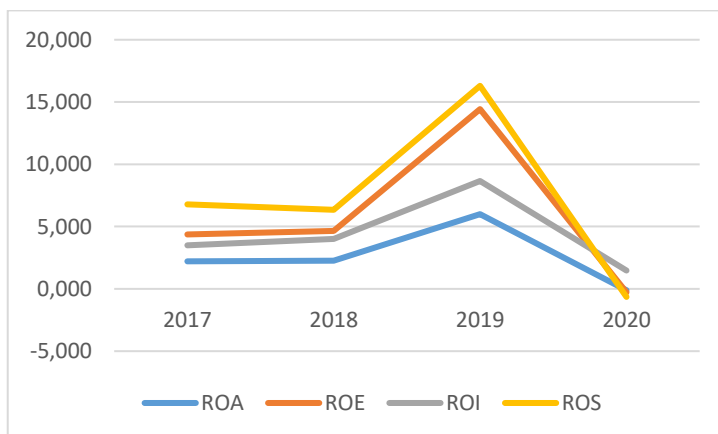
Figure 4. Rentability ratios (development)

To a certain extent, the growth of profitability indicators is also influenced by the decrease in total costs, which are part of the overall profit calculation. Companies should deal with the optimization of the volume of costs throughout their existence, because solving the issue of cost optimization is a long-term issue and it is excluded that this issue should only be addressed when the company's financial situation is threatened (Sahman et al., 2009). There are several ways in which the company manages to reduce its total costs. It would be appropriate to focus primarily on reducing the costs of the company's economic activity. When reducing labour costs, the company should consider the possibility of outsourcing. It would also be effective if businesses reduced their tax through tax write-offs. On the other hand, it is possible to use depreciation to finance business assets, which is the so-called "free capital" (Preisinger, 2019).

The financial situation and performance of companies have completely changed due to the impact of the global COVID-19 pandemic. The pandemic has affected every financial ratio we monitor. Compared to 2019, however, companies managed to increase the year-on-year values of individual liquidity. The most negatively affected indicators are activity indicators, where some values increased by more than 50% during turnover times, which only hurt the business. Turnover indicators, on the other hand, decreased by 50%, which also has a negative effect on business activity. The pandemic also hurt businesses in financing their needs, when their indebtedness increased, which meant that businesses were more dependent on foreign capital than in previous periods. Profitability indicators were also affected by the pandemic, when a negative net profit was achieved due to increasing costs.

4 Conclusions

In general, financial analysis is considered the most widely used and sought-after means by which businesses can reliably assess their financial health through various financial indicators. Ratio financial indicators are among the basic indicators of financial analysis. Their advantages are that they can be used to analyse the development of the company's financial health over time, whether based on their results it is possible to predict the future development of the company's financial situation, or whether their results are comparable to the results achieved by the industry. By evaluating the results, we came to the conclusion that the global COVID-19 pandemic had a severe impact on the development and operation of companies in the selected sector.

Acknowledgements

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Prediction of the evolution of economic crime in the Slovak Republic

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Abstract

Research background: Conventional theft and other illegal means of enrichment have recently been abandoned. Economic crime is now coming to the foray are perpetrated by educated people who know about finance. In few cases, it happens that economic crime is committed by only one person; in most cases, it is an organized group that has an established modus operandi and has been committing this crime for a long time. Economic crime causes economic damage to the state, legal and natural persons. It is mostly a latent crime, i.e. it leaves no visible criminal traces and is therefore difficult to detect.

Purpose of the article: The main objective of the authors of the article is to predict the possible development of economic crime up to 2027. The prediction of crime will reflect crime trends from 2002 to 2021, when we already know the number of economic crimes for each year.

Methods: The above analysis of publicly available sources will be used in the preparation of this article. Synthesis, induction and deduction will also be used. Last but not least, prediction will be used.

Findings & Value added: The findings of the study, i.e. the prediction itself, will serve state agencies such as the police force, the financial administration. Based on the results of the study, various prevention programs can be applied to reduce economic crime.

Keywords: *crime; economic crime; evolution; prediction*

JEL Classification: *F52; H55; K14*

1 Introduction

Crime and victimization occur in every society, although relative differences in their kind and extent are inevitable (Jibat and Nigussie 2015).

The phenomenon of economic crime remains an ongoing challenge despite all efforts to combat it. The rules that society creates for the economy and its participants are often broken. Corruption, collusion, fraud, tax evasion and other forms of misconduct are widespread and costly (Kertesz and Wachs 2020). The main reasons for the emergence and existence of economic crime and fictitious business are: the imperfection of legislation

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regulating economic activity, the high level of corruption, tax evasion, the control of corrupt persons in the main sectors, the low professional level of law enforcement police officers in detecting, documenting and investigating these crimes (Krysovaryy 2021). According to Argentiero (2018), economic crime has shifted significantly in recent years from Backer's economic crime to a more flexible approach where many demographic and socioeconomic variables are taken into account

Economic crime is an ever more commonly used term without a strict definition, which is generally thought to include fraud, corruption, money laundering, intellectual property crimes and some of the cybercrimes that facilitate them (Button 2021). There is currently no settled definition for the term economic crime. This is because each scientist defines economic crime in terms of his or her area of study. It is the same with similar terms such as "crimes in the field of economics", "economic crimes", "shadow economy", "criminal economy", "economic crime" (Cherniavskyi, 2021). Economic crime together with organised crime belong to work related crime (Vestby, 2021).

Economic crime is not a new social and criminal phenomenon in our lives, but it is still not sufficiently, fully and in depth explored in the context of the dynamic changes that are emerging in the world. Economic crime is constantly evolving and is increasingly difficult to detect. This is because economic crime has moved online, and the use of computers, computer networks or other forms of information and communication technology is required (De Nicola 2022). It is quite clear that such a situation is not acceptable for the practice of the state's influence on economic crime, nor for the researchers who are trying to learn about its nature and modifications. Therefore, in the world society there has come the need to introduce a uniform standard of classification of economic crimes (Barzykina, 2016). Levi (2017) states that economic crimes have recently been occurring primarily in cyberspace. Therefore, quantifying the specific damages is problematic.

According to Volobuiev and Schevchenko (2019), the variety of ways of committing economic crime, the use of different technologies, as well as a wide range of modus operandi lead to considerable difficulties in their investigation. Economic crime has improved considerably over the last 50 years and detection is becoming more difficult every year. Kozak (2018) considers economic crime to be property crime but also crimes in the economy. The author views as economic crime the interference in the property, management of the economy, which are committed by the basic stop social position in the structure of the economic for the purpose of unjustified enrichment. Gaspierik (2010) states that the motive for economic crime, as for property crime, is the acquisition of unjustified pecuniary gain. The majority of economic crimes are defined in Act No. 300/2005 Criminal Code, specifically in Chapter V. Some economic crimes are also defined in Chapter VI of the Criminal Code. According to Recommendation No. R (81) 12 of the Committee of Ministers to Member States on Economic Crime, economic crime includes environmental crime. In the foreign literature (Argentiero 2018) it is possible to read about three determinants that we classify as economic crime:

− property crime,
− fraud,
− usury.

Alvesalo and Tombs (2004) say that economic crime can be controlled even today, when globalisation is coming to the fore. According to Draca and Machin (2015), the labour market and wages are to blame for the increase in crime. Because if work was sufficiently rewarded, people would not need to commit crimes for economic reasons. Another possibility for why economic crime exists is the transformation of organized crime from violent crime to economic crime, where we can also include money laundering (Levi 2015).

According to the statistics of the Ministry of the Interior of the Slovak Republic from 1989-2020, a total of 389,676 economic crimes were recorded in Slovakia. Soltes (2022) talks about dividing the trend of development into 2nd periods. The first period from 1989-2021, and the second period from 2002 - present. The reason for the division into 2nd periods is the change in the Criminal Code and the resulting increase in economic crime in 2002. In terms of fundamental economic models, the reduction in crime can be said to be driven by increased resources for policing and crime prevention (Machin and Marie 2011). Currently, the clearance rate for economic crimes da hovers around 50 %. Statistics on the status and clearance of economic crime in the 2nd period, i.e. from 2002 to 2001, can be found in Figure 1.
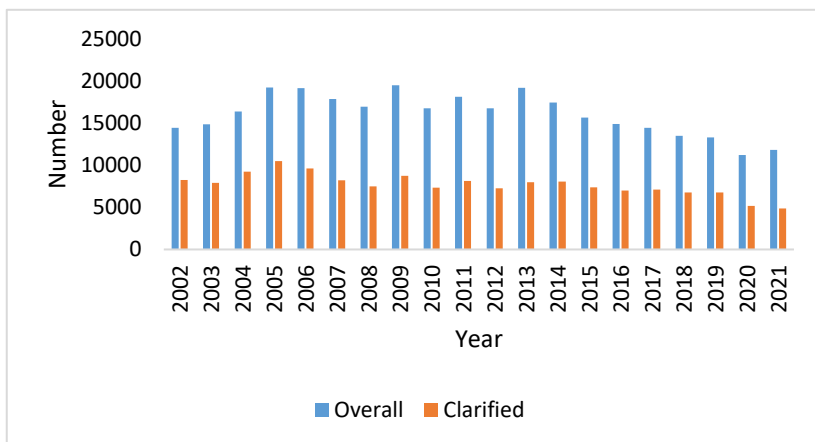
Figure 10. Statistic of economic crimes (MinV, 2022)

2 Methods

In order to predict the evolution of economic crime, we will consider the number of economic crimes from 2002, i.e. from the change of the Criminal Code, to 2021. Predictions since 2002 are also supported by Soltes (2022), who says that the change in the Criminal Code in 2002 significantly distorts the portrayal of the evolution of economic crime in the Slovak Republic. On the results of the prediction, the competent authorities will be able to develop and determine appropriate preventive measures.

3 Results

As Figure 1 shows, economic crime remained roughly flat until 2013. Since 2014, we have seen a slow decline in economic crime until 2020. In 2021, the number of economic crimes increased slightly. The clearance rate for economic crime has been in the range of 55%-45% from 2002 to the present.

In forecasting we will take into account 3 models, namely:
- lower confidence limit,
- prediction,
- upper confidence limit.
  See Figure 2 for a prediction of the number of economic crimes by 2027.
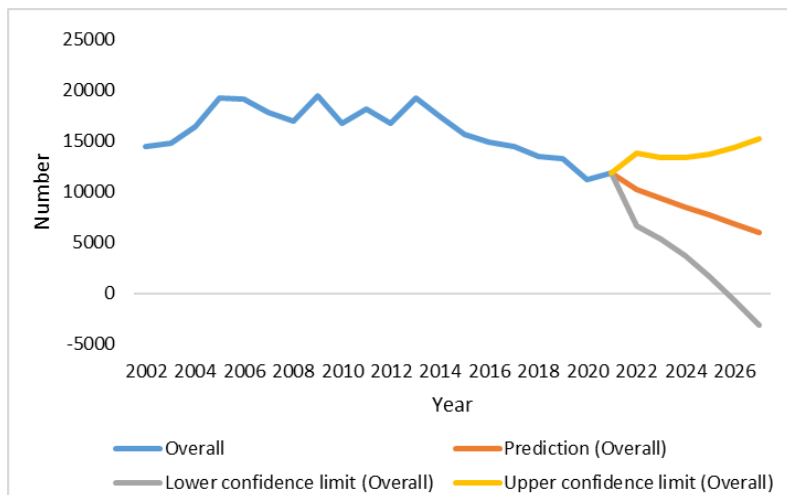
Figure 11. Prediction of economic crime

As we can see, the forecast is downward sloping, as indicated by the trend of the previous years. The upper confidence limit is slightly upward sloping, which may result in a slight increase in economic crime in 2021. The lower confidence limit reaches a negative number, which is not possible in this context, so we can say that there should be no economic crime in the Slovak Republic from 2026 onwards, but we do not agree with this.

Next, we will predict the number of cleared cases of economic crime. As in the previous case, the prediction will be until 2027.
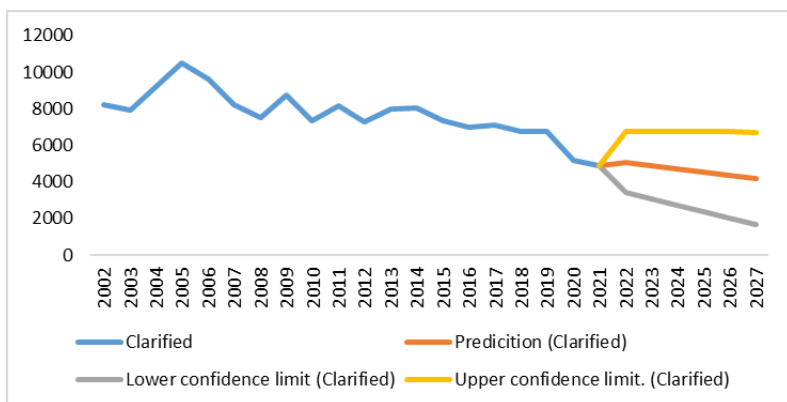
Figure 12. Prediction of clarified economic crimes

As we can see, we can see that even for the clarified cases, the prediction has a downward trend, as in previous years. The upper confidence limit has a significant increase in cleared crimes until 2023, but stagnates from 2024 onwards. The lower confidence limit has a downward trend, but here we do not get to 0, which is inconsistent with the lower confidence limit for the number of economic crimes. We see that the economic crime clearance rate is decreasing, but this is not a negative phenomenon as the number of economic crimes is also decreasing.
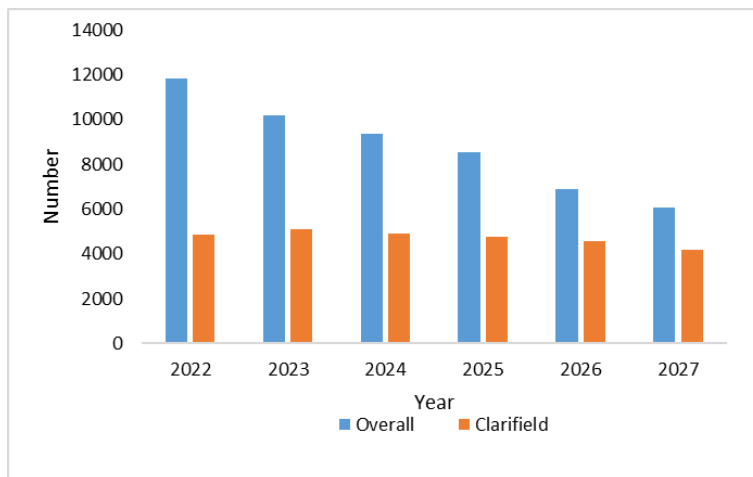
Figure 13. Prediction the development of economic crime and crime clearance

As we can see, the trend of economic crimes is decreasing, which means that the number of solved cases is decreasing every year. However, clarity has an increasing trend and in 2027 clarity will reach 69 %, which is an increase of almost 30 % compared to 2021.

4 Conclusion

Economic crime is one of the most significant types of crime. Its consequences can have an impact on the functioning of individual states. The reason why economic crime is a serious problem is because it is largely latent and difficult to detect. In the Slovak Republic, economic crime is defined in Act No. 300/2005 Criminal Code. The statistics of economic crime in the Slovak Republic can be divided from 1989 to 2002 and from 2003 to the present, due to the amendment of the Act in 2002. The article contains a prediction of economic crime until 2027. The prediction results in a decreasing trend of economic crime. The trend in the clearance rate of economic crimes, which is up to 70 % based on the prediction, is encouraging.

Acknowledgements

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Globalization phenomena on the Slovak financial market profiling the credit cycle - a view of households

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Abstract

Research background: In the development of modern society, we increasingly witness credit booms and excessive loan growth. A typical example is the case of Slovakia, where loans to households have been growing the fastest in Central and Eastern Europe for more than a decade, even after the end of the growth phase of the economic cycle. Indebtedness of Slovak households changed from being the least indebted, when it settled between the top rankings within the EU. A similar specificity in Slovakia also occurred with interest rates, which changed from the highest in the region to the lowest.
Purpose of the article: Despite the fact that the profiling risks for the territory of the Slovak Republic represent to a large extent an unprecedented development, economic theory recognizes similar development scenarios. This allows us to better identify and name these phenomena. At the same time, our intention is to verify whether the competitive war of banks leads to frenzied household indebtedness regardless of economic development.
Methods: We use a multiple linear regression model using the instrumental variable method (IV Regression) to test the derived hypothesis. To estimate the model, we use the steps of statistical tests such as the Hausman test, the Method of Least Squares (OLS), the Pesaran-Taylor test, the Breusch-Godfrey test and the Cochran-Orcutt correction.
Findings & Value added: In the private sector, we capture multiple phenomena such as the transfer of risks by retail banks to the state through their unprecedented risk appetite; sharing the collective guilt of senior management of financial institutions by copying given trends; triggering a mortgage war by banks in an environment of excessive competition; and finally, as a result, the herd behaviour of consumers with disproportionate indebtedness.

Keywords: *share the Blame effect; search for yield; herd behaviour; mortgage boom; bubbles and bursts*

JEL Classification: *D81; E32; E58; F62; G21*

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1 Introduction

The environment of credit booms requires a search for their triggers and understanding the causes of (disproportionate) household indebtedness should be an important concern for policy makers and regulators. The most significant generalization of the effects on the credit cycle are *government interventions* in the free market reported in the economic literature. Through the monetary policy of central banks, the interest rate market is influenced, which also causes excessive credit growth. While, interest rates also fell abroad, despite this, the trend of credit growth in neighbouring countries during the observed period did not turn into excessive growth and was even often rather the opposite. In Slovakia, economic experts considered the growth phase of the economic cycle with favourable macro prospects and positive sentiment as the main reason for the stimulus of the credit rally. However, the authors of the paper proactively pointed out that the new drive in the unceasing growth of household indebtedness is primarily driven by the artificially induced pricing of interest rates, as part of the mortgage war in an environment of saturated retail bank competition. In addition, external financial intermediaries play an important role here, whose predatory offer and individual approach to the client act as a multiplier effect. In favour of the stated postulate, the overall rate of growth of loans to households in Slovakia, which is still excessive even after the cooling of the domestic and world economy, also testifies. First of all, the supply strategy contributes to this. The business model of the retail banking sector is focused on providing loans with little room for diversification of activities. This intensifies the competition between them and pushes for the reduction of interest margins, which are among the lowest in the Eurozone. In some months of 2019, they also reached the lowest rank in the monetary union. The phenomenon of low profitability is still present in the eurozone banking sector. The main factor was the decrease in income from the retail sector due to falling interest margins. Until 2016, the Slovak banking sector was one of the most profitable in the region. In the longer term, the attractiveness of Slovak banks from their parent groups' point of view may decrease, which may lead to a decrease in investments on their part. In general, high indebtedness or its rapid growth causes higher losses for banks in times of crisis. However, the experience of the last crisis indicates that there is also a connection between the growth of indebtedness before the crisis and the drop in household consumption during the crisis. Simply put, the higher the changes in the share of household debt to GDP in good times, the deeper was the decline in household consumption in bad times, and thus its lower contribution to GDP. According to Edwards and Mishkin, the traditional business of banks - making long-term loans and financing them by issuing short-term deposits - has declined in recent years. These developments raised concerns that more banks would fail or be forced to take greater risks to remain profitable (1995a). It is the unprecedented appetite for credit and less prudent risk management by the banking houses operating in the territory of the Slovak Republic that is ultimately a phenomenon that we are witnessing in the current development. The IMF also places great emphasis on the impact of low interest rates on financial stability in its analyses. The era of cheap money also has an effect on excessive indebtedness in certain segments of the corporate sector. The long-term persistence of interest rates at low levels, in many cases historically low, is one of the main sources of risks for financial stability. Such conditions create motivations in the real economy and financial markets leading to the accumulation of imbalances and an increase in vulnerabilities. In the event of an economic downturn, these characteristics subsequently amplify and accelerate negative trends and deepen crisis development (2019). In addition to the mentioned mechanisms, low interest rates and unconventional currency operations can have other side effects. The role of quantitative easing in deepening income and property inequality through increasing asset prices, which are concentrated amongst the wealthier

population, is becoming more and more discussed. It is not effective for the development of the economy's long-term potential that low interest rates help unpromising businesses to survive financially and thus hinder the process of the so-called *creative destruction*.

2 Collective optimism and the herd effect as the driving engine of the boom

Despite the assumption that it is natural for all market agents to achieve the greatest possible profit and progress, the occurrence of the named phenomena, which at first glance evoke optimism and maximization of growth, may not ultimately represent a positive effect. The word boom evokes the growth of a certain phenomenon, or its onset at a rapid pace. Based on this, we can say that for further assessment of its usefulness, it also matters what phenomenon it will be used with and what is its trigger. The baby boom among economically active society is perceived positively. Likewise, the term is often associated with a technological boom, which advances the overall development of our civilisation. And what about the mortgage boom, is it a positive phenomenon? Housing loans based on collateral are among the most effective types of loans and help households, as market agents determining consumer trends, to develop. Anyway, economic metrics consider the growth of selected statistical indicators depending on the development of associated groups of indicators. In economic jargon, we then interpret a boom as artificial growth, when some assets can grow beyond the corresponding macroeconomic fundamentals, and in that case, we can talk about the formation of bubbles. In the end, the best-known booms remain etched in history on the example of the sectors mentioned above. The dot-com boom, also known as the dot-com bubble, was a technology stock market bubble in the late 1990s (during a period of massive growth in Internet use) that caused many online service companies to go bankrupt. And of course, the bursting of the US subprime bubble in mid-2007, which grew into a global financial and debt crisis. Optimism as such would be interpreted negatively by few, not even with a collective sign. However, it can be a certain problem if it causes the private sector to insufficiently assess risks, the appropriateness of investments, or if it develops into herd behaviour. According to Chari and Kehoe, there is a general awareness of the association of financial crises with herd behaviour, which they confirm in their study (2003). Kaminsky (1999), Calvo and Mendoza (1996) identify the presence of herd behaviour with the emergence of crises as a significant part of the random component where the main reasons for the crisis were considered to be mainly bad development of macro indicators. The most common cases of herd behaviour, many observers cite large trends in the stock market, when individual investors join a crowd of others rushing to enter or exit the market. According to Brunnermeier, these episodes often begin and end with periods of *frenzied buying* (bubbles) or *selling* (crashes) and are driven by specific emotions - *greed* during bubbles and *fear* during crashes (2001). This phenomenon was already noted by Keynes (1936) when he further compared the behaviour of investors in the asset markets to the famous, generally known example of a "*beauty contest*". With our analysis, we have a unique opportunity to present the phenomenon of the mortgage boom, which occurred in the territory of the Slovak Republic from April 2016 and continues in a transformed form in 2022. The environment of unprecedentedly low rates and the mortgage war of banks has changed the economic term of the *willingness to borrow* (more or less) into a *herding effect* and frenzy by the urge to take out a loan and own real estate. Indebtedness of Slovak households reached the highest values amongst the countries of Central and Eastern Europe. While Slovak clients often reach a higher level of debt when granting a loan than the limits allow abroad. A high level of indebtedness brings several risks; the vulnerability of households to possible shocks (decrease in income, loss of employment, etc.) increases. Excessive debt growth also increases the likelihood of

financial crises and reduces the potential for economic growth. The growth of indebtedness in Slovakia far exceeds the growth of favourable economic fundamentals. The year-on-year growth of loans to households, as well as the growth of real estate prices, has been a double-digit number for several years. With such a combination, economic theory already assumes the possible formation of bubbles. The most significant risk is associated with a possible overvaluation of assets, primarily as a result of the long-term period of low interest rates and quantitative easing. The mortgage war of banks, which plays a major role in the given boom, is also proof that herd behaviour does not only concern the household sector, but also the private sector (in our case, retail banking) is subject to it in its management decisions. Scharfstein and Stein (1990) point out that there is a phenomenon of sharing the collective guilt of managers (so-called *share-the-blame-effect*) as part of herd behaviour in the management of enterprises. If there is a social atmosphere of performing well while taking care of financial stability, it also motivates executive managers across the market. However, this applies even if one starts taking risks, which can threaten financial stability as a whole. In the case of banking houses, the effect of transferring risks to the state in an effort to obtain higher returns through risky investments is also documented. Bagus (2008a), therefore state the enormous influence of the "big player", which in this case is the ECB, which has it all in its hands. On the side of investors, the long-term low interest rates signed the so-called *search for yield* phenomenon. Low market yields push mainly institutional investors bound by achieving a predefined valuation to buy ever riskier assets in an attempt to fulfil these goals. The risk parameters of the portfolio of investment funds, pension funds or insurance companies have been at an elevated level for a long time. In recent months, this trend has become even more pronounced. These entities try to find more profitable assets by extending the duration of the portfolio, buying issues with a lower rating, or investing in illiquid asset classes. However, the tax for this activity is an increase in the risk of their balance sheet in several dimensions – interest, credit and liquidity (NBS, 2019, p. 17). Bagus (2008b), based on studies, sums up three other significant areas through which the spreading optimism caused by government incentives can influence social events. They are:

1. *As a result of the boom, the accounting profits of companies increase*. These misleading profits, as he further describes them, give rise not only to the feeling that the situation in the economy is in order, but also that it is a period of great prosperity and real growth. This further increases the optimism, as a result of which even the general population can invest in the asset market to a greater extent, fuelling the boom even more.

2. *During this boom, the belief is often spread that credit expansion makes it possible to sustain increased production without having to forego consumption.* Euphoria permeates the economy as people assume that it is possible to increase production without having to save in the first place. They also see their savings in debt. Developments in the financial markets, as well as the real estate market, seem to be safe, as they show growth. Therefore, investors continue to speculate.

3. *Boom is transforming the business environment.* Rising asset prices attract more and more investors, and entrepreneurial creativity and effort are directed towards asset price markets. Due to the flow of money into these asset price markets, prices continue to rise, further increasing optimism. People may leave their jobs to speculate in the asset price market, where profits appear to be made more easily than in their original jobs.

3 Methodology

Our goal in conducting a quantitative research study was to determine the relationship between one category characterized as Dependent variable - DV and the other category Independent variable - IV within the population - Slovak households. For the interest of

investigating the dependence of two or more quantitative variables, we have several statistical tools at our disposal. Since we are working with cardinal variables in our hypothesis, our choice is narrowed down to the two most suitable methods, either the correlation method or the linear regression method. With the help of linear regression method, not only we can examine the causal relationship between two or more variables, we can also calculate it exactly. Furthermore, we can determine the size of the influence and even determine the expected values of the dependent variable if we know the value of the independent variable (Greene, 2019a).

4 Results and work procedures

4.1 From the willingness to borrow to the frenzy in household lending

The term *willingness to borrow*, commonly used in Slovak analytical studies and comments, expresses the willingness of households to enter into a credit relationship and thus presents the development of new increases volume of loans depending on the selected period, which can also be examined from different viewpoints. If, within the credit cycle, we experience a disproportionate growth in household indebtedness that grows above the related fundamentals, we are talking about a growth imbalance, which is mostly associated with a credit boom. To expand the terminology of this phenomenon, we use the term *crowd frenzy in crediting the population*, while further investigating its causes. Historical development supported by analytical studies formulate postulates about the dependence of development in the real economy and the credit cycle. In broad terms this linear relationship is logical, more specifically, we can then talk about the examination of more detailed relationships and reactions of the credit market to fluctuations in the national economy. During the research activity, specifics such as the short history of the Slovak Republic with a lack of fluctuations, the underdeveloped financial market or the short history of the modern credit market must be taken into account. Separately, we note that it is also necessary to work with the cultural element as the mentality of nationalities may vary, which could be confirmed by fellow ethnographers, and it can also affect financial decision-making. This fact limits us when formulating conclusions when examining the relationships concerned by relying on the results of foreign studies. Finally, let's mention that financial decision-making falls under the act of human action, which, in addition to the level of financial literacy, is not always rational, subject to emotions, can be impulsive, and is influenced by values that also evolve over time. In view of our analysis, we consider scientific research in this area to be important and establish a derived hypothesis.

H: Availability and cost of loans are more important determinants for households than good times.

The term *good times*, commonly used in analytical studies and commentaries (e.g., of regulator), generally expresses the growth phase of the economic cycle with macro-fundamentals conjuncture, good consumer sentiment, with other favourable prospects. By *the availability and cost of loans*, we understand the release of banks' credit risk and low interest rates for housing loans. For testing the hypothesis, we choose a multiple linear regression model, as we need to identify the effect of the variable interest rate of housing loans on the dependent variable of volumes of housing loans and purify this effect from the influence of other macroeconomic factors.

4.1.1 Data used

We expressed the financial decision-making of households in the area of housing loans using the variable *volume of new loans* in thousand. EUR, which acts as a dependent variable. To test the hypothesis, we examined the dependence of the demand for loans on *the interest rate on housing loans*. Other independent variables were *ESA employment, GDP in CP* and *the real wage index*, which we used to express the economic cycle. An additional variable was *the interest rate of consumer loans*. Supplementary variables, also called instrumental variables, are used when it is necessary to find variables that do not depend on the random component of the equation, but are correlated with other explanatory variables (auxiliary variable method known as IV Regression). The data frequency was quarterly in the time period from 2008Q1 to 2020Q4.

4.1.2 Data preparation

The GDP variables in CP, ESA employment and the real wage index are in the form of year-on-year changes compared to the same period last year – called *romr*. Of this, GDP and wages were adjusted for inflation using *the HICP consumer price index*. We recalculated interest rates to year-on-year changes, thereby treating the effect of seasonality. We recalculated the volume of loans in SKK, from before the introduction of the euro currency, using the exchange rate and comprehensively adjusted for inflation using the consumer price index (HICP). We expressed the interannual changes of these volumes in the form of logarithmic differences. We used this adjustment so that changes in loans could also be expressed as percentage changes (and thus appropriately compared with other variables). Makuch evaluates the transformation of data before entering the model positively and describes it as an innovative element (2016).
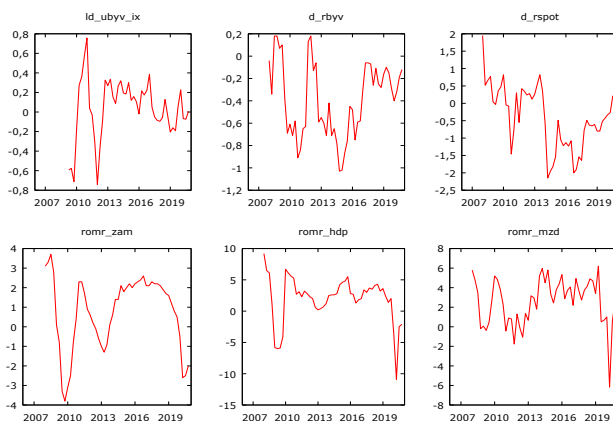
Figure 1. Preview of graphs of transformed variables and their visualization over time

Source: own processing based on the output in the Gretl program (2022)

Description of variables:
ld_ubyv_ix - logarithmic difference in the volume of loans compared to the same period last year,
d_rbyv - % change in the interest rate on housing loans compared to the same period last year (romr),
d_rspot - % change in the interest rate of consumer loans compared to the same period last year (romr),
romr_hdp - % GDP change,

romr_zam - % change in employment,
romr_mzd - % change in real wages.

4.1.3 Statistical tests

The different nature of data and types of variables contribute to the variability of potentially applicable methods. As we indicated earlier, we want to express the values of our regression parameters as well as the relations between variables X and Y using a computationally easy function that shows good approximation properties, which is fulfilled by the method of least squares (OLS). However, the linear model must meet several assumptions, on the basis of which the estimation of the model using the OLS method is unbiased and efficient. Heteroskedasticity and rank correlation are often present in econometric models, which (among other things) results in a distorted estimate of the standard deviations of the estimated coefficients and thus we can make wrong conclusions regarding the significance of the regression coefficients (Greene, 2019c). In these steps, we use a test statistic, which is a previously (appropriately) determined function of sample data. The subsequently calculated statistic value serves to decide whether the null hypothesis will be rejected or not (significance testing of H_0).

4.1.4 Step 1) Hausman test for endogeneity of regressor

An important purpose in combining time-series and cross-sectional data is to control for individual-specific unobservable effects (aka "errors") that may be correlated with other explanatory variables. Using exogeneity restrictions and the time-invariant characteristic of the latent variable, we derive a test for the presence of this effect (Hausman and Taylor, 1981). The Hausman test (also called the Hausman specification test) detects the presence of endogenous variables in a regression model. Endogenous variables exhibit values that are determined by other variables in the system. The presence of endogenous regressors in the model will cause ordinary least squares estimation to fail because one of the assumptions of OLS is that there is no correlation between the predictor variable and the error term. In this case, instrumental variable estimates can be used as an alternative. However, before deciding on the best regression method, you need to determine whether the predictor variables are endogenous (ibid). In step 1) we verified the exogeneity of the independent variable *d-rbyv* with respect to the dependent variable *ld-ubyv-ix*. For this, the auxiliary variable *d-rspot* was suitable, which we used as an instrument (IV) in a two-stage regression (two stage least squares TSLS) with independent business cycle variables. The null hypothesis assumes that the estimates using OLS are consistent, whereas the alternative rate with estimates using the instrumental variables estimator (IV estimator) (Adkins, 2018a).
   Null hypothesis
   H_0: There is no correlation between "errors" and regressors
   Calculation result:
   Asymptotic test statistic: Chi-square (one degree of freedom) = 3,4644
   with P value = 0,0627032
   Since the test is not significant (p value > 0.05), we conclude that the residuals are independent of the explanatory variable *d-rbyv*, which we can consider an exogenous variable for the needs of the given model. At the same time, we can use OLS (ordinary least squares) regression to estimate dependence).

4.1.5 Step 2) Pesaran-Taylor test for heteroskedasticity

One of the assumptions of the linear model is the same value of variances of the random component u_i for different values of the explanatory variable x_{ik}. It is referred to as the condition of homoscedasticity or constant variance of a linear model. If the values of the variances are not the same, homoscedasticity is not fulfilled and a phenomenon known as heteroskedasticity occurs. In such cases, the results of the model estimation without taking this disorder into account cannot be verified, as the statistical tests are inadequate. Heteroskedasticity is therefore the inconstancy of the dispersion of random disturbances and residuals, and in the event of its occurrence, even the method of least squares would be inappropriate (ibid). There are several diagnostic tests for heteroskedasticity in IV regressions, the most suitable ones are followed by Pesaran and Taylor (1999), whose experimental study derives an improved test that was also adopted by the Gretl program.

Null hypothesis
H_0: constant variance is present
Calculation result:
Asymptotic test statistic: $z = 1{,}14499$
with P value $= 0{,}252213$

Since the test is not significant (p>0.05), we accept the assumption of constancy (equality) of variance.

4.1.6 Step 3) Serial correlation test (Breusch-Godfrey's)

In linear regression models, independent errors are assumed, therefore it is important to be able to test the presence of autocorrelation of errors in linear regression. We are talking about the serial dependence (correlation) of random disturbances or residuals. Autocorrelation is thus understood as a dependence between two or more values of one variable arranged in time (Greene, 2019d). If the perturbations of a linear model are autocorrelated, the least-squares estimates are biased and generally inconsistent. For this reason, it is important to have tests against autocorrelation available. In our serial independence test, we use the Breusch-Godfrey test, also known as the LM test (*Lagrange Multiplier test*) or its extended version, the LMF test (*The Lagrange Multiplier F*) (Breusch, 1978). Kiviet (1986) described that the standard LM test too often rejects the true null hypothesis, which is solved by the F-test form of the statistic, which has better statistical properties. First-order serial correlation test.

Null hypothesis
H_0: there is no serial correlation (autocorrelation is not present)
Alternative hypothesis
H_A: serial correlation is present (presence of autocorrelation)
Calculation result:
LMF test statistics $= 6{,}33454$
with P value $= P(F(1, 41) > 6{,}33454) = 0{,}0159517$

The test is significant (p=0.016<0.05), so we reject H0 and serial independence. We have to correct the solution for serial dependence.

4.1.7 Step 4) Estimation of the model (COILS - Cochran-Orcutt iterated least squares)

Since the basic assumption of the linear regression model is uncorrelated random components. This means that the random components from two arbitrary observations must be independent, in the case of autocorrelation even the least squares estimator would be ineffective. We must therefore find another estimation procedure or modify the least

squares method in order to obtain an acceptable estimator of the parameter vector. Given the results of the tests in steps 1-3, the appropriate solution will be to use the method of least squares with the Cochran-Orcutt correction for serial dependence. In this way, we will estimate the model of the correlation investigated and interpret it (Cochrane and Orcutt, 1949). The Cochrane-Orcutt procedure is applied by taking quasi-differentiation or generalized differentiation so that the sum of squared residuals is minimized. Since we have the dependent variable in logarithmic form, we have to convert the coefficient estimates into logarithmic ones. This gives us the interpretation of the coefficients: Percentage decrease/increase in the dependent variable for a unit change in the explanatory variable. Since the explanatory variables are also percentage year-on-year changes, we get the interpretation of the percentage change of the dependent variable for the percentage change of the corresponding explanatory variable.

Cochran-Orcutt method, using data for the period 2009:3-2020:4 (T = 46)
Dependent variable: ld_ubyv_ix
rho = 0.621302

Table 1. Auxiliary calculations.

	Variable	Original coefficient	Std.error	T-ratio	P-value	Rounded coefficient	Recalculated coefficient
1	const_β_0	−0,173079	0,0993654	−1,742	0,0890	-0,173	-15,89
2	d_rbyv	−0,495926	0,135077	−3,671	0,0007	-0,496	-39,10
3	romr_zam	0,0413319	0,0316646	1,305	0,1991	0,041	4,22
4	romr_hdp	0,0216751	0,0148161	1,463	0,1511	0,022	2,19
5	romr_mzd	−0,0186760	0,0161930	−1,153	0,2555	-0,019	-1,85

Source: own processing, according to output in Gretl (2022)

Interpretation:

1. Means the trend of the year-on-year % change in the volume of loans while keeping other variables unchanged. However, the coefficient is not statistically significant (p-value > 0.05).
2. Means a % decrease in the volume of loans with a 1% increase in housing loan interest. The coefficient is statistically significant (p=0.0007<0.05).
3. Means a % increase in the volume of loans with employment growth of 1%. The coefficient is not statistically significant (p-value > 0.05).
4. Means a % increase in the volume of loans with a GDP growth of 1%. The coefficient is not statistically significant (p-value > 0.05).
5. It means a % decrease in the volume of loans when the real wage increases by 1%. The coefficient is not statistically significant (p-value > 0.05).

Table 2. Statistics based on quasi-differentiated data.

Statistics	Coefficient	Statistics	Coefficient
Sum squared residuals	1,388402	S.E. of regression (std. error)	0,184020
R-squared	0,639459	Adjusted R-squared	0,604284
F(4, 41)	4,207716	P-value(F)	0,006037
rho	0,121676	Durbin-Watson	1,711090

Source: own processing, according to output in Gretl (2022)

The coefficient of determination, denoted as *R-squared* in the Gretl system, expresses how much of the variability of the dependent variable can be explained by the regression model.

However, the visualized R^2 statistic is primarily constructed for estimating a simple linear model. By adding independent variables to the multiple linear regression model, there is a decrease in the value of the total variability of the residuals (ESS) and an increase in the value of the coefficient of determination R^2. The Gretl program therefore offers the *Adjusted R-squared* function, which corrects the resulting difference (Adkins, 2018b).

The value of $R^2 adjusted = 0{,}604$ finally means that *the model explains about 60.4% of the variability in the demand for housing loans*.

4.1.8 Diagnostics of the suitability of the used model (Common factor test)

We will verify the suitability of the used model using the common factor test. With this test, we verify the assumption that the correction term rho, which we use in quasi-differentiation, is the same for all variables in the vector X (Hendry and Mizon, 1978).

H_0: rho is the same for all variables in the vector X
H_A: rho is not the same for all variables in the vector X
Test statistic: $F(4, 36) = 1.43918$, with p-value = 0.24107

We can see that the test is not negative (p-value > 0.05), so we consider the assumption to be fulfilled.

4.1.9 Evaluation of the hypothesis

Based on the results of statistical modelling, we can conclude that the hypothesis was confirmed. Taking into account the impact of macroeconomic developments in the monitored period, it was shown that the demand for mortgages is significantly dependent on the interest rates. This dependence is (as expected) negative. Moreover, with an increase (decrease) in the interest rate (IR) by 1%, we can assume a decrease (increase) in the volume of loans by approximately 39%. We can also show the dependence in a table (while leaving the other variables in the equation unchanged):

Table 3. Change in the volume of loans depending on the projection of the change of the IR.

% change in IR	1,2	1,0	0,8	0,6	0,4	0,2	0,0	-0,2	-0,4	-0,6	-0,8	-1,0	-1,2
% change in the volume of loans	-44,8	-39,1	-32,7	-25,7	-18,0	-9,4	0,0	10,4	21,9	34,7	48,7	64,2	81,3

Source: own processing (2022)

5. Discussion and proposed solutions to the results of the derived hypothesis

Favourable macroeconomic data, the growth of nominal wages and, as the testing of our hypothesis shows, especially the impact of the drop in interest rates had a great influence on the exceptional growth of indebtedness to the private sector in Slovakia. The willingness of Slovaks to take on debt has thus grown into a phenomenon that we refer to as *herd behaviour* in behavioural economics. At the same time, the year-on-year growth of loans to households has been growing at a double-digit rate for several years and is approaching the level of 50% debt in relation to GDP, which not only keeps the local regulator on the lookout, but also activated international attention and threats from rating agencies.

The environment of extremely low interest rates, which has been a defining situation on the Slovak financial market for a long time, pose several risks for financial stability. This mainly concerns the excessive growth of household indebtedness, the long-term impact on

the deterioration of the profitability of banks and insurance companies, increasing sensitivity to the economic cycle, increasing pressure on real estate prices and the necessity of a shift to riskier or less liquid investments in mutual funds.

We consider the impact of excessive competition in the banking sector, or their current business strategy and remuneration policy, primarily for external financial intermediaries, to be a major risk. Banking houses operating on the Slovak market have been solving margin shortfalls for several years by massively lending to households, significantly reducing the risk policy and building a portfolio of extremely cheap loans, which imposes risks to the functioning of the real economy. Therefore, we conclude that we have noticed a phenomenon of moral hazard in our territory embedded in the sharing of the collective guilt of executive managers (see "share-the-blame-effect").

Edwards and Mishkin (1995b) argue that the excessive risk taking observed in the 1980s in the US was a response by banks to the erosion of profits due to competition from financial markets. This competition has reduced their cost advantages in raising funds and undermined their position in the credit market. Feng deals with the issue in more detail, grouping studies from the 1980s, focused on the American banking system, testing the hypothesis whether higher competition (of the described type) is correlated with a higher frequency of banking crises (2018). The author describes the testing of this hypothesis on the one hand as empirically difficult and the impact on the real economy is often unclear, but at the same time, he collects enough evidence and studies by scientists in favour of this claim. He tests the hypothesis himself in the situation of a major financial crisis. The cross-sectional differences in competition on the local mortgage market versus the value of local real estate and the fluctuations of these values confirm the willingness of banks in economic competition to take on higher risks disproportionally to security. He further finds strong evidence that banks in the highly competitive US environment of 2000-2005 were willing to massively lower their mortgage risk standards compared to banks in less competitive environment.

The ECB study also confirms that the high level of competition in banking (within our territory in retail banking) can increase the accumulation of risks. Excessive competition and rivalry amongst banks can result in reduced risk aversion and accumulation of risks in the banking sector with subsequent impact on the real economy (Carletti and Hartman, 2002a).

At the same time, measures to prevent the transfer of risks by banking houses to society were absent in the legislation for a long time, such as preventing irresponsible lending to households in an environment of high competition in Slovak retail banking sector. In their study, Carletti and Hartman document the fact that the relationship between economic competition, risk arising from liability and optimal regulation has been ignored not only by the policy makers, but also by the economic experts and the literature. Based on an in-depth study of the world literature, they state that most contributions on bank governance and systemic risk pay very little attention to the strategic interaction between banks, ignoring the effects of different market structures on their financial stability and on the efficiency and effectiveness of macro-prudential policy measures. Most traditional models assume that banks operate in a perfectly competitive environment or in a monopoly setting (2002b).

The long-term persistent growth of indebtedness, which was excessive in recent years, significantly deepened the systemic nature of the risk associated with household indebtedness. In order to mitigate the further accumulation of these risks in the future, it is therefore important to moderate the growth rate of household indebtedness, at least to the level of neighbouring countries. *Even in such a case, however, the above-mentioned risks resulting from the current excessive growth of indebtedness will remain present* (Kalman, 2018).

We conclude that since most changes in consumer behaviour can lead banks to non-traditional activities and moral hazard risks, the main role in protecting financial stability must

be played by proactive and effective regulation, then the new business environment can be regulated as effectively as the original one, associated with traditional activities of banks.

Indebtedness can be effectively mitigated through rental housing. The underdeveloped sector of non-commercial rental housing also contributes to the rapid growth of mortgages. Only 11% of households live in a rental property. The preference for buying one's own real estate with a housing loan (even by less creditworthy groups of the population) leads not only to the prevailing social model of real estate ownership, but also to the limited offer of real estate for rent, especially subsidized apartments. The supply of rental housing is almost exclusively determined by the supply of private owners. Rental housing subsidized by the state or municipalities has a very low share. It makes up only 1.5% of the entire housing stock, which is significantly the least among EU countries (Habrman, 2018a).

Price bubbles can also be prevented by faster and better regulation of new constructions. The regulation of new constructions, which inhibit the new property developments in more developed regions, also remain a challenge for the public sector. This leads to a time mismatch between supply and demand and to rising prices. According to the Doing Business index, only 8 countries in the world are worse than Slovakia in this respect. The biggest delays are caused by territorial and construction proceedings. For comparison, the Czech Republic can show a good example in this regard, where territorial and construction proceedings are combined into one process and last 37 days (Habrman, 2018b).

We consider it necessary to adjust the remuneration of financial agents, whose new setting should not allow the possibility of instant earnings but should support professional financial advice. Certain changes in remuneration have recently begun to be implemented, but their systematic and comprehensive application is necessary as part of a macro-prudential policy.

Ultimately, it is necessary to look at credit expansion through the approach of the central bank's policy and government interventions into the principles of market functioning. Our other recommendations are related to raising the national financial literacy standard not only in basic financial and banking terms, but focusing on complex financial decision-making, and areas such as awareness of disproportionate indebtedness, the ability to better assess risk, which we address in a separate study.

Conclusion

The aim of the paper was to verify our postulate by testing the derived hypothesis. At the same time, we anchored the research problem with broader connections using the inductive method. In order to formulate conclusions, we did not necessarily limit ourselves to their diversion into a separate chapter, but we formulated them primarily in the discussion section. Thus, we did not silence the stimulated creativity, let the thought processes flow, allowed the penetration of new postulates, maximized the work with expert literature and thus obtained valuable premises. Our findings ultimately led to solutions and bring concrete proposals for policymakers in Slovakia, as well as other countries in Central and Eastern Europe.

Acknowledgements

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Portfolio Analysis of Real Estate Crypto Tokens and Cryptocurrencies in Mixed Asset Portfolios

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Abstract

Research background: In the wake of the last major wave of digital innovation, the highly speculative investment market based on various crypto tokens has been a major factor driving the growth of the financial industry. Bitcoin as the market leading cryptocurrency with a market share of over 40 percent (Coinmarketcap, 2022) takes an increasing market position as a driver for the investment market described above. For this reason, selected cryptocurrencies backed by real assets are used for admixture in the portfolios. Here, selected real estate cryptocurrencies represent both real and investment structures that are easily accessible to all users. The focus of this investigation is the efficient limits of optimal portfolios all portfolio constellations represent, whereby the return can be maximized with respect to the targeted risk.

Purpose of the article: This paper is focused on the analysis of real estate crypto tokens and cryptocurrencies in mixed asset portfolios within the efficient portfolio theory. The research purpose is based on the examination of risk-return ratios for the various constellations of mixed asset portfolios.

Methods: The research approach is to be interpreted as a continuation of the study 'The role of Bitcoin in well diversified portfolios: a comparative global study' by the authors Moro, A. and Kajtazi, A. (2018), with a scientific specification on the analysis of Real Estate Crypto Tokens as a component of mixed asset portfolios.

Findings & Value added: The research results indicate that mixed asset portfolios have beneficial return ratios by including real estate crypto tokens and cryptocurrencies, nevertheless the portfolio constellations have significantly higher risk ratios. Further research results can be stated by referring to the inevitability of Cryptocurrencies market performances, which encourage the financial markets to assign further investment researches.

Keywords: *Bitcoin; Portfolio Management; Real Estate; Crypto Token*

JEL Classification: *D53; G32; O32; F30; E22*

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1 Introduction

The asset class of real estate in mixed portfolios has been one of the main investment focuses of investors worldwide in recent years, as the market has gained interest through the further development of indirect real estate investments in the form of real estate funds, listed real estate shares, Real Estate Investment Trusts, or certificate-based investments. The investment hurdles and risks have been reduced in contrast to direct real estate investment, with the asset class in particular gaining in popularity and being used as a diversification instrument for mixed-asset portfolios. During the last major wave of digital innovations, the highly speculative investment market based on various crypto tokens have been a significant factor in the growth of the financial industry. Bitcoin, as the market-leading cryptocurrency with a market share of over 40 percent (Coinmarketcap, 2022), is taking on an increasingly market position as a driver for the investment market described above. Bitcoin and other popular cryptocurrencies have been subject of research for a couple of years now. Pho et al. (2021) compared Bitcoin and Gold to see which one acts as a better diversifier and concluded that risk-seeking investors looking for higher returns could potentially add Bitcoin to their portfolio. Platanakis and Urquhart (2020) found similar results for risk-adjusted returns in their portfolios. Similarly, Bitcoin has been researched regarding hedging strategies and short selling Bitcoin (Guesmi et al., 2019; Li et al. 2021). Akhtaruzzaman et al. (2020) confirmed Bitcoin as a hedging tool against risk for industry portfolios. This is a similar result to the study by Chemka et al. (2021) where they showed the effectiveness of Bitcoin as a hedging asset in reducing risk in international portfolios. They added, that during the Covid-19 pandemic, Bitcoin cannot provide shelter due to its increased variability. Symitsi and Chalvatzis (2019) concluded that Bitcoin is a significant diversifier when analysing portfolios consisting of currencies, gold, oil and Bitcoin. Especially due to the growing 'acceptance' and 'popularity' of Bitcoin as an asset benefit and simultaneously struggles due to a highly volatile investment increase based on its pioneering position (Nakamoto, 2008). However, the volatility fluctuations of recent years have been too much of a blessing and a curse for Bitcoin, as the following figure shows (Inci, Lagasse, 2019).
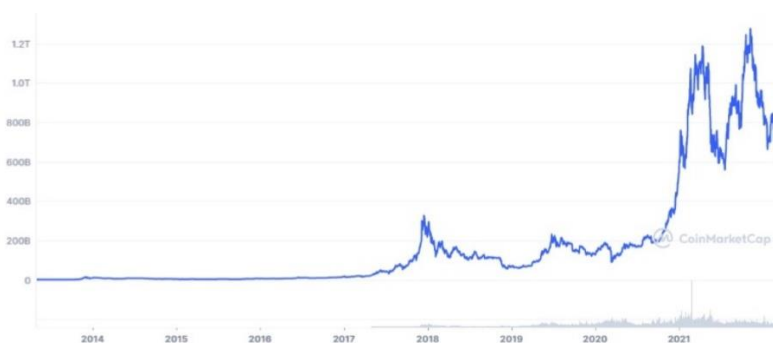
Figure 1. Bitcoin's market capitalization during the years 2013 until 2022

Source: Coinmarketcap, 2022

The research focus is on the analysis of risk-return portfolio structures through the admixture of Bitcoin and other crypto assets. The efficient frontier of optimal portfolios includes all portfolio constellations, whereby the return can be maximized with respect to the targeted risk. Here, the selected crypto stocks are added to the optimally diversified portfolios to check their influence on the risk-return structure. An extension to crypto stocks is done for two reasons. First, while the advantage of crypto technology is undisputed, there is still a lack of feasible business models that can be implemented and

understood by users and investors. For this reason, selected cryptocurrencies backed by real assets are used for admixture in the portfolios. The selected real estate crypto assets represent both real and investment structures easily accessible to all users. Thus, the question must be raised: How is the global financial system on the example of the money and asset market, as the central actor, sponsor, and supervisor of the pre-described market developments, affected by these innovative changes? For answering this question, one must refer to the year 2008, a year of historical, fiscal policy dismissal, when a truly disruptive technological development was announced by the publication of a white paper entitled 'Bitcoin: A Peer-to-Peer E-cash System' (Nakamoto, 2008). It was intended to be the starting point for a new type of fiscal policy. In the shadow of the growing progress of central banks' efforts to digitalize the cash-dominated monetary system (Pichler, Summer, Weber, 2020), Bitcoin, and subsequently other crypto-currencies, have shown considerable co-growth progress.
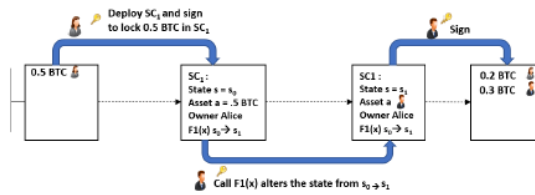
Figure 2. Blockchain process of smart contracts

Source: Abbadi, 2019, p.4

As a result, assets that previously were subject to limits due to illiquidity or legal trading restrictions can become liquid and freely tradable goods. For example, the World Economic Forum in its report 'Deep Shift Technology Tipping Points and Societal Impact' predicts that an estimated 10 percent of global Gross Domestic Product (GDP) will be traded through blockchain applications by 2027 (World Economic Forum, 2015). Especially for the digitization of previously illiquid assets, such as real estate and gold, the process of 'tokenization' enables the value of the entire investment market to increase, allowing buying, selling and trading processes to be carried out in an unlimited and accelerated manner, as the following figure shows in a highly simplified form (Dowsett, Wied, n.d.).

Figure 3. Tokenization of assets through blockchain solutions

Source: Deloitte, 2017, p.19

Various market players worldwide have integrated blockchain applications into their existing systems, as this can be seen in the example of the transaction-rich sectors of the financial market. For example, Exporo, one of the leading crowdfunding platforms for real estate financing, has launched a blockchain-based financing basis for real estate. By implementing the blockchain technology, a 'digital twin' of a property is created, which

makes it possible to reduce the proportionate allocation of share ownership of a property to a fraction of the share ownership that would otherwise be necessary. This allows investors to make diversified investments with minimal investment volumes. At the same time, this process opens up access to otherwise inaccessible forms of investment to a large number of micro to large investors (Exporo, 2020). Thus, corresponding 'tokenized assets' can be promoted and sold in connection with innovative stock exchanges, whereby previously limited investment volumes for particularly illiquid assets can be newly tapped by the financial market (Don, Rajah, Ott, Fromm, 2019). A thorough review of blockchain in the real estate sector highlights, that many blockchain ideas remain empirically unconfirmed. On the other hand, blockchain could increase efficiency, reduce time, and provide verifiability, transparency, and automation in the real estate sector, according to Saari et al. (2022). Additionally, the applications could help reduce fraud, increase security and trust compared to centralized digital solutions (Saari et al., 2022).

2 Portfolio management – research methodology

Portfolio management as the basis of an optimal portfolio is based on rational decisions and helps to close the gap of information uncertainties between business and finance. The concept of the optimal portfolio is based on two fundamental elements of investing: minimization of risk and maximization of the expected return. Investors and their portfolio managers strive to minimize possible price fluctuations while maximizing expected returns. This is done by considering their individual risk tolerance, whereby portfolio 'optimization' heavily depends on the following indicators: variance of the excess return, correlation of returns on assets and Sharpe Ratio. Investors can increase the variance and at the same time the yield of the portfolio by considering uncorrelated or counter-correlated investment values. As shown, positively correlating assets have a negative effect on portfolio variance and negatively correlating assets have a positive effect on portfolio variance (Trautman, Dorman, 2018). It should be noted that the efficient diversification of a portfolio based on these previously described ratios represents the conceptual design of an optimal portfolio and that each investment unit can have an influence on the overall performance of a portfolio. This insight already led Markowitz (1952, 1976) to his groundbreaking work, which continues to form the basis of Modern Portfolio Theory in today's financial systems (Kajtazi, Moro, 2018). In conclusion, Markowitz came to the concepts that an investor based on the Modern Portfolio Theory would have to consider neither the systematic nor the systemic risks – more on this later – but due to the self-regulating diversification of the portfolio, only the systematic risk would be considered relevant. In anticipation of the brief explanation of the risk subdivisions, it should be said that the non-systematic risk, as an asset-specific component, is to be avoided and the systematic, as an overall market-specific risk, cannot be avoided by diversifying the portfolio based on Modern Portfolio Theory, as shown in the figure below (Markowitz, 1952).
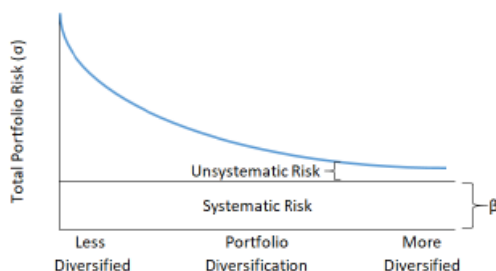
Figure 4. Systematic and unsystematic risk

Source: Trautman, Dorman, 2018, p. 13

Markowitz' intention is to reduce unsystematic risk, which at the same time improves the risk-return ratio. Systemic risk, on the other hand, cannot be reduced or avoided and is therefore compensated by a return on an investment. Overall, the depth and breadth of diversification creates a combined portfolio risk-return profile. Relevant to the use of the Mean-Variance Framework as the underlying model of Modern Portfolio Theory, as described in the following part, is the basic assumption of Markowitz (1952) that by calculating the return, standard deviation and correlations, efficient portfolio weighting is possible for portfolio optimization.

3 Mixed asset portfolios – research results

The methodology used is broadly based on Modern Portfolio Theory (Markowitz, 1952, 1976) and on the article "The role of Bitcoin in well-diversified portfolios: a Comparative Global Study" by Kajtazi and Moro, 2018. Here, the methodology is divided into evaluation phases. Existing portfolios are compared to analyse how the addition of Bitcoin and other crypto assets affect risk-return structures. The impact on portfolio risk is mapped, as well as the impact on portfolio return. It should be noted that only portfolio risk in the form of a minimum variance portfolio is defined as the primary objective. The same period from 01.01.2018 to 31.12.2020 is analysed for the studies. The study groups were adopted and analysed for the period from 01/01/2018 to 12/31/2020 in subsequent analysis. To complement the research group of Moro, A. and Kajtazi, A. (2018), additional crypto tokens with a business focus on the real estate industry are attached. Here, a basket of Real Estate Crypto Tokens was studied, which were selected based on the following two databases www.cryptoslate.com/cryptos/real-estate/ and www.coinmarketcap.com. As a result of the previously named real estate crypto stocks, a self-created real estate crypto index was added to the series of investigations.

This consists of the entire basket of the selected real estate crypto stocks, which were shown in the form of a sum function through the one-time inclusion, regardless of their respective price levels. The conducted research approach is not intended to be exhaustive. Individual study values have been selected based on the portfolio structures. In the context of the research, the portfolio structures 'Total Portfolios', 'Mix Portfolios' and 'Two-Pair Portfolios' were examined for their Minimum Variance Portfolios, Naive-Equal-Weighted Portfolios and Maximum Variance Portfolios. These are shown below as an example of the portfolio structure 'Total Portfolios' in the investigation period from 01.01.2018 to 31.12.2020.

Table 1. Portfolio Variance – example – 'Total Portfolios' 01.01.2018 until 31.12.2020

Portfolio Assets	Minimum Variance	Naïve equal weights	Maximum Variance
Portfolio Return	10.90%	-2.49%	-20.78%
Portfolio Variance	3.547%	192.21%	36663.16%
Portfolio Volatility	18.83%	138.64%	1914.76%
R(f)	0.173%	0.173%	0.173%
Sharpe Ratio	0.56	-0.01	-0.01
Slope	0.579	-0.018	-0.011

Source: author's research

In the further evaluation process, in addition to the presented Variance-Portfolio evaluations, corresponding Efficient Frontiers were also examined. These are based on the portfolio structures of the 'Two-Pair-Portfolios', each shown at the reference value 'BTC-USD-Index' and the further examination values. In the following, the imputed evaluation of

the 'Two-Pair-Portfolio' for the examination value 'BTC-USD-Index' and the 'Crypto-RE-Index' for the period 01.01.2018 to 31.12.2020 is shown as an example.

Table 2. Portfolio analytics – efficient frontier – calculation – 'Two-Pair-Portfolio'

Series final – Efficient Frontier Portfolios (01.01.2018-31.12.2020)			
Weights		Analytics	
BTC USD Index	Crypto RE Index	Annual Return	Annual Standard Deviation
100%	0%	36.02%	44.89%
90%	10%	26.18%	405.05%
80%	20%	16.34%	1498.91%
70%	30%	6.51%	3326.46%
60%	40%	-3.33%	5887.75%
50%	50%	-13.16%	9182.72%
40%	60%	-23%	13211.40%
30%	70%	-32.84%	17973.79%
20%	80%	-42.67%	23469.88%
10%	90%	-52.51%	29699.67%
0%	100%	-62.34%	36663.16%

Source: author's research

In the following, the evaluations of the presented portfolio weightings are shown by the graphical representation of the Efficient Frontiers. Below, these are exemplified for the 'BTC-USD Index' versus the 'Crypto-RE Index' in the study period 01.01.2018 to 31.12.2020. This shows an almost theoretically perfect representation of the efficiency curve and the diversification potentials at hand.
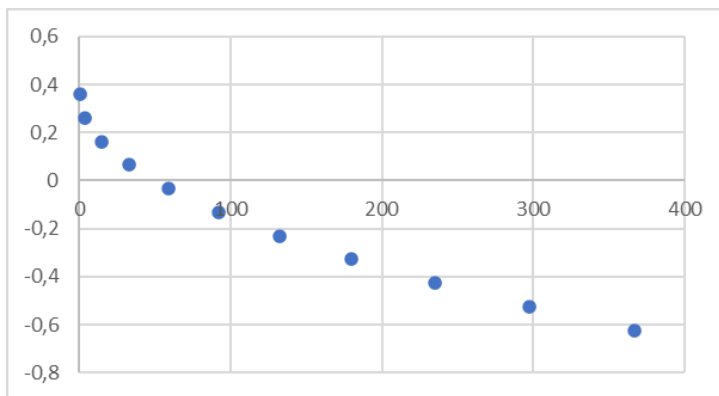
Figure 5. Efficient frontier – Crypto RE Index vs. BTC USD Index

Source: author's research

In comparison to this, the results of the investigation are shown below using the example of the portfolio structures of the 'Two-Pair Portfolios' in each case on the reference value 'BTC-USD Index' and the 'Dow Jones U.S. Real Estate Index' for the period 01.01.2018 to 31.12.2020.

Table 3. Portfolio analytics – efficient frontier – calculation – 'Two-Pair-Portfolio'

Series final – Efficient Frontier Portfolios (01.01.2018-31.12.2020			
Weights		Analytics	
BTC USD Index	Dow Jones U.S. Real Estate Index	Annual Return	Annual Standard Deviation

100%	0%	36.02%	44.89%
90%	10%	32.92%	36.76%
80%	20%	29.82%	29.67%
70%	30%	26.71%	23.61%
60%	40%	23.61%	18.58%
50%	50%	20.51%	14.58%
40%	60%	17.41%	11.62%
30%	70%	14.31%	9.68%
20%	80%	11.21%	8.78%
10%	90%	8.11%	8.91%
0%	100%	5.01%	10.07%

Source: author's research

In the following, the evaluations of the presented portfolio weightings are shown by the graphical representation of the Efficient Frontiers. Below, these are exemplified for the 'BTC-USD Index' versus the 'Dow-Jones-U.S.-Real-Estate-Index' in the study period 01.01.2018 to 31.12.2020. This shows an almost theoretically perfect representation of the efficiency curve and the diversification potentials at hand. In comparison, the portfolio structures of the 'two-pair portfolios' are shown in each case at the reference value 'BTC-USD index' and the 'S&P 100' for the period 01.01.2018 to 31.12.2020.

Table 4. Portfolio analytics – efficient frontier – calculation – 'Two-Pair-Portfolio'

Series final – Efficient Frontier Portfolios (01.01.2018-31.12.2020			
Weights		Analytics	
BTC USD Index	S&P 100	Annual Return	Annual Standard Deviation
100%	0%	36.02%	44.89%
90%	10%	52.72%	37.12%
80%	20%	69.42%	31.53%
70%	30%	86.12%	28.12%
60%	40%	102.83%	26.90%
50%	50%	119.53%	27.85%
40%	60%	136.23%	30.99%
30%	70%	152.94%	36.30%
20%	80%	169.64%	43.80%
10%	90%	186.34%	53.48%
0%	100%	203.05%	65.35%

Source: author's research

This shows an almost theoretically perfect representation of the efficiency curve and the diversification potential available.
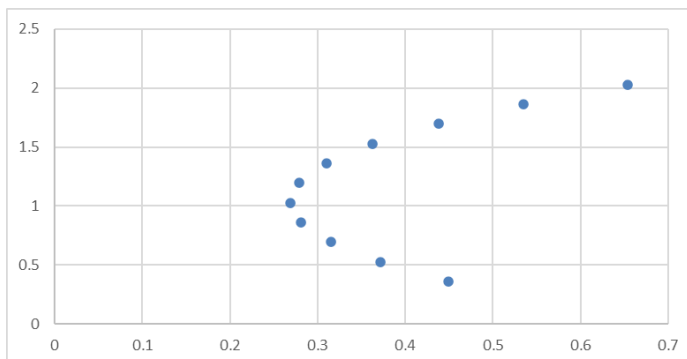
Figure 6. Portfolio analytics – efficient frontier – S&P 100 vs. BTC USD Index

Source: author's research

The collected data models were summarized for further analysis as part of the inductive study and structured according to the three study periods (01/01/2018 - 12/31/2018, 01/01/2019 - 12/31/2019, and 01/01/2020 - 12/31/2020).

4 Conclusion

Accordingly, the researchers Symitsi and Chalvatzis (2019), Shahzad et al. (2019) and finally by Shahzad et al. (2019) demonstrated the beneficial admixture of Bitcoin to mixed-asset-portfolio for enhancing the risk-return performance. However, it should be noted that under extreme market conditions, Bitcoin can be considered a rather weak hedging instrument, which leads to the scientific assumption that further research based on the novel data base is necessary, especially in times of the recent economic financial crash of the global financial markets due to the COVID-19 pandemic (OECD, 2020). This finding of the preliminary research conclusion could be supported by the empirical elaboration according to which a highly significant improvement of the 'risk-return efficiency' is achieved by adding the 'BTC-USD index' to the selected 'mixed asset portfolio'. This is on the one hand due to the improved 'Sharpe Ratios' and on the other hand due to the highly significant correlation evaluations of the return values (Return) when considering the 'Naive equal weights portfolio'. In addition, however, the non-existent correlation between the study value 'BTC-USD Index' and the 'Naive equal weights Portfolio' based on the correlation evaluation of the volatility values (Risk) must be considered, according to which the study value 'BTC-USD Index' shows a significantly higher volatility on average compared to all three portfolio constellations 'Minimum Variance Portfolio', 'Naive equal weights Portfolio' and 'Maximum Variance Portfolio'.

A final remark is listed below, according to which Bitcoin and other cryptocurrencies were already attributed a far-reaching significance in 2015 according to the report 'Deep Shift Technology Tipping Points and Societal Impact' (World Economic Forum, 2015). Following this approach, the World Economic Forum published a far-reaching statement in 2020 as part of the 'Great Reset' (World Economic Forum, 2021). Accordingly, the assigned Global Future Council on Cryptocurrencies stated in 2020 that "Cryptocurrencies have reached a point of inevitability." (World Economic Forum, 2020). A statement, which will be followed in the context of this thesis. Accordingly, the presented research results contribute to the scientific debate on the relevance of cryptocurrencies. A continuation of the research approaches can be advocated and represents the basis for achieving far-reaching research validity.

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Bitcoin's invention and impact on the financial markets

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Abstract

Research background:
The global financial system is on the example of the money and asset market, as the central actor, sponsor and supervisor of the pre-described market developments, affected by innovative changes? For answering this question one has to refer to the year 2008, a year of historical, fiscal policy dismissal, when a truly disruptive technological development was announced by the publication of a white paper entitled 'Bitcoin: A Peer-to-Peer E-cash System' (Gurria, 2008). It was intended to be the starting point for a new type of fiscal policy. In the shadow of the growing progress of central banks' efforts to digitalize the cash-dominated monetary system (Weber, 2020), Bitcoin in particular has shown considerable co-growth progress.

Purpose of the article: The aim of this paper is to analyse the Bitcoin's invention and the impact on the financial markets. Thus, the question has to be raised: how is the global financial system on the example of the money and asset market, as the central actor, sponsor and supervisor of the pre-described market developments, affected by these innovative changes?

Methods: The research method is based on the invention and market analyses of Bitcoin in the financial markets, among other things, since the Global Future Council on Cryptocurrencies stated that Cryptocurrencies have reached a point of inevitability. (World Economic Forum, 2020).

Findings & Value added: According to the World Economic Forum's Global Future Council on Cryptocurrencies the international bodies have been working on assessing risks and appropriate policy responses to the rise of cryptos. Globally, central banks and regulators already have their eyes on this growing trend. (World Economic Forum, 2022).

Keywords: *Bitcoin; portfolio management; innovation; crypto token*

JEL Classification: *D53; G32; O32; P45; E22*

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1 Introduction – Bitcoin's invention

A brief historical digression at the beginning of this work: in the 14th century the Bardi family had a very powerful and prosperous position. Their fields of work included both trade and banking, at that time they ran one of the largest banks of the late Middle Ages and together with the Peruzzi family they were among those who subsidized the war activities of King Edward III against France. In the historic year 1345, when England went bankrupt and the families were not reimbursed for their war payments, they were forced out of their initial businesses. In the same year, the Bardi family, who had almost completely lost their fortunes, decided to change their business: from banking to precious metals mining. However, due to their lack of expertise, they were caught at the very beginning of their new venture and sentenced on 15 October 1345. Interestingly, the main reason for their failure as a mining company was their lack of liquidity and the appreciation of the gold price. The latter in particular marked the historical years between 1333 and 1348, when the epidemic spread of the plague completely changed the social and economic fabric throughout Europe (Kajtazi, Moro, 2018).

In the course of history it can be seen, as the American writer Mark Twain already stated „history doesn't repeat itself; it rhymes", that 'allegedly' constant market structures and their leading market actors are over time constantly forced to make radical economic adjustments due to either socio-political events, technological innovations or recurrent collapses due to epidemic incidents. In recent times since the 1990s, a transformation of the predominant industrialized markets, caused by the progressive globalization and increasing technological disruption, can be observed. The wave of technological inventions in the late 20th century led to a new conception of a modern, sociological and economic market structure, shown by the example of the telecommunication sector in figure 1.
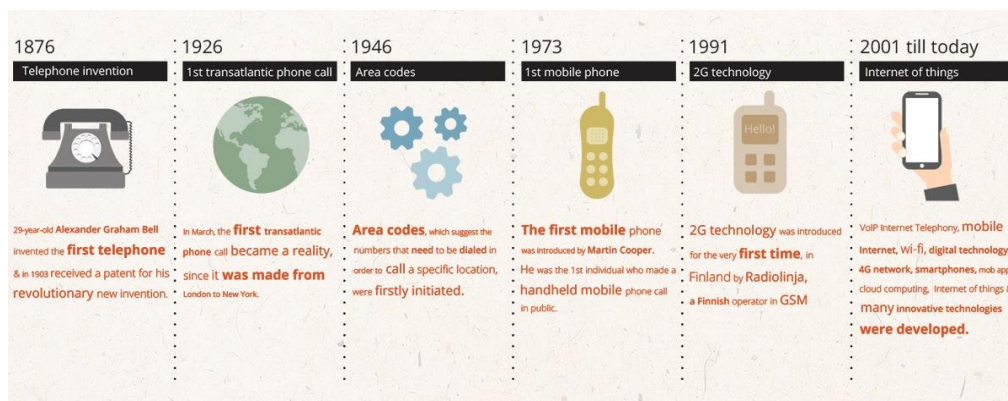
Figure 1. The Evolution of Telecommunications.

Source: M-STAT, (n.d.)

Following this trend, in the 21st century technological developments are still predominant for market changes and are increasingly taking oligopolistic or already monopolistic market structures. For example, the inventions of digital social networks have redefined 'human' interaction, reformulated the idea of 'connectivity' and changed the way people exchange information. The smartphone and its application technologies have provided billions of people with an astonishing array of information and direct access to novel network structures. Each continuation of the Internet's improvement has fundamentally affected the structure of social and economic systems by intensively changing existing assumptions about the need for the physical exchange of information, goods and services.

As already mentioned, technological developments have continued to develop with exponential growth, particularly in the past 25 years, and have almost completely reached all sectors of the economy (Burniske, 2017). Thus, the question has to be raised: how is the global financial system on the example of the money and asset market, as the central actor, sponsor and supervisor of the pre-described market developments, affected by these nowadays innovative changes? For answering this question one has to refer to the year 2008, a year of historical, fiscal policy dismissal, when a truly disruptive technological development was announced by the publication of a white paper entitled 'Bitcoin: A Peer-to-Peer E-cash System' (Gurria, 2008). It was intended to be the starting point for a new type of fiscal policy. In the shadow of the growing progress of central banks' efforts to digitalize the cash-dominated monetary system (Weber, 2020), Bitcoin in particular, and subsequently other crypto-currencies, have shown considerable co-growth progress.

3 Bitcoin a growing investment market – research methodology

The variety of existing crypto-currencies consists of two main categories of blockchains, according to which a division into permission-free and permission-conditioned blockchains is to be made. Permission-free blockchains are based on a public data structure and permission-conditioned blockchains work on the basis of a 'fault-tolerant' protocol, as explained below (Zakhary, Amiri, Maiyya, Agrawal, Abbadi, 2019). For an overview, the following figure shows the three layers of the permission-free blockchain and the interconnections of the layers.
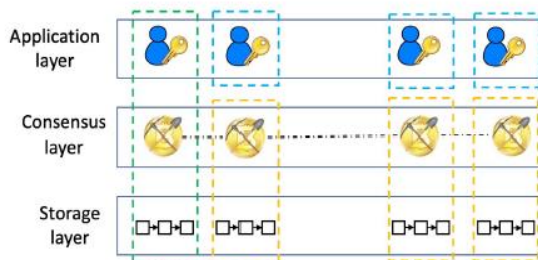
Figure 2. Structure of permissionless blockchains.

Source: Zakhary, Amiri, Maiyya, Agrawal, Abbadi, 2019, p.2

At the application level, transactions are used by the end users. They have an identity which is defined by their individual 'public key' and their secure 'private key'. By combining the two elements, the application layer enables the end user to generate transactions that reach so-called 'mining nodes' via a 'client library' which are directed to the consensus level. The transactions generated can include simple currency exchange or commodity transactions. (Zakhary, Amiri, Maiyya, Agrawal, Abbadi, 2019). The consensus layer represents the 'mining' process, whereby the transactions received are checked at the 'mining nodes' by the 'miners' trying to solve a 'cryptographic puzzle'. The miner who solves the 'puzzle' sends the transaction in a block to all 'nodes' so that further miners check the 'solved puzzle' and declare it valid. Subsequently, the transaction is released and irrevocably added to the existing 'chain' in the form of the block (Zakhary, Amiri, Maiyya, Agrawal, Abbadi, 2019). The storage layer represents the 'general ledger' of all resolved, checked and released transactions, after which a tamper-proof blockchain is created, which in turn is managed by each 'mining node'. The storage layer is based on a distributed general ledger, which is managed by a public 'node network'.

The inner life of the general ledger thus consists of 'blocks' lined up next to each other, which in turn have stored a series of valid transactions. The 'nodes' are the actors of the 'process',, who act as end users or miners. 'End users' can serve all three levels, the 'miner' has to serve the consensus and storage layers (Zakhary, Amiri, Maiyya, Agrawal, Abbadi, 2019). As an introduction, the following illustration shows the three layers of the permission-related blockchain.
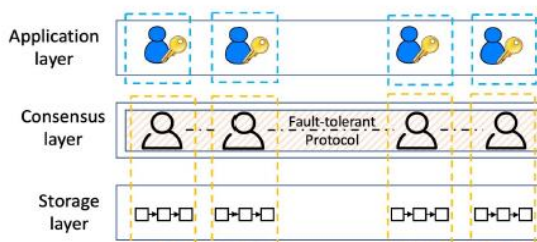
Figure 3. Structure of permissioned blockchains.

Source: Zakhary, Amiri, Maiyya, Agrawal, Abbadi,2019, p.5

The application layer of a permission-driven blockchain is structured similarly to the previously described structure of a permission-free blockchain (Zakhary, Amiri, Maiyya, Agrawal, Abbadi, 2019). The consensus level also represents the receipt and validation of transactions based on the known and identified 'nodes'. Therefore, the sometimes costly 'mining' process can be replaced by conventional consensus protocols to ensure verification and release of the transactions (Zakhary, Amiri, Maiyya, Agrawal, Abbadi, 2019). The storage level of the permission-based blockchain, on the other hand, is again similar to the permission-free blockchain and is based on a distributed 'general ledger', which can be managed by all nodes of a blockchain (Zakhary, Amiri, Maiyya, Agrawal, Abbadi, 2019).

Research methodology is focused on the basis of an optimal portfolio theory, which offers information to close a gap of information uncertainties between business and finance parties in the markets. The concept of the optimal portfolio is based on two fundamental elements of investing: minimization of risk and maximization of the expected return. Investors and their portfolio managers strive to minimize possible price fluctuations while maximizing expected returns. This is done by considering their individual risk tolerance, whereby portfolio 'optimization' heavily depends on the following indicators: variance of the excess return, correlation of returns on assets and Sharpe Ratio. Investors can increase the variance and at the same time the yield of the portfolio by considering uncorrelated or counter-correlated investment values. As shown, positively correlating assets have a negative effect on portfolio variance and negatively correlating assets have a positive effect on portfolio variance (Trautman, Dorman, 2018). The collected research results are presented within the following subchapter according to the structure of the question.

4 Bitcoin replaces traditional and alternative assets – research results

Irrespectively of the underlying blockchain technology, the global financial investment market is undergoing a process of change. Especially since the times of global economic crises such as in 2001, 2008 and 2020, well-structured 'alternative' diversification instruments show an improvement in the risk-return ratios. Greer provides the following breakdown, as shown in the figure.

Tab. 1. Categorization of traditional and alternative assets

	CAPITAL ASSETS "Ongoing source of something of value…valued on the basis of net present value of its expected returns."	CONSUMABLE/ TRANSFORMABLE ASSETS "You can consume it. You can transform it into another asset. It has economic value. But it does not yield an ongoing stream of value."	STORE OF VALUE ASSETS "Cannot be consumed; nor can it generate income. Nevertheless, it has value; it is a store of value asset."
EQUITIES	X		
BONDS	X		
INCOME-PRODUCING REAL ESTATE	X		
PHYSICAL COMMODITIES (e.g., grains or energy products)		X	
PRECIOUS METALS (e.g., Gold)		X	X
CURRENCY			X
FINE ART			X

Source: Burniske, White, 2017, p.4

As investments are increasingly driven by an intensive search for returns, 'traditional' asset classes are increasingly being considered less and 'alternative' asset classes primarily more as attractive risk-returns investments (PwC, 2018). This leads to a lower diversification effect of traditional investments. Most of these asset classes are affected by the same macroeconomic variables due to globalization and are no longer limited to individual markets by affecting the entire world economy. This statement, backed up by facts and figures, show that investors have a growing interest for truly new portfolio diversification instruments. In fact, approximately USD 13.9 trillion will be provided by institutional investors for 'alternative' assets in 2020 – from asset classes such as real estate, commodities and gold investments (PwC, 2018). In addition, institutional investors and high net worth individuals have committed more capital than ever before to new investment classes. According to the 2019 Capgemini and Merrill Lynch World Wealth Report 2019, investors have increased their 'alternative' asset share by 4 percent from 11 percent to 13 percent between 2018 and 2019 (Capgemini, 2019).

Gold as one of the supposedly 'most species-like' asset on the research topic 'Bitcoin' will be examined in the following, especially with regard to its characteristics as a diversification instrument compared to traditional assets. For example, as early as 1978, the researcher Greer produced a publication that examined the comparison between gold-deposited 'futures contracts' on equity investments demonstrating a favourable risk-return ratio in the years between 1960 and 1974 by investing in gold (Greer, 1978). Further, Greer (1978) described the yield profiles of 'futures contracts' compared to equities as similar. In their work, they examined the period between 1959 and 2004, with 'futures contracts' showing the same yield results compared to US equities. More recent studies by Conover, Jensen, Johnson and Mercer (2010), among others, found that the addition of gold-backed 'futures contracts' to pure equity portfolios achieves efficient portfolio allocation. In fact, Bitcoin and gold have a species-like structure, which means, for example, that stocks are limited and that production and extraction costs are high. Both asset classes currently have a dual function as both a 'currency' and a 'store of value', whereby gold can also have the function of a 'production factor' in the industry and has an intrinsic value. Thus, the gold price can retain its 'intrinsic' value in isolation from a decline in the demand for money by industrial demand, which is why the volatile fluctuations on a theoretical basis should be

less than for Bitcoin (Krause, Pham, 2017). The researcher Dyhrberg (2016) investigated these correlations further and proved in his study that Bitcoin reacts similar to gold. Thus, both asset classes have the theoretical ability to act as risk hedges for systematic market risks. However, especially due to Bitcoin's faster transaction and reaction capability, the intervals of systematic market risk changes can be absorbed more intensively. This does not mean that Bitcoin can be used advantageously as a diversification tool for short-term portfolio corrections. Thus, the study also showed that, using the example of the UK financial market, Bitcoin can act as a significant hedge and substitute for gold (Dyhrberg, 2016).

Pho et al. (2021) researched if Bitcoin or Gold is a better portfolio diversifier. They concluded that Gold is better for risk-averse investors, but Bitcoin can be a better choice for risk-seeking investors looking for potential higher returns. Another study (Platanakis & Urquhart, 2020) found similar results in regards to risk-adjusted returns. Chemkha et al. (2021) concluded that Bitcoin reduces the risk of international portfolios. According to Akhtaruzzaman et al. (2020) an investment in Bitcoin in an industry portfolio hedges the risk against the named portfolio. Symitsi & Chalvatzis (2019) concluded Bitcoin as a significant diversifier when analysing portfolios including currencies, gold, oil and stocks. They added that the decrease of overall portfolio risk is due to the low correlation of Bitcoin with other assets and is not offset by high volatility. Additionally, Guesmi et al. (2019) show that hedging strategies involving gold, oil, equities and Bitcoin reduce a portfolios' risk considerably, when compared to a portfolio made up of gold, oil and equities only. This applies, when a short position in the Bitcoin market is included and is also confirmed by Li et al. (2021).

The study focus is on the sample assets 'BTC-USD Index', 'S&P WCI GOLD (ER)', 'S&P WCI' and 'Dow Jones U.S. Real Estate Index', which are listed as alternative study assets according to the investment classifications.

Table 2. Bitcoin and alternative assets – Inductive 01.01.2018 – 31.12.2020

Periods	Analytics (discret)	BTC-USD-Index	S&P WCI GOLD (ER)	S&P WCI	Dow Jones U.S. Real Estate Index
2018	Annual Return	-72.95 %	-2.90%	-16.06%	-7.41%
	Annual Standard Deviation	69.66%	11.07%	21.11%	18.38%
	Sharpe Ratio	-0.007	-0.017	-0.010	-0.011
2019	Annual Return	94.51%	14.69%	14.90%	26.74%
	Annual Standard Deviation	57.02%	12.45%	24.43%	14.12%
	Sharpe Ratio	0.001	-0.009	0.002	-0.006
2020	Annual Return	301.32%	22.42%	-10.71%	-7.46%
	Annual Standard Deviation	71.96%	24.26%	41.33%	49.78%
	Sharpe Ratio	0.009	-0.003	-0.001	-0.003

Source: author's research

In the study periods 01.01.2018 - 31.12.2018 and 01.01.2020 to 31.12.2020, it can be seen that the sample value 'BTC-USD-Index' has the most advantageous 'Sharpe Ratio'. In addition to the correlation studies, Bitcoin also has a 'mining' terminology compared to gold, which is close to gold mining (Conover, Jensen, Johnson, Mercer, 2010). Here, both 'mining processes' can be significantly differentiated, according to which the risks in gold mining are particularly the volatility of production costs due to the need for constant exploration of new gold production volumes (Krause, Pham, 2017).

By contrast, Bitcoin production is determined on the basis of the prevailing regional energy costs, as the production volume does not only have to be explored as it is the case for gold explorations. Regardless of the production costs, the possible total production of Bitcoin as well as gold is known. While the assumptions for gold are subject to estimation, in the case of Bitcoin an exact specification is possible (Gurria, 2008). Thus, either 'mining processes' either are more intensive or less intensive in phases compared to the two asset classes. Bitcoin mining, on the other hand, will never be completely interrupted, as the Bitcoin protocol contains a mechanism whereby a minimum quantity is produced on a permanent basis, regardless of the supply-demand constellation (Krause, Pham, 2017).

Thus, the hypothesis that Bitcoin is strongly correlated with alternative investments and will replace gold as a 'store of value' in the future can only be partially confirmed, according to which Bitcoin, although having a clear analogy to the asset class of gold, appears unsuitable for a 'store of value' due to the currently still prevailing volatile price formation (Kajtazi, Moro, 2018). However, as early as 2018, the researcher Fry demonstrates the long-term potential of Bitcoin as a 'value store', after which he finds that the volatile properties of Bitcoin compared to gold are declining over a six-year period until 2017, but, as researchers Bouri et al. (2017) also concluded, this was a consequence of the lower trading volume of Bitcoin. This finding suggests that Bitcoin may approach its function as a 'store of value' over time by decreasing volatility.

5 Conclusion – Bitcoin's impact on the financial system

Since then, Bitcoin has taken a leading position as a cryptographic 'currency', followed by currently more than 5,500 other 'currencies'. The market is dominated by Bitcoin having a market share of around 50 percent Bitcoin and the top four players, Bitcoin, Ethereum, Tether and the top 5 crypto-coins, making up over 80 percent of the entire crypto-currency market (Coinmarketcap, 2022). The crypto-currencies are differentiated by their transaction speeds and underlying application areas. Even though most crypto-currencies were not originally invented with the intention of acting as fixed assets, the majority of investors refer to exactly this function. In particular, the invention of crypto-currencies during a period of financial instability (Gurria, 2008) has led to the inclusion of crypto-currencies in investment portfolios for crisis protection and diversification.
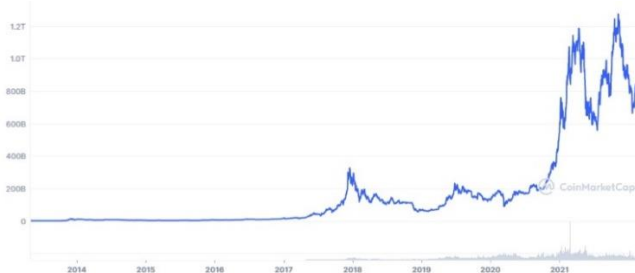
Figure 4. Bitcoin's market capitalization during the years 2013 until 2022

Source: Coinmarketcap, 2022

The core challenges here lie in the volatility of the market and the still unresolved, uniform classification of the individual crypto-currencies. For example, the Commodity Futures Trading Commission (CFTC) has commented that crypto-currencies are a commodity, while the Internal Revenue Service (IRS) has classified crypto-currencies as property and the US Securities and Exchange Commission (SEC) has issued a definition that requires a case-by-case decision (Trautman, Dormann, 2018). In this context, the term 'crypto-currency' leads to regulatory ambiguities, as the term 'currency' itself is an allocation to the asset class of the means of exchange and traditional investment. On the other hand, the technical conception and financial use leads to a contrary allocation as 'value store' and thus to the selection of alternative investments. Consequently, the discussions that have repeatedly flared up in recent years about the definitions of 'crypto-currency' or 'digital gold' (Trautman, Dormann, 2018) must be interpreted in such a way that crypto-currencies can be counted among the largest unregulated markets in the world Foley et al. (2019). The core of any attempt for classification is based on the interpretation of the individual purpose of use and the underlying technology. In line with the scientific research orientation, the empirical evaluations produced do not claim to be exhaustive and are intended to make a scientific contribution to the collection of data and information. A final remark is listed below, according to which the crypto value Bitcoin and other cryptocurrencies were already attributed a far-reaching significance in 2015 according to the report 'Deep Shift Technology Tipping Points and Societal Impact' (World Economic Forum, 2015). Following this approach, the World Economic Forum (World Economic Forum, 2021) published a far-reaching statement through the Global Future Council on Cryptocurrencies, according to which it could be stated that: „Cryptocurrencies have reached a point of inevitability (World Economic Forum, 2020). However, the approaching regulatory intent is pervasive, after which the World Economic Forum published the complementary statement: „According to the World Economic Forum's Global Future Council on Cryptocurrencies, there has been no internationally coordinated regulation of cryptocurrencies — though international bodies have been working on assessing risks and appropriate policy responses to the rise of cryptos. Globally, central banks and regulators already have their eyes on this growing trend." (World Economic Forum, 2022). A scientific statement, which can also be made in the context of this empirical series of investigations with the current state of work consequence and the empirical research results. Consequently, the presented research results represent a contribution to the scientific discourse on the relevance of crypto assets in portfolio structures.

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The impact of ICT investments in information systems in developing countries – case study of Africa

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Abstract

Research background: Since the turn of the 21st century, Sub-Saharan African nations have witnessed a significant economic progress that has been driven by improved governmental and policy reforms, strong agricultural development, increased national and foreign direct investment and improving global commodity prices (ICT Works). However, the widespread adoption of technological advances, such as ICT-enabled infrastructure, is likely to be considered the primary driver for this progress as it has acted as a key enabler for all the other improving factors. This paper will seek to highlight some of the primary opportunities and risks involved in the government and international investments in Information Systems, namely ICT-enabled infrastructure.
Purpose of the article: This paper highlights the importance of government and international investments in Information Systems, with a focus on Information and Communication Technology (ICT), for the economic development of emerging economies, with a focus on Tanzania, Uganda and Ghana.
Methods: This paper reviews past and current ICT enabled investments and their potemtial contribution the African continent. An indepth analyis of the various contributions are examioned.
Findings & Value added: Although there will be many threats to overcome for African nations attempting to implement efficient ICT-enabled infrastructure, it is highly likely that the long-term impacts for the region's economic development will be invaluable

Keywords: *information system; economic impact; eeveloping world; ICT; Africa*

JEL Classification: *E60; O11; P33*

1 Introduction

Although it is acknowledged that ICT is not the only important aspect of the Information System, it is however, an aspect that can be analysed in a systematic and coherent manner.

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Furthermore, it is ICT that requires significant government and international investment in order to further bolster economic development. The additional features of the Information System can be addressed through implementing other political and cultural approaches but are by no means less important to the overall success of Information Systems. It can be concluded that investments in ICT are also directly or indirectly investments in the overall Information System. This paper will then highlight the importance of ICT and Information Systems for the economic development in Africa. It is also important to note the previous and current challenges faced by many African nations in adopting widespread access to ICT-enabled infrastructure and how these challenges will likely be addressed. One of the primary issues that many of the developing world are confronted with is what is known as 'achieving critical mass' – which is the widespread use of ICT-enabled devices. This paper will explore this issue in more detail. After highlighting some potential ICT related risks that threaten to hinder economic development rather than bolster it, this paper will conclude that, despite the many risks and challenges posed by ICT, the government and international investment in ICT and Information Systems are absolutely essential for the economic development of African nations. Although it is frequently unwise to apply the same conclusions to other regions without a focused analysis of them, it is reasonable to suggest that investments in ICT-enabled infrastructure will be vital in the progress of all developing economies for years to come.

1.1 What are Information Systems?

Arguably, the most important aspect of modern Information Systems (IS) is Information and Communication Technology (ICT) such as computers, databases, hardware, network infrastructure and mobile devices that enable the processing, storing and sharing of information electronically (Caprar et al., 2022). However, ICT is not the only aspect of the IS. There are also human, social and organisational aspects of the IS that play their own vital roles in the functioning of these systems. For example, the most advanced software is worth nothing if it cannot be widely adopted by the human end-user and therefore, the human element of the Information System is vital. Despite this acknowledgment, it is understood that investments in the improvement, management and continuation of IS in the public sector would almost certainly be found to be primarily focused on ICT. This is due to the fact that the research, development and deployment of ICT-enabled infrastructures requires a significant amount of investment. ICT-enabled infrastructure refers to the entire system that must be in place for a society to become digitally enabled. This includes a reliable network of telecommunication cables and satellites, the availability of affordable and user-friendly personal devices, efficient software that is continuously upgraded and updated, and many more.

1.2 Why is ICT such an important aspect of the Information System?

It cannot be denied that ICT-enabled services have played a key role in the development of modern economies (Nasab & Aghaei, 2009). Although some early studies in the late 1980s and early 1990s found that ICT had a limited impact on economic growth (Johnson, 2021), the advantages are now clear enough that many have suggested that ICT is a necessity for advancing an economy. A national ICT-enabled infrastructure allows a nation to connect with each other as well as the rest of the world on a level that would have been impossible to achieve without it.

Considering that in 2014, the ICT sector accounted for roughly 25% of global business expenditure, with this expected to grow exponentially considering that it is recognised that for every job created in the high-tech industry another five are created in other supporting

sectors (European Commission, 2017). A World Economic Forum study identified five of the most common economic impacts of ICT (WE Forum, 2013). It was identified that, on average, a 10% increase in broadband penetration accounts for a 1.4% increase in GDP growth in emerging markets, whilst the Internet itself can account for up to 3.4% of overall GDP. However, although this may be difficult to prove inconclusively, there is a widespread agreement that connection to the Internet is almost certain to have a strong positive impact on the performance of a national economy (Vives, 2017).

The direct impacts of ICT-enabled infrastructure are multi-dimensional and highly complex. For example, the availability of public services online has significantly improved accessibility to the rural portions of society that would otherwise be completely disconnected. This adoption of public digital services can be referred to as e-Government and is considered almost indispensable (Johnson, 2021). In the first quarter of 2020, more than 45 million visits to US government sources were recorded and this number is predicted to rise and will likely be reflected across the world (Johnson, 2021). However, Africa has been ranked as the region with the lowest e-Government services. Additionally, new 'microwork' platforms allow businesses to outsource many individual tasks to contractors based in emerging economies that provide businesses with cheaper yet comparative services. As more citizens in developing nations are able to access personal devices with reliable connections, they are able to access many more employment opportunities that would have never been available without ICT.

This increase in accessible offshoring and outsourcing contractors allows businesses to prosper whilst individuals are able to increase their household incomes. Both of these factors are mutually beneficial. Additionally, it was found that in OECD countries, more that 95% of businesses have an online presence that exploit social media platforms as invaluable marketing tools that allow businesses to reach a much larger and a sometimes-international customer base. With all this considered, it is reasonable to suggest that the developed economies of the 21st century are entirely reliant on reliable telecommunications networks and Internet connections. However, many developing nations are still working on developing their own domestic ICT-enabled infrastructure in order to compete in the modern economy and to promote their own economic development. In support of this necessity, the World Bank and other international organisations have funded numerous ICT-focused international projects that aim to provide the developing world with the assistance it requires to develop a reliable and essential ICT-enabled infrastructure.

2 Methods

This paper reviews past and current ICT enabled investments and their potemtial contribution the African continent. An indepth analyis of the various contributions are examioned.

3 Results

3.1 Current e-Government Projects

The World Bank funds numerous projects all over the developing world that aim to develop and deploy e-Government initiatives with a distinct focus on encouraging economic development through technological advances. "These projects aim to use technology to uplift living standards and propel the country forward" (The World Bank).

This section will focus on some of the most recent projects that have been adopted in African nations such as Tanzania and Ghana. The 'Digital Tanzania Project' is a $150

million project that aims to increase access to broadband for the public and private sector, as well as for the general population (The World Bank). Although Tanzania has experienced some periods of rapid urbanisation, it has been reported that up to 70% of the population still resides in rural areas, of which most of the poorest citizens are usually found. As this paper will explain, it is arguably the poorest citizens of the rural areas that are less likely to have access to ICT-enabled devices or services even though these populations are likely to benefit the most from them. Tanzania is no exception when observing the economic progress of the African continent, however, there exist some regional challenges that may hinder the progression towards universal digitalisation. Many potential investors in the national ICT-infrastructure are being deterred from investing as the Tanzanian government are charging relatively high prices for the rights-of-way access to the network when compared to their immediate neighbouring African countries. Furthermore, the generally low levels of income experienced by the majority of Tanzanian citizens in conjunction with the increased competition have forced prices for ICT-enabled devices and services, which has caused service providers to accept quite low marginal revenues. The inability to make reasonable profits further discourages investors in the system. The Digital Tanzanian Project seeks to encourage investments in the Tanzanian digital enterprise and to ensure that the benefits are experienced across the country. The World Bank hopes to achieve these objectives by collaborating with the Tanzanian Government in adopting effective policies and laws that do not threaten the growth of the industry, building upon the digital skills of government institutions and younger generations, encouraging private investments by ensuring that those investments are attractive and fair, and providing the government with support channels in combatting cyber-crime, data protection and privacy concerns.

The Digital Uganda Vision is a framework that aims to unify the Ugandan people through digital empowerment and strong ICT policy direction (Boon et al. 2019). However, as of 2019, Uganda had one of the lowest rates of internet penetration in the region. Furthermore, less than half the Ugandan population own a mobile device compared to 83% in South Africa and 87% in Kenya, whilst only 7% of the rural population have access to a mobile device. It has been identified that the relatively slow adoption of ICT-enabled infrastructure in Uganda is partly to blame on how expensive it is when compared to the average national income. However, in order to tackle this issue with affordability, the Ugandan Broadband Commission attempted to significantly revise prices, but there is still a long way to go. Nevertheless, there are also many other contributing factors that hinder the progress of connectivity in Uganda, such as, it being amongst the least developed countries with a very low GDP per capita.

The 'e-Transform Ghana Project' aims to achieve very similar results to the abovementioned projects in Tanzania and Uganda (World Bank, 2020). However, one of the key enablers that is highlighted as pivotal in the success of the Ghanaian equivalent, is the achievement of critical mass (World Bank, Ghana). Critical mass refers to the widespread accessibility and usability of ICT infrastructures and can be measured by three overarching factors. These are the use of devices at reasonable prices that allow the general public to access them; the deployment of electronic payment systems that facilitate micro-transactions; and enough users able to pay for all these services. Without the critical mass, a nation will struggle to adopt nationwide ICT-enabled services as if only a fraction of the population can access it, there will be a huge reliance on the traditional non-technology based approaches(Chen, W.& Kamal F., 2016) Government investments must focus on achieving critical mass by ensuring that ICT services are affordable and accessible by the majority of the population. However, private investors are also key enablers for the success of achieving critical mass.

In all the cases of Tanzanian, Uganda and Ghana, it is evident that the achievement of critical mass will be a major challenge in the short-medium term as governments seek to address a multitude of difficulties in progressing their own economies. The continuation of national and international investments will be the key drivers for facilitating this mass adoption of ICT-enabled infrastructure which is absolutely essential for the economic progress of these countries.

A macro view of the African continent paints a portrait of rapid growth in the ICT sector. In 2020, estimates in the mobile network coverage reveal that Africa has 88.4% connectivity, 77.4% 3G connectivity, and 44.3% 4G coverage. Between 2017 and 2020, the people using the Internet in Africa increased from 24.8% of the population in 2017 to 28.6% in 2019 (Adeleye and Eboagu, 2019). Access to mobile broadband for every 100 inhabitants in Africa increased from 25.5% to 33.1%. Africa's Internet access through fixed broadband for every 100 inhabitants increased from 0.4% to 0.5% (Enke et al., 2019). The statistics demonstrate an upward trajectory for the ICT sector in Africa. However, the data also highlights the facts that Africa lags most of the other regions (North America, Europe, and Asia) in the rate of penetration, integration and mainstreaming of the ICT sector into core socioeconomic processes.

These macro-trends are driven by the underlying dynamics that shape access to the Internet, computers, and ICT infrastructure in Africa. For example, in 2019, only 14.3% of households on the continent had access to the Internet at home. Around 7.7% of households in Africa had access to a computer at home in 2019 (Mitchell and Siebörger, 2019). Additionally, an estimated 39.6% of the young people aged 15 and 24 years were using the Internet in Africa in 2019 (Adeleye and Eboagu, 2019). The data explains the slow rate of ICT uptake in Africa compared to other rapidly growing economies, such as China and Southeast Asia economies.

When compared to the global average, Africa is lagging in most of the metrics used to indicate ICT growth, penetration, and integration. For example, 14.3% of the population in Africa has access of Internet at home compared to the global average 57.4%. Around 18.6% of the people in African use the Internet compared to the global average of 51.4% (Mitchell and Siebörger, 2019). The African continent also lags in the gender gap in accessing Internet services; 37.1% of the men in Africa have access to the Internet compared to 20.2 per cent of women (Li et al., 2022). The global average is 55.2% of men and 48.3% of women access Internet services. The gender gap in Africa is around 17% whereas the global gender gap is 7% (Adeleye et al., 2021).

The next section will explore the problems with ICT adoption across Africa and why investments in ICT and Information Systems are so important for the national and regional progress.

3.2 The current problem with ICT adoption

Due to the relatively high price of satellite bandwidth, the widespread deployment of the Internet in the developing world was unrealistic and unaffordable. Analysis of the affordability of fixed prices reveals that Africa has some of the highest costs for fixed-broadband prices as a percentage of GNI per capita when compared to other regions. The range within the African continent spans from a cost of under 2% of GNI per capita in Mauritius and Seychelles to more than 100% in Rwanda, Madagascar, Malawi, Niger, and Burundi. Mauritius and Seychelles are the only nations in Africa that have attained the Broadband Commission target for 2025 (David, 2019). A large chunk of nations in Africa provide capped monthly data allowances for entry-level fixed-broadband plans. The advantage of this approach is that providers can offer reduced costs; however, users are limited in their Internet use (Sloniec, 2019). Additionally, more than 50% of the countries

offer fixed-broadband speeds of between 256 Kbit/s and 2Mbit/s, which significantly hamper the utility of Internet access. Analysis reveals that nations in Africa that offer optimal access to high-quality data at competitive prices (close to the Broadband Commission target) have significantly developed ICT infrastructure, penetration, and integration into their economies (Maitland, E.& Sammartino A., 2015; Rietveld, J., & Schilling, M. 2021). On the other hand, the African nations that offer access to broadband (or ICT services and infrastructure) are considerably costly rates face slow or stunted growth in their ICT sectors, penetration in their populations, and integration into their economies (David, 2019).

However, bandwidth has now begun to drop in price and is therefore becoming a much more affordable commodity for the developing world to adopt. Arguably, the adoption of the Internet by the developing world is absolutely vital in ensuring that these economies remain competitive and continue to develop. There is a significant risk that many developed nations that do not invest in improving their information system infrastructures will be left behind. Furthermore, the existence of a single Internet provider in the developing countries meant that there was very limited investments and no competition on prices. However, as has been discussed, some nations are experiencing a lack of interest from investors due to too much competition driving marginal profits down. A system that addresses both of these issues with improving connectivity in the developing world must be adopted. On the one hand, governments must facilitate a market that allows business enterprises to compete for customers by offering better prices, whilst on the other hand, they must also ensure that the ICT-infrastructure industry is a profitable and attractive option for investors. This is another area that is being addressed by global initiatives such as those outlined in the previous section.

3.3 Why Invest in ICT/Information Systems

Although the opportunities for investments in Information Systems in Africa are almost endless, this paper will highlight some of those perceived benefits for the education and health sector. It is recognised that systemic improvements to these public services are almost certain to contribute towards the progress of the African economy. After all, a healthier and well-educated population are more likely to individually contribute towards a successful economy.

In the education sector, the ICT Transforming Education in Africa project aims to enrich the social and human prospects through the use of ICT in education. The strategic objectives of this project are to improve, through the use of ICT, the teaching methods and abilities of teachers in African schools; encourage the development and widespread adoption of ICT by giving students the opportunities to learn on ICT systems; and to ensure that national education programmes are able to become more centralised to encourage systemic improvements.

The most important opportunities for improved ICT in the African healthcare sector directly reflect upon the core challenges experienced across the region. There is a significant shortage of experienced and suitably qualified healthcare workers in Africa – a continent that hosts roughly 25% of the global disease burden (Luo, Y. A, 2022). Improved ICT systems would contribute to an improvement to healthcare education, even spread allocation of healthcare workers and resources, and the essential ongoing semi-automated monitoring and evaluation of the healthcare system. The introduction of effective ICT-enabled infrastructures will foster a better connectivity between households, care providers, healthcare services and policy makers. This improved communication between these parties will likely contribute towards the improvement of morbidity and mortality rates (Jandik T. & Kali R., 2009). Furthermore, the accessibility of public information campaigns through

more ICT-enabled information systems will allow governments to better manage public health issues or preventable diseases.

3.4 The hope and risk of doing it wrongly

Investments in improving information systems on a global scale are presenting global development opportunities that would be otherwise unimaginable (African Union, 2020). However, in order to capitalise on these unprecedented opportunities, nation states must commit towards facilitating an environment that is suitable.

Agenda 2063 is the African framework that seeks to transform Africa into a global powerhouse of the future and of which, investments in information systems is a key enabler (African Union). In support of Agenda 2063, the African Union (AU) published the Digital Transformation Strategy for Africa (2020-2030) that aims to utilise technology and innovation to transform African economies by encouraging African worldwide integration, invigorating domestic economic growth, increase job creation and subsequently improve the socio-economic enjoyment of all African populations (African Union, 2020). Amongst many ambitious yet highly achievable specific objectives, the African Union hopes to facilitate continent-wide digital empowerment to all African citizens by 2030. As of 2020, there were roughly 200 million African citizens without internet access. It has been recognised that access to an internet connection for these 200 million would significantly contribute towards GDP growth and therefore, this ambition to achieve universal connectivity will likely prove to be a significant contribution to the development of African nations.

Without significant coordination efforts between nations and regional organisations such as AUC, ATU and UNECA, it may be very difficult to achieve the digital agenda. Although this threat does not directly relate to the investments in national and regional adoption of the ICT-enabled infrastructure, it does relate to the adoption of Information Systems as a whole. As previously discussed, the human and organisational features of the Information System are key enablers in exploiting the infrastructures in place. However, it is likely that most interested parties recognise the importance of collaboration which will assist in alleviating this risk.

The improved access to digital technologies will almost certainly lead to an increase in cyber-crimes that many African nations may not be equipped to deal with. Therefore, there is a demand for increased international and regional support to ensure that cyber-crime is addressed in the most effective and reasonable manner. As many of the poorest across Africa have had limited access to ICT, once they do gain access there is a high risk that many will not be aware of the new risks to their personal data and capital. The most efficient approach to addressing this risk would be to ensure that people are educated about the risks as well as ensuring that anti-cyber-crime units are adopted by governments who would have previously not needed them. Both of these mitigatory actions will require significant investments to ensure they are achieved effectively.

Perhaps a relatively overlooked risk to increased accessibility to the ICT-enabled infrastructure relates to gender inequality. It has been found that there is a significant difference between women and men's access to mobile and internet devices across Africa. Failure to address this gender gap may result in further gender inequality as more men will have access to the increased opportunities offered by ICT. The most effective approach to mitigate this risk to gender equality may yet to be determined. However, there may be a requirement for government initiatives that offer free or heavily subsidised access to ICT-enabled devices for women. This would also require significant investments but would almost certainly alleviate the risks whilst also proving to facilitate a higher percentage of women able to access the benefits available to them.

Furthermore, there is a risk that if access to ICT-enabled infrastructures is unaffordable for the poorest citizens, then they will be unable to benefit from its widespread adoption. Arguably, the very poorest are likely to benefit the most from newly available resources such as e-Government services as it is these populations that are in most need of improved socio-economic opportunities. If African nations fail to provide access to ICT at an affordable rate, then the rich-poor divide may be exacerbated even further, which may be even more difficult to address at a later stage. The most effective approach to this risk would likely be similar to the approach suggested for the gender inequality risk which would also prove to be costly yet impactful for the regions economic development.

4 Conclusion

Although there will be many threats to overcome for African nations attempting to implement efficient ICT-enabled infrastructure, it is highly likely that the long-term impacts for the region's economic development will be invaluable. Economic development must not only be related to domestic GDP growth as it is important that people's quality of lives also improve concurrently. Significant investments in African Information Systems, such as those from the World Bank and African Union, are absolutely essential in ensuring that the future progress of the African economy is secured. As more people are awarded more access to the Internet, there will be an exponential growth is improvements to education, health and business opportunities that will all contribute towards regional development. It can be reasonably concluded that government and international investments in Information Systems are pivotal in bolstering the developing world's economic growth.

Acknowledgements

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Climate change strategic management adaptation in agriculture in Slovakia

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Abstract

Research background: Climate change is undeniable. Strategic management plays a key role in assessing the right agricultural solutions to climate change problematic. While agriculture is one of the main contributors to climate change, it is also a sector that is highly sensitive to extreme weather events resulting from climate change.
Purpose of the article: This work focuses on studying the impact of climate change on agriculture and evaluating strategic adaptation measures.
Methods: We performed statistical analysis to confirm positive or negative effects of climate change on agricultural wheat yields in Slovakia. Through a provided data from local farmers, we examined the farmer's attitude to climate change, its impacts and clarified his climate change adaptation choices, and finally, through a cost-benefit analysis, we estimated the cost-effectiveness of climate change adaptation measures.
Findings & Value added: The results showed that farmers in Slovakia are currently feeling a positive effect of increased temperatures on their wheat crops but are negatively impacted by the lack of rainfall. We can assume that the need for strategic management, implementation of strategies and their subsequent control are not only an important element of farm management but also long-term prosperity. The cost-benefit analysis showed that three measures in particular, crop rotation, fertilization, and minimal tillage, would have the greatest impact on the cost analysis and overall strategies.

Keywords: *climate change; impact; agriculture; adaptation measures; strategic management*

JEL Classification: *O13; M11; Q54*

1 Introduction

Agriculture is undoubtedly one of the sectors most affected by climate change, but it is also one of the largest sources of greenhouse gas emissions. The main manifestations of climate change include rising temperatures, changes in the intensity and frequency of precipitation, and an increase in the occurrence of extreme weather events. The objective of this thesis is

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to provide an analysis of the impacts of climate change on agriculture, confirming the positive or negative impacts, finding a farmer's perspective, and evaluating the measures as a strategic management approach, especially adaptation measures, necessary to mitigate or adapt to the climate change.

2 Current state of solution of the evaluated issue in the theory

According to the Singh (2021), the factors effecting climate system include natural processes and in the last three centuries were extended by the human activities. As it is mentioned by the US Global Change Research Program (2018), it is important to make a distinction between the terms, climate changes that have a natural origin and climate change, which origin is purely anthropogenic. Županić et al. (2021) stated that the Central European region shows general features of climate change and warming occurs in all areas. According to Slovak hydrometeorological institute (a) over the last 100 years, we have seen a trend of increasing the average annual air temperature by 1,1 degrees Celsius and a decrease in annual total atmospheric precipitation by 5,6% on average. With the upcoming climate changes, the need for strategic measures is high. The Strategic management is the integration of all functions so as to pro-actively manage the total farming system in harmony with the internal and external environment towards achieving the long term goals of the farming business.

2.1 Agriculture in Slovakia

Slovakia is a mountainous country, only 40% of its area is less than 300 m.a.s.l. (Ministry of Agriculture and rural development of Slovak Republic, 2020). According to data from Enviroportal (2021b), the total agricultural land in 2020 was 2 375 025 ha, out of which the largest part was arable land 59,17% and permanent grassland 35,79%. On the other hand, hop gardens had the smallest share of 0,02%, orchards 0,73%, vineyards 1,1% and gardens 3,19%. The key question that economic analysts should answer for decision-makers and investors is whether, when, and how to adapt to the adverse effects of climate change. Han (2017) and Buranatrakul et al. (2018) emphasise that while on the one hand, there are several scientific studies on the physical consequences of climate change, on the other hand, there are still no standardized procedures in which the costs and benefits of adaptation measures ("cost benefit analysis") are assessed against other solutions or maintenance costs of current situation.

2.2 Empirical evidence from current literature

For example, Dunsenge et al. (2018) used an ARDL-linked testing approach, and the results of their study showed a Plant carbon metabolism is impacted by rising CO2 concentrations and temperatures, but also feeds back onto the climate system to help determine the trajectory of future climate change. The link between climate change and economic growth was examined by Malhi et al. (2020) and the study analysed gross domestic product (GDP), precipitation, temperature and arable land as well as impacts on ecosystems. The results showed that there is a unidirectional causal relationship of temperature and arable land to GDP. The strategic management of systems approach was used in a study by Banson et al. (2018) examining the impact of new systems on pork production in Ghana. The results of this study showed a significant positive relationship between new technologies and pork production, with positive and significant short- and long-term relationships between pork production and income. A study by Rehman, Ozturk, and Zhang (2019) examined CO2 emissions and agricultural productivity in Pakistan using an ARDL limit test approach. The

results showed that acreage, energy use, fertilizer use, GDP per capita and water availability were significantly related to CO2 emissions, while improved seed distribution and total grain quantity were negatively related to CO2 emissions in Pakistan. A study by Chandio et al. (2020) examined the impact of global climate change on agricultural production in China. The results show that agricultural production is significantly affected by CO2 emissions in the long-term and short-term analysis, while temperature and precipitation have a negative impact on agricultural production in the long-term.

3 Methods

Our work is focused on assessing the impact of climate change on agriculture, primarily by confirming the relationship between climate change and agricultural yields, by understanding the farmer's view of the impact of climate change on his business, his role, responsibilities, and adaptability, and by the economic evaluation of adaptation changes. The data used in the calculations in the first part of the practical part were obtained from the Slovak hydrogeological institute, focusing on the period from March to September from 1997 to 2019. In the second and third part, we obtained data from 5 local farms situated in East and Centre Slovakia regions. To achieve the goals of our work, we used the following methodology - Descriptive statistics, Unit root test, Correlation analysis, Regression analysis, Guided interview, Net present value and Internal rate of return.

Descriptive statistics- Measures of location (central tendency) - arithmetic mean, median, mode, geometric mean, and quartiles. Measures of variation (dispersion) - range, interquartile range, variance, standard deviation, and coefficient of variation. Measures of shape – skewness and kurtosis used for the test of normality.

Unit root test - One of the tests used for the verification of non-stationarity or stationarity of time series data is the Augmented Dickey-Fuller test (ADF). The decision rule in this testing is following: If the p-value is > 0,05, then we accept the H0 hypothesis, but if p-value is < 0,05, then we reject the H0 and accept H1. The hypothesis set for the ADF test is following:

- H0: There is a unit root in the time-series sample, the data series is non-stationary.
- H1: There isn't a unit root in the time-series sample, the data series is stationary.

Correlation analysis - Correlation analysis provides the information about the relationship between quantitative variables.

Regression analysis - The hypotheses for the multilinear regression are following:

Hypothesis for the model:

- H0: The model is statistically insignificant.
- H1: The model is not statistically insignificant.

The decision rule in this testing is following: If the p-value is > 0,05, then we accept the H0 hypothesis, but if p-value is < 0,05, then we reject the H0 and accept H1.

Hypothesis for the coefficients:

- H0: The coefficients are statistically insignificant.
- H1: The coefficients are not statistically insignificant.

The decision rule in this testing is following: If the p-value is > 0,05, then we accept the H0 hypothesis, but if p-value is < 0,05, then we reject the H0 and accept H1.

Net present value and internal rate of return - Net present value (NPV) is used in the investment planning for the analyzation of the profitability of a projected investment or project.

4 Results

4.1 Data specification

Regarding the data specification, for the analysis of the impact of climate change on yield we used the data from 1997 until 2019 with focus on the period from March to September. In the case of yields, we focused on data on reflecting the hectares yield of wheat in tons. Data of the remaining six variables monitored the climatic condition of the area of East Slovakia during the same period. Specific variables are Yield, Area Temperature, Rain, Wind, Humidity.

4.2 Descriptive statistics

In the first part of our analysis, we focused on the basic data analysis using descriptive statistics for the summarization and description of the characteristics of our data set. The mean value of yields of wheat was 4,664 tons per hectare, and the maximum average temperature was at 21,473 degrees Celsius. According to skewness, that measures the degree of asymmetry, we can conclude that yield, and average rain are positively skewed, while the area, average minimal temperature, average maximum temperature, wind, and humidity are negatively skewed. For the kurtosis, referring to the shape of the distribution, the analysis showed that yield, average maximum temperature, average rain and wind have negative (flat distribution) kurtosis and the area, average minimum temperature and humidity have positive (peaked distribution) kurtosis. Maximum yield of wheat was recorded in 2019 and achieved 6,37 tons per hectare while the minimum 3,03 tons per hectare were recorded in 2003.

The second part of the results considerates the analysis of our data transformed using the natural logarithm. Almost all variables, lnYield, lnArea, lnAverage minimum temperature, lnAverage maximum temperature, lnWind and lnHuminidity are negatively skewed, and only the lnAverage rain is positively skewed. LnYield, lnAverage maximum temperature, lnAverage rain, and lnWind have negative kurtosis, meaning their distribution is flat, while the distribution of lnArea, lnAverage minimum temperature, and lnHuminidity is peaked, having positive kurtosis.

In order to be able to conduct time series analysis, it is firstly necessary to test the stationarity, as non-stationary variable could cause several model-misfunctions. Therefore, we decided to test the data using Augmented Dickey-Fuller test.

4.3 Augmented Dickey-Fuller test

Results of this test show, that almost half of our variables are non-stationary, (yield, area, and average rain) as the value of the test statistics was higher than the critical value at 5% significance level, confirmed by p value that was higher than 0,5. Rest of the variables (average minimum temperature, average maximum temperature, wind, and humidity) are stationary. Due to the fact that not all variables were stationary it was inevitable to use the first difference. Results of variables unit root test at first difference show that all variables are stationary at the level of significance 10%, however, with the critical value at 5% significance level, the variable area was still non-stationary. For that reason, that our data are not stationary and thus we cannot conduct regression analysis, we decided to transform our data using natural logarithm that should ensure that our data will be stationary.

Table 1. Augmented Dickey-Fuller test (ln)

Variables	Test statistics	5% Crit. v.	P-value	Interpretation	10% Crit. V.	Interpretation
lnYield	-4,520	-3,600	0,0014	Stationary	-3,240	Stationary
lnArea	-5,217	-3,600	0,0001	Stationary	-3,240	Stationary
lnAv. min. temp	-4,617	-3,600	0,001	Stationary	-3,240	Stationary
lnAv. max. temp	-5,517	-3,600	0,000	Stationary	-3,240	Stationary
lnAv. rain	-4,144	-3,600	0,0054	Stationary	-3,240	Stationary
lnWind	-3,975	-3,600	0,0095	Stationary	-3,240	Stationary
lnHumidity	-5,360	-3,600	0,000	Stationary	-3,240	Stationary

Source: own processing (2022)

4.4 Correlation

The next step in the analysis of the impact of climate change on yield was calculation of correlation matrix that describes the relationship between two variables, either positive or negative.

The correlation between the lnYield and all other variables is positive, meaning that the variables will always move in the same direction. For instance, when the area of wheat production increases by one hectare, then the hectare yields of wheat will increase by 0,385 tons. However, the correlation between the lnYield and lnAverage minimum temperature, the lnYield and lnAverage maximum temperature, and lnYield and lnWind is very weak. The correlation between the lnYield and all other variables is positive, meaning that the variables will always move in the same direction. For instance, when the area of wheat production increases by one hectare, then the hectare yields of wheat will increase by 0,385 tons. However, the correlation between the lnYield and lnAverage minimum temperature, the lnYield and lnAverage maximum temperature, and lnYield and lnWind is very weak.

Table 2. Correlation

	lnYield	lnArea	lnAv. min. temp	lnAv. max. temp	lnAv. rain	lnWind	lnHumidity
lnYield	1,000	0,385	0,025	0,013	0,188	0,013	0,285
lnArea	0,385	1,000	-0,024	0,040	-0,412	0,380	-0,079
lnAv. min. temp	0,025	-0,024	1,000	0,838	0,269	0,234	-0,374
lnAv. max. temp	0,013	0,040	0,838	1,000	-0,078	0,081	-0,728
lnAv. rain	0,188	-0,412	0,269	-0,078	1,000	0,177	0,363
lnWind	0,013	0,380	0,234	0,081	0,177	1,000	-0,140

lnHumidity	0,285	-0,079	-0,374	-0,728	0,363	-0,140	1,000

Source: own processing (2022)

4.5 Regression analysis's

For the final part of the analysis of the impact of climate change on yield of wheat we conducted the regression analysis for the estimation of the relationship between a dependent variable, in our case lnYields of wheat, and independent variables. We decided to conduct regression analysis with variables transformed by using natural logarithm, due to the reason that only log transformed variables were stationary. The regression equation that is a result of the regression analysis shows the relationship between each independent variable and the dependant variable. The regression formula with our data is following:

$$lnYield = \beta0 + \beta1lnArea + \beta2lnAv.min.temp + \beta3nAv.max.temp + \beta4lnAv.rain + \beta5lnWind + \beta6lnHumidity + \varepsilon$$

The results of the regression analysis show that 58,9% of the variation of the hectare yield of wheat is explained by the independent variables. Significance F at 0,015 indicates that the model is not statistically insignificant, as we reject the H0 hypothesis and accept H1 hypothesis. Regarding the coefficients, the lnArea, lnAverage minimum temperature, lnAverage maximum temperature, lnAverage rain and lnAverage humidity are all statistically significant. We also rejected the H0 hypothesis and accept H1 hypothesis. Only the coefficient lnWind is statistically insignificant as its p-value 0,758 is higher than 0,05, therefore we do not reject the H0 hypothesis.

4.6 Strategic cost-benefit analysis

Following are the information about the adaptation measures that we decided to evaluate. Regarding the cost, we are mainly focused on implementation cost, of our selected company that would have to incur to implement these practices, and on maintenance costs but we also mention some operational cost that would be related to these changes.

Except the irrigation, that would require an investment equal to 1600 € per hectare, all adaptation practices have relatively low implementation costs, below the 400 € per hectare. For the implementation of mixed cropping the farm would not have to incur any implementation costs.

Regarding the maintenance costs, again the highest costs would be for the maintenance of irrigation system around 550 € per hectare. Medium amount of money would have to be spend on the maintenance of fertilization practises (260 € per hectare). On the other hand, the lowest maintenance cost would be for the crop rotation (25 € per hectare) and mixed cropping (20 € per hectare).

Concerning the operational costs, the cost of application of the fertilizer is approximately 6 € per hectare and the same amount of costs must be spent on spraying. In the case of tillage and the use of deep drilling, the cost per hectare is around 40 € and, last but not least, the mowing cost is around 35 € per hectare. When deciding which adaptation measures to apply while considering the costs, the most beneficial would be the crop rotation, fertilization, and tillage. Crop rotation requires only minimum costs for the implementation and maintenance and results into improved soil quality and decreased incidence of pests and diseases. Fertilization, mainly the use of the fertilization applied specifically on the leaf, can improve the absorbance of nutrients and it also reduces the amount of fertilizer required by half. we present the expected increase in the yield of wheat after adoption of each of the adaptation measures. Except mixed cropping, all adaptation

measures would result in the increase of yields. The most notable increases of 5 and 4 tons per hectare relates to fertilization and tillage, respectively. These two measures were also mentioned in the assessment of costs, as being the most effective.

5 Discussion

The agricultural sector is a large contributor of CO2 emissions. On the other hand, agriculture is severely affected by the changes in temperature, precipitation, soil, and water availability that are a result of changing climate. As it was proved by the results of our practical part, climate change is already influencing the agricultural conditions in Slovakia and is influencing the behaviour of the agricultural business.

Our findings of the impact of climate change on the yields of wheat however do not correspond with the studies carried out by other researchers (Zaied and Zouabi, 2016; Dumrul and Kilicarslan, 2017; Raihan et al., 2021; Chandio et al. 2020). In all the mentioned studies, the researchers confirmed negative impact of increased temperature on various crops or the overall agricultural output. Our finding suggested that if the average maximum temperature increased by one percent, the hectare yield of wheat would increase by 5,884%. On the other hand, Zaied and Zouabi (2016), Dumrul and Kilicaslan (2017), and Raihan et al. (2021), concluded that increase in the precipitation would have positive impact on the agriculture. That was also confirmed by our result, as the regression analysis suggested that a 1% increase of rainfall would lead to increase in yields of wheat by 0,457%. Different conclusions were presented in the study of Chandio et al. (2020). According to their estimations negative impact on agricultural output has not only the increase in temperature, but also increase in precipitation. The study calculated the impact of land area under cereal crops to agricultural output and concluded that a 1% increase in the land area will lead to increase of agricultural output by 1,2774%. Our findings were similar as a 1% increase in the land area will lead to increase of yield of wheat by 0,942%. Ali et al. (2017) in their study focused specifically on the effects of climate change on the major crops including the wheat. Their findings revealed that maximum temperatures have an adverse effect on the wheat production, while the effect of minimum temperatures is positive. Their results also shown that rainfall and relative humidity negatively influence wheat crop yield. All of their conclusions are therefore in direct contradiction to our findings as for instance, increase in precipitation, and increase in humidity would have in our case positive impact on wheat yield. Soryali et al. (2021) confirmed that farmers have very differing beliefs regarding the climate change and the views on their responsibilities towards mitigating and adapting to climate change differ. However, generally, finish farmers seem to have high awareness of climate change and are keen to take necessary actions.

Third part was oriented on the evaluation of costs and benefits of adaptation measures. The findings of Williams et al. (2020) indicated that application of strategic adaptation practices (intercropping, mixed cropping, crop rotation, irrigation, and fertilization) would yield positive results and would be economically profitable, therefore using strategic management approach was needed. According to their evaluation, implementation of irrigation measure would be the most expensive. Overall, only crop rotation and mixed cropping were recommended as the other three practises presented higher risk of failure if adopted due to their longer return. Our results indicated that most beneficial, regarding the costs, would be the application of three practices, crop rotation, fertilization, and tillage. Therefore, we came to the same conclusion with the study of Williams et al. (2020) only in the application of crop rotation. Similarly, in their study was also confirmed the high financial burden connected with construction and maintenance of irrigation system.

Due to the fact, that not all of our conclusions were confirmed by the other studies, we suggest that this thesis might be an inspiration for a much more robust and in-depth research that can be carried out on the larger area in case of evaluation of impact of climate change and on larger sample in case of evaluation of perception of farmers on climate change.

6 Conclusion

To conclude, we were able to achieve our aim. We assessed the overall perception of the agricultural business on the climate change, and more specifically, its point of view regarding the measures that could be applied to mitigate or to adapt to changing climate. And, in the last section, we evaluated costs and benefits resulting from the implementation of each adaptation strategic measure. Our recommendations would be following:

- To create a database that would be centre point for all data related to the climate change and its impact. Regarding the agriculture for instance to have the possibility to find information about the CO_2 from agricultural activities.
- To conduct more comprehensive study, including larger area, that would focus on studying the impact of climate change not only on the yields of wheat but also on the other crops.

There are many studies that examine the impact of climate change on agriculture and while the current effects are not the same for the agriculture around the whole world, it is expected that in the future climate change will lead to the food insecurity. Our work has its limitations, but we believe a that with this part of work we were able to practically and theoretically contribute to positively impact this problematic.

Acknowledgement

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The impact of globalization on the availability and use of telematics data

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Abstract

Research background: "Think globally, compare locally" is a key to success when defining the composition of a car fleet. Fuel consumption (and related emissions) is second most important parameter (after purchase price) when fleet cars are compared, but source data are calculated based on New European Driving Cycle (NEDC) or newer Worldwide harmonized Light Vehicle Test Procedure (WLTP). The difference between the results of NEDC, WLTP and Real Driving Emissions (RDE) is 20 – 40%. With the arrival of plug-in hybrid electric vehicles and the increase of their global market share, the consumption gap even grew.
Purpose of the article: RDE is the right way to minimize the consumption gap and offers better results, but cannot provide custom data for the choice of the objective fleet. None of these models can consider driving behaviour, weather conditions, road gradient, vehicle load, other car driver and local specifics, so such a model needs to be developed.
Methods: For such an objective model, driver habits and local conditions need to be collected based on his standard fleet operation and applied through the evaluative model to new vehicle selection, where these vehicles are rated upon same conditions in real traffic. Data for the valuation model can be collected from telematics black boxes in older fleets and connected cars by new cars.
Findings & Value added: This is an area where data modelling should take place, as it can bring near-realistic results and bring the utilization of fleet operation to the next level.

Keywords: *telematics; transport, bigdata; road transport*

JEL Classification: *L86; L92; L96*

1 Introduction

Part of decision-making process is evaluation of risks and costs. Globalized world leads us to act based on "best practices" previous decisions made anywhere in the world. These decisions were sometimes made according to global conditions not respecting local influences. "Think globally, act locally" is an indispensable approach in decision making

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process as local conditions may vary compared to global conditions despite default inputs are identical. Even small local influence may significantly change the results and radically change the final decision. A hidden area where are these principles overlooked is Fleet management (Akkartal and Aras, 2021). Fleet management is an administrative approach that allows companies to organize and coordinate work vehicles with the aim to improve efficiency, reduce costs, and provide compliance with government regulations (Bielli et al., 2011). Costs can be divided info fix and variable.

Fix costs are mainly managed locally as it's taken from local market, respectively from local offers. Vehicles lease or purchase payments, insurance etc. are demanded locally due to local requirements (e.g. vehicle homologation EU/US). Exceptionally are accepted offers from other markets, if global company is able to give an offer. Depreciation, licenses and permits are given by local legislative. Fixed costs are easy to determinate before acquiring the fleet on any time during operation, renewal process.

Variable costs include costs needed to operate the fleet. These costs are less predictable than fixed costs and are dependent on work volume. Main variable costs that should be included are fuel, tolls, accidents, maintenance and repair. All of this category can be affected by route planning, driving behaviour and maintenance planning. Maintenance plan is given globally by the vehicle producer for each model. It is based on mileage, time (eventually engine hours or fuel used) and it's obligatory for vehicles warranty. There isn't much space for optimization as it is given globally and mandatory, just precise planning can lead to better utilization and limited downtime. Tolls are given by local conditions, regardless of operator, state or private, fees are defined for vehicle category and roads and cannot be influenced without changing vehicle type. Only option is to optimize route to ideal ratio toll fee vs. lost time caused by using road without fees. This option is available in most of online navigation application and except trucks does not offer much space for optimization. Repairs costs can be divided into two sections, by the driver at fault and through no fault by the driver. Second option repair are caused by external influences like damages caused by other vehicles or by road traffic, weather, vandalism and other unpredictable causes. Some like damages caused on parked vehicle can be limited by save parking spot, but that is not available anywhere and increase operation costs of vehicle. Accidents and Repairs where the driver is at fault are connected with driving behaviour or generally with carelessness. As mentioned in a study conducted by (Ando et al., 2010) driving behaviour where absolute value of acceleration, deceleration or handling exceed 0.2G (G=0.98m/s2) is evaluated as potentially risky. With higher speeds and increasing absolute value of acceleration repair costs caused by accidents grows. Whatever aggressive driving behaviour causes higher repair costs exact statistics how much the driving behaviour correlates with damage costs in local conditions are not available. Due to this fact only general data enters the decision making process or such costs are ignored. Last but not least in operation costs is fuel. Fuel is the biggest cost in operation. In decision making process fuel costs are derived from official fuel consumption of the vehicle delivered by car producers. These values are set according to global standards, New European Driving Cycle (NEDC) (Dong et al., 2020) or newer Worldwide harmonized Light Vehicle Test Procedure (WLTP) (Park et al., 2021). NEDC and WLTP were created to set up standards to unify driving cycle in which the CO_2 emissions are measured. Same driving cycles are used to set up official fuel consumption by each vehicle. (Kadijk et al., 2016), (Ramos et al., 2018)

New European Driving Cycle is an older driving cycle develop in the 1980s and last updated in 1997 created to estimate the emissions levels and fuel economy. Originally designed to measure emissions and fuel consumption by petrol vehicles, but also used to measure diesel engines. As new engine types were delivered NECD is used to measure hybrid vehicles and battery electric vehicles. NEDC was valid for EU countries 1998-

08/2017 as homologation lab-bench procedure, even it is not valid anymore, vehicles with official fuel consumption estimated according to NEDC are still parts of existing fleets and need to be included in analyses. (Shim et al., 2014)

NEDC test cycle in done on cold vehicle (20-30 °C) and in "laboratory" conditions, generally performed on a roller test bench. NEDC is composed from two driving cycles, Urban Driving Cycle ECE-15 (UDC), which simulates typical driving condition in European cities and Extra-urban driving cycle (EUDC) which simulates more aggressive driving and higher speeds. Both cycles are precisely defined from time, speed and acceleration perspective. NEDC is composed from 4 UDC cycles and one EUDC cycle, see figure 1. Whole cycle last 1180s, where 0-780s is destined for 4 UDC and 780-1180s for EUDC. (Shim et al., 2014)
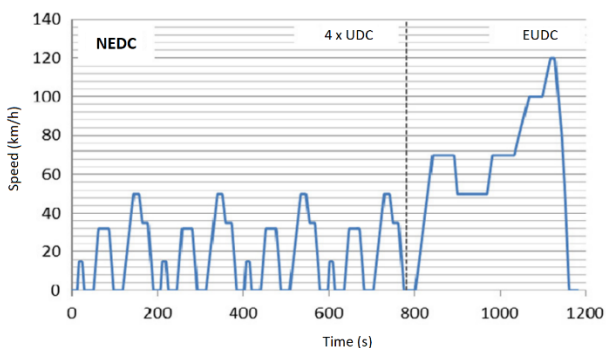
Figure 1. New European Driving Cycle.

Source: (Pavlovic et al., 2018)

Despite long driving cycle development and updates of NEDC the consumption gap (difference between official fuel consumption and real consumption) increases rapidly (Degraeuwe and Weiss, 2017). According to data collected from self-reporting consumers and fleet operator fuel consumption data increased the consumption gap substantially in the EU, from about 6% in 2001 to almost 40% in 2017. NEDC was not able to reflect the progress in 21st century technology, which was the main reason for such consumption gap increase (Ktistakis et al., 2022) . Therefore in 2017 European Commission introduced Worldwide harmonized Light Vehicle Test Procedure.

2 Methods

WLTP is a global standard for estimating the levels of pollutants, CO_2 emissions and fuel consumption. It is designed to test traditional petrol and diesel cars, any kind of hybrids and electric vehicles also. WLTP as hint it is not just an EU standard, but it is accepted by China, Japan, the United States, India, Canada, New Zealand, Australia and many more. (Klosterman, 2020)

WLTC are not a laboratory tests, for better results is WLTP divided to three categories according to vehicles performance. Each category has different test cycle and vehicles are sort out depending on vehicle power-to-mass ratio (W/kg) (Bouter et al., 2020):

- Class 1 – lower power vehicles with power <= 22 W/kg
- Class 2 – medium power vehicles between 22W/kg and 34W/kg
- Class 3 – high power vehicles with power > 34 W/kg and all OVC-HEVs, NOVC-HEVs and PEVs

2.1 WLTC Class 1

WLTC Class 1 is intended for power vehicles not able to achieve speeds needed for more powered vehicles. Class 1 cycle is composed from low and medium test cycles specific for Class 1, where low least 589s and medium 433s from total 1022s. Compared with NEDC is distance 2875m shorter.
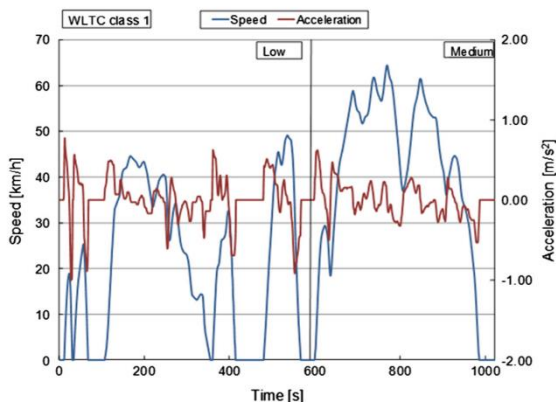
Figure 2. WLTC Class 1 v3.2 Speed and acceleration profiles.

Source: (Tutuianu et al., 2015)

2.2 WLTC Class 2

WLTC Class 2 is intended for medium powered vehicles with power between 22W/kg and 34W/kg. Class 2 test cycle is composed from four cycles, low, medium, high and extra-high with duration 589 s, 433 s, 455 s, 323 s, total 1800 s. Total distance is 22.64 km.
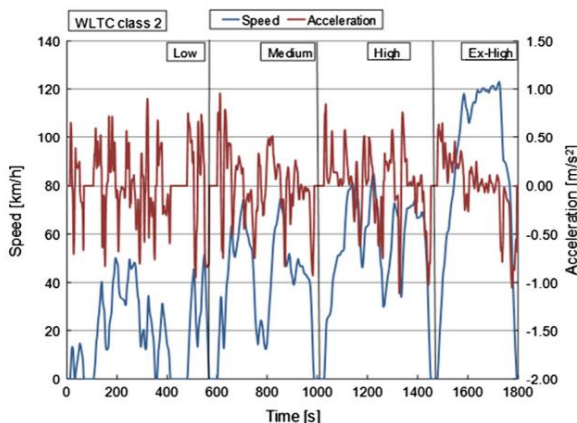
Figure 3. WLTC Class 2 v3.2 Speed and acceleration profiles.

Source: (Tutuianu et al., 2015)

2.3 WLTC Class 3

WLTC Class 3 was proposed for vehicles with power-to- mass over 34 W/kg and for all OVC-HEVs, NOVC-HEVs and PEVs. Test cycle is divided into 4 sub-parts as by Class 2,

low, medium, high and extra-high, but with different course than by Class 2. Total duration is 1800s, distance is 23.27 and high speed is 131.2km/h compared to 123.1km/h by Class 2. (Tutuianu et al., 2015)
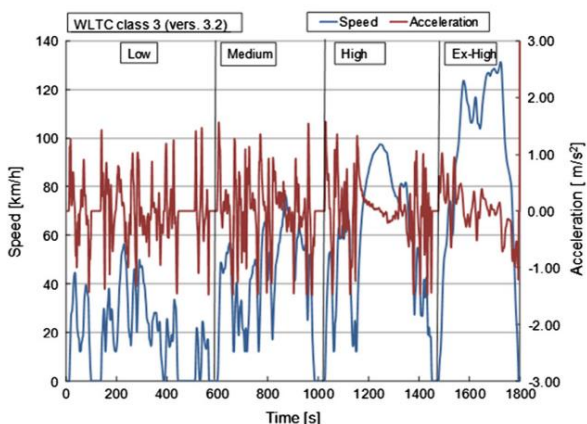
Figure 4. WLTC Class 3 v3.2 Speed and acceleration profiles.

Source: (Tutuianu et al., 2015)

WLTC is definitely step forward from global perspective, test cycles are more complex, additional equipment is included and many other. Next to it, it is no more a test in laboratory conditions and with real driving (RDE) part and measurement with portable emission measure system seems that problem with consumption gap, resp. emission gap solved.

3 Results

A Dutch study from 2020 based on data from Travelcard Netherland BV analysing 259,000 petrol passenger cars, of which 33,000 (plug-in) hybrids, 277,000 diesel passenger cars, of which 4,000 (plug-in) hybrids, and 54,000 vans (Merkisz et al., 2020) was found that the introduction of the Worldwide Harmonized Light vehicles Test Procedure (WLTP) reduced the average consumption fuel gap by 20–24% by petrol cars. Converse results were by plug-in hybrids where consumption gap increased to large consumption gap (150-300%), especially by petrol. (Merkisz et al., 2020) These values are valid for Netherlands conditions, where plugin-in hybrids and full electric vehicles are very widespread and completely used. In Czech conditions are results much worse as charging infrastructure is very limited and charging outside home/work needs be more planned. Due to this fact plug-in hybrids are in standard operation used more as petrol vehicles and electric saving estimated in WLTC consumption is not used. That is the main reason for larger consumption gap by PHEV in Czech Republic, see Table 1 PHEV results from 1-8 2022. Source: own study. Even with excellent driving style, which by petrol cars would mean lower fuel consumption values than official fuel consumption, is consumption gap more than 200%.

Table 1. PHEV results from 1-8 2022.

Labels	Mileage (km)	Official fuel consumption	Average of real consumption	Consumption GAP	Driving style with traffic	Driving style
PHEV 1	17436	1.7	4.66	274%	1.35	1.30
PHEV 2	15731	1.3	5.21	401%	2.07	1.55
PHEV 3	10164	1.6	3.68	230%	1.80	1.49
PHEV 4	22168	1.6	9.36	585%	2.23	1.98
PHEV 5	9755	1.2	4.36	363%	2.39	2.35
PHEV 6	13710	1.4	6.85	489%	1.89	1.76

Source: Own research

5 Discussion

Petrol and diesel vehicles with official fuel consumption according to WLTC is lower, as mentioned approx. 20-25% by vehicles without focus on driving behaviour and traffic fluency. Driver, resp. driving behaviour, and selecting route, reps. Traffic, affects the consumption gap the most compared to other influences like vehicle factors (vehicle maintenance and aging, rolling and aerodynamics resistance, tires, etc.) or environmental factors (weather conditions, ambient temperature, cold start, road grade, etc.). At Picture 5 Relation between driving behaviour w/o traffic and consumption gap, analysing 25 vehicles Skoda Octavia 1.6TDI in 8-month time period with average mileage per month above 2 500km, you can see the relation between diving style w/o traffic and consumption gap.

If driving behaviour is worse by approx. 1 point the consumption gap increases by approx. 30%. There is also visible that driving style affects consumption more than traffic situation. Unfortunately, there aren't enough data for full evaluation of the result. The driving style uses 1st version where are only fluency, moderate/aggressive acceleration and deceleration enter the driving behaviour evaluation.
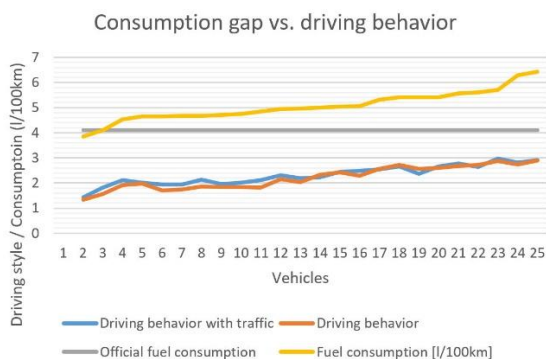
Figure 5. Relation between driving behavior w/o traffic and consumption gap.

Source: Own research

Next version of driving style being developed will include more inputs like road altitude, local speed limits and more. Using new data modelling methods and big telematics data collected from black-boxes installed in fleet cars will new model based on data modelling results bring consistent overview enabling decision based on local conditions and customized upon drivers behaviour and needs. Such decision will better respond to fleet needs, increase utilization and limit unexpected excess expenses.

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Globalization and decentralized finance

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Abstract

Research background: The focus of article is introduction of basic building blocks that forms essential platform or toolset if you will, for implementation of various decentralized finance services, which has become a very popular investment for users in recent years. We live in a time when society is changing thanks to technological progress. Technology is advancing in all industries and banking as well finance sector in general is no different. After electronic banking services, which are now an integral part of our lives, decentralized services such as cryptocurrencies, insurance, loans, stock markets and lot of others have been recently introduced to public.
Purpose of the article: With the help of these decentralized services, you carry out various financial transactions practically without waiting, with for very low fees and without need of so-called intermediary institutions that interconnect trading parties. There are already thousands of such services that can be easily utilized in the virtual world.
Methods: Article has been implemented as a result / outcome of various research and analyze procedures focused to map and compare the real world online DeFi services available in the 2022 market.
Findings & Value added: In the article we are focusing to the basics of the decentralized finance services world, its advantages and disadvantages, transactions, wallet as well as most recognized service – cryptocurrencies; vital alternative of the convectional currency as we know it today.

Keywords: *decentralized financing; cryptocurrencies; financing; Bitcoin; Ethereum*

JEL Classification: *M48; G30; F60*

1 Introduction

Decentralized finance banking is generally a term for financial services that take place / are implemented on top of the public blockchain database platforms such as Ethereum, Solana, Decent and others.

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This type of financing does not use third parties and requires no paperwork. Through smart contracts, everything is automated, which means that financial intermediaries (e.g. brokers, banks) are not necessary.

Decentralized financing allows any two parties to conduct operations reliably and directly without an intermediary or other external body. More people can access financial services at lower costs or get better interest rates than traditional financial institutions. Although decentralized finance is different from banks, they also provide services such as: earning interest, borrowing, lending, trading assets, buying insurance and trading derivatives (Sarnecký, 2022).

With the help of new technologies, companies and merchants, people can perform financial operations. Using a peer-to-peer financial network (directly between two people, it does not go through a centralized system), they use connectivity, software, hardware improvements cryptography and security protocols. This type does not require access rights for trading in financial instruments, lending or borrowing (Lahuta, 2021).

The use of decentralized financing is relatively simple, as interested parties will acquire a large number of remarkable opportunities in this context, including the creation of smart contracts and their implementation. All you need is an internet connection and you can trade, lend to someone, or borrow through software that tracks and verifies financial transactions in decentralized databases - blockchains. Blockchain decentralized database collects information from all users and is possible to operate in form of millions parallelly running instances located different places that form one uniform and consistent platform (Benson et al., 2021).

With the help of decentralized financing, anyone, anywhere can use financial services. In this type of financing, users can control their digital assets with the help of either personal wallets or business services.

2 Methodology

In this section, we focus on the comparison with centralized banking financing.

Centralized finance is generally a term for financial services that are provided by eligible financial institutions such as banks, insurances or similar corporations. For them, the main goal is to achieve the highest possible profit. Contrary to DeFi, this type uses third parties, which help in the movement of money between parties, but each party also charges certain fees for their services.

In a centralized financial system, financial institutions are important intermediaries that control and mediate financial transactions. Intermediaries try to reduce transaction costs and ensure that financial transactions are mediated efficiently and smoothly (Chen and Bellavitis, 2020).

Through a central exchange, trade orders are processed in centralized funding. Funds are processed on a central exchange, meaning you don't own your let's say key to access your wallet. The central exchange determines how much fees you have to pay for trading and what coins you can trade. In the end, you are not the owner of your finance when buying or selling thanks to a centralized exchange. The exchange sets the rules for you to trade according to.

Unlike an OTC market that allows direct trading between two agents, an exchange is an institution that standardizes assets and trading rules for multiple participants. Therefore, the stock exchange provides mechanisms to maintain asset liquidity and to determine asset prices (Mohan, 2022).

With such centralized approach however comes also various risks and disadvantages. Global world finance system has been disrupted and faced a growing disappointment as well as massive loss of reliability in relation to their customers. These events led various

inventors to idea, whether banking, investing and payment processing could become decentralized and disintermediated. A wide range of new innovations in financial products and services has experienced rapid growth (Allen et al., 2022).

Decentralized financing differs in, that the field of cryptocurrency financial products, they try to maintain the typical characteristics of cryptocurrencies in contrast to centralized financing. They are mainly:

1. Trust in centralized financing, you must trust exchanges and centralized assets, you have no other choice. In decentralized financing, you don't have to trust anyone, because your funds are in non-transparent wallets, where no one has access, nor administrators of the certain service. In centralized funding you have to trust the company, while in decentralized funding you have to trust the protocols and especially the technology.

2. Authorization With decentralized financing, if you have a non-administrative crypto wallet, you do not need to register your account, while with centralized financing, user registration must take place and must be subject to KYC (Know your customer) regulations. Registration serves to prevent criminal activities such as compliance with cryptographic regulations and money laundering (Micky, 2022).

3. Public verifiability Each user of decentralized financing can observe and control the implementation of changes to the state of his funds. It may happen that some decentralized finance applications may not be open source, we can verify this on the blockchain in this case, still this aspect is irrelevant. It is about transparency of the basic implementation / communication protocol that gives decentralized financing technologies an unrivalled power to transfer trust.

4. Fees; One of the advantages of decentralized financing are fees, because they are minimal. Whereas centralized fundings have higher fees for platform maintenance, employee salaries and product improvements.

5. Liquidity; In centralized financing projects, the platforms match the orders of buyers and sellers similar to stockbrokers. In DeFi, all trading is done automatically on the blockchain. Instead, the platforms rely on an innovative concept where both sides of the trade are pre-funded by liquidity providers who are motivated to find their funds. Finally, the trading fees are distributed among the liquidity providers.

6. Speed Execution; speed is relatively fast in both CeFi and DeFi, although it depends on each platform individually. Most exchanges can provide near-instant execution for market orders.

7. CeFi customer services is a highly competitive space where every exchange and institution is actively trying to attract customers. Customer care services offered by this sector are trying to be as perfect as possible, they even established dedicated departments, that proactively look after the needs of the customers. In contrast, DeFi networks are independent networks and usually do not come with customer support services although situation is slightly changing doe to the growing competitiveness.

8. User experience Beginners are more inclined to use centralized financial products because they are easier to use and usually have customer service that answers questions. Most of them even provide an education section on their website. And with DeFi, there is in most cases no human customer service.

9. Regulations; The CeFi sector / space is governed by rules and regulations. Policies such as the fight against money laundering and terrorist financing are being enforced. Regulators and observers are concerned about the risks associated with DeFi, as they are easy targets for hackers and lack investor protection.

10. Innovations; There is not much to innovate when it comes to CeFi services. However, since blockchain is still in its early stages with breakthroughs occurring routinely, DeFi

networks are innovating at an exciting rate. This leaves users with more automated benefits.

11. Potential Threats; The key threat associated with CeFi is nightly hacking of exchanges or other institutions. While exchanges and providers often use state-of-the-art security measures to protect themselves, this does not help them when it comes to exchange heists. On the other hand, the biggest enemy of the DeFi system is the network itself. Any error in the source code of the blockchain can put participants' assets at direct risk and cause complete loss of their deposits (Wazirx, 2022).
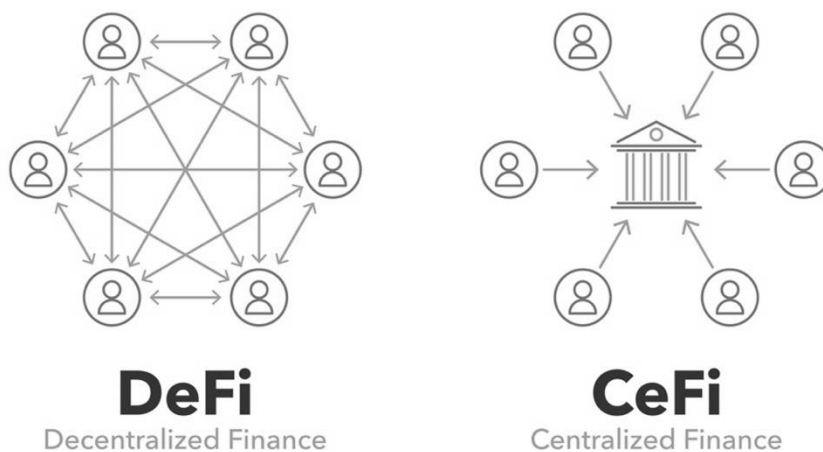
Figure 14. Differences between Decentralized and Centralized Finance

Source: https://www.ledger.com/defi-vs-cefi-how-defi-measures-up

3 Results

3.1 Advantages and disadvantages of decentralized financing

3.1.1 Advantages

Immutability of data

Data may not be changed or deleted after being saved in the system. The advantage of immutability is the usability of increasing confidence in the system and its data. Users of these accounts are guaranteed that the data is reliable and will remain there as it was uploaded to the system. However, this property does not guarantee that trusted data has been stored in the system, it follows that it has not been manipulated before being stored in the system.

Absence of central authority

The absence of a central authority that manages the operation of the entire system has many advantages:

− The structure of the system is under the supervision of all involved entities.
− The system has greater immunity to cyber attacks.
− It reduces possible risks and costs and increases the speed of operations in transactional contact between individual entities.

Security

Although decentralized financing is free, if the systems they use must make information available to regulatory and supervisory authorities, and the state must guarantee the cyber security of digital processes (Savona, 2022).

Transparency and privacy

High transparency is another advantage of DeFi, where all transactions are publicly visible. However, they do not provide account names or any information about the owners, so as not to violate the privacy of the parties between whom the transaction was sent. The private key serves us precisely to unlock the owner's account, where he has all the information about him.

Horizontal scalability

Vertical scalability is worse, because the constant growth of the volume of transactions and weaker nodes do not meet the requirements for their demands. However, horizontal scalability is very good. The system is more stable and can provide more computing power when there are more nodes in the network.

Autonomous processing

An account can also be created by a device connected to the network and not only by a legal entity (organization, person) (Bagha and Madisetti, 2017). Automation is already carried out in the device and transaction management in general. In modern platforms, it is already possible to program and thus automate transactions in the form of so-called smart contracts (Bagha and Madisetti, 2017).

Connecting entities that do not trust each other

DeFi financing brings together entities that do not trust each other.

Cryptocurrency financing is unique in that it enables a transaction without the involvement of a central authority (bank, auction portal), i.e. a third party. Entities do not have to rely on the trust of another to complete a transaction.

3.1.2 Disadvantages

Vulnerability through smart contracts

Nowadays, there are many cryptocurrency platforms that provide smart contracts. The goal was to program digital contracts between two or more participants connected to the system, but which would not be legally enforceable in the real world. Anyone can deploy the program code to the blockchain, there is a chance for the potential misuse of smart contracts (Bagha and Madisetti, 2017).

Product risk

Less mature funds or newer protocols are not tested and usually have higher returns. There is a significant amount of risk involved in how your income is generated. Unlike a classic bank, there is no regulation or insurance of your money with DeFi.

Privacy

Transparency of transactions is an advantage, but on the other hand, it can be a disadvantage. If the identity of the account owner is known, we can find out a lot of information about him, such as

e.g. account balance, when they spend money, how often and so on. And it is with transparency that a cyber attack can occur.

Availability

A problem can also arise with the availability of nodes, which some owners, for example they can turn off at night. Since there is no central authority, no one guarantees us that the system will work 24/7.

Insurance

Decentralized financing lacks labour insurance. The insurance is intended to protect investors against fraudulent activities or in case of hacking.

Your responsibility

DeFi presents itself as risk-free and hassle-free financing, but it is not responsible for your mistakes. DeFi transfers responsibility from intermediaries to users. If you accidentally lose your funds, no one is responsible but you. As a result, there is a need to create tools in DeFi to prevent human error. With freedom in financing comes responsibility, and many participants are not used to having to take care of themselves, which can lead to losing their funds or being defrauded (Liecher, 2020).

Transactions

With decentralized financing, it is the same as with traditional financing. Users have an electronic wallet created on their account, in which they store funds in cryptocurrencies. When users send money to each other, it's anonymous, no one needs to know about it.

During the transaction, as with traditional financing, the user enters the destination address where he wants to send the money and also enters the amount he wants to send. He then confirms the transaction with his private key assigned to him.

In the next part, a third party enters into the transaction, which confirms the transactions and consists of other users. The reward for users is different for different types of cryptocurrencies. The advantages of cryptocurrency transactions are mainly low fees, speed and transparency. Their speed is a big advantage, mainly because they all take place within one hour. As soon as you enter a transaction, it will be published on the Internet.

Transaction fees are much lower than sending by bank transfer. Huge benefits we register for international transfers. One of the major disadvantages of transactions is non-returnability (if we enter the transaction incorrectly, it will not be returned to us and it is not possible to claim it).

TYPE	DATE	PRICE	SHOW DETAILS
↓ Portfolio Fee (2nd year)	7.02.2022	-62,78 €	Show more
↑ DEPOSIT	23.09.2021	1.000,00 €	Show more
↑ DEPOSIT	18.05.2021	500,00 €	Show more
↑ DEPOSIT	3.03.2021	500,00 €	Show more
↑ DEPOSIT	5.02.2021	500,00 €	Show more

Figure 15. Transactions log example

Source: https://my.fumbi.network/

3.2 Wallets

A crypto-wallet is a device or program that manages public or private keys that are necessary for cryptocurrency transactions, even when the cryptocurrency is not deposited in the wallet. A wallet is also defined as an encrypted long series of random numbers or words (the so-called personal key). All wallets also have a public key, which is mathematically linked to a private key and allows deposits to be accepted. One wallet can accept several keys, i.e. transactions at once.

These wallets are divided into software and hardware. Hardware wallets are physical devices, they look like a USB key, the advantage of these keys is that they work offline and guarantee higher security for the protection of cryptocurrencies. The opposite is software keys that are online, thus also have security risks. The most used wallets are Coinbase.com, Trezor.io, Blockchain.info.

3.3 Blockchain

According to the National Security Agency, blockchain is defined as an infrastructure that enables different distributed software applications to store, access and store data in a way that guarantees data integrity and high availability, as well as confidentiality.

These are data records of a smaller scale, meaning that only basic information about events, messages or transactions arising in the ecosystem of mutually communicating parties (participants) is entered into the blockchain (NBU, 2021) (Mirri, 2019).

Cryptocurrencies are based on blockchains, which allow parties that do not trust each other to agree on the transfer of funds with minimal counterparty risk (Harwick and Caton, 2020).

Blockchain can also be understood as a type of decentralized distributed database, where there is a list of records where blocks are connected to each other. A record is any information that should be kept in the database, e.g. a record of receiving the shipment or a record of the creation of a document (Mirri, 2019).

In order for transactions to be carried out on blockchains, fees expressed in cryptocurrency units of the blockchain must be paid (Metin and Őzturan, 2022).

Blockchain is one type of distributed network. This is the basic technology of cryptocurrencies, where not only money or currency may be stored within the database, but different types of data may be involved in these cases. When entering data into the database from participants, other participants must confirm the correctness of the entered information and it can then be added to the block (Hrabčák, 2019).

Characteristic features of blockchain:

- is based on an agreement – there must be an agreement between the participants, only then can the information be added to the block,
- cryptographic sealing – information cannot be reversed or replaced, therefore it is closed in blocks,
- chronological sequence of information – information, transactions are recorded chronologically in the blockchain,
- it is digital - no paper documentation.

3.4 Cryptocurrency mining

Cryptocurrency mining is a very interesting process by which cryptocurrencies are compared to digital gold. However, for profitable mining it is necessary to create your own hardware just for mining. As a result of mining, this process becomes extremely competitive, but if we want to mine, we need to study how mining works, find out the cost of electricity, which contributes to the calamitous increase in the environmental footprint, and learn how to mine most efficiently. It is for these reasons that customers prefer to buy cryptocurrency and thus avoid difficulties. (JANA et al., 2022).

3.4.1 Mineable cryptocurrencies

The category of minable cryptocurrencies includes all cryptocurrencies that can be mined by the general public. These currencies include Bitcoin, Litecoin and many others (Coinmarketcap, 2022).

Mineable cryptocurrencies also include preloaded cryptocurrencies. Cryptocurrencies that are frontloaded are known because a certain percentage of their entire money supply is frontloaded, meaning that it was mined by the creator of the cryptocurrency itself or by a small group of people. Among them are, for example, FuelCoin, CureCoin and others (Coinmarketcap, 2022).

3.4.2 Non-minable cryptocurrencies

They represent cryptocurrencies that are not mineable by the public. In this case, it can be cryptocurrencies that use a different system than mining or are not intended for the general public. Non-minables include Ripple, BitShares and others (Coinmarketcap, 2022).

Fully preloaded cryptocurrencies also belong to the category of non-minable cryptocurrencies. Fully leveraged cryptocurrencies are cryptocurrencies whose total money supply has been leveraged, such as Ripple or Osmosis.

4 Conclusion

The use of decentralized financing is on track, but still has room for improvement. Decentralized finance will find many new users in the future and will enter everyday life and be a daily part of financing.

Investors who want to invest and thus take risks with their funds should first of all answer the following questions: What should I buy? How much should I buy? When should I buy it? When should I sell it? These questions cannot be answered in the future, as the market fluctuates, which means that sometimes it is up and sometimes down. Investment platforms provide the investor with help and information on when to buy and sell cryptocurrencies. The most used investment platforms include: eToro, FUMBI, Binance, Kriptomat and Coinbase.

Acknowledgements

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Unemployment in Slovakia and its comparison with other V4 countries

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Abstract

Research background: If there is an imbalance between demand and supply in the labour market, unemployment occurs. Unemployment is a phenomenon that is part of our lives and has a negative impact on every person. It represents a serious economic and social problem that is part of every country and cannot be solved without state intervention. The problems brought about by unemployment have an impact not only on the individual, but also on the whole society. Therefore, countries around the world are trying to fight unemployment, for example, through various tools of active labour market policy, on which the governments of individual countries spend considerable funds.

Purpose of the article: The main aim of this article is to carry out the analysis of the development of the unemployment rate in Slovakia and then compare the development of the unemployment rate in Slovakia with other V4 countries.

Methods: In this study, we made an analysis of the development of unemployment in countries such as Hungary, Poland, the Czech Republic and Slovakia, during the period 2011-2020. For the analysis, we used the data available from EUROSTAT.

Findings & Value added: The results of the study indicate that among the countries of the Visegrad Group, the Slovak Republic is the country with the highest unemployment rate. The results could be beneficial in the case of efforts to reduce the unemployment rate through various instruments or government measures, not only in Slovak Republic.

Keywords: *unemployment; development of unemployment; unemployment rate*

JEL Classification: *E20; E24; J64*

1 Introduction

Unemployment is a phenomenon that represents a problem for the whole society. It affects the lives of individuals and is part of the economies of all countries of the world. We classify unemployment among the socio-economic problems belonging to the market

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economy. It affects not only less successful economies, but also developed market economies. The high rate of unemployment, together with the high rate of inflation, are considered the most serious economic problems ever. (Chu et al., 2021; Simionescu, Cifuentes-Faura, 2022)

Unemployment can be understood as a state in the economy when all the working population, who are of productive age and at the same time willing to work, cannot find a job on the labour market for certain reasons (Sengupta, 2009).

A situation where a high rate of unemployment of economically active people appears is an undesirable phenomenon. It is employment and productive work that represent the conditions of socio-economic development at the level of the region and the state. An increasing amount of professional literature points to the negative consequences of job insecurity in many areas of life. The impact of unemployment on the economy is mainly manifested in the economic loss that occurs when there is no full employment in the economy and therefore the output is below the potential level. (Švábová et al., 2019; Fiori et al., 2016; Eckhard, 2022)

Different measures of the labour market are used to solve the problem of unemployment, Berzinskiene and Juozaitiene (2011) talk about the regulation of relations between employees and employers, determining the amount of the minimum wage, assistance for employees and job seekers, unemployment insurance services.

Currently, even in the countries of the European Union, which are perceived as economically stable, unemployment is fought through the tools of active labour market policy (Švábová, Ďurica, Klieštik, 2019).

The classification of tools of active labour market policy by the authors d'Hombres and Santangelo (2019) is identical to the classification of tools of active labour market policy used by Eurostat and also by the Organization for Economic Cooperation and Development, these three groups are concerned:

- training courses,
- incentives for employees,
- labour market services.

Hamalainen (2002) says that the government knows how to intervene in regional labour markets through active measures. Such measures include education on the labour market and selective measures in the field of employment.

The effectiveness of active labour market policy instruments depends above all on the sufficient level of their financing and, of course, on the effectiveness of their setting. If these instruments were underfunded or ineffective, the effect of these instruments would be very low or could disappear altogether.

The main aim of this article is to analyse the development of the rate of registered unemployment in Slovakia and compare it with the development of the rate of registered unemployment in other countries of the Visegrad Group. The structure of this article is follows. In the introduction part, we focus on the basic theoretical framework related to the solved problem, it presents studies that, like us, are devoted to the given problem. A description of the individual methods of unemployment quantification can be found in the Methodology section. The analysis of unemployment development in individual countries can be found in the Results section. The results section is followed by a discussion and conclusion, which contains a brief summary of the obtained results.

2 Methods

In the conditions of the Slovak Republic, two different metrics are used to calculate the unemployment rate. The type of metric depends on the institution that quantifies unemployment, it can be the Center for Labour, Social Affairs and Family (COLSAF) or

the Statistical Office of the Slovak Republic. In the case of both metrics, the unemployment rate is quantified by the following relationship:

$$MN = \frac{NEZ}{EAO} * 100 \ [\%] \tag{1}$$

where MN represents the unemployment rate, NEZ is the total number of unemployed persons and EAO represents the economically active population. The difference between these metrics lies in the definition of unemployment and the economically active population (Illés and Ódor, 2005).

Since both of these institutions follow a different definition of the economically active population, the way they calculate the total number of the economically active population, which is a variable in the denominator of the relationship for calculating the unemployment rate, also differs. For this reason, it is possible to observe two different rates of registered unemployment in the conditions of the Slovak Republic.

Due to the fact that the legislation regarding the unemployment rate and its calculation differs in the states, this unemployment rate cannot be used for comparison between individual countries. Since in this article we are comparing the unemployment of several countries, such as the Slovak Republic, the Czech Republic, Hungary and Poland, in order to ensure a good comparability, it is necessary to use the same metric.

The European Statistical Office compiles the unemployment rate for EU member states. A "harmonized" unemployment rate based on International Labour Organization definitions is compiled. "Harmonized" mean values that concern individuals and households are used by EUROSTAT for the entire EU to ensure the comparability of member states (Illés, Ódor, 2005). In this case, the unemployment rate is calculated by the following relationship:

$$unemployment\ rate = \frac{number\ of\ unemployed}{labour\ force} * 100 \ [\%] \tag{2}$$

In this study, we will focus on the analysis of the development of unemployment in Slovakia during the period 2011-2020, while using freely available data from the Statistical Office of the Slovak Republic (www.datacube.statistics.sk).

In the case of comparing the unemployment rate of the Slovak Republic with other countries of the Visegrad Group, we work with data from EUROSTAT, because we are comparing several countries with each other, and as mentioned above, in order to be able to compare the unemployment rates of individual countries, it is necessary to use the same methodology for calculating the unemployment rate.

3 Results

We can consider the countries of the Visegrad Group as countries that operate at a similar level of economic development and are characterized by a similar employment structure (Zielinski, 2015). This is precisely why we decided to compare the development of unemployment in the countries of the Visegrad Group, which also includes the Slovak Republic.

3.1 Unemployment in Slovakia

During the monitored period of 2011-2020, it was also possible to observe the emergence of unemployment in the territory of Slovakia. The data from which he analyses the development of the registered unemployment rate in the Slovak Republic come from the official database of the Statistical Office of the Slovak Republic. The values of the

registered unemployment rate quantified in Slovakia during the monitored period can be found in the following table.

Table 1. The registered unemployment rate in Slovak republic during period 2011-2020 [%]

year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
registered unemployment rate	13,59	14,44	13,50	12,29	10,63	8,76	5,94	5,04	4,92	7,57

Source: own elaboration according to www.datacube.statistics.sk

For a better overview of the development of the rate of registered unemployment in the Slovak Republic in the period 2011-2020, we have shown the rate of registered unemployment on a graph.
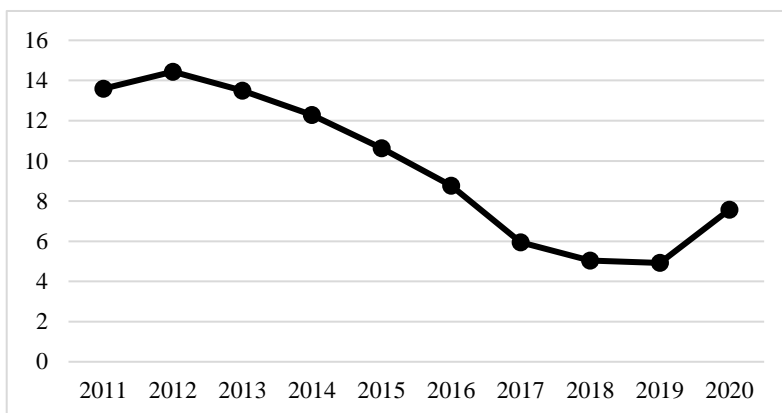
Figure 1. The development of registered unemployment rate in Slovak republic during period 2011-2020.

Source: own elaboration according to www.datacube.statistics.sk

From graph 1, it can be seen that during the observed period of 2011-2020, the rate of registered unemployment in Slovakia recorded by the Statistical Office of the Slovak Republic tended to decrease. The exception in this case was the year 2012, when the registered unemployment rate reached the highest value of 14.44%, which represented an increase compared to the previous year of 2011 by 0.85 percentage points. However, since 2012, it was possible to observe a decreasing trend in the development of unemployment. This trend could be observed until 2019, when the registered unemployment rate reached the lowest value of the entire monitored period. In 2019, the registered unemployment rate was 4.92%. However, a reversal can be observed in 2020, this year the registered unemployment rate increased to 7.57%.

The fact that in 2020 there was an increase in the rate of registered unemployment can be connected with the Covid-19 pandemic, which significantly affected the lives of people not only in Slovakia, but all over the world (Švábová and Gabríková, 2021). People started working from home, employers in an attempt to avoid bankruptcy were forced to reduce the number of jobs, or even some were forced to close their businesses (Marinescu, Skandalis, Zhao, 2021).

We can say that during the observed period, the decreasing trend of unemployment, with the exception of the last year, was perceived as desirable. The aim of labour market policymakers is to fight unemployment and increase employment (Rotar, 2018). In order for the makers of labour market policy to effectively fight unemployment in Slovakia, they

should know which of the regions of Slovakia has the highest and, conversely, which of the regions has the lowest rate of registered unemployment. After that, they can focus activities aimed at reducing unemployment in those regions where it is most needed.

The values of registered unemployment in individual regions of Slovakia can be found in the following table.

Table 2. The registered unemployment rate in the regions if the Slovak Republic during period 2011-2020 [%]

Region	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Bratislava	5.41	5.72	6.17	6.13	5.34	4.51	3.05	2.62	2.83	4.71
Trnava	8.88	9.43	9.16	8.03	6.71	4.41	2.60	2.31	2.63	5.18
Trencin	9.95	10.89	10.74	9.56	7.71	5.85	3.53	2.93	3.20	5.39
Nitra	13.27	14.08	12.52	11.21	9.71	6.96	4.05	3.12	2.93	5.50
Zilina	11.91	12.79	12.51	10.91	8.86	6.92	4.70	4.04	3.96	6.53
Banskobystrica	19.83	20.81	18.26	17.22	14.94	12.80	8.67	7.03	6.69	9.83
Presov	18.95	20.66	19.35	17.45	15.50	13.91	9.68	8.61	8.19	11.39
Kosice	18.76	19.58	17.23	15.92	14.39	12.76	9.94	8.17	7.57	10.55
Slovak Republic	13.59	14.44	13.50	12.29	10.63	8.76	5.94	5.04	4.92	7.57

Source: own elaboration according to www.datacube.statistics.sk

From the data presented in Table 2, we can see that during the entire observed period, the highest unemployment values are shown by regions such as Banskobystrický, Prešovský and Košický. The values of the registered unemployment rate in these regions during the monitored period exceeded the value of the average registered unemployment rate in the Slovak Republic.

In the following figure, we have shown the distribution of the registered unemployment rate in individual regions of Slovakia at the beginning of the monitored period, i.e. in 2011 and at the end of the monitored period, i.e. in 2020.

Figure 2. The distribution of the registered unemployment rate in individual regions of Slovakia in 2011 and in 2020.

Source: own elaboration according to www.datacube.statistics.sk

3.2 Unemployment in V4 countries

Because each of the analysed countries could use one of their own national metrics to calculate unemployment. Given that we are comparing the unemployment rate of EU

countries, we used data from the EUROSTAT database. For this reason, the individual data on the unemployment rate in Slovakia differ from the data and previous analysis.

The following table contains data on the unemployment rate in the countries of the Visegrad Group for the period 2011-2020.

Table 3. The registered unemployment rate in V4 countries during period 2011-2020 [%]

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Czech Republic	6.7	7.0	7.0	6.1	5.1	4.0	2.9	2.2	2.0	2.6
Hungary	11.0	11.0	10.2	7.7	6.8	5.1	4.2	3.7	3.4	4.3
Poland	9.7	10.1	10.3	9.0	7.5	6.2	4.9	3.9	3.3	3.2
Slovakia	13.6	14.0	14.2	13.2	11.5	9.7	8.1	6.5	5.8	6.7

Source: own elaboration according to https://ec.europa.eu/eurostat/web/main/data/database

For a better illustration of the comparison of the development of the rate of registered unemployment in individual countries. We will show the data from table 3 in the following figure.
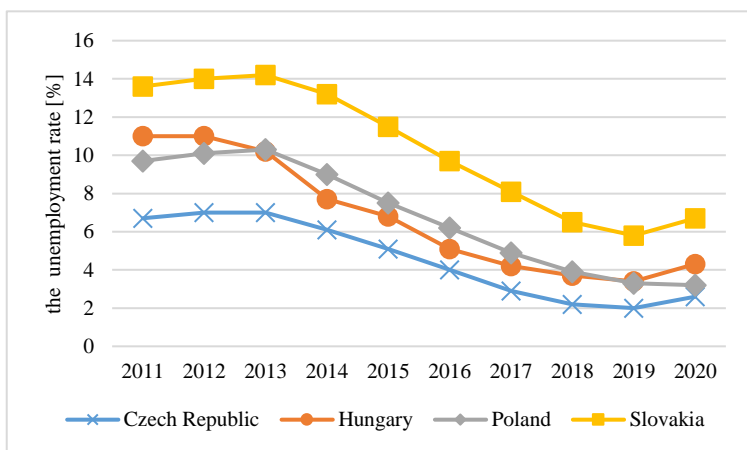
Figure 3. The development of registered unemployment rate in V4 countries during period 2011-2020.

Source: own elaboration according to https://ec.europa.eu/eurostat/web/main/data/database

From Figure 3, we can see that the unemployment rate in individual V4 countries in the period 2011-2020 developed similarly, which confirms that the countries are characterized by a similar employment structure and level of economic development.

In Hungary, the unemployment rate in 2011 was only slightly lower than Slovakia, namely 11%. In 2012, the unemployment rate in Hungary was at the same level as in 2011 and started to decrease in the following year. The development of the unemployment rate in the following years in Hungary can be considered positive, as it decreased. In 2019, the unemployment rate in Hungary was 3.4%, which is lower than in Slovakia. However, in Hungary, the unemployment rate in 2020 reached higher values than in the previous year, namely 4.3%.

The unemployment rate in Poland in 2011 was 9.7%, which is also lower than in Slovakia. In the following two years, the unemployment rate rose to more than 10%. Since 2014, the unemployment rate in Poland has started to decrease. Unlike the other three countries, the V4 declined until 2020, when it had a value of 3.2%.

The Czech Republic had the lowest unemployment rate in the entire selected period of 2011-2020. In 2011, it was at the level of 6.7%, and in the following two years, the unemployment rate in the Czech Republic was 7%. Similar to the other V4 countries, the unemployment rate in the Czech Republic began to decline in 2014. The decline stopped at 2% in 2019. Similar to Slovakia and Hungary, the unemployment rate in the Czech Republic increased to 2.6% in 2020.

Compared to the other three V4 countries, the Slovak Republic had the highest unemployment rate during the entire selected period of 2011-2020. It had the worst values compared to the Czech Republic. Compared to Poland and Hungary, during the years 2011-2013, it was closer to the unemployment rate in Hungary. Since 2014, it has been closer to Poland's unemployment rate, but this changed again in 2020, as Poland achieved a lower unemployment rate than Hungary in 2020.

4 Discussion

Rezabek et al. (2022) compared the development of the unemployment rate in individual countries of the Visegrad Group, Germany, Austria, EU 28 countries, EU 15 countries and also Euro area (19 countries). Their research period was 1999-2018. They came to the conclusion that the situation was the worst in Slovakia among the countries studied, while the Czech Republic was the best.

Schwarcz, Kováčik and Valach (2021) evaluated the development of selected economic and social indicators during the period 2005-2017, focusing on countries such as the Slovak Republic, the Czech Republic, Hungary and Poland, i.e. countries belonging to the Visegrad Group. Unemployment in individual countries rose after 2008, this trend continued until 2010, the situation stabilized only in 2013. In this case, the highest number of unemployed people was measured in Poland, the lowest number of unemployed people was found in the Czech Republic. However, the authors found that during the entire period, direct investments in all the studied countries increased, except for Slovakia.

The development of unemployment after 2020 was primarily influenced by the COVID-19 pandemic. As in other countries, the COVID-19 pandemic also contributed to unemployment in Slovakia. As the country took various measures to contain the spread of the virus, in an effort to avoid bankruptcy, employers began to close their businesses and lay off workers. For this reason, unemployment began to increase in the country (Švábová, Gabríková, 2021).

5 Conclusion

In the presented article, we focused on analysing the development of the registered unemployment rate in Slovakia and comparing it with the development of the registered unemployment rate in the other countries of the Visegrad Group. We monitored the entire situation regarding unemployment during the period 2011-2020.

In the case of the Slovak Republic, we focused on monitoring the overall rate of registered unemployment and then on the rate of registered unemployment in individual regions of Slovakia. In the case of Slovakia as a whole, it can be said that unemployment tended to decrease almost throughout the observed period, with the exception of the first analysed year, 2011, and the last analysed year, 2020. In the case of the regions of Slovakia, the highest unemployment values were shown by regions such as Banska Bystrica, Presov and Kosice regions. On the contrary, the lowest values of the registered unemployment rate could be observed in the Bratislava, Trnava and Trencin regions. Based on the graphic analysis, we can conclude that the eastern part of Slovakia suffers from a high unemployment rate.

When comparing the development of unemployment in Slovakia with other countries of the Visegrad Group, we used the data available in the EUROSTAT database, because when determining the amount of registered unemployment in individual countries, it was necessary to use a uniform methodology for its calculation. Among all four countries studied, the Slovak Republic was characterized by the highest rate of registered unemployment, during the entire observed period of years, 2011-2020. On the contrary, the country with the lowest rate of registered unemployment was the Czech Republic.

Acknowledgements

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The analysis of customers' communication preferences in the banking industry

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Abstract

Research background: The current consequences of the financial crisis, together with the strong pressure of globalization, are causing increased banking competition and a rapid decline in the number of independent banking institutions, mainly due to numerous acquisitions and mergers. Thanks to these pressures, marketing is becoming even more effective, and the communication dogmas used in the past are slowly being removed. This change means that banking institutions can generally become more attractive to a larger part of potential clientele with their marketing communication, considering all the specifics of the segment

Purpose of the article: The aim of the paper is to reveal the possible existence of statistical dependence between the age of the respondents (clients of commercial banks) and their preference for the channel of communication with the banking institution.

Methods: The method of collecting data through a questionnaire and the contingency analysis (Pearson's chi-squared test) to process the data were chosen for this research.

Findings & Value added: Based on the results, the assumption was confirmed that all respondents, regardless of age, would prefer a similar way of being informed by their bank. Therefore, the generational difference is insignificant when it comes to communication. Customers of banking services use mobile devices as their primary engagement channel and give a lot of importance to human contact as well.

Keywords: *communication channel; preferences; banking industry*

JEL Classification: *M30; D83; G21*

1 Introduction

The current consequences of the financial crisis, together with the strong pressure of globalization, are causing increased banking competition and a rapid decline in the number of independent banking institutions, mainly due to numerous acquisitions and mergers. These changes in institutions have come about thanks to the pressure of clients who are not averse to innovation. Due to the rapid development of information technologies or other

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externalities, banking houses are pushing to shift from basic products designed for everyone to their modifications more closely adapted to the needs of individuals, which in the past were intended only for a higher segment of clients (Moufty, et al., 2022). Thanks to these pressures, marketing is becoming even more effective, and the communication dogmas used in the past are slowly being removed (Krizanova et al., 2013; Kliestikova et al., 2019a; Kliestikova et al., 2019b). This change means that banking institutions can generally become more attractive to a larger part of potential clientele with their marketing communication, taking into account all the specifics of the segment. The aim of the paper is to reveal the possible existence of statistical dependence between the age of the respondents (clients of commercial banks) and their preference for the channel of communication with the banking institution. The established hypothesis is primarily based on the assumption that all respondents, regardless of age, will prefer a similar way of being informed by their bank.

2 Literature review

Due to the homogeneity of financial products, according to Sasse (2008), it is particularly difficult for banks to position themselves in the market and differentiate themselves from the competition. As a result of this fact, he claims that the marketing success of financial services products depends mainly on the communication activity of banks, thanks to which they are able to gain a competitive advantage compared to the competition in the banking market. As stated by Su et al., (2020), the communication of banks is increasingly important not only in theoretical but also in empirical research, while the important role of communication is precisely the management of all market expectations, which are key not only for financial markets but also for the entire economy. On the contrary, Ranaldo and Rossi (2010) understand the term communication as a kind of tool through which banks achieve transparency or a high degree of responsibility. We should also not forget the fact that thanks to communication, banks have a greater influence on the expectations of financial market participants, thereby improving the effectiveness of monetary policy. Korauš (2000) also deals with the issue of communication of financial institutions. According to him, it is relevant that financial institutions inform the client about all product, including the latest ones, their features, news, lower or higher prices and, last but not least, about their comparative advantages over the competition. He also sees the importance of attracting clients, influencing their consumer behaviour, highlighting the strengths of the product, and thus raising the competitive position on the market.

In the interests of all financial institutions, high-quality communication with their current and potential clients, intermediaries and, last but not least, with the public is at the fore. According to the authors, the mission of communication consists in addressing potential clients, subsequently increasing their interest in the offered products, up to bank visits. We should also not forget that the communication between bank employees and clients should be correct, because only with their help can the problem be overcome when the consumer perceives the offer of individual banks as identical. A very similar opinion is held by Čimo et al. (2008), who consider it necessary for every bank to be able to promote itself to the public and actively communicate not only with its clients, but also with intermediaries and the public. In addition to this statement, he also states that the purpose of effective communication is to reach and interest clients with recommended products, to some extent influence their decisions, to be more prestigious compared to the competition, or to present the bank's image.

As stated by Cibáková et al. (2014), marketing communication is an integral part of modern marketing, which demands more than just creating an adequate service or product with an attractive offer and making it available to target customers of financial institutions.

Štarchoň (2017) claims that high-quality marketing communication is beneficial for banks in various areas. Thanks to it, banks reach the subconscious of the public in the widest possible range of their activities. In addition, it influences customer wishes, promotes demand and intensifies consumption. We should also not forget the fact that it expands markets and represents the bank externally. Although this fact is listed last, it does not mean that it is less important than the others are. Girchenko and Panchenko (2020) have a different understanding, who claim that the need for marketing communication in the banking sector results mainly from the fact that nowadays it is difficult for consumers to orient oneself in the crowded market of banking services. According to the authors, it is true that banks cannot do without connected, constantly evolving communication that will correspond to the changing external and internal environment. As stated by Zephaniah et al., (2020), marketing communication shapes attitude, while attitude determines customer loyalty. This is an interesting, innovative point of view, and it can therefore be assumed that through marketing communication and the effective use of all its tools, banking institutions can increase the loyalty of their customers (Somili, 2022). Chochoľáková et al., (2014) are of the unanimous opinion that banks' orientation to product development and other secondary aspects of bank management bring success in the short term, but those banks that focus on communication and building strong customer relationships are successful in long-term time horizon. According to the authors, a prerequisite for building long-term relationships is thorough knowledge of current and prospective clients, their needs, preferences and satisfaction attributes. Hagen and Schürenkrämer (2015) claim that the purpose of marketing communication in banking institutions is to provide the client with the bank's expertise. They are even convinced that the choice of products or services is not determined by the fees for banking services, but by the needs of the given client and his positive relationship with the bank. According to Bornitkov (2011), it is also important that banking institutions adapt the forms and channels of communication depending on the situation not only in the bank itself, but in the entire banking sector. Currently, in the era of the digital economy, Girchenko and Panchenko (2020) and Shpak et al. (2020) consider marketing communication to be indispensable for increasing the efficiency of banks and their profitability. Šalgovirová and Fierriero (2017) have a different view, according to which, despite the fact that the transfer of communication from conventional to digital form occurred relatively quickly, there are still segments that prefer human contact and conservative communication about banking products. Zephaniah et al. (2020) hold a very similar opinion. According to them, the personal communication between sellers and customers is the most convincing.

Marketing communication enables banking institutions to differentiate themselves from the competition and in a unique way to gain a strong position not only on the market but also in the awareness of the target segment. The aim of the paper is therefore to reveal the possible existence of statistical dependence between generations of commercial bank clients and the preferred channel of communication with the banking institution.

3 Methodology

For the purposes of this study, primary data were obtained. The own survey was conducted on a sample of 415 respondents during the fourth quarter of 2021. Based on the number of frequencies of all socio-demographic categories, it can be conclude that the representation of individual traits is in the context of the entire population and with such a large sample size, distribution of sample approximates a normal distribution, which can be proved by a central limit theorem (Kwak & Kim, 2017). The data may therefore be considered suitable for further statistical investigation.

The hypothesis is primarily based on the assumption that all respondents who took part in the marketing survey will prefer a similar way of being informed by their bank. Our goal will be to verify the dependency, or independence between the age of the respondent and their preferred channel of information. The hypothesis was established as follows:

There is no statistical dependence between the age of the respondent and the preferred channel of information.

The hypothesis processes the results from the questions that we obtained from the marketing research conducted. Specifically: What is your age? (generational stratification) and Which channel of information by the bank (communication) do you prefer the most? The importance of monitoring generational differences and their subsequent effective interpretation is growing in all sectors. Generational stratification according to Bencsik et al. (2016) that was used in this paper includes Baby boom generation (1946 - 1960); X generation (1960 - 1980); Y generation (1980 - 1995); Z generation (1995 - 2010). To find out the respondents' communication channel preferences, they were offered the following options: Phone call; SMS; Internet/mobile banking; Social sites; Video call; Face-to-face communication; Uninformed and Non-clients of the bank.

4 Results and discussion

The contingency analysis (Pearson's chi-squared test) to process the data were chosen for this research. To calculate the test statistic, we used the IBM SPSS Statistics software and is shown in Table 1.

Table 1. Pearson's chi-squared test.

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	31.578[a]	21	0.065
Likelihood Ratio	33.915	21	0.037
Linear-by-Linear Association	0.743	1	0.389
N of Valid Cases	415		

Source: author according to SPSS

Significance level α was determined at 0.05. Based on the comparison of the significance level with the P-value (Asymptotic Significance), the null hypothesis was confirmed, so there is no statistical dependence between the variables examined. Based on the results, the assumption was confirmed that all respondents, regardless of age, would prefer a similar way of being informed by their bank. Therefore, the generational difference is insignificant when it comes to communication.

Several researches confirm this fact. The study according to Finn Al (2021) which was focused on exploring the use of financial products and services by Baby Boomers, Millennials and Gen Z has shown only slight differences between generations Y and Z. Other surveys (BAI, 2021; THE FINANCIAL BRAND, 2022; Lahtani, 2016) also show that although there is a noticeable percentage difference between generations, but it is not statistically significant. For this reason, the relevant results are for the whole set. The results are shown in Table 2.

Table 2. Frequency table.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Phone call	25	6,0	6,0	6,0
	SMS/chat	57	13,7	13,7	19,8
	Internet/mobile banking	167	40,2	40,2	60,0
	Social sites	10	2,4	2,4	62,4
	Video call	44	10,6	10,6	73,0
	Face-to-face	97	23,4	23,4	96,4
	Uninformed	9	2,2	2,2	98,6
	Non-clients	6	1,4	1,4	100,0
	Total	415	100,0	100,0	

Source: author according to SPSS

The largest number, exactly 167, in percentage 40.2% of respondents marked the option "Through Mobile and Internet banking". In addition, personal contact is still preferred by clients, up to 97, respectively 23.4% of all respondents prefer this way of being informed about the latest news by the bank. The third most frequently mentioned answer, chosen by 13.7% of respondents, was the option "Through SMS messages or chat." 10.6% prefer to be informed by the bank via video call. Based on the answers, we can also conclude that 6% of respondents are satisfied with information via telephone. The smallest number of respondents (2.4%) prefers to be informed via social networks. The remaining respondents (2.2%) are not informed by the bank and 1.4% of respondents could not answer this question relevantly, as they are not clients of any bank.

5 Conclusion

In today's financial services sector, a true understanding of customer needs and requirements is more important than ever. The universality of the offer of banking services has caused that the financial market become more and more saturated with monotonous products. This is the reason for which the target markets with potential customers become narrower and the clients more distrustful. Based on this fact, it is very important for financial institutions of the banking sector to adapt marketing communication to the specifics of the target market and to identify the requirements, preferences and values of each client in the best and most efficient way possible. It is not for nothing that an institution that understands the true essence of marketing communication will achieve a competitive advantage in the form of a larger market share, customer satisfaction and loyalty.

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The effect of corporate debt on the divergences of the Visegrad Group countries in debt in a global context

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Abstract

Research background: The debt analysis represents a crucial part of the management of the enterprise. This analysis plays a significant role not only in evaluating the current state but also in predicting the future development of the enterprise, which helps in its successful integration into the current market conditions. The share of equity and debt affects the overall financial stability of the enterprise.

Purpose of the article: The main aim of the paper is to carry out a debt analysis of enterprises operating in the Visegrad Group countries using adequate quantitative methods, and the subsequent description and quantification of the existence of statistically significant differences across the monitored countries.

Methods: Financial data from the ORBIS database was the basis for a detailed debt analysis. Subsequently, the non-parametric Kruskal-Wallis test, which does not assume a normal distribution of the underlying data, was used to investigate statistically significant differences between the monitored debt indicators.

Findings & Value added: Statistically significant differences concerning the country of operation of the enterprise exist between individual indicators of indebtedness. The test result shows that the most notable differences can be observed primarily between Slovakia and the Czech Republic, Slovakia and Hungary, Slovakia and Poland, and between the Czech Republic and Poland.

Keywords: *debt analysis; indebtedness indicators; non-parametric test; Visegrad group*

JEL Classification: *F34; F60; G32*

1 Introduction

In the past, the share of equity and debt has become the subject of frequent discussion in the literature because it primarily affects not only the financial stability of an enterprise but also its profitability of own capital. A high share of equity creates prerequisites for greater financial independence and stability of the enterprise (Hudakova et al., 2021, pp. 60-77).

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However, equity is generally more expensive than debt because shareholders demand a higher return than they would get by depositing their funds in a bank (Priem, 2021, pp. 9-40), which is related to the risk involved (Zwak-Cantoriu et al., 2021, pp. 432-446). However, it is possible to use financial leverage and increase the profitability of equity by using debt. High indebtedness increases the cost of debt, the enterprise becomes more unstable, and liquidity problems arise, as borrowed funds must be returned with interest (Horobet et al., 2021, pp. 122-136).

The main aim of this paper is to examine the indebtedness of enterprises operating in the countries of the Visegrad Group realized through 8 essential indicators of indebtedness using adequate quantitative methods.

The paper is divided into the following sections. The first part of the paper contains a literature review, which serves to acquaint the reader with the theoretical basis of the issue of corporate indebtedness. In the second part, methods for the implementation of debt analysis with a focus on the existence of statistically significant differences in the values of the calculated indicators due to the influence of the country of the Visegrad Group are described. The third part describes the results obtained by the previous calculation of selected debt indicators and their subsequent statistical verification, which are compared in the context of other relevant studies published worldwide. At the end of this paper, the most crucial outputs, the limitations, and future research of the corporate debt issue are summarized.

2 Literature Review

Monitoring business performance is extremely important for any enterprise that wants to be successful and is interested in achieving higher competitiveness (Matuszewska-Pierzynka, 2021, pp. 885-906). The success of the enterprise and its prosperity is a very complex activity in the current market conditions. Financial analysis provides a realistic picture of the financial condition of the enterprise by evaluating its current state and predicting its future developments. There are many financial analysis indicators, while debt indicators are intended to measure the financial risk of the enterprise. In general, increased use of debt financing will increase the return on equity if the return on assets is higher than the loan interest rate (Durana et al., 2021, pp. 425-461). Highly loaded enterprises are more sensitive to a drop in business activity. Therefore, they are more likely to be unable to fulfil their contractual and non-contractual obligations than enterprises with a lower equity ratio.

Indebtedness is closely related to the issue of the financial structure, which provides information about the share of equity and debt financing. The corporate debt can be monitored as the share of short-term and long-term capital from total capital (Jencova et al., 2021, pp. 37-46). In many cases, indebtedness is an indicator of the enterprise liquidity (for example, in the case of promissory notes). In general, in times of insufficient liquidity, obligations to suppliers are often settled by issuing promissory notes (Musa et al., 2021, pp. 375-398). Individual debt indicators of the enterprise monitor the structure of its financial resources (Valaskova et al., 2021, pp. 639-659). The share of equity and debt financing has a significant impact on the stability of the enterprise. A high share of equity makes the enterprise stable and independent. On the contrary, the enterprise with a low share of equity is more unstable, while fluctuations in the market and doubts of creditors can have serious consequences.

The use of debt primarily affects not only the risk (Virglerova et al., 2021, pp. 1011-1032) but also the enterprise profitability (Kliestik et al., 2020, pp. 371-400). In unfavourable conditions, when sales are lower for identical costs, the enterprise may have higher financing costs than revenues. The enterprise can thus get into difficulties with repaying its obligations. However, corporate debt is not always only a negative

characteristic of the enterprise. It is true that the higher the indebtedness, the greater the business risk and the related difficulties in obtaining sources of debt financing. In general, the right combination of equity and debt financing, which refers to the selection of an appropriate capital structure, is one of the most crucial questions in the enterprise financial management (Kovacova et al., 2022, pp. 41-59).

3 Methods

The main aim of this paper is to examine the indebtedness of enterprises operating in the countries of the Visegrad Group realized through 8 essential indicators of indebtedness using adequate quantitative methods.

Financial parameters from the ORBIS database, considered a provider of business and financial data on more than 400 million private and public enterprises operating worldwide, were essential for a comprehensive debt analysis. The database provides financial data on 100,057 enterprises operating in the Visegrad Group countries for the monitored period of 2015-2020, which was the basis for a debt analysis. The data from the database had to be adjusted appropriately because not all enterprises were suitable for the debt indicators calculation. Enterprises that do not provide all the input data necessary for the debt analysis in the monitored period were removed. Outlying values were removed from the dataset to reduce the informativeness of the obtained results of the calculated debt analysis. After the final adjustment, the database contains 10,762 enterprises whose elementary identification data are summarized in Table 1.

Table 1. The elementary data of the enterprises operating in the V4 countries in the period under the review

Indicator		Absolute Frequency	Relatively Frequency
Country	SK	2,441	22.68
	CZ	2,503	23.26
	PL	4,746	44.10
	HU	1,072	9.96
Firm size	Small enterprise	616	5.72
	Medium sized enterprise	6,028	56.01
	Large enterprise	3,471	32.25
	Very large enterprise	647	6.01
Legal form	Private limited enterprise	7,701	71.56
	Public limited enterprise	1,605	14.91
	Partnership	1,340	12.45
	Other legal form	116	1.08
Total		**10,762**	**100.00**

Source: own elaboration

The basis for calculated debt indicators was financial data (in thousands of euros), and its basic descriptive statistics, such as average, median, standard deviation, minimum, maximum, and coefficient of variation, are summarized in Table 2.

Table 2. Descriptive statistics of individual financial indicators (values are given in thousands of euros)

	avg.	med.	std. dev.	min.	max.	CV
TOAS	449.230	399.015	157.046	60.255	766.012	0.350
OCAS	45.221	95.641	33.114	12.647	196.314	0.732

DEBT	128.447	178.772	99.145	0.000	613.774	0.772
NCLI	85.973	93.013	57.062	1.256	298.365	0.664
CULI	155.713	149.252	92.133	2.308	335.112	0.592
EBIT	35.444	26.497	33.003	-19.287	773.596	0.931
SHFD	207.544	162.022	81.556	1.448	800.164	0.393
INTE	2.634	8.119	1.078	0.344	27.145	0.409

Note: TOAS Total Assets, OCAS Other Current Assets, DEBT Debtors, NCLI Non-Current Liabilities, CULI Current Liabilities, EBIT Earnings before Interest and Taxes, SHFD Shareholders Funds, INTE Interest Paid
Source: own elaboration

A comprehensive analysis focused on the indebtedness of enterprises operating in the Visegrad Group countries in the monitored period was carried out using eight debt indicators. Formulas necessary for the subsequent calculation are summarized in Table 3.

Table 3. Summarized formulas of indebtedness indicators

Ratio	Algorithm
Total indebtedness ratio	Current and non-current liabilities to total assets
Self-financing ratio	Shareholders funds to total assets
Current indebtedness ratio	Current liabilities to total assets
Non-current indebtedness ratio	Non-current liabilities to total assets
Debt-to-equity ratio	Current and non-current liabilities to shareholders funds
Interest coverage ratio	Earnings before interest and taxes to interests paid
Equity leverage ratio	Total assets to shareholders funds
Insolvency ratio	Current and non-current liabilities to receivables

Source: Valaskova et al. (2021)

The financial analysis regarding the indebtedness of enterprises was carried out in the following methodological steps.
1. Firstly, it was necessary to calculate the individual monitored debt indicators separately for enterprises operating in the Visegrad Group countries in the monitored time horizon, set from 2015 to 2020.
2. In the next step, the normality tests (Kolmogorov-Smirnov and Shapiro-Wilk tests) were used to determine if a dataset is well-modelled by a normal distribution. The normality tests are supplementary to the graphical assessment of normality and its ability to detect whether a sample comes from a non-normal distribution. The p-value is interpreted against a significance level of 5 % and finds that the test dataset deviates significantly from normal distribution.
3. The Kruskal-Wallis test, a non-parametric alternative to one-way ANOVA test, was used to determine that at least one sample stochastically dominates one other sample. The test extends the two-sample Wilcoxon test in the situation where there are more than two groups. The Kruskal-Wallis test result does point to a significant difference between groups but does not identify which pairs of groups are different, so the Bonferroni correction was used to limit the possibility of getting a statistically significant result and for counteracting the multiple comparisons problem.

4 Results and Discussion

The assessment of corporate indebtedness is generally based on various debt indicators, which primarily examine the structure of the financing sources of the enterprise. These ratios express and quantify the extent to which the enterprise primarily uses debt to finance

its needs. The following indebtedness indicators were selected to fulfil the main aim of this paper, namely the total indebtedness ratio, self-financing ratio, current indebtedness ratio, non-current indebtedness ratio, debt-to-equity ratio, interest coverage ratio, equity leverage ratio, and insolvency ratio. The average values that individual debt indicators reached in the monitored period are summarized in Table 4.

Table 4. 6-year average values of indebtedness indicators

Ratio	6-year average values
Total indebtedness ratio	0.538
Self-financing ratio	0.462
Current indebtedness ratio	0.388
Non-current indebtedness ratio	0.149
Debt-to-equity ratio	1.531
Interest coverage ratio	13.454
Equity leverage ratio	2.531
Insolvency ratio	2.244

Source: own elaboration

The fundamental indebtedness indicators, indicating the extent to which the enterprise needs are covered by its equity and debt financing sources, are the total indebtedness ratio and the self-financing ratio. In general, these indicators are complementary, i.e. their sum must be equal to 1, or 100 %. The total indebtedness ratio, expressing the ratio of current and non-current liabilities to total assets of the enterprise, reached an average value of 0.538 in the monitored period, which means that 1 € of total assets is covered by 0.538 € of the total liabilities of the enterprise operating in the Visegrad Group countries. In general, many investors prefer an enterprise with a total indebtedness ratio between 0.3 and 0.6. However, a total indebtedness ratio lower than 0.4 is considered better because this indicator is crucial in assessing the financial risk of the enterprise. On the contrary, if the total debt ratio is higher than 0.6, the enterprise face problems in obtaining financial sources (Stefko et al., 2021). A complementary indicator to this indicator is the self-financing ratio, which expresses the ratio of shareholders' funds to the total assets of the enterprise. The calculated debt indicator result shows that 1 € of total assets is covered by 0.462 € of shareholders' funds of the enterprise. If the enterprise primarily uses debt to finance its business activity, it is crucial to monitor the debt financing sources structure using the analysis of partial indicators of the enterprise financial structure, including the current indebtedness ratio and non-current indebtedness ratio. These indicators express the use of short-term and long-term debt in the enterprise. The more the share of bank loans and aid in the financing of the enterprise grows, the more the enterprise depends on this form of financing and the importance of knowing the structure and conditions of this financing for its financial management grows (Michalkova et al., 2021, pp. 276-295). From the calculated results, it is clear that enterprises operating in the V4 countries use an average of 38.8 % of short-term and 14.9 % of long-term debt to finance their business activity. The debt-to-equity ratio indicates the ratio of the current and non-current liabilities to shareholders funds of the equity. The enterprise uses this ratio to evaluate how much leverage it uses. From the financial analysis results focused on indebtedness, it is clear that 1.531 € of the corporate debt corresponds to 1 € of shareholders funds. The next debt indicator is the interest coverage ratio, which indicates the enterprise financial performance. This indicator is one of the most crucial indicators of indebtedness, which expresses how many times the profit exceeds the value of the interest that the enterprise must repay and how many times the enterprise is able to cover the interest from debt after paying all the costs associated with the business activity. Hafeez and Kar (2021, pp. 674-688) state that

the optimal value of the indicator is considered to be 3. This indicator reached an average value of 13.454 in the monitored period. The enterprise indebtedness is one of the cardinal components of the financial balance, in which the equity leverage ratio participates in the elementary questions of financial management of the enterprise. The debt indicator is the inverse of the self-financing ratio. Financial leverage is usually based on the idea that debt financing is conventionally cheaper than equity financing. If the value of the equity leverage ratio decreases, the enterprise has an excess amount of capital from its equity. Otherwise, the share of equity in total assets is insufficient. Indeed, the greater the share of debt, the greater the indicator of equity leverage, i.e. high financial leverage represents high indebtedness of the enterprise (Gungoraydinoglu and Oztekin, 2022). The analysis results show that 1 € of shareholders' funds accounts for 2.531 € total assets of the enterprise. The last calculated indicator within the realized debt analysis was the insolvency ratio, which compares the current and non-current liabilities to receivables of the enterprise. In the monitored time horizon of 6 years, the average value of the indicator was 2.244, which means that 1 € of receivables is covered by 2.244 € of total liabilities of the enterprise.

The detailed debt analysis of enterprises operating in the countries of the Visegrad Group was primarily focused on assessing the existence of statistically significant differences between the individual monitored indebtedness ratios concerning the country in which the business entity operates. The aim of the analysis was to point out whether the average values of the debt indicators are the same in all the countries of the Visegrad Group or whether there are statistically significant differences between the individual values of the ratios.

Firstly, it was necessary to verify the normality of the dataset by using the Kolmogorov-Smirnov and Shapiro-Wilk tests, the results of which, however, rejected the null hypothesis that the data come from a normal distribution. The non-parametric Kruskal-Wallis test was used to examine the existence of statistically significant differences between the monitored indicators of indebtedness with respect to the country because the Kruskal-Wallis test does not assume a normal distribution of the data compared to the analogous one-way ANOVA and is not sensitive to outliers in the dataset. The Kruskal-Wallis test result is summarized in Table 5. Statistically significant differences concerning the country of enterprise operation exist between individual indebtedness indicators because the p-value of the test is lower than the chosen significance level for all ratios, so the null hypothesis is rejected.

Table 5. The output of the Kruskal-Wallis test

	TI	SF	CI	NCI
Kruskal-Wallis H	379.269	378.396	458.908	76.086
df	3	3	3	3
Asymp. Sig.	0.000	0.000	0.000	0.000
	D-E	IC	EL	Ins
Kruskal-Wallis H	395.818	81.517	395.012	59.841
df	3	3	3	3
Asymp. Sig.	0.000	0.000	0.000	0.000

Note: TI Total indebtedness ratio, SF Self-financing ratio, CI Current indebtedness ratio, NCI Non-current indebtedness ratio, D-E Debt-to-equity ratio, IC Interest coverage ratio, EL Equity leverage ratio, Ins Insolvency ratio
Source: own elaboration

Due to the existence of statistically significant differences between the eight monitored indicators of indebtedness, a post hoc analysis was carried out in the next step, which pointed to significant pairs between which countries have the most crucial differences in the values

of the indicators. The result of the pairwise comparison of the monitored enterprises considering the country of its operation is summarized in Table 6.

Table 6. The output of the pairwise comparison of countries in which the enterprises operate

TI	Test	Std. Error	Std. Test	Sig.	Adj. Sig.
CZ-HU	-266.395	113.405	-2.349	0.019	0.113
CZ-PL	-474.923	76.748	-6.188	0.000	**0.000**
CZ-SK	1,625.393	88.379	18.391	0.000	**0.000**
HU-PL	-208.527	105.063	-1.985	0.047	0.283
HU-SK	1,358.997	113.836	11.938	0.000	**0.000**
PL-SK	1,150.470	77.384	14.867	0.000	**0.000**
SF	**Test**	**Std. Error**	**Std. Test**	**Sig.**	**Adj. Sig.**
SK-PL	-1,149.496	77.384	-14.855	0.000	0.000
SK-HU	-1,359.308	113.836	-11.941	0.000	0.000
SK-CZ	-1,622.927	88.379	-18.363	0.000	0.000
PL-HU	209.812	105.063	1.997	0.046	**0.275**
PL-CZ	473.431	76.748	6.169	0.000	0.000
HU-CZ	263.619	113.405	2.325	0.020	**0.121**
CI	**Test**	**Std. Error**	**Std. Test**	**Sig.**	**Adj. Sig.**
CZ-PL	-827.723	76.748	-10.785	0.000	**0.000**
CZ-HU	-846.786	113.405	-7.467	0.000	**0.000**
CZ-SK	1,887.400	88.379	21.356	0.000	**0.000**
PL-HU	19.063	105.063	0.181	0.856	1.000
PL-SK	1,059.677	77.384	13.694	0.000	**0.000**
HU-SK	1,040.614	113.836	9.141	0.000	**0.000**
NCI	**Test**	**Std. Error**	**Std. Test**	**Sig.**	**Adj. Sig.**
HU-SK	113.679	113.836	0.999	0.318	1.000
HU-PL	-364.652	105.063	-3.471	0.001	**0.003**
HU-CZ	783.116	113.405	6.905	0.000	**0.000**
SK-PL	-250.973	77.383	-3.243	0.001	**0.007**
SK-CZ	-669.437	88.379	-7.575	0.000	**0.000**
PL-CZ	418.464	76.748	5.452	0.000	**0.000**
D-E	**Test**	**Std. Error**	**Std. Test**	**Sig.**	**Adj. Sig.**
CZ-HU	-293.707	113.405	-2.590	0.010	0.058
CZ-PL	-498.525	76.748	-6.496	0.000	**0.000**
CZ-SK	1,666.818	88.379	18.860	0.000	**0.000**
HU-PL	-204.819	105.063	-1.949	0.051	0.307
HU-SK	1,373.111	113.836	12.062	0.000	**0.000**
PL-SK	1,168.292	77.384	15.097	0.000	**0.000**
IC	**Test**	**Std. Error**	**Std. Test**	**Sig.**	**Adj. Sig.**
SK-CZ	-90.823	88.379	-1.028	0.304	1.000
SK-PL	-399.812	77.384	-5.167	0.000	**0.000**
SK-HU	-919.683	113.836	-8.079	0.000	**0.000**
CZ-PL	-308.989	76.748	-4.026	0.000	**0.000**
CZ-HU	-828.860	113.405	-7.309	0.000	**0.000**
PL-HU	519.872	105.063	4.948	0.000	**0.000**
EL	**Test**	**Std. Error**	**Std. Test**	**Sig.**	**Adj. Sig.**
CZ-HU	-292.491	113.405	-2.579	0.010	0.059
CZ-PL	-500.284	76.748	-6.519	0.000	**0.000**
CZ-SK	1,665.532	88.379	18.845	0.000	**0.000**
HU-PL	-207.793	105.063	-1.978	0.048	0.288

HU-SK	1,373.041	113.836	12.062	0.000	**0.000**
PL-SK	1,165.248	77.384	15.058	0.000	**0.000**
Ins	**Test**	**Std. Error**	**Std. Test**	**Sig.**	**Adj. Sig.**
CZ-HU	-290.608	113.405	-2.563	0.010	0.062
CZ-PL	-407.228	76.748	-5.306	0.000	**0.000**
CZ-SK	671.920	88.379	7.603	0.000	**0.000**
HU-PL	-116.619	105.063	-1.110	0.267	1.000
HU-SK	381.311	113.836	3.350	0.001	**0.005**
PL-SK	264.692	77.384	3.421	0.001	**0.004**

Source: own elaboration

The test results show statistically significant differences in the total indebtedness ratio, debt-to-equity ratio, equity leverage ratio, and insolvency ratio, especially between the Czech Republic and Poland, the Czech Republic and Slovakia, Hungary and Slovakia, and Poland and Slovakia. There are also differences between the Czech Republic and Hungary in the current indebtedness ratio. On the contrary, there are statistically significant differences between all pairs of countries of the Visegrad Group, except Hungary and Slovakia, in the non-current indebtedness ratio. There are no statistically significant differences in the monitored indicator, and the median values are the same. The statistically significant differences were not confirmed in the interest coverage ratio only between Slovakia and the Czech Republic. The Visegrad Group was formed from the post-socialist countries of Central Europe (the Slovak Republic, the Czech Republic, Poland, and Hungary) and thus created an informal grouping of neighbouring EU member states, linked not only by a common geographical location but also by history (Sedliacikova et al., 2021, pp. 99-116). These four countries were very similar in the past in culture, location, customs, religion, economic development, and intellectual values (Durana et al., 2021, pp. 39-55). In the past, many authors have studied the indebtedness of enterprises in the countries of the Visegrad Group. According to Grzegorzewska and Stasiak-Betlejewska (2014, pp. 315-322), the largest share of self-financing is visible in Polish enterprises. The difference between Poland and other countries is quite significant, which proves the high financial independence and security of Polish enterprises. However, the average share of self-financing in Czech enterprises is increasing interannual, and the equity financing is decreasing in Hungarian enterprises, which increases the debt during the monitored period 2007-2012. At the same time, the authors state that the smallest extent of financing the assets of the enterprise with equity is in Slovak enterprises. According to Cernohorska et al. (2017, pp. 175-187), the Czech and Slovak enterprises primarily use long-term bank loans compared to the other countries of the Visegrad Group. A smaller share of long-term loans thus concerns Polish and Hungarian enterprises. On the contrary, according to Ruckova and Skulanova (2022, pp. 117-136), short-term loans are most widely used by Czech and Slovak enterprises. According to the authors, short-term loans are less important for Hungarian enterprises, while Polish enterprises use short-term loans to the smallest extent. In their publication, the authors pointed to the fact that there is a visible difference between the involvement of these capitals in Polish enterprises compared to the other monitored countries. Kluzek and Schmidt-Jessa (2022, pp. 451-481) focused on examining the level of indebtedness and the impact of taxation on the capital structure of enterprises that operate within national and multinational groups in the countries of the Visegrad Group, while the authors pointed out in the results generally to a higher level of indebtedness of domestic corporations. However, many other authors have also studied the debt level in the conditions of the Visegrad Group countries.

5 Conclusion

One of the tasks of financial management is deciding on the need for capital and choosing the appropriate form of financing the development activities of the enterprise. Many studies have been conducted dealing with the preference of a specific source of financing for business activities, but these studies were and are often contradictory. Therefore, it cannot be claimed that there is a universal procedure for choosing a financing source for the development of an enterprise. The enterprise is affected not only by many microeconomic but also macroeconomic factors that, on the contrary, cannot be influenced by the business unit. Indebtedness indicators point to the structure of the financial sources of the enterprise, namely the share of equity or debt financing in the total assets. These indicators indicate the degree of financial stability of the enterprise, where a high share of its own resources makes the enterprise more independent and stable. On the other hand, higher indebtedness increases the risk of financial instability of the enterprise, but in a balanced market environment, the use of equity is more expensive for the enterprise than the use of debt. The indebtedness indicator is most likely to change when financing business activities by debt. In general, an increase in the corporate debt can have a negative as well as a positive impact on the enterprise performance. Growing indebtedness reduces the tax base by the amount of the increase in interest cost, which has a positive effect on the financial result of the accounting period, but it brings with it certain risks.

The main aim of this paper was to carry out a debt analysis of enterprises operating in the Visegrad Group countries using adequate quantitative methods, and the subsequent description and quantification of the statistically significant differences across the monitored countries. A detailed corporate debt analysis was primarily focused on assessing statistically significant differences between the individual monitored indicators of indebtedness with respect to the Visegrad Group country in which the business entity operates. It is clear from the test results that statistically significant differences exist primarily between the Czech Republic and Poland, the Czech Republic and Slovakia, Hungary and Slovakia, and Poland and Slovakia.

Despite the contribution of this paper to the extant literature, the following limitation needs to be highlighted. The scope of the paper (i.e. the focus only on one formation of Visegrad group) limits the extent of generalization of the findings. Future research should examine this phenomenon in more formations, or in a longer time horizon than set for this research, to determine whether there will be differences in the findings and allow for greater generalization and applicability.

Acknowledgements

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Impact of Blockchain application in selected global corporations: Evidence from event study approach

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Abstract

Research background: Blockchain technology was first described in 2008 and is widely associated with cryptocurrencies, but it also founds its purpose in a business environment. Most of the real-life applications of this technology in corporations started in 2019, and it has been tested globally in international companies. As the evidence shows, this emerging technology is mainly used in logistics, supply chain and finance. Moreover, blockchain is expected to help drive global GDP by trillions of USD in the next ten years, which underlines its importance.

Purpose of the article: This article focuses on publicly traded companies that are active globally and have recently applied blockchain technology to their processes. The aim is firstly to identify which companies already used blockchain, select only publicly traded companies and analyse if and to what extent the adoption of blockchain influences the stock price.

Methods: Using fundamental research and event study methodology, we study stock price movement before and after the official announcement of blockchain implementation into the processes of global corporations. By calculating cumulative abnormal returns of stocks in 2 periods, before and after implementation, we observe the behaviour of returns in the stock exchange. Abnormal returns are identified.

Findings & Value added: After individual analyses of selected corporations, it is possible to claim, in general, that implementation could positively impact stock price development, but not immediately after implementing blockchain.

Keywords: *blockchain; supply chain; digitalisation; event studies*

JEL Classification : *G14 ; O30 ; O31*

1 Introduction

Blockchain technology, as described initially in 2008 by Nakamoto is mostly used in cryptocurrencies; however, it can also be used in the corporate environment as it can efficiently accommodate various information settlement in encrypted way that ensures trust

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(Mendling, 2018). As businesses keep their eyes open for real applications, the importance of this technology is gaining momentum. Most crucial part of implementing new technology in 21. Century is cybersecurity. Such potential threads are well described by Leng et al. (2021), especially cybersecurity issues in smart manufacturing process. On the other hand, positive relationship between blockchain technology, company's performance, supply chain resilience and business model design was identified. (Li, 2022)

Moreover, it can shape and transform business, according to PWC (2020), having the potential to increase the global GDP by 1,76 trillion USD by 2030. This would be achieved in areas such as Provenance (verification and transformation of the supply chain), Finance (clearing of payments/financial instruments), Identity check and confirmation, Contracts and Claims resolution and the least being Customer engagement - integration with CRM platforms such as Salesforce or Dynamics365 (PWC, 2020).

Our study aims to identify the influence blockchain has on selected publicly traded companies that announced a blockchain technology project. Most of the projects started between 2018-2020, and we constructed a sample of 10 companies from different segments or industries: Automotive, Finance, Food & beverages and Technology. After that, we apply the event study approach to analyse whether the first announcement or information about starting a blockchain project significantly influences the stock price around the event day.

The paper is organised into the following sections: In the Literature review, we summarise recent studies on this or similar topics to see at which level the current knowledge in this field. The next part describes the Methodology and Data used in our research and the calculation procedure. The final parts are Results and Conclusion, where the most important findings are described and discussed.

2 Literature review

Blockchain as a technology has been evolving since its first publication, and most real corporate applications were announced in 2018 and later. Furthermore, literature evidence from recent years shows that most interest in blockchain technology is connected to cryptocurrency, although evidence shows that this technology is feasible for use in different industries, such as supply chain, finance, health, energy, automotive, agriculture and food (Erol et al., 2021). However, this paper aims to analyse blockchain as a viable technology used in various global corporations and study the market reactions to the company's announcement of the first real adoption of this technology.

When analysing literature regarding market reactions to such announcements, there are already a few studies worth mentioning, such as Cheng et al. (2019) or Cahir et al. (2020), where a rather positive effect on willingness to invest into stocks of such companies was observed. A recent study by Chen et al. (2022) are relatively close to our aims and approach, however, in their study, only China and Chinese companies are selected, and the analysis goes beyond pure blockchain announcements. Two groups of companies are constructed – high tech firms and non-high tech firms, both with plans to adopt blockchain in the future. Altogether 302 companies listed on the Shanghai and Shenzhen Stocks Exchanges in 2016 - 2020 were selected. For analysis, two periods are constructed with 41 and 11 trading days. Results showed that blockchain announcements by high-tech companies attracted more investors' attention with stronger stock price reactions, as investors find such companies more credible (Chen et al. 2022).

Another event study analyses financial corporations that use blockchain and the reactions of their stocks during the COVID-19 pandemic. Here again, the common parameter is that high-tech companies, either members of blockchain consortiums or those with some

technological advantages, have better positive stock development results, preventing potential losses during pandemic-related announcements (Paul et al., 2022).

In the study by Liu et al. (2022) announcements concerning blockchain are considered and market reaction is observed. However, in this particular case only 1 company is observed but a total of 143 blockchain announcements are analysed. A combination of event study approach with multivariate regression is used to study the reaction of the market and also to identify factors influencing the change. Positive market reaction on the release day is observed. The announcements are categorised to find that those marked as strategic-level cause more positive market reaction.

3 Methods

3.1 Methodology and data

In this paper, we use the event study approach to quantify the effect of announcements regarding blockchain applications on stock prices. For this purpose, we selected ten globally active corporations and retrieved from the platform Investing.com daily stock close prices for the last ten years. Additionally, to compare prices with broad market performance, we selected MSCI World Index. Since selected companies and indices representing benchmarks are traded in different countries, the problem with non-trading days occurred, which is a common problem in event studies. As in the sample, individual stocks and indexes are present, and a discrepancy in the form of different trading days count can occur. We do not address this problem by setting missing values as zero daily stock returns, as suggested by Kallunki (1997) and Leemakdej (2009). Instead, we have chosen trade to trade method mentioned by Campbell et al. (2010), which involves omitting non-trading days completely. This approach was used in our paper.

After the data preparation phase, we searched for specific announcements regarding real blockchain implementation projects in this paper considered event days (T0). Most of the projects started between 2017-2020. We continue by setting the event window (30 days prior to and after event day) and estimation window, which starts 120 days before the event window (Figure 1).
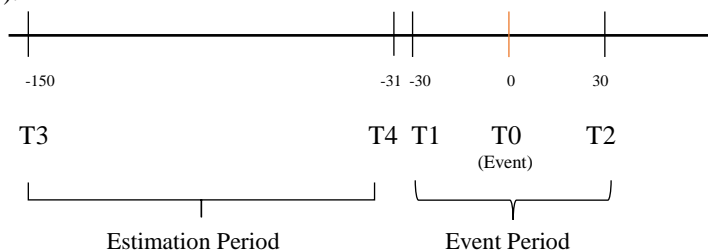
Figure 1. Event Timeline – Estimation Period and Event Period

Source: Own illustration

As a next step, we calculate the actual and expected returns of each company and benchmark index using the OLS Market model, which is described by formulas below:

$$R_{i,t} = \ln\left(\frac{P_{it}}{P_{it-1}}\right)$$
(1)

$$E(R_{i,t}) = \alpha_i + \beta_i \cdot R_{mt}$$
(2)

$E(R_{i,t})$ represents the expected return of Company *i* on day *t*, and R_{mt} demonstrates the return of the benchmark index (in our case MSCI World) at time *t*.

Afterwards, we calculate the individual company's abnormal returns AR_{it} during the event window and cumulative abnormal returns CAR_{it}. Whereas AR is a difference between actual and expected returns, *CAR* is a sum of previous *AR*s. The mentioned procedure is expressed by following two formulas:

$$AR_{i,t} = R_{i,t} - E(R_{i,t}) \tag{3}$$

$$CAR_{i,t} = \sum_{t=T1}^{T2} AR_{i,t} \tag{4}$$

In the next step, we compute average ARs for each day, and as a result, CAR of all average abnormal returns obtained.

In the Table 1 we summarise our sample and corresponding announcement days and sources. Selected corporations come from the Automotive, Finance, Food & Beverages and Entertainment sectors.

Table 1. Companies which implemented blockchain

Company	Official Announcement (Event day T0)	Source
Volkswagen	22.04.2019	https://www.volkswagen-newsroom.com/en/press-releases/from-mine-to-factory-volkswagen-makes-supply-chain-transparent-with-blockchain-4883 https://nederob.medium.com/volkswagen-to-use-ibms-blockchain-technology-65aafdb26f8d
BMW	13.02.2019	https://www.ledgerinsights.com/bmw-blockchain/
Walmart	23.04.2018	https://fortune.com/2016/10/19/walmart-ibm-blockchain-china-pork/ https://fortune.com/2016/10/19/walmart-ibm-blockchain-china-pork/ https://www.bloomberg.com/news/articles/2018-04-23/walmart-is-getting-suppliers-to-put-food-on-blockchain-to-track#xj4y7vzkg https://cointelegraph.com/news/walmart-is-ready-to-use-blockchain-for-its-live-food-business
Allianz	07.11.2017	https://www.coindesk.com/markets/2017/11/07/allianz-unveils-blockchain-prototype-for-self-insurance-products/
Jaguar Land Rover / Tata Motors	16.12.2020	https://www.edie.net/jaguar-land-rover-invests-in-blockchain-for-sustainable-materials-sourcing/
Walt Disney	01.10.2017	https://www.businessinsider.com/disney-blockchain-creators-build-commercial-platform-on-dragonchain-with-ico-2017-9
Goldman Sachs	27.07.2021	https://www.coindesk.com/markets/2021/07/26/goldman-sachs-applies-for-defi-etf/
Anheuser Busch	26.10.2020	https://www.foodbev.com/news/ab-inbev-trials-blockchain-to-track-and-trace-barley-supply-chain/
AT&T	26.09.2018	https://www.ledgerinsights.com/att-consulting-blockchain/
SAP	16.05.2017	https://news.sap.com/2017/05/sapphire-now-sap-cloud-platform-blockchain-service/

Source: internet websites containing announcements

4 Results

After calculations according to our methodology described above we constructed chart with cumulative abnormal returns of 10 observed companies. After that we performed statistical tests using SPSS Software. Our results, as seen in Figure 2 and both tables afterwards, show that returns on the event day T0 are slightly positive, and for 4 out of 10 days after the announcement we can also observe positive performance. However, ten days before the announcement, there were six days with negative returns, which could be caused by other information or rumours about these projects. The market received this as slightly negative, which can be interpreted as a potential risk of new technology implementation.
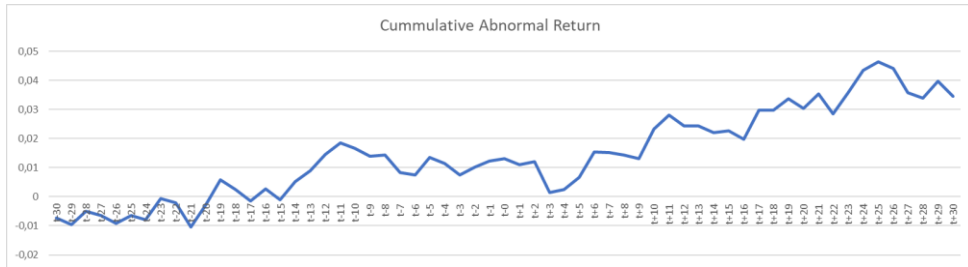
Figure 2. Cumulative Abnormal returns in the event period

Source: Own calculation in MS Excel

Table 2 includes one-sample statistical results which represent the whole event period. In the time period prior to event day we see 14 days of positive average performances out of 30 days. According to our data, period after event day performed similarly, in this case 50% of days were positive.

Table 2. One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean		N	Mean	Std. Deviation	Std. Error Mean
t-30	10	-0,0073	0,0080	0,0025	t+1	10	-0,0021	0,0099	0,0031
t-29	10	-0,0022	0,0091	0,0029	t+2	10	0,0012	0,0093	0,0029
t-28	10	0,0045	0,0123	0,0039	t+3	10	-0,0107	0,0279	0,0088
t-27	10	-0,0014	0,0127	0,0040	t+4	10	0,0011	0,0067	0,0021
t-26	10	-0,0028	0,0096	0,0030	t+5	10	0,0042	0,0114	0,0036
t-25	10	0,0027	0,0141	0,0045	t+6	10	0,0087	0,0161	0,0051
t-24	10	-0,0015	0,0134	0,0042	t+7	10	-0,0002	0,0193	0,0061
t-23	10	0,0073	0,0113	0,0036	t+8	10	-0,0009	0,0153	0,0048
t-22	10	-0,0014	0,0105	0,0033	t+9	10	-0,0012	0,0072	0,0023
t-21	10	-0,0083	0,0148	0,0047	t+10	10	0,0103	0,0316	0,0100
t-20	10	0,0077	0,0217	0,0069	t+11	10	0,0047	0,0237	0,0075
t-19	10	0,0086	0,0312	0,0099	t+12	10	-0,0038	0,0196	0,0062
t-18	10	-0,0034	0,0165	0,0052	t+13	10	0,0000	0,0081	0,0026
t-17	10	-0,0038	0,0187	0,0059	t+14	10	-0,0022	0,0078	0,0025
t-16	10	0,0041	0,0097	0,0031	t+15	10	0,0007	0,0073	0,0023
t-15	10	-0,0038	0,0092	0,0029	t+16	10	-0,0029	0,0114	0,0036
t-14	10	0,0063	0,0201	0,0064	t+17	10	0,0100	0,0372	0,0118
t-13	10	0,0036	0,0094	0,0030	t+18	10	-0,0001	0,0273	0,0086
t-12	10	0,0057	0,0127	0,0040	t+19	10	0,0040	0,0101	0,0032
t-11	10	0,0040	0,0075	0,0024	t+20	10	-0,0034	0,0239	0,0076
t-10	10	-0,0019	0,0125	0,0040	t+21	10	0,0049	0,0234	0,0074
t-9	10	-0,0028	0,0089	0,0028	t+22	10	-0,0068	0,0211	0,0067

t-8	10	0,0005	0,0079	0,0025	t+23	10	0,0074	0,0145	0,0046
t-7	10	-0,0060	0,0157	0,0050	t+24	10	0,0076	0,0204	0,0065
t-6	10	-0,0009	0,0107	0,0034	t+25	10	0,0029	0,0254	0,0080
t-5	10	0,0060	0,0090	0,0028	t+26	10	-0,0023	0,0087	0,0028
t-4	10	-0,0020	0,0164	0,0052	t+27	10	-0,0084	0,0123	0,0039
t-3	10	-0,0041	0,0126	0,0040	t+28	10	-0,0018	0,0131	0,0041
t-2	10	0,0026	0,0126	0,0040	t+29	10	0,0058	0,0137	0,0043
t-1	10	0,0022	0,0089	0,0028	t+30	10	-0,0051	0,0090	0,0028
t-0	10	0,0008	0,0116	0,0037					

Source: SPSS Statistics

After performing statistical tests, following days as seen in Table 3 were tested as significant - at a 10% level of significance: days: t-23, t-5, t+27 and the day t-30 tested as significant on a 5% significance level.

Table 3. One-Sample T-Test

	t	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference Lower	Upper		t	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference Lower	Upper
t-30	-2,882	0,018ᵃ	-0,0073	-0,0131	-0,0016	t+1	-0,669	0,52	-0,0021	-0,0092	0,0050
t-29	-0,782	0,454	-0,0022	-0,0087	0,0042	t+2	0,399	0,699	0,0012	-0,0055	0,0078
t-28	1,158	0,277	0,0045	-0,0043	0,0133	t+3	-1,209	0,257	-0,0107	-0,0306	0,0093
t-27	-0,343	0,74	-0,0014	-0,0104	0,0077	t+4	0,507	0,625	0,0011	-0,0037	0,0059
t-26	-0,925	0,379	-0,0028	-0,0097	0,0041	t+5	1,148	0,28	0,0042	-0,0040	0,0123
t-25	0,609	0,557	0,0027	-0,0074	0,0128	t+6	1,712	0,121	0,0087	-0,0028	0,0202
t-24	-0,349	0,735	-0,0015	-0,0111	0,0081	t+7	-0,038	0,97	-0,0002	-0,0140	0,0136
t-23	2,039	0,072ᵇ	0,0073	-0,0008	0,0154	t+8	-0,184	0,858	-0,0009	-0,0119	0,0101
t-22	-0,406	0,694	-0,0014	-0,0089	0,0062	t+9	-0,524	0,613	-0,0012	-0,0063	0,0040
t-21	-1,766	0,111	-0,0083	-0,0189	0,0023	t+10	1,027	0,331	0,0103	-0,0123	0,0329
t-20	1,116	0,293	0,0077	-0,0079	0,0232	t+11	0,626	0,547	0,0047	-0,0122	0,0216
t-19	0,87	0,407	0,0086	-0,0137	0,0309	t+12	-0,608	0,558	-0,0038	-0,0178	0,0103
t-18	-0,662	0,525	-0,0034	-0,0152	0,0083	t+13	-0,001	0,999	0,0000	-0,0058	0,0058
t-17	-0,647	0,534	-0,0038	-0,0172	0,0096	t+14	-0,907	0,388	-0,0022	-0,0078	0,0034
t-16	1,328	0,217	0,0041	-0,0029	0,0110	t+15	0,313	0,761	0,0007	-0,0045	0,0059
t-15	-1,318	0,22	-0,0038	-0,0104	0,0027	t+16	-0,811	0,438	-0,0029	-0,0111	0,0052
t-14	0,992	0,347	0,0063	-0,0081	0,0207	t+17	0,85	0,417	0,0100	-0,0166	0,0366
t-13	1,223	0,252	0,0036	-0,0031	0,0104	t+18	-0,008	0,994	-0,0001	-0,0196	0,0195
t-12	1,421	0,189	0,0057	-0,0034	0,0148	t+19	1,242	0,245	0,0040	-0,0033	0,0112
t-11	1,707	0,122	0,0040	-0,0013	0,0094	t+20	-0,444	0,668	-0,0034	-0,0205	0,0138
t-10	-0,482	0,641	-0,0019	-0,0109	0,0071	t+21	0,663	0,524	0,0049	-0,0119	0,0217
t-9	-0,975	0,355	-0,0028	-0,0091	0,0036	t+22	-1,02	0,334	-0,0068	-0,0219	0,0083
t-8	0,203	0,843	0,0005	-0,0051	0,0062	t+23	1,614	0,141	0,0074	-0,0030	0,0177
t-7	-1,219	0,254	-0,0060	-0,0173	0,0052	t+24	1,175	0,27	0,0076	-0,0070	0,0222
t-6	-0,259	0,802	-0,0009	-0,0086	0,0068	t+25	0,365	0,723	0,0029	-0,0152	0,0211
t-5	2,126	0,062ᵇ	0,0060	-0,0004	0,0124	t+26	-0,836	0,425	-0,0023	-0,0086	0,0039
t-4	-0,383	0,711	-0,0020	-0,0137	0,0098	t+27	-2,144	0,061ᵇ	-0,0084	-0,0172	0,0005
t-3	-1,018	0,335	-0,0041	-0,0131	0,0050	t+28	-0,428	0,679	-0,0018	-0,0112	0,0076
t-2	0,66	0,525	0,0026	-0,0064	0,0117	t+29	1,34	0,213	0,0058	-0,0040	0,0156
t-1	0,768	0,462	0,0022	-0,0042	0,0085	t+30	-1,802	0,105	-0,0051	-0,0115	0,0013
t-0	0,215	0,835	0,0008	-0,0075	0,0091						

Notes: Test Value = 0; a, b indicate the 5, and 10 percent levels of significance.

Source: SPSS Statistics

Finally, different periods were tested for their statistical significance, as shown in Table 4 and Table 5. The length of periods was set at 30, 15, 5 days, and 1 day prior and after t0, and cumulative ARs of each company were computed. According to our results, the average performance in three out of four periods was at a positive level, and only one period (-5, 5) was slightly negative in total. However, only three companies were negative, which could be seen as rather positive.

Even if the shortest period (-1, 1) was positive on average, six individual companies performed negatively.

No company had significant AR after the announcement except Tata Motors, where a negative AR of -8,59% was observed on the third day after T0.

The most volatile results after t0 occurred in the case of Tata Motors, BMW, AT&T and Anheuser-Busch. In general, in most cases, a positive upward trend was present. However, the results before t0 show that in the case of companies Anheuser-Busch, Tata Motors, Volkswagen and Walt Disney, there were slightly negative abnormal returns in the period t-22 until t-16 and slightly positive in the period t-15 to t-11.

However, as the data show in Table 5, even if selected companies have positive performance on average, this performance is not statistically significant according to our data.

Table 4. One-Sample Statistics of various intervals

	N	Mean	Std. Deviation	Std. Error Mean
(-30,+30)	10	0,0346059	0,1649621	0,0521656
(-15,+15)	10	0,0200345	0,0705450	0,0223083
(-5,+5)	10	-0,0008010	0,0392938	0,0124258
(-1,+1)	10	0,0008429	0,0156227	0,0049403

Source: SPSS Statistics

Table 5. One-Sample T-Test of various intervals

	Test Value = 0				95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
(-30,+30)	0,663	9	0,524	0,034606	-0,083401	0,152613
(-15,+15)	0,898	9	0,393	0,020035	-0,030430	0,070499
(-5,+5)	-0,064	9	0,95	-0,000801	-0,028910	0,027308
(-1,+1)	0,171	9	0,868	0,000843	-0,010333	0,012019

Source: SPSS Statistics

As our data suggests, there was no statistical significance in all four tested intervals.

We want to mention that within this research, we considered only blockchain announcements as the only event influencing the stock price. All other factors that could affect stock price were not acknowledged.

5 Conclusion

Blockchain as an emerging technology is getting more and more popular not only in the business area but also within academia. As this technology is seen as disruptive technology within the company, our aim of this paper was to analyse what influence has this blockchain technology on the company. In this paper, we focused on selected international companies

and published announcements concerning implementing blockchain technology. Using the event study approach, we observed the market reaction in the period that preceded the event, the announcement day, and the period after the event. In general, a positive upward trend was observed after the announcement, especially in the case of Tata Motors, BMW, AT&T and Anheuser-Busch. Around three weeks before the event day, negative abnormal returns were present on the tested sample. However, being closer to the event day, a positive trend has been present for two weeks. The strongest results show Tata Motors, VW, Walt Disney and Anheuser-Busch.

We encourage further research to expand the selected sample, add companies from different sectors, and compare results with a control group of similar companies listed on the stock market that did not consider or implement blockchain technology.

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Rumour or official interest rate change announcement – Influence on green investment performance

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Abstract

Research background: When planning an asset allocation, the two most important factors are taken into consideration for institutional and individual investors - performance and transaction costs. Recently, popular investments globally are ETF funds labelled as "green", "impact", or ESG, focusing on positive influence on the environment while aiming for value appreciation of an investment. As volumes of such funds are rising, there is a need to study these investments from different perspectives.
Purpose of the article: This paper analyses selected green ETF funds by two criteria: AUM and performance. Changes in interest rates can influence the performance of a fund. There are also rumours before the official announcement, so these need to be considered when making an investment decision. Finally, we aim to find out if official or non-official information has a bigger impact on the performance of a green fund.
Methods: Firstly, a sample of 10 green funds is identified, and daily close prices are obtained. Secondly, using the event study method, performance is analysed around two events – the official FED rate hike on March 17th, 2022 and unofficial information prior to it.
Findings & Value added: The analysis of selected funds indicates a significant influence of FED rate hikes on performance after the official announcement. Interestingly, unofficial information in the form of rumours also has a significant impact as in the global connected markets; information spreads quickly before an official statement, which could affect the investment decision.

Keywords: *green funds; ETF; impact investing; rate hikes; portfolio management*

JEL Classification : *G11; G14; F21*

1 Introduction

Green investing is an especially popular term as such investments are offered to the public by investment advisors and various banks. According to Google Trends statistics from the USA, at the beginning of 2020, interest in this topic started to rise from level 7 and oscillated

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around 50 in mid-2022. This indicator expresses popularity where the highest level of 100 points shows maximum popularity. Investment funds, which in their prospectus do not mention social responsibility or sustainable investing, are nowadays hard to find.

Bloomberg predicts that ESG-related investments can be 53 trillion USD by 2025, which would be 30% of global assets under management. Of the total amount, ETF funds represent 190 billion USD by the end of 2021. European ESG market was the biggest in 2021 (Le Sourd and Safaee, 2021) but the pace at which the US market is rising aims for the first place as there was a 318% in assets inflows in 2020 (Bloomberg.com, 2021). This is the main reason and motivation of this paper to concentrate research mostly on the US market.

2 Literature review

Thirty years ago, environmental damage of great scale shocked the world and gained public attention to green investing. This ecological catastrophe was caused by Exxon Valdez in the 1990s when a great amount of oil was spilled in Alaska. Between 615 oil spill events happened between 1989 and 2018, with more than seven metric tons of oil (Leahy, 2019).

One of the definitions of investments that positively impact the environment could be described by a shortcut ESG - Environment, Social and Governance. More specific areas fall under those three categories. Under the category environment are themes like Climate, Resource scarcity, Waste and Water and Biodiversity. The second category is Social, with Human Capital, Safety and health, Demographic change and Food security themes. The last ESG category stands for Governance, which could be defined by Risk and Reputation management, Oversight structures, Corporate Behavior/Governance and Compliance and Corruption. (Gabler Wirtschaftslexikon, 2018)

Regarding ESG ratings, there is quite a disagreement among rating agencies. The analysis shows that more ESG disclosures lead to more disagreement between agencies, leading to higher return volatility. Most prominent ratings are constructed by Morgan Stanley Capital International (MSCI ESG rating system), Thomson Reuters ESG Scores and Sustainalytics ESG Rating Research Methodology (Christensen et al., 2022).

When searching for literature on ESG investing, we first made a clear differentiation between investments in bonds and equities so that the focus lies on equities. Evidence shows that green stocks outperform brown stocks when climate issues intensify (Pastor et al., 2022).

A vast amount of literature exists that focuses on the influence of Covid-19 on the stock market. An event study by Gregory (2022) which involved companies from S&P1500, showed that especially non-financial US companies with implemented ESG strategy had better market development and higher risk-adjusted returns during the first year of the global pandemic. Another event study considered 62 suitable ETFs and took the market crash in February 2020 as an event day. The researchers looked into the period before and after the crash, concluding that lower-rated ETFs outperformed the higher-rated ETFs. Interestingly, ESG ETFs did not exceed the losses of other investments during the crash, suggesting that this type of investment could be considered suitable during downturns. (Pavlova and de Boylie, 2022). Causalities and spillovers between NASDAQ indexes (clean energy, Composite Index and Global Select Market Composite) and energy indexes before and after Covid-19 were also tested to find that both sustainable and green indexes impact each other in the long term and from the start of the pandemic connectivity rose significantly. Evidence shows that sustainable investments performed better during the pandemic than other standard strategies (Sharma et al., 2021). In line with this result is Omura et al. (2021), who investigated equity market performance in most important regions and globally to find that during pandemics, ESG funds did not outperform benchmarks marked as SRI (Social Responsible Investing). However, there is a great amount of attractiveness of such

investments. In the Australian market, a study of 244 ETF funds with ratings from Morningstar uncovered that portfolios with lower carbon and fossil fuel exposure tend to outperform in the Covid-19 period. ESG portfolios are more likely to experience more volatility in stock returns, but their characteristics add an additional layer of protection against market drops (Sun and Small, 2021).

Evidence from Japanese ESG-rated companies showed no evidence that companies with higher ESG scores also have higher abnormal returns, but those with ESG rating outperformed companies without this rating (Takahashi and Yamada, 2021).

The ESG performance analysis of so-called "sin stocks" is very interesting, representing the Alcohol, Tobacco and Firearms industry, where 79 of such companies are compared to the control group of structurally similar companies from traditional sectors. As a result, sin stocks lack ESG practices and are exposed to more severe issues (Paradis and Schiehll, 2021).

3 Methods

3.1 Data and Methodology

In this paper, we are observing two events (two announcements). The first event is the rumour about a possible change of interest rate on April 12th, 2021 (Politi et al., 2021); however, as it was a non-trading day in the US and Friday followed by a weekend, we set Monday, April 5th as the event day. The second event occurred almost one year later, on March 17th, 2022, when FED officially announced a rate hike (Federalreserve.gov, 2022).

We decided to set the event period at the length of 43 days, beginning with t-21 and ending with t+21. The estimation period has 100 days and starts in t-121 and ends in t-22. The visualisation of observed periods – estimation and event window are presented in the Figure 1.
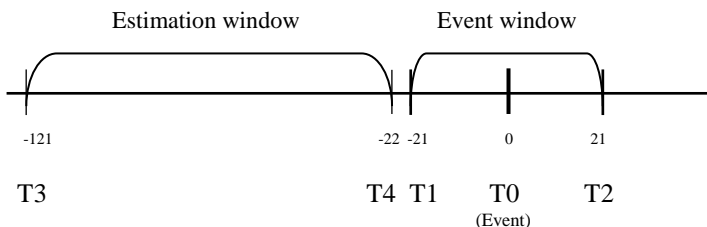
Figure 3. Event Timeline – Estimation window and event window

Source: Own illustration

After setting observed periods, we selected a sample of 10 ETF Funds from the platform www.ETF.com, where we used AUM and ESG description of a fund as a selection criterion. We filtered only Equity funds. Six funds in the sample are from segment US Total Market, one ETF fund Developed Markets Ex-North America Total Market, two funds from segment Emerging Markets Total and one fund labelled as Global Ex-US Total Market. Selected funds are summarised in Table 6.

Table 6. ESG funds

Ticker	Name	Segment	Issuer	Expense Ratio	AUM
ESGU	iShares ESG Aware MSCI USA ETF	Equity: U.S. - Total Market	Blackrock	0.15%	$22.12B

ESGD	iShares ESG Aware MSCI EAFE ETF	Equity: Developed Markets Ex-North America - Total Market	Blackrock	0.20%	$6.35B
ESGV	Vanguard ESG U.S. Stock ETF	Equity: U.S. - Total Market	Vanguard	0.09%	$5.87B
ESGE	iShares ESG Aware MSCI EM ETF	Equity: Emerging Markets - Total Market	Blackrock	0.25%	$4.12B
DSI	iShares MSCI KLD 400 Social ETF	Equity: U.S. - Total Market	Blackrock	0.25%	$3.62B
SUSA	iShares MSCI USA ESG Select ETF	Equity: U.S. - Total Market	Blackrock	0.25%	$3.32B
SUSL	iShares ESG MSCI USA Leaders ETF	Equity: U.S. - Total Market	Blackrock	0.10%	$3.11B
USSG	Xtrackers MSCI U.S.A. ESG Leaders Equity ETF	Equity: U.S. - Total Market	DWS	0.10%	$3.04B
VSGX	Vanguard ESG International Stock ETF	Equity: Global Ex-U.S. - Total Market	Vanguard	0.12%	$2.82B
XSOE	WisdomTree Emerging Markets ex-State-Owned Enterprises Fund	Equity: Emerging Markets - Total Market	WisdomTree	0.32%	$2.44B

Source: Own illustration

As a next step, we obtained daily close prices of each fund from www.investing.com. We then calculated the actual returns of each ETF ESG fund as a continuous logarithm (Formula 1).

$$R_{i,t} = \ln\left(\frac{P_{it}}{P_{it-1}}\right) \tag{5}$$

To obtain expected returns, we used OLS Market Model in which, as a benchmark index, we chose S&P500 (Formula 2).

$$E(R_{i,t}) = \alpha_i + \beta_i \cdot R_{mt} \tag{6}$$

$E(R_{i,t})$ represents the expected return of ESG fund i on day t, and R_{mt} demonstrates the return of the benchmark index, which in our case is index S&P500.

Afterwards, we calculate the individual ETFs abnormal returns AR_{it} during both event windows and also cumulative abnormal returns CAR_{it}. The AR represents the difference between actual and expected returns, CAR is a sum of previous ARs. The mentioned procedure is expressed by following two formulas:

$$AR_{i,t} = R_{i,t} - E(R_{i,t}) \tag{7}$$

$$CAR_{i,t} = \sum_{t=T1}^{T2} AR_{i,t} \tag{8}$$

In the next step, we compute average ARs for each day, and as a result, CAR of all average abnormal returns is calculated.

4 Results

In this section divided into two parts, we summarise the most important results of our calculations and observations.

4.1 The announcement (rumour) in April 2021

As presented in Figure 4, on day t-16, we see the start of a gradual decline of *CARs* which continues for the whole observed period, except for four days around t0 (t-3 to t+1), where only a small change of performance is observed. For this period, approximately 4,00% decline was measured in our sample. Additionally, volatility was quite high from day t-19 to t-13, with difference from -0,60% to 0,60%.
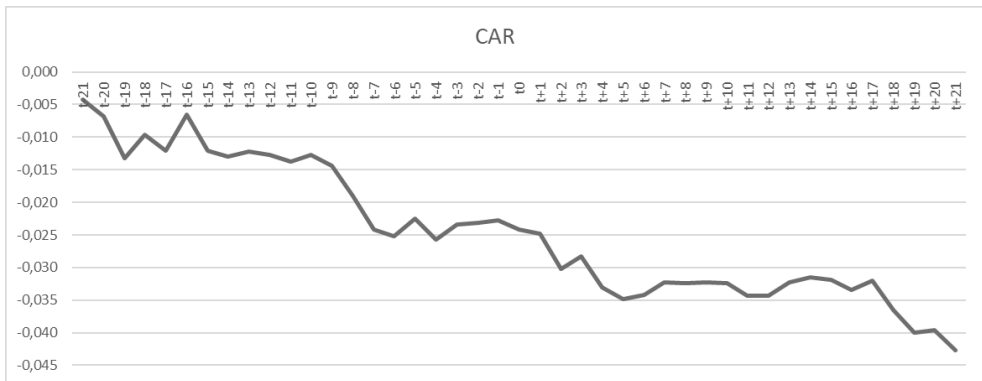
Figure 4. Cumulative average Abnormal returns of ESG funds - event window in 2021

Source: Own calculation in MS Excel

Table 7. One-Sample T-TestTable *7* represents one sample T-test for all days in the event period, and the results show that from all 43 observed days, 19 were tested as significant: 3 days at a 1 % level of significance, 7 days at 5% level of significance and 8 days at 10% significance level.

Table 7. One-Sample T-Test

	Test Value = 0				95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference		
					Lower	Upper
t-21	-3,014	9	0,015[b]	-0,00418	-0,00732	-0,00104
t-20	-1,549	9	0,156	-0,00257	-0,00632	0,001183
t-19	-1,783	9	0,108	-0,00642	-0,01457	0,001724
t-18	2,637	9	0,027[b]	0,003548	0,000505	0,006591
t-17	-1,853	9	0,097[c]	-0,0024	-0,00534	0,00053
t-16	2,092	9	0,066[c]	0,005526	-0,00045	0,011503
t-15	-2,038	9	0,072[c]	-0,00555	-0,0117	0,000609
t-14	-0,931	9	0,376	-0,00091	-0,00311	0,001296
t-13	1,295	9	0,228	0,000796	-0,00059	0,002187
t-12	-1,309	9	0,223	-0,00062	-0,00168	0,000449
t-11	-0,915	9	0,384	-0,00092	-0,00318	0,001348
t-10	0,572	9	0,581	0,000979	-0,00289	0,004852
t-9	-1,183	9	0,267	-0,00172	-0,005	0,001567

t-8	-2,422	9	0,038[b]	-0,00463	-0,00895	-0,00031
t-7	-1,876	9	0,093[c]	-0,00509	-0,01122	0,001047
t-6	-1,499	9	0,168	-0,00112	-0,0028	0,000568
t-5	2,326	9	0,045[b]	0,002747	7,56E-05	0,005418
t-4	-3,332	9	0,009[a]	-0,00314	-0,00526	-0,00101
t-3	2,974	9	0,016[b]	0,00231	0,000553	0,004066
t-2	0,14	9	0,892	0,000141	-0,00213	0,002414
t-1	1,032	9	0,329	0,000494	-0,00059	0,001578
t0	-1,01	9	0,339	-0,00148	-0,00479	0,001833
t+1	-0,457	9	0,659	-0,00064	-0,0038	0,002522
t+2	-2,317	9	0,046[b]	-0,00538	-0,01064	-0,00013
t+3	2,714	9	0,024[b]	0,00194	0,000323	0,003557
t+4	-2,194	9	0,056[c]	-0,00481	-0,00977	0,00015
t+5	-1,373	9	0,203	-0,00176	-0,00466	0,001141
t+6	1,289	9	0,229	0,000666	-0,0005	0,001836
t+7	2,189	9	0,056[c]	0,001925	-6,4E-05	0,003914
t+8	-0,505	9	0,625	-0,00016	-0,00088	0,000558
t+9	0,199	9	0,847	8,81E-05	-0,00091	0,001091
t+10	-0,145	9	0,888	-6,8E-05	-0,00113	0,000992
t+11	-1,255	9	0,241	-0,00198	-0,00555	0,00159
t+12	-0,033	9	0,974	-2,1E-05	-0,00147	0,001423
t+13	3,887	9	0,004[a]	0,002164	0,000904	0,003423
t+14	1,266	9	0,237	0,000694	-0,00055	0,001933
t+15	-1,036	9	0,327	-0,0004	-0,00126	0,000469
t+16	-4,398	9	0,002[a]	-0,0015	-0,00227	-0,00073
t+17	1,208	9	0,258	0,001376	-0,0012	0,003951
t+18	-4,799	9	0,001[a]	-0,00446	-0,00657	-0,00236
t+19	-1,916	9	0,088[c]	-0,00343	-0,00747	0,000619
t+20	0,229	9	0,824	0,000302	-0,00268	0,00328
t+21	-2,234	9	0,052[c]	-0,003	-0,00604	3,78E-05

Notes: a, b, c indicate the 1, 5, and 10 per cent level of significance.

Source: SPSS Statistics

In the last step, 8 intervals were set, *CARs* were calculated and were tested for statistical significance. As a result, five intervals showed statistical significance at the level of 10%. (Table 8)

Table 8. One-Sample T-Test

	Test Value = 0				95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference		
					Lower	Upper
(-21,+21)	-2,236	9	0,052[c]	-0,04264	-0,08577	0,000502
(-15,+15)	-2,039	9	0,072[c]	-0,02542	-0,05363	0,002782
(-10,+10)	-2,195	9	0,056[c]	-0,01869	-0,03796	0,000574
(-5,+5)	-1,829	9	0,101	-0,00957	-0,02141	0,002267
(-1,+1)	-1,971	9	0,08[c]	-0,00162	-0,00348	0,00024
(-5,+10)	-1,634	9	0,137	-0,00712	-0,01699	0,00274
(-5,+15)	-1,379	9	0,201	-0,00666	-0,01759	0,004265
(-5,+20)	-2,196	9	0,056[c]	-0,01437	-0,02918	0,00043

Notes: a, b, c indicate the 1, 5, and 10 per cent level of significance.

Source: SPSS Statistics

4.2 The official announcement in March 2022

The same procedure was repeated for the second event - the official announcement on March 17th, 2022. The cumulative abnormal returns are presented in Figure 5. After a steep decline lasting six days from t-16 until t-8, we observed an upward trend until t+12.
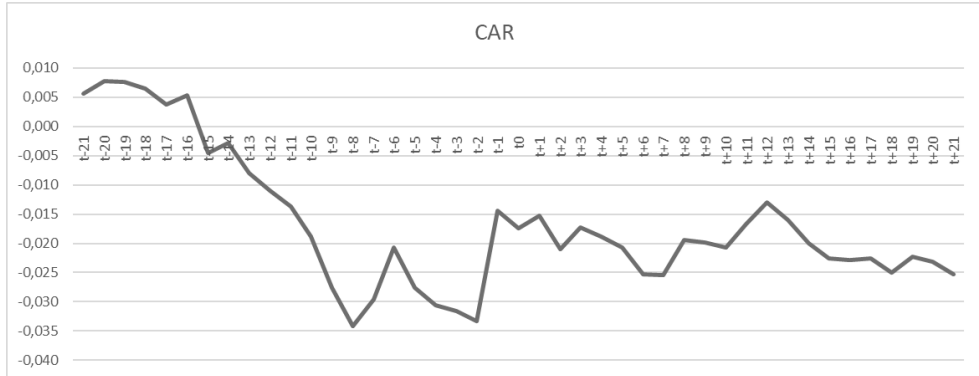
Figure 5. Cumulative Abnormal returns of ESG funds - event window in 2022

Source: Own calculation in MS Excel

Table 9 below represents 43 days of the event period from which 31 days were tested significant, whereas 8 days were tested as significant at 1% significance level, 13 days at 5% significance level and 10 days at 10% significance level.

Table 9. One-Sample T-Test

	Test Value = 0				95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
t-21	3,19	9	0,011[b]	0,005576	0,001621	0,00953
t-20	2,403	9	0,04[b]	0,002128	0,000125	0,004131
t-19	-0,208	9	0,84	-0,00014	-0,00168	0,0014
t-18	-1,407	9	0,193	-0,00108	-0,00282	0,000659
t-17	-2,522	9	0,033[b]	-0,00277	-0,00526	-0,00029
t-16	2,179	9	0,057[c]	0,001535	-5,9E-05	0,003129
t-15	-1,956	9	0,082[c]	-0,00978	-0,02108	0,001531
t-14	1,109	9	0,296	0,001692	-0,00176	0,005142
t-13	-2,314	9	0,046[b]	-0,00519	-0,01027	-0,00012
t-12	-2,122	9	0,063[c]	-0,00296	-0,00612	0,000196
t-11	-2,035	9	0,072[c]	-0,00277	-0,00584	0,000308
t-10	-2,546	9	0,031[b]	-0,00515	-0,00972	-0,00057
t-9	-2,871	9	0,018[b]	-0,00862	-0,01541	-0,00183
t-8	-2,529	9	0,032[b]	-0,0066	-0,01251	-0,0007
t-7	2,71	9	0,024[b]	0,0046	0,00076	0,00844
t-6	3,25	9	0,01[a]	0,008818	0,002681	0,014955
t-5	-3,926	9	0,003[a]	-0,00683	-0,01076	-0,00289
t-4	-2,121	9	0,063[c]	-0,00305	-0,0063	0,000203
t-3	-0,316	9	0,759	-0,00098	-0,008	0,006035
t-2	-1,201	9	0,26	-0,00171	-0,00494	0,001514
t-1	2,255	9	0,051[c]	0,018822	-6,2E-05	0,037706
t0	-1,884	9	0,092[c]	-0,00302	-0,00666	0,000607

t+1	2,469	9	0,036[b]	0,002237	0,000187	0,004286
t+2	-3,008	9	0,015[b]	-0,00577	-0,01011	-0,00143
t+3	2,972	9	0,016[b]	0,003678	0,000879	0,006477
t+4	-2,069	9	0,069[c]	-0,00152	-0,00318	0,000142
t+5	-4,07	9	0,003[a]	-0,0019	-0,00295	-0,00084
t+6	-2,984	9	0,015[b]	-0,00457	-0,00804	-0,00111
t+7	-0,046	9	0,964	-5,4E-05	-0,00272	0,002612
t+8	3,668	9	0,005[a]	0,006001	0,0023	0,009702
t+9	-1,004	9	0,342	-0,00044	-0,00145	0,000558
t+10	-0,725	9	0,487	-0,00082	-0,00338	0,001741
t+11	2,004	9	0,076[c]	0,00393	-0,00051	0,008366
t+12	1,977	9	0,079[c]	0,003693	-0,00053	0,007918
t+13	-2,305	9	0,047[b]	-0,00293	-0,0058	-5,4E-05
t+14	-5,863	9	0[a]	-0,00404	-0,00561	-0,00248
t+15	-1,568	9	0,151	-0,00253	-0,00618	0,001119
t+16	-0,579	9	0,577	-0,00033	-0,00163	0,000964
t+17	0,743	9	0,477	0,000334	-0,00068	0,001352
t+18	-3,683	9	0,005[a]	-0,00242	-0,00391	-0,00093
t+19	3,679	9	0,005[a]	0,002673	0,001029	0,004316
t+20	-0,878	9	0,403	-0,00085	-0,00305	0,001344
t+21	-3,957	9	0,003[a]	-0,00223	-0,0035	-0,00095

Notes: a, b, c indicate the 1, 5, and 10 per cent level of significance.

Source: SPSS Statistics

The last table below summarises eight intervals where only three are statistically significant, all on the significance level of 5%. This finding is interesting as for official announcement; fewer intervals are significant than in the case of rumour (with five statistically significant periods). What is more, six out of eight periods reached negative average performance.

Table 10. One-Sample T-Test

	Test Value = 0				95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference		
					Lower	Upper
(-21,+21)	-2,643	9	0,027[b]	-0,02536	-0,04706	-0,00365
(-15,+15)	-2,417	9	0,039[b]	-0,02777	-0,05376	-0,00178
(-10,+10)	-1,615	9	0,141	-0,00689	-0,01654	0,002764
(-5,+5)	-0,017	9	0,987	-4,3E-05	-0,00572	0,005632
(-1,+1)	2,35	9	0,043[b]	0,018034	0,000678	0,035391
(-5,+10)	0,029	9	0,978	6,3E-05	-0,00491	0,005034
(-5,+15)	-0,788	9	0,451	-0,00182	-0,00703	0,003396
(-5,+20)	-0,685	9	0,51	-0,00241	-0,01038	0,005554

Notes: a, b, c indicate the 1, 5, and 10 per cent level of significance.

Source: SPSS Statistics

5 Conclusion

Within this paper, we performed an event study analysis focusing on the first FED interest rate hike in March 2022, done after two years of pause in increasing interest rate changes. We tried to understand if rumours concerning rate hike prior to the official announcement

would cause different performances on selected samples. We focused our analysis on ten ETF equity funds from the ESG category, which were chosen by AUMs.

The results of this paper show that for both announcements and event periods, similar cumulative abnormal returns were present at about -4% in total. However, in the case of rumour, we observed a steady decline for almost the whole period. The official announcement caused more volatile movements with the first sharper decline followed by a week upward trend but still in negative territory. More favourable tests for statistical significance were in the case of rumour event, where more observed periods showed statistically significant. The results are in line with theory in general, as decrease in interest rate causes a decline in the stock market, because risk-free investment would be favoured by investors.

It would be interesting to cluster ETF ESG funds by segment and expense ratio or total costs and perform a similar analysis. Additionally, different benchmark indexes could also be taken into consideration in the future research.

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A satisfied employee as a key factor in the success of a company

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Abstract

Research background: Employee satisfaction is a key factor in a company's success. A satisfied employee creates more value and profits for the company. Nowadays, the employees of every company perceive job satisfaction as a whole, in which they are provided with other benefits in addition to the salary. Suitable working conditions for the performance of work are also important at work, where there is a good working climate at the workplace and, above all, where they get satisfaction from their work and feel satisfied. Motivation to work can come from within, when employees themselves are sufficiently motivated and enjoy their work, or they may need motivation from the outside in the form of additional benefits.
Purpose of the article : The paper deals with the proposal for evaluating selected factors of employee satisfaction that are based on personnel marketing. By evaluating the given factors in the matrix of importance and satisfaction, companies will be able to find out and solve the factors that are currently very important to the employees of a given company, but at the same time they are very dissatisfied with them. The proposed employee satisfaction methodology can be used by companies that are interested in having satisfied and loyal employees.
Methods: Induction, deduction, analysis, synthesis, questionnaire survey, statistical methods
Findings &Value added: Proposal of a methodology for evaluating employee satisfaction in companies in Slovakia.

Keywords: *employees, satisfaction, importance*, *evaluation criteria, personal marketing*

JEL Classification: *E2, J6, M5*

1 Introduction

A satisfied employee is an inseparable part of personal marketing. Personal marketing is considered a relatively new field in human resources management, which emerged as a

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separation from personnel management. A paying attention to human resources means not only hiring suitable employees and keeping them in the company, but also recruiting them for a common cause, creating favorable conditions for their work (Cheema and Javed, 2017), suitable working applications, professional growth and personal satisfaction, and building the enterprise as a human working community (Iskamto, D., 2021). The Companies that pay due attention and effort to personnel marketing and human resources are usually characterized by the higher loyalty (Saputra, F., and M Rizky Mahaputra, 2022).   and initiative of their employees, better work results, and a greater willingness of people to work harder for the benefit of corporate goals. Such businesses achieve greater profits and are better prepared for the future. A similar opinion is also held by Popkova et al. (2013) that the basic task of personnel marketing is to create an attractive image of the company as an employer. Another task, according to Esfahani et al. (2017), is to ensure an optimal amount of quality human resources. At the moment, the authors of e.g. Lazear and Oyer (2004), Lengnick-Hall et al. (2009), Dublebohn et al. (2009), Crowley & Bourke (2017). In Slovakia and the Czech Republic, e.g., personnel marketing is devoted to Nadanyiova (2016), Szarkova (2013), Olsovska et al. (2016), Myslivcova (2016) and Sukalova (2015). The goal of the aforementioned contribution is to bring the proposed methodology for measuring employee satisfaction closer to reality. This methodology can be used in companies in Slovakia that are interested in maintaining satisfied employees and a good name as potential employers in the labor market. In order to master the process of measuring and monitoring employee satisfaction, companies within the framework of personnel marketing in Slovakia, regardless of size and focus, should implement and adhere to the following algorithm of activities:

- specify who is a company employee,
- define employee needs and indicators of employee satisfaction,
- design and create questionnaires for measuring employee satisfaction,
- determine the size of the sample-a sample of employees,
- select an appropriate data collection method and conduct your own data collection,
- develop data evaluation procedures, including procedures for quantifying the level of satisfaction,
- use the results of measuring and monitoring satisfaction as inputs for process improvement.

2 Theoretical starting points

2.1 Personal marketing and its use in companies

Personnel marketing helps to recognize the needs and wishes of employees, both existing and potential, which can ensure the acquisition of a competitive advantage over other organizations Szarkova, (2013), Alniacik et al. (2012), Myslivcova, (2015). Huselid (1995) stated that businesses can adopt various HRM practices to improve the skills and quality of their employees and thus their competitiveness. A human resources should be understood as a potential source of efficiency growth and not as a cost to be minimized. Employees create the value of the company, so it is necessary to develop their skills (Budur, T. and Poturak, M. 2021). Israelsen and Yonker (2017) claim that personnel marketing focuses on the future and tries to estimate the real need for labor resources in advance. It takes into account business intentions and strategies. Companies with strong personnel marketing are at an obvious advantage, especially in terms of readiness to respond to competition and market

developments. Personnel marketing as the overall development of human potential expressed as the value of the organization.

2.2 The marketing mix in HR

Kovarova (2009) states that the classic marketing mix can also be used inside the company, not only in contact with customers. Good marketing starts inside the business, where the customer orientation turns into an employee orientation. Internal marketing can use marketing mix tools. The essence of personnel marketing is the use of marketing tools in the field of personnel. The classic marketing mix tools can be adapted to meet the needs of personnel marketing, and the marketing mix in HR can be assembled as follows (Szarková, 2013, Antosova, 2005):

1. Product (job) – the company tries to fill a vacant position with an offer from the labor market. It is possible to fill a job position and thus obtain a workforce from the internal or external labor market. The internal labor market consists of company employees who can be transferred to another job, and the external labor market consists of job applicants outside the company.
2. Reward for superior work performance This reward can be granted in the form of financial (salary, salary increase, bonuses) and non-financial rewards (promotion, praise, or various employee benefits). A set of forms and a reward system make up the company's reward strategy. An appropriate strategy can attract the necessary and high-quality human capital, stabilize current employees, motivate them to more demanding tasks, and support the growth of their qualifications.
3. Place (corporate culture) - defined as the workplace. When choosing a job, applicants often make decisions based on the corporate culture and image of the company. Corporate culture includes the substantive organization of the company, workplace relations, training and development of employees, recognized values, and what is considered good and bad in the company (Virgiawan et al. 2021).
4. Promotion (presentation of a job offer): it is a tool with which a company presents a job offer. This offer should be clear and comprehensible and should motivate and arouse sufficient interest among applicants. It contains all the information about the job and the requirements for the applicant, but also information about the company and the benefits it provides to its employees.

3 Results and discussion

3.1 Questionnaire items

The evaluation criteria in the questionnaire are based on marketing mix tools used in the field of HR. The questionnaire should be part of the annex to the company's internal guidelines and is made up of evaluated categories, which are listed in Table 1. The questionnaire contains an introductory address, an explanation of the purpose of the survey, and instructions for filling out the questionnaire. Each evaluation criterion is evaluated from the point of view of satisfaction and importance, with points from 0 to 3. Where 0 represents complete dissatisfaction and unimportance of the given criterion, and point 3 represents the highest possible satisfaction and the highest importance of the given criterion. At the end, there is room for possible comments and an increase in satisfaction from the employees' point of view.

Table 1. Evaluation criteria of employee satisfaction

	Evaluation criteria	Satisfaction				Importance			
		0	1	2	3	0	1	2	3
1.	Financial evaluation (wages, bonuses, rewards)								
2.	Non-financial evaluation (praise, company car, phone, laptop)								
3.	Possibility of career growth (training, courses, further education)								
4.	Catering at the workplace (choice of meals, quality of food)								
5.	Employee benefits (replacement time off, paid overtime, sports and cultural events for employees)								
6.	Working hours (flexible working hours, length of working hours, possibility of working from home)								
7.	Interpersonal relations in the workplace (work climate)								
8.	Organization of work (setting goals, division of work, method of achieving goals, etc.)								
9.	Communication between employees at the workplace (information about what is happening in the company)								
10.	Work environment (noise, temperature, cleanliness, lighting, equipment)								
Comments and suggestions for increasing employee satisfaction:									

Source: own elaboration

Data from the questionnaire is statistically processed and presented graphically. For the purpose of a better overview of the individual evaluated criteria, we recommend placing the resulting values (statistical average, mode, and median) of the evaluated criteria in the corresponding quadrant in the resulting matrix of employee satisfaction (see Fig. 1), which will provide a closer picture of the individual criteria.

		Satisfaction	
		high	*low*
Importance	*high*	I. IDEAL	II. PRIORITY SOLUTION
	low	III. EXCELLENT STATE	IV. RESOLUTION

Figure 1. The resulting matrix of employee satisfaction evaluation.

Source: own elaboration

3.2 Selection of a research sample

The basic file is determined from the records of the employees of the given company for the monitored year. The survey is anonymous and its completion is voluntary. We recommend a sample size (base set) of 95 % probability and 5 % variance.

3.3 Distribution, collection, and transmission of questionnaire data

It is methodologically correct and expedient to provide the questionnaire to the respondents on the day when the assessment takes place, together with instructions on the place of submission of the completed questionnaire, which should ensure anonymity. For data processing, it is necessary to designate an employee who meets the qualification requirements for working with data as well as material equipment such as software, a computer, a printer, and an internet connection.

3.4 Interpretation and publication of results

A person should be appointed to interpret the processed data, who will transfer the evaluated data into the form of outputs according to the purpose of use. It can also be the same person as the one who processes the data. Outputs can take the form shown in table 2.

Table 2. Use of information from employee satisfaction surveys

Purpose of use	Form of presentation of results	Publication of results	Frequency of publication
annual report	written document (electronically)	website	annually
information for management	written document	presentation of work meetings	monthly, quarterly, as determined
information for departments, sections	electronically	controlled documentation determined by quality management	continuously, taking corrective measures
public website	website, media	continuously	continuously

Source: own elaboration

The interpretation of the results should be entrusted to a person or several people who know the issue and can process the data in a form that will be clear, readable, and understandable for the individual subjects using the results of the satisfaction assessment. It requires knowledge of working with databases, graphic display of results, and interpretation knowledge. Designation of responsible persons and training is an important phase of the entire survey. In addition to the company's internal directive, which should be available to all interested parties and conveniently placed in the workplace, it is important to conduct regular training on survey procedures. It is also important to check the correctness of the implementation of surveys by employees of the quality department, or to the quality manager in the case of a functional quality management system. The implementation of the survey requires the identification of persons responsible for the following activities:
- distribution of questionnaires;
- briefing on filling in and submitting questionnaires;

- collection of questionnaires from the place designated for submitting the questionnaire;
- checking questionnaires and transferring data into electronic form; • data processing; and
- interpretation and publication of results.

4 Conclusion

Although personnel marketing is considered a relatively new field of management, businesses are increasingly becoming aware of its importance. Focusing on the employee, his qualities, education, and motivation are among the key elements of the competitiveness of companies in the market. Companies in Slovakia that pay due attention and effort to personnel marketing and employee satisfaction are generally characterized by higher loyalty and initiative from their employees, better work results, and a greater willingness of people to work harder for the benefit of company goals. Such businesses achieve greater profits and are better prepared for the future. This methodology can be used in companies in Slovakia that are interested in maintaining satisfied employees and a good name as potential employers in the labor market.

Acknowledgements

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The uncertainties related to climate change and its damage

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Abstract

Research background. Since the beginning of the industrial revolution, humanity has begun to change the earth's climate by releasing GHGs into the atmosphere: CO2, methane, nitrous oxide, and other fluorinated gases. The climatologists are almost unanimous: humanity will experience large-scale and, above all, very rapid climate change in the coming centuries. Some of these effects have already experimented in some parts of the world, by higher average temperatures, a rise in oceans level and an increased frequency of droughts, storms, hurricanes, and torrential rains. It might be too late to reverse the situation. We should replace old technologies based on fossil energy consumption, produce more clean energy and reduce our energy-intensive habits.

Purpose of the article: In this article, we will analyse the uncertainties about climate change and its damage and what are the terms of the debate on the need to act today.

Methods: Using descriptive and comparative analysis the paper reveals the risks of climate change for future generations and the impact on ecosystems and human activities.

Findings & Value added: The emergency of the situation imposes a quick response; Kyoto Protocol and Paris Agreement are the first steps to reach a global consensus but the scepticism will be always present in environmental debates.

Keywords: *climate change, greenhouse gases, fossil energy*

JEL Classification: *Q 01; Q 40; R5*

1 Introduction

The risks to climate change for future generations are severe and bring scientific, political, and ethical issues. These are issues of a new nature. Climate change is indeed the first large-scale impact on the global environment that is not rapidly and relatively easily reversible

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(IPCC, 2021; Brondizio et al, 2021). It raises questions that were not even imagined a few decades ago, in the sense of intergenerational equity; the attitudes towards future generations not only for centuries but maybe for millennia (Barnett et al.,2019; Mogos et al., 2021).

However, great uncertainties remain as to what exactly climate change will be and, above all, its consequences. These uncertainties first require a sustained research effort to better understand the nature of climate change that awaits us, its effects on ecosystems, and human activity (Radulescu et al., 2020; Bran et al., 2020). They feed into a very complex debate as to whether action should be taken now, how, and who should withstand the initial effort. From this debate, science today is only able to frame the terms and gradually tighten certain hypotheses. In the absence of scientific 'certainties', the decision-making process is therefore essentially a matter of policy, specifically a pragmatic understanding and application of the 'precautionary principle', as well as ethical considerations (Purnhagen et al, 2020).

To measure the current uncertainties, it is enlightening to start from what the apprehension of the problem should be if all the necessary information were available (Negescu Oancea, et al., 2020). The point is to move from a stabilized regime of the Earth's atmosphere, which was before the Industrial Revolution, to another stabilized regime, with a necessarily higher concentration of greenhouse gases (Kuzemko et al, 2016). Indeed, even if all emissions were stopped today - which is impossible - the already acquired increase in the concentration of greenhouse gases (for the concentration of CO_2 alone, we went from 280 ppm before the industrial revolution to 360 ppm now) would take centuries to absorb (Gergart and Ward, 2010). So the question is: what level of concentration is desirable to stabilize: 450 ppm or can we go up to 1,000 ppm (apparently this is the range in which most of the scenarios studied are located; ppm- parts per million)?

To answer this, we must first assess the consequences of a stabilized level of concentration on climate change, which themselves will take decades - and for some, centuries - to stabilize. The impact of climate change on ecosystems and human activities must then be assessed. If all this information is available, then one can, by reasoning which will be mentioned below, define the level of concentration not to be exceeded. It then remains to be determined the time profile of emissions, in the next century, which will make it possible not to exceed the concentration-ceiling level. In summary, we need to know the following sequences: what kind of emissions and what may be the stabilized concentration? How will impact climate change? Effects of climate change. For answers to these questions, researchers created analyses using powerful climate simulation models using information from a large number of disciplines, from biology to economics (Profiroiu et al., 2020).

However, there are currently great uncertainties regarding each of these sequences, so there is considerable uncertainty about the whole process. A very precise link between emissions and concentrations cannot yet be established, as uncertainties remain about the very complex "cycle" of carbon and other greenhouse gases released into the earth, the atmosphere, and the oceans. As for the link between stabilized concentration and climate change, the models give answers in a very wide range. For example, for a level of concentration stabilized at 450 ppm, the models give an average temperature increase range, in 2100, of 1.3 °C to 2.5 °C and 1.8 °C to 4 °C for the temperature stabilized (because warming will continue after 2100). The same ranges for a stabilized concentration at 1000 ppm are 2 °C to 3.5 °C in 2100 and 3 °C to 8.5 °C for the stabilized temperature (Goodwin et al., 2018). The geographical distribution of this average temperature rise, which is essential in the sensible analysis of effects, is even less well known. Finally, not much is known about the thresholds from which physical phenomena could be triggered that would cause a runaway of climate change (i.e., almost irreversible and nonlinear phenomena), such as the total melting of polar ice caps, the cessation of the Gulf Stream, the release into the

atmosphere, as a result of warming, of carbon stored in soils and methane stored in marine sediments.

2 Methods

Using descriptive and comparative analysis the paper reveals the risks of climate change for future generations and the impact on ecosystems and human activities. We confront the two extreme visions of what may be happening and what can be done in order to avoid the catastrophic consequences of global change. To have a better understanding we will analyse the global income gains of population and we will assess the projected annual CO2 emission and temperatures during time.

3 Results and discussions

3.1 Between the two extreme visions

As for the effects of climate change, the typology is known, but their assessment, especially monetary, can only be the subject of very crude estimates today - the main reason being that we are extended the effects of physical phenomena generated by climate change for that of social and economic developments. Indeed, it is not possible to assess the "damage" suffered by human societies without scenarios of what these societies will be in the next century.

It is therefore easy to conceive that, by combining the most favourable hypotheses, one can easily come to the conviction that it is more useful to wait and see more to act. But, conversely, it is conceivable that the combination of unfavourable assumptions cannot let us without reaction, as long as one cares about the future of humanity. We are navigating between two extreme options: few of us believe it is a controllable phenomenon in the future and others consider it an assured apocalypse if nobody acts very quickly. The fact is, at present, it is almost impossible to decide between these two extreme visions. Even though there is a vast majority of researchers and political leaders fighting against global warming, who are more visible on media, there are still some others who are convinced by the contrary – the former president of the U.S. Donald Trump (end maybe the future) is one of them.

Nevertheless, there are two things, however, that can be taken for granted:

1) Climate change, of a speed unknown in Earth's history (except perhaps that that followed after the meteorites collisions), will happen no matter what. This change will certainly not dramatically affect the men alive today, in the sense that the actual generation of people on earth will not be extinct. But it will require future generations of adaptation efforts (arguably geographically very unevenly distributed) that certainly include vast migrations. The only question then becomes: is it necessary to act now so that this effort is not too heavy to bear for future generations?

2) The long-term solution is technical. We have to slow down the use of carbon stored in fossil fuels, because burning this stock in its entirety, would lead to concentrations of greenhouse gases at levels where the likelihood of catastrophic damage in the coming centuries will not be negligible. Long before the depletion of fossil carbon reserves, it will be necessary to: a) find the technical means to supply humanity with non-fossil greenhouse gas (solar, liquid hydrogen, hydraulic, wind, biomass) and nuclear if the waste problem is managed properly); (b) provide cleaner technology or find ways to capture much of the CO2 emitted by combustion, since fossil fuels will

continue to be used during the transition period. But the questions are: When will this transition have to be completed? When should we firmly commit to it?

3.2 Should we act now?

This issue is at the heart of current controversies. For some, it would be a waste of productive resources to act now, because it will not cost so much for future generations to gradually adapt. If we want to help the currently poor countries, which will probably be the hardest affected, it would be better, for example, to help them eradicate poverty, solve the water scarcity, take malaria seriously or give them the means to cure AIDS. There are some people (Lomborg, B., 2001) generally called sceptical environmentalists, who express their opinions, by using statistical information from internationally recognized research institutes, and who criticised the way many environmental organizations make selective decisions based on the misleading source of information or scientific evidence. This type of reasoning supported first the delay of accepting the Kyoto Protocol and later the withdrawal of the U.S. government from the Paris Agreement.

Beyond all statistics and interpretations, we should have economic reasoning to try to understand the situation. Suppose we can assess in monetary terms the effort humanity will have to make in 2100 to adapt to the consequences of climate change if neither we nor future generations do anything before it. We should first assess that the 2100 generation is like ourselves and we should accept the burden and be willing to bear to avoid this damage for them.

3.3 Economic reasoning

But first of all, in 100 years the population will be richer than us (historically is proven that every generation contributes with added value to the global estate). Since there is no data older than 1940, we consider it appropriate to show available data for comparison.
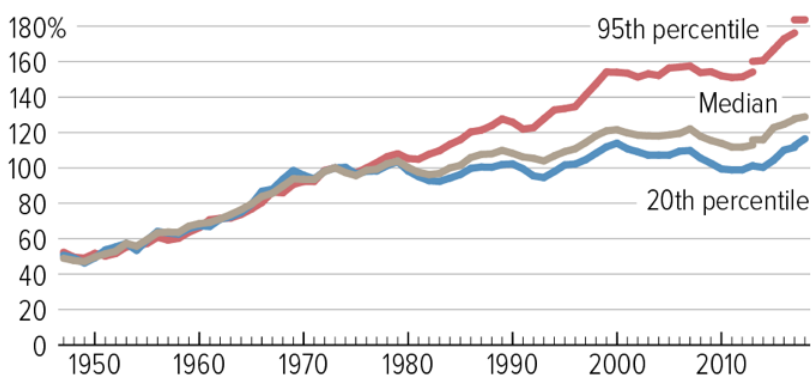
Figure 1. Income gains in the last 70 years

Sources: CBPP calculations, 2020.

As could be seen, in the last 70 years, the real income gains grew up by almost 3 times (inflation adjusted), so it may be acceptable to assume that in 100 years, given the advance of the new technologies, the future generation will be at least maybe 5 times richer.

So it will be normal for our generation to accept to pay a fraction of this price, maybe 20%. Then, a few times richer, their basic needs will be more fully satisfied; so it is normal

for them to pay a higher price for the protection of their environment than we (especially the developing countries) are willing to do today so the maximal price which we should pay today should be lower, maybe 10%. It is then sufficient to assess the cost of the measures which, taken today, would prevent generations living in 2100 from having to bear colossal damage. If this cost is less than a certain threshold which we established as being roughly 10% of the total damage, and if, again, we treat them "like ourselves," so we must act now. Otherwise, it's better to shift the burden to them, because it will be "less costly" for them to act to repair than it is for us to act to prevent.

If now, we believe that the fate of future generations must be taken into account, but only to a certain extent, we go beyond the realm of economics to enter into the carrousel of ethics. Suppose that our concern for future generations (and therefore our preference for the present generation) translates into a decision such as we agree to take care today of only half the damage that our present inaction would cause, then the maximum cost we are willing to bear is reduced to 5%.

As we have seen above, we do not know precisely the cost of adaptation for future generations, the rate of economic growth for the future century, or the evolution of prices related to the environment, for future generations (Ekins et al, 2021). These are three parameters of an economic nature, more or less quantifiable but we do not have a very precise idea of the real level of damages, not to mention the level of an ethical preference for the present generation, which is more complicated to measure.

So while precise economic calculation leads to the problem of intergenerational choice, preventing or adapting, it certainly does not make it possible to decide today for lack of information. Consequently, neither the claims of sceptics nor those of the alarmists who urge us to act quickly and strongly can be based on objective data processed by economic calculation. But the necessary progress in robust data acquisition may not allow us to do so until it's possibly too late. We are therefore faced with an archetype of situations where it is necessary to reason differently, according to the precautionary principle.

3.4 Precautionary principle

The application of the precautionary principle is justified when our current knowledge does not allow excluding extremely damaging and irreversible developments when they have already begun. Schematically, this assumes that we recognize the non-zero probability of nonlinear phenomena, such as threshold phenomena beyond which a sudden and irreversible acceleration of damage occurs.
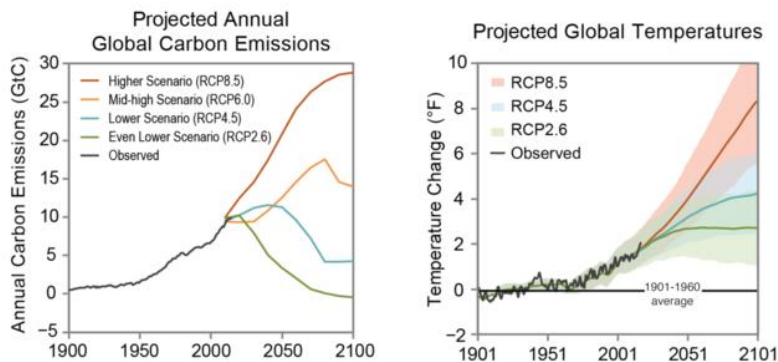
Figure 2. Projected annual CO2 emission and temperatures

Sources: U.S. Climate Science Special Report, 2017.

If we consider the scenarios known as Representative Concentration Pathways (RCPs), for example, it means that 2025-2030 represents a threshold. If we don't diminish the CO2 emissions consistently then the average temperature will go irreversibly up. There is a minimum space of time for acting.

Years ago, the researchers told us that in case of inaction between 2000 and 2030, stabilizing the GHG emissions in 2050 would involve a huge effort to reduce emission flows between 2030 and 2050. Under these conditions, the cost to be borne for these reductions would amply justify (depending on the reasoning previous) to be undertaken now, spreading the effort over fifty years instead of twenty. By acting now, there is a risk of enduring "costly" efforts that are maybe too costly (in the sense that it would have been better to push them back in time). However, the cost of error in the event of good news will be significantly lower than the cost of inaction between 2000 and 2030, if extreme assumptions. In this case, the application of the precautionary principle is justified.

There is another argument, of a different nature, put forward by proponents of immediate action. If climate change policies are put in place now, they will result in a rise in the price of fossil fuel use and thus stimulate the search for non-polluting energy solutions, which will, one day, have to replace fossil carbon-based energies, and before their reserves are depleted (Moses et al, 2022). However, this argument is less strong and can be criticized: there is nothing to prevent it from being content, in terms of climate change policy, to launch a vigorous alternative energy research program right now. This was the position of the United States for a while: it is time to accelerate the research effort, but not yet to embark on costly emission reduction policies. Thinking of the future election, we have to consider we might see it again.

3.5 What type of policy to fight against climate change?

If, in the name of the precautionary principle, we believe that we must reduce emissions now, what policy should we adopt? Any policy to combat climate change can only result from an agreement between sovereign States. Such an agreement must have the following three characteristics:

1) Prohibit — or at least strongly dissuade (since no one can prohibit anything from a sovereign State) — the practice of the free passenger, since the preservation of the climate is a public good (when it is produced, no one can be excluded from its benefit and therefore everyone benefits, even those who have not contributed to producing it).

2) Take into account the current situation, which is characterized by an extreme diversity of emissions per inhabitant, not only between the poor and the rich world but within the rich world itself (the annual emissions per inhabitant in tons of CO2 equivalent are 15.5 in the United States, 11.5 in Russia, 5.13 in France, 7.38 in China, 9.7 in Japan, Worldometers, 2016).
In the next graphic we can see that the total CO2 emission is growing consistently, even in the last decade, in China, India, and Iran while other, more convinced and interested in reducing global warming consequences, effectively reduced their contributions.
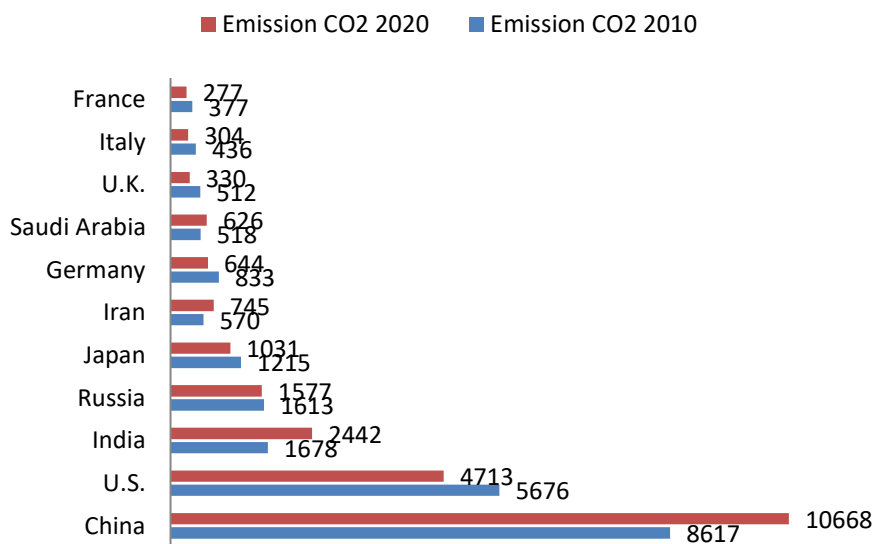
Figure 3. Carbon dioxide emissions in 2010 and 2020 (in million metric tons)

Source: Statista, 2022.

Wanting to quickly reach objectives of convergence of emissions per inhabitant is certainly ethically defensible (since all people are equal, they have the same rights to use the planet), but politically unacceptable in the immediate future by many States.

3) Minimize, for a given emission reduction, the total cost. Indeed, once quantitative objectives have been set by a State, it would be absurd not to minimize the total cost of achieving these objectives. It would therefore be absurd to prohibit the countries which realize that the reductions are less costly at home to go beyond their objectives and sell this surplus to those for which it would be more costly to reduce emissions at home. Then "buying" these reductions from others (the CO2 certificates), will make the overall reduction the same, and the overall cost is reduced.

4. Conclusion

The emergency of the situation imposes a quick response; Kyoto Protocol and Paris Agreement are the first steps to reach a global consensus. The developing countries have to be convinced to be part of this common effort and not just free riders, but they need to preserve their development rights. More and more voices are therefore being raised to link climate negotiations to other agreement negotiations relating to the establishment of global governance, and in particular trade agreements within the framework of the WTO.

Europe must pursue and step up a policy to combat climate change based on four pillars: set an example by reducing its emissions through behavioural changes that allow the optimal use of technologies and develop a new one, less energy consuming; step up efforts to research techniques for replacing fossil fuels, as well as trapping and sequestering CO2; promote the adhesion of the major emerging countries by declaring without ambiguity that the countries that are currently rich must bear the bulk of the initial effort and do everything possible to

promote the adoption of the best techniques and practices by these emerging countries; work to link all international negotiations concerning "global public goods". Scepticism will be always present in environmental debates, it is important to fight it with strong scientific arguments that convince the world of the need to make decisions. Perhaps the breaking news about global warming, displayed in the whole media, without solid arguments and research, only creates a feeling of unnecessary panic among the population. Treating the subject more professionally would make some of us more attentive and less suspicious of this issue.

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Motivation of Creative Employees in the Context of Globalization. IT Professionals in the EU

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Abstract

Research background: Information technology (further in the text IT) plays a special role in the knowledge economy and IT sector becomes key to the development of creative industries. When it comes to managing creative employees, the task of motivation, as a process of increasing job satisfaction, turns into the task of motivating an employee's creativity. This task requires more complex managerial decisions, formation of the motivational model that should simultaneously take into account personal creativity (abilities, talent), self-efficiency of the person (confidence in his abilities), intrinsic motivation and working conditions.

Purpose of the article: The aim of this article is to identify the opportunities and motivation factors of creative industries workers (using the example IT professionals in EU).

Methods: The research method is an online survey of IT professionals from EU countries (sample's size is 4200). The data obtained were analyzed using factor analysis and regression analysis, resulting in a motivation model that links intrinsic motivation, self-efficiency, and creativity of IT professionals

Findings & Value added: The results of the research showed the importance of intrinsic motivation for creative employees. Without intrinsic motivation, employees will not be creative, even with high self-efficacy and external motivation. At the same time, without self-efficiency, employees will not be creative, even if they want to do something useful for society and enjoy what they do. Finally, if the employee is confident in his abilities and is not afraid of punishment for failure, he will be the most creative in socially significant projects.

Keywords: *creativity; self-efficiency; IT professionals; motivation to work.*

JEL Classification: *A11; C14; F60; J28*

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1 Introduction

The modern economy is often referred to as the "knowledge economy" (Coviello et al., 2017). The idea of the knowledge economy is that the growth and profits of companies depend more on factors such as knowledge and information than on factors such as labor and capital.

Information technology plays a driving role in the development of the knowledge economy and creative industries. The massive spread and development of communication technology helps to ensure the dissemination of information, facilitates access to information and the exchange of information. The development of Internet technologies has led to the creation and rapid growth of the number of platforms for the exchange of creative products. Communities of people with common interests, tastes, and worldviews are forming around these platforms. They represent spaces for self-expression, opportunities for meetings, contacts, exchange and consumption of creative products, and acquisition of new knowledge. All this helps the development of creative industries, creates conditions for marketing and management in modern conditions. Thus, the IT sector becomes key for the development of creative industries and the knowledge economy as a whole.

The products of traditional industries are usually evaluated by their practicality and functionality. In creative industries products are not evaluated by their functionality, but by their "expressive value", i.e. by their creativity, originality and novelty. The basis for the creation of expressive value is the creativity of employees. How creative employees are determining the success of companies operating in the creative market. The business model for companies in creative industries is the commercialization of expressive value, and the main task of management is to motivate employees' creativity, motivate their desire to develop their creative skills, motivate them to get new knowledge and new experiences (Betle, 2021). The problem of effective motivation is especially acute in the context of globalization, as the wider the labor market, the more offers qualified employees have. This paper examines the work motivation of IT professionals from EU countries.

Motivation to work is a very complex system, which is a combination of individual motives that motivate people to work (Vokoun et al., 2018). And this is the main task of company management. When it comes to managing creative employees, the task of motivation, as a process of increasing job satisfaction, turns into the task of motivating employee creativity. This task requires more complex managerial decisions, the formation of a more subtle motivational model, which should simultaneously take into account the personal characteristics of the employee (because creativity is primarily certain abilities, skills and talent), the self-efficacy of the person (i.e. his confidence that he is able to handle the tasks set), internal motivation (i.e. desire to work and show his creativity) and work conditions (organization of the work process, workplace characteristics, social environment). Even the most capable employee will not (or will not be able to) show his abilities fully if he works under strict control, surrounded by people who are not close to him (socially and professionally), if he performs uninteresting for him, routine work, and he has no sense of self-confidence.

Motivators in management refer to conditions that lead to increased job satisfaction, as well as increased employee productivity and self-efficacy (Nienhaus, Shrapnel, 2021). Locke's definition of what motivation is often used in management is "a pleasant or positive emotional state resulting from the evaluation of the result of work". It is this emotional state that is the ultimate goal of managers (Badubi, 2017). From a management perspective, motivation can be described as cognitive decision making to ensure that through initiation and control, employees take actions to achieve a certain goal. In doing so, they experienced job satisfaction and a desire to work even more creatively and efficiently.

Creativity is identified with the creation of a new product or new and original ideas. Those who have managed to translate their creative ideas into a tangible form receive not only recognition from others, but also great satisfaction from their work. Thus, creativity plays the role of one of the determinants affecting job satisfaction, because creativity is the effort used by a person to achieve their goals (Amabile, 1996; Rubenstein et al., 2018).

In order for an employee not to be afraid to be creative, not to be afraid to experiment and try new solutions, they must have confidence that they are capable of solving complex problems. In other words, the employee's self-efficacy is important.

Self-efficacy refers to the perception of an individual's ability to perform actions to exhibit certain skills (Bandura, 1986). Creative self-efficacy differs from self-efficacy in general because it focuses on the individual's beliefs about their own creative skills and their own creative potential (Chen, 2021). It is an individual's belief in their ability to create new projects or generate creative ideas (Amabile (1988)

Personal abilities (skills), motivation (in the form of job satisfaction) and self-efficacy (self-confidence), are elements of creative personality formation (Zahra, 2022). Thus, a motivational mechanism is formed: increased job satisfaction will influence increased self-efficacy, which indirectly affects individual professional skills. Individuals with high job satisfaction will continue to create ideas, designs, concepts, and creative products, resulting in increased self-efficacy.

Drawing on component theory of creativity, social cognitive theory, and social motivation theory, consider intrinsic motivation, self-efficacy, and social motivation as different motivational mechanisms underlying creativity. This is an attempt to develop a more nuanced theoretical approach to creativity motivation.

Over the past 30 years, research on creativity factors and on creativity motivation has been published quite frequently in leading journals, providing important data for researchers and practitioners. Even a highly creative employee may not display his or her abilities if he or she works in a company where the workflow organization negatively affects intrinsic motivation (Mahoney et al., 2021). However, it is important to remember that intrinsic motivation, unlike a person's creativity abilities and opportunities for its development, is more fluid. It is subject to the influence of the work environment, the influence of the organization of the work process (Amabile, 1988). In order to shed light on the different functions of the three motivational factors, it is necessary to consider how they may function in different situations, depending on the organization of the work process and the personal factors of employees.

Several important theoretical works emphasize that intrinsic motivation is the main motivational precursor of creativity (Pattonc, 2021). Also, the positive influence of intrinsic motivation on creativity has been shown in a number of empirical studies (Chen, 2020). In general, in contrast to self-efficacy as a source of motivation for creativity (Taylor, 2019), and in contrast to social motivation as a source of motivation for the usefulness of creative ideas, the authors argue that intrinsic motivation provides a unique motivational force for the desire to engage in creativity (Amabile, 1996; Deci, Ryan, 2012).

Thus, even when employees believe they can achieve results (i.e., they have high self-efficacy) and they are willing to propose new ideas beneficial to others (i.e., they are highly socially motivated), a lack of intrinsic motivation (i.e., lack of interest in and enjoyment of work tasks) will keep them from fully and persistently participating in these creative processes. A hypothesis can be formulated:

H1: Without intrinsic motivation, employees will not be creative, even when self-efficacy and social motivation are high. Statistically speaking, this means that by controlling for self-efficacy and social motivation, intrinsic motivation makes a unique contribution to employee creativity.

On the other hand, social cognitive theory and the studies that are based on this theory show that even if people enjoy their work (i.e., are highly intrinsically motivated) and are willing to focus on new ideas that are useful to others and the environment (i.e., are highly socially motivated) without sufficient self-efficacy (confidence in their abilities), the individual may still not achieve good creative results (Bandura, 1997; Taylor, 2019). This theory emphasizes that if people do not believe that they can achieve the desired outcome or prevent any negative consequences through their actions, they will not put enough time and resources into their work (Bandura, 2001).

From the perspective of component theory of creativity, increased self-efficacy results in employees cultivating a strong and resilient defense against failure, without which the creative process is impossible (Zahra, et al., 2022) and supports a focus on learning (Taylor, 2019). Therefore, even when faced with setbacks and risks, those with higher self-efficacy scores are less likely to abandon their efforts and agree not to engage in creative processes. In contrast, employees who suffer from low self-efficacy show less cognitive persistence and are more reluctant to continue discovering new knowledge, which prevents them from being creative.

A growing number of empirical studies show a positive relationship between self-efficacy and creativity (e.g., Devaux, 2017). Another hypothesis can be formulated:

H2: Without confidence in their abilities, an employee will not be creative even if they want to do something useful for society and others and enjoy what they do. That is, when controlling for intrinsic motivation and social motivation, self-efficacy makes a unique contribution to creativity.

Social motivation theory suggests that socially motivated employees will strive to develop ideas that are useful to colleagues, supervisors, clients, or customers (Betle, 2021). Social motivation encourages the individual to adopt the perspective of others and thus focus on discoveries that are useful to others (Pattonc, 2021).

At the same time, self-efficacy allows a person to be proactive, strive to achieve goals, and achieve creative results (Taylor, 2019). This behavior attracts people's interest in new ideas, unfamiliar things, and encourages new knowledge. Confident people are not afraid to propose new solutions, even if they turn out to be wrong or trivial.

Social motivation encourages people to consider the needs of others and attracts interest in ideas that are more useful to others. The above theoretical rationale suggests that in addition to intrinsic motivation and self-efficacy, social motivation can make a unique contribution to an individual's creativity by directing them to concentrate usefulness. Thus, the third hypothesis would be as follows:

H3: If an employee is confident and not afraid of punishment for failure, he or she will be most creative when completing socially relevant projects. In other words, when controlling for intrinsic motivation and self-efficacy, social motivation reaches the highest level of creativity.

2 Methods

Empirical data for testing the hypotheses formulated were obtained by online survey of IT professionals from EU countries. The sample size is 4200 respondents. The distribution of respondents by EU countries is shown in Fig. 1.
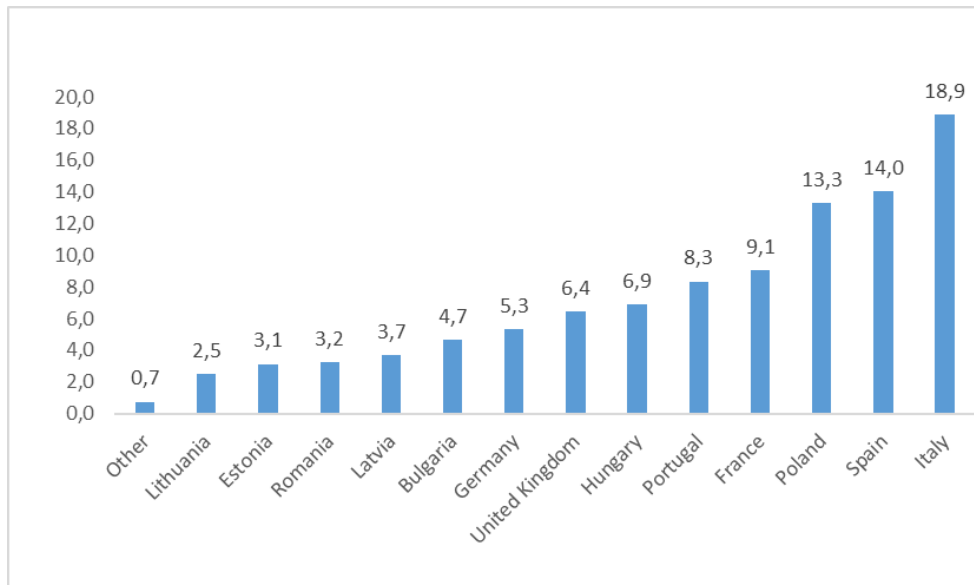
Figure 1. Distribution of respondents by EU countries

Source: author (2022).

The survey questionnaire included questions aimed at determining job satisfaction, assessing respondents' intrinsic motivation and social motivation, self-efficacy, and creativity. All of these variables are constructs and represent multiple variables. Table 1 shows from which observable variables the analyzed multiple variables are constructed.

Table 1. Construction of concepts

Intrinsic Motivation	Job gives me an opportunity to fully realize my skills and abilities	I get much pleasure from the work I do	Working in this company allows me to constantly improve my qualification and competence	This work inspires me. I want to perform all tasks as efficiently as possible
Social Motivation	In this company, I participate in realization of socially significant projects that help people, improve the environment, make the world better	In this company, I am among like-minded people, among people close to me in their values, culture and ideology	This company adequately assesses my qualification, skills and abilities	This company implements the principle of fair remuneration for each employee
Creativity	I like to work a lot		I can be very creative in my work	
Self-efficiency	I am not afraid to be without a job		I do any job as efficiently and effectively as possible	

Source: author (2022)

The partial least squares (PLS) method was used as the data processing method in this study. Partial Least Square (PLS) is a multivariate statistical method that compares multiple

dependent variables to multiple independent variables (Jogiyanto, 2011). The measurement model was used to test the validity and reliability of the measurement instruments, and the structural model was used to test causal relationships.

The PLS is a reliable tool for testing the predictive model because it can be used for small sample sizes and applied to the formative and reflective design. Another reason is that PLS can be used to develop theory.

In this study, causal relationships between variables were analyzed both for the entire sample and for each mill separately.

3 Result and Discussion

After collecting data from the questionnaires, the results were analyzed to determine the validity and reliability of each variable. Variables were considered valid if they corresponded to the scale of measurement of load, which is a minimum of 0.7 (Chen, 2021). The result showed that all measures of the variables creativity, creative self-efficacy, intrinsic motivation, and social motivation were valid. Reliability was tested through the composite reliability and Cronbach's alpha statistic, which was above 0.7 (Devaux, 2017). All variables in this study were found to be reliable.

Table 2 shows the influence of self-efficacy, intrinsic motivation, and social motivation on creativity. From the table, it can be seen that all of the variables analyzed have a significant effect on creativity.

The correlation between the tested constructs using t-statistics showed that the regression coefficient on the influence of intrinsic motivation on creativity is positive at the level of 0.239. The coefficient is positive, therefore, the higher the intrinsic motivation of the employee, the higher the creativity. Based on this result, the first hypothesis (H1) was confirmed.

Table 2. Inner Model Analysis Result (Structure Model)

Relationship	Regression coefficient	T-statistics	Significant
Intrinsic Motivation and Creativity	0,239	15,801	<0,001.
Self-efficiency and Creativity	0,509	17,903	<0,001.
Social Motivation and Creativity	0,209	13,644	<0,001.

Source: author (2022)

The highest regression coefficient in the model of self-efficacy influence on creativity. It is equal to 0.509 and has a positive value. I.e. the more a person is confident in his abilities, the more creative he is in his work. This result supports hypothesis (H2).

People's belief in their creative self-efficacy helps them achieve better results because they have strong motivation, a clear goal, stable emotions, and the ability to perform successfully. According Hennessey and Amabile (2010) analysis, when employees have good performance and achieve their goal, implicitly they have high job satisfaction. Job satisfaction will be achieved if it is supported by intrinsic motivation, extrinsic motivation (work environment, relationships with co-workers), and relationships of people in the organization. It can be concluded that these factors influence creativity and become a determinant of success. Human satisfaction can be achieved when there is an intersection between striving and achievement.

The regression coefficient value of the effect of social motivation on creativity is positive and is 0.209. The coefficient is positive, the higher the social motivation, the higher the creativity. T-statistic value indicates that social motivation significantly affects creativity. Based on this result, the third hypothesis (H3) is accepted, according to which social motivation has a significant impact on creativity of IT professionals.

Increased creativity affects the increase in productivity, which affects the skill of the employee. A person who manages to translate their creative ideas into tangible form will not only receive recognition, but also a sense of satisfaction with themselves. Therefore, people will continue to strive to create ideas, designs, creative concepts and products, which will also improve their creative skills.

There are studies that show that work complexity can contribute significantly to a person's self-efficacy because it cultivates professionalism (Bandura, 2001). Complex work requires a large cognitive investment. As job complexity increases, the individual needs to think through and choose from a variety of cognitive processes to respond to the challenges of the job. As a result, when employees perform complex work, they are more likely to increase their professionalism (Bandura, 2001).

In contrast, performing routine and simple work may cause employees to doubt their professional and creative abilities (Bitencourt et al., 2020). Even if employees handle routine work easily, they will rarely feel excited and satisfied with their work and may develop negative emotional states (boredom, dissatisfaction, frustration) (Kozlenkova et al., 2021).

PLS analysis conducted for each country separately showed that the identified patterns and formulated hypotheses are confirmed in all countries. Figure 2 shows the values of the regression coefficients in three models: the relationship between creativity and social motivation, creativity and self-efficacy, creativity and intrinsic motivation.
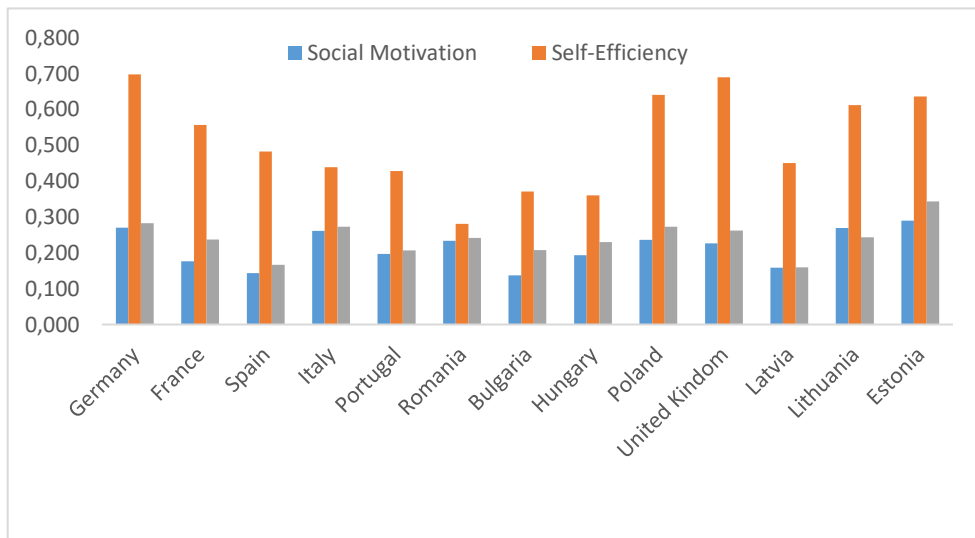
Figure 2. Relationship Creativity, Self-Efficiency, Social Motivation (Regression Coefficients)

Source: author (2022)

The results shown in Figure 2 show that in all of the countries that participated in the study, the strongest influence on IT professionals' creativity is self-efficacy, i.e., confidence that the professional can accomplish the task at hand. The relationship between self-efficacy and creativity is strongest in Germany, Britain, and Estonia. The weakest relationship between these concepts is in Romania, Hungary, and Bulgaria. Intrinsic motivation and social

motivation have significantly less influence on the creativity of IT professionals in all countries.

In their review of creativity research, Coviello and Kano (2017) suggested that it would be interesting to investigate how and why individualism might moderate the influence of predictors on creativity. Individualism fundamentally distinguishes some cultures from others and is the single most fruitful cultural dimension in cross-cultural management research (Mahoney et al., 2021).

Intrinsic motivation and self-efficacy correspond to norms of individualism rather than collectivism because individualistic culture emphasizes personal choice and the importance of competence (Barney et al., 2018). In an individualistic culture, people tend to see themselves as independent of their affiliated communities, thereby allowing their personal interests (i.e., intrinsic motivation) and confidence in their creative abilities (i.e., creative self-efficacy) to influence their behavior, including creative behavior. Thus, individualism can reinforce positive connections between intrinsic motivation, self-efficacy, and creativity.

Social motivation, reflecting an individual's desire to benefit others, is consistent with a more collectivist culture where people tend to view themselves as part of their affiliated communities and strive to achieve collective goals (Distel et al., 2022). Consequently, the positive relationship between social motivation and creativity may be weakened by individualism, which works against social motivation.

The data from this study partially support this assumption. Self-efficacy does have a stronger effect on creativity in countries with an individualistic culture. As for social motivation, the results of the study show that it is almost equally important for IT professionals from countries with different cultures.

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The impact of a global change – the COVID–19 pandemic on commercial corporations in the Czech Republic from an accounting and tax Perspective

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Abstract

Research background: The COVID-19 pandemic in 2020 and 2021 has had a negative impact on most commercial corporations in the EU and around the world, making them highly vulnerable. It endangered a number of business entities in such a way that they had to close their business. From this perspective, it is crucial to understand the key factors and practices that entrepreneurs needed to ensure financial stability and maintain their business during the pandemic. At the same time, it is important to focus on the various forms of support and measures provided by the state in the period mentioned.
Purpose of the article: The aim of the paper is to analyse and evaluate the impact of global changes such as the COVID-19 pandemic in accounting and tax context, which all commercial corporations not only in the Czech Republic, the EU, but also around the world were forced to deal with, in the context of their financial situation, economic results and their business in general. The paper further deals with selected measures that were introduced in the Czech Republic in response to this situation, with the aim of mitigating the effects of the pandemic on businesses, and it also presents and analyses new interesting accounting situations that arose under these completely extraordinary conditions. It is also focused on selected tax matters in connection with the application of pandemic measures under the current the legislation in the Czech Republic within the business of commercial corporations in the years 2020 to 2022.
Methods: The methods of description, analysis, comparison, evaluation and deduction were used during the elaboration of this paper.
Findings & Value added: The analysis shows an understanding of key factors and procedures for dealing with emergencies such as COVID-19 pandemic.

Keywords: *accounting, COVID–19, impacts, financial statements, taxes.*

JEL Classification: *H25, F6, K34, M40, M41, M48*

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1 Introduction

In early 2020, a global epidemic of coronavirus disease (COVID-19), which is caused by severe acute respiratory syndrome coronavirus, began to spread around the world. The first cases of the disease were confirmed in the Czech Republic on 1 March 2020. The Czech government, like most countries in the world, decided to introduce a variety of measures that limited economic activity in most sectors. Schools were fully closed; restaurants, hotels or some other business entities significantly reduced their services and and for that reason had to deal with a decrease in their sales. (Deloitte, 2022).

The closing or slowing down of the economy had an impact on the gross domestic product (GDP) of the Czech Republic. The Czech Republic's pre-global epidemic GDP level (Deloitte, 2022) should be reached by the end of 2022. The following Fig. 1 shows the GDP development of the Czech Republic from 2012 to 2022.

Note: * Estimate

Figure 1. Development of GDP in the Czech Republic 2012-2022

Source: ČSÚ (2022); Deloitte (2022), own processing

The Czech Republic experienced one of the biggest economic downturns in 2020 due to the global epidemic. Gross domestic product fell by around 10% year-on-year. The decline in GDP was significantly influenced by a reduction in exports abroad, which was caused, for example, by a decline in foreign demand. The investment activity of commercial corporations and households, which decreased in the period under review, also had a negative effect on GDP (Deloitte, 2022).

Fig. 2 shows the development of the national debt and the balance of the national budget to GDP from 2012 to 2021.
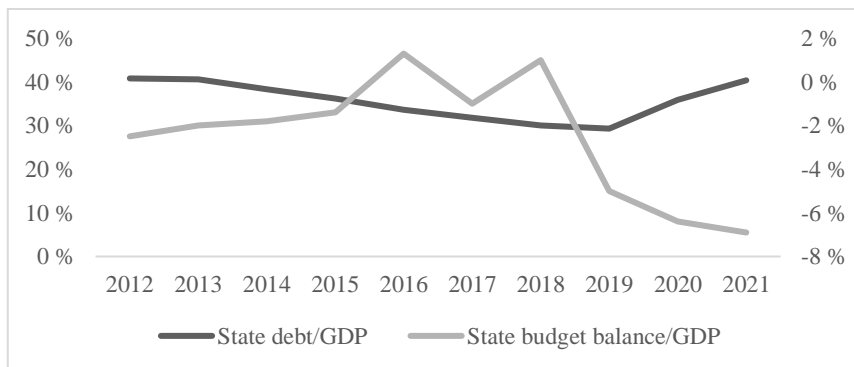
Figure 2. Debt and state budget balance 2012 – 2021 (in % of GDP)

Source: ČSÚ (2022), own processing

The national debt of the Czech Republic reached about 2.46 billion CZK in 2021 (40.4% of GDP). In 2020, it was about 2.5 billion CZK (35.9% of GDP) and in 2019 in the period before the global Covid-19 epidemic it was 1.64 billion CZK (28.3% of GDP). The balance of the state budget of the Czech Republic reached a deficit of about 419 billion CZK in 2021. In 2020 it was about 367 billion CZK, and again for comparison in 2019 it was 28 billion CZK (ČSÚ, 2022).

The Czech Republic's revenue was weakened by a decline in personal income tax revenue due to tax changes and a temporary waiver of value-added tax payments on electricity and gas in response to rising energy prices.

2 Methodology

Methods of procedure, description and comparison were applied in this paper. The authors' findings are summarized using the synthesis method.

3 Results

The COVID-19 pandemic in 2020 and 2021 had a number of negative impacts on the economy and the business environment of commercial corporations, regardless of the industry in which they operated. Business activity in some sectors has come to a complete halt, either due to the interruption of supplier/customer relations, lack of working capital or certain restrictions imposed not only by the government of the Czech Republic, but also by the governments of other countries around the world. Probable reasons for the economic decline were, in addition to the above, disproportionate loss of jobs, declining foreign exports, investment uncertainty, adverse effect on customer base, etc. (Hossain, 2021). Business corporations were forced to react quickly to this unprecedented and unexpected situation and to solve these impacts not only from the point of view of financial stability, but also to observe the continuous duration of the accounting entity (going concern), the principle of true and fair presentation or the principle of prudence, etc. COVID-19 pandemic affected not only large corporations, but also had a hard impact on small and medium-sized enterprises (SMEs), which had to face economic upheavals. Small and medium-sized enterprises faced various problems, such as a decrease in demand, cancellation of orders, liquidity crisis, delayed transportation, lack of raw materials and absence of employees. (Sarker et al., 2022). On the other hand, the pandemic positively affected the innovative activities of small companies (Urbanikova el al., 2021).

During the pandemic, commercial corporations projected a number of extraordinary accounting cases into their accounting and taxes, including solving tax aspects according to the rapidly changing provisions of the national accounting and tax legislation, and they were forced to deal with the impact of approved pandemic measures on their business. These included mainly the following extraordinary accounting and tax situations:

- provision of protective equipment to employees and testing of employees,
- costs associated with employees and working from home,
- providing interest-free loans to employees,
- analytical procedures associated with changes in the maturity of receivables and liabilities and the deterioration of payment morale,
- requests for the provision of subsidies to cover wage costs and their utilization,
- the creation and utilization of legal or other reserves for future expenses and incurred risks,

- creation of and accounting for adjustment entries in the event of a temporary decrease in the value of assets,
- estimated items for costs and revenues,
- impacts on financial statements, annual reports and non-financial reports (Hakalová et al., 2022).

It is important for every commercial corporation to manage its solvency and cash flow planning. Only a corporation that is able to pay its obligations on time creates the conditions for its continued existence and preservation. In case of a decrease in cash flow and liquidity of companies in an unexpected crisis, it was necessary to proceed urgently to solve these situations, for example, by postponing some payments, in the form of a loan, or cost optimization (Hakalová et. al., 2022).

During the COVID-19 pandemic, the government of the Czech Republic issued a wide range of measures and packages that reduced the effects of the pandemic on the business of small and large business entities, in most cases in the form of subsidy programs (Hakalová et al., 2020). As already mentioned in the introduction of this paper and in Figure No. 3, these were mainly Antivirus programs, compensation bonuses, Covid - Rent, Covid - Uncovered Costs, Covid 2021, Covid - Sport, Covid Gastro - Closed Establishments, Covid Fairs/Congresses, etc. During the audits of these subsidy options, problematic issues were solved primarily from a factual, but also a formal point of view. From a factual and time point of view, questions related mainly to various types of claimed cost items within the presented Amended Profit and Loss Statement were resolved, such as tax depreciation or adjusting entries. From a formal point of view, the actual verification of the Amended Profit and Loss Statement by the auditor in the context of missing data and prescribed requirements was a problem (KA ČR, 2022).

State expenditures of the Czech Republic increased in the mentioned years due to state subsidies provided to support the economy. The Fig. 3 below the total number of state subsidies paid to support commercial corporations and others in billion CZK.
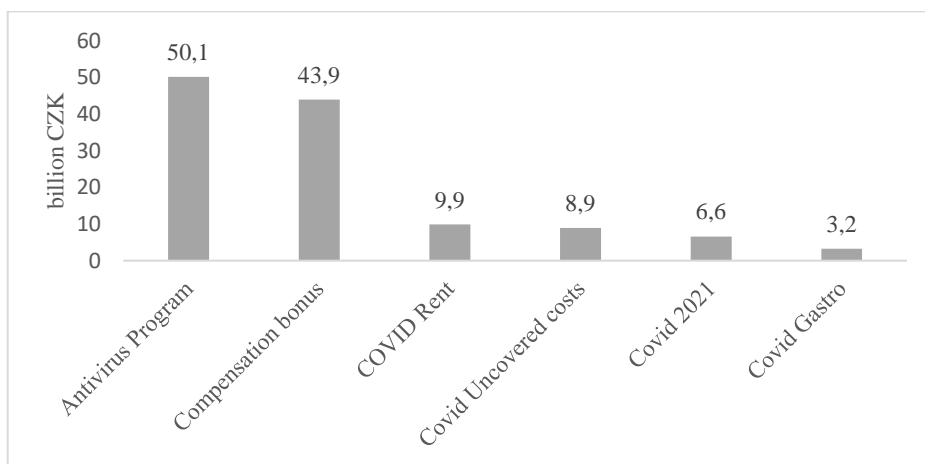
Figure 3. Total number of state subsidies paid

Source: MPSV (2021); MPO (2022); Finanční správa (2021), own processing

The Antivirus program was used to optimize employment and protect jobs to cover labour costs. As of 10 August 2021, approx. 50 billion CZK was paid out and more than 70 thousand commercial corporations were supported (MPSV, 2021). The development of the unemployment rate shows that it decreased until 2019, while from 2020 there is a slight increase. Covid-19 certainly has an impact on the labour market. Redundant jobs may be

abolished, unqualified employees may be dismissed (Dvořák et al., 2020) and the influence of Industry 4.0 is also increasing (Hedvičíková and Kozubíková, 2020).

The Covid Rent program served entrepreneurs to pay part of the rent if they were obliged to close the retail sale of goods and the provision of services. As of 25 March 2022, approx. 9.8 billion CZK was paid out in a total of 3 calls (MPO, 2022). The Covid Uncovered Expenses program was used to reimburse entrepreneurs operating in selected sectors (such as organizing sports or cultural events). As of 25 March 2022, approx. 8.9 billion CZK was paid out (MPO, 2022).

The Covid 2021 and Covid Gastro program was used by entrepreneurs to maintain their business activity (operating costs). As of 25 March 2022, approx. 6.6 billion CZK was paid out respectively 3.2 billion CZK (MPO, 2022).

However confusing and stressful the situation during the COVID-19 pandemic might seem, from an accounting point of view it was necessary to respect long-known and valid accounting principles and proceed using principles and proceed according to the set rules, and based on new relevant information capture and also present faithfully and fairly current negative situation and impacts (Hakalová et al., 2016). As a result, accounting information can then in turn support policy makers to introduce various aid mechanism (Buchetti et al., 2021).

As for the financial reporting, it became very important during the pandemic to comply with the principle of the going concern according to Section 7 (3) of the Act No. 563/1991 Sb., on Accounting. This is not only a legal duration, but primarily an economic duration for the near future. This principle is very important and is always verified by the auditor for at least another 12 months after the balance sheet date and commented on not only in the notes to the financial statements and in the annual reports of corporations, but also in the reports of auditors. For a number of commercial corporations, this principle was threatened by the pandemic (MPSV 2021; MPO, 2022).

3. 1 Significant changes in income taxes

The nationwide measures that were taken due to the coronavirus epidemic brought about a number of restrictions in the business environment and had a negative impact on most business entities, i.e. legal persons and individuals. For this reason, a number of important measures in the area of direct taxes have been adopted over time.

During 2022, there was an amendment to the road tax, the subject of which are all motor vehicles that are used for business. The road tax has been completely abolished for passenger cars and vehicles up to 12 tonnes. The road tax for goods vehicle over 12 tonnes maximum weight has been substantially reduced. However, significant changes have already occurred since 2020, mainly in the area of income tax.

An important change in the Act on Income Taxes which can help to obtain funds for further investments in the business earlier than usual and thus improve the cash-flow of the business entity, **is the retroactive application of tax loss carry back as an item deductible from the tax base. namely for the two tax periods immediately preceding the tax period or the period for which the tax return is submitted for which the tax loss is determined.** Until 2020 in the Czech Republic, a taxpayer could deduct a tax loss from the tax base only in the following periods. The basic principle in claiming tax loss was that the tax entity had to show a positive economic result in subsequent years, i.e. a profit, in order to be able to use the loss for previous periods. If no profit was made in the next five tax periods in which the tax loss could have been claimed under the law, the taxpayer has lost the possibility of claiming the tax loss from previous years. Thanks to the introduction of the of retrospective claiming of tax loss, income taxpayers in the Czech Republic could claim any tax loss

reported for 2020 in their tax bases already for 2019 and 2018, but in a limited aggregate amount not exceeding 30 million CZK. Thus, in the form of a refundable overpayment, the income tax payers were able to recover the funds for the tax paid or part thereof for that tax period. The option to claim tax losses retrospectively is one way to encourage domestic companies to maintain employment, stay healthy and continue to do business. It is a recommended institute that is now in operation in many countries around the world. (Albitar, 2021). As a result of claiming a tax loss retrospectively up to a maximum amount of 30 million CZK tax revenues of public budgets will decrease. According to the calculations of the Ministry of Finance of the Czech Republic, this is expected to amount to approximately 32 billion CZK for 2020 and 2022, but it is by this shortfall that tax revenues will increase compared to the current situation between 2022 and 2025, when companies and entrepreneurs would claim the tax loss, they would have incurred in 2020 and 2021 (MF ČR, 2022). Claiming tax loss retrospectively is also possible for entrepreneurial individuals. For more information on aspects of personal income taxation (Krajňák, 2021).

Another significant change in income taxes with effect from 1 January 2020, there was a renewal of the category of previously used extraordinary tax depreciation in 2009 and 2010 for selected tangible property for a taxpayer who is its first depreciator. This is property classified in the first and second depreciation group. The entry price for tax depreciation of tangible assets was also increased from 40,000 CZK to 80,000 CZK and the tax category of intangible assets was abolished. This measure abolished tax depreciation of intangible assets. Tax depreciation of intangible assets corresponds to the accounting depreciation that accounting entities establish in their accounting depreciation schedules.

For tangible asset classified in the first depreciation group, the taxpayer may write off 100% of the entry price over a 12-month period without interruption on a straight-line basis. For tangible assets classified in the second depreciation group, the taxpayer may depreciate 100% of the entry price over 24 months, with depreciation applied evenly for the first 12 months up to 60% of the entry price of the tangible asset and depreciation applied evenly for the immediately subsequent 12 months up to 40% of the entry price of the tangible asset. For the four other depreciation groups listed in the appendix to the Income Tax Act, extraordinary depreciation cannot be used.

Technical improvements of tangible assets depreciated by extraordinary depreciation does not increase their entry price. The completed technical improvement is classified in the depreciation group in which the tangible asset on which the technical improvement is carried out is classified and is depreciated as a separate tangible asset. Extraordinary tax depreciation cannot be discontinued, and the discontinuation of tax depreciation is and will continue to be a common tool for effective cost recovery in cases of tax loss or very low tax base. The taxpayer is not required to use the extraordinary tax depreciation. In case of a low tax base, the taxpayer may decide, for example, to use the straight-line method in the year of acquisition or to discontinue depreciation.

Extraordinary depreciation, however, can significantly reduce the high tax base and thus bring savings in corporate or personal income tax over time. The negative effect caused by the faster claiming of tax expenses in the form of extraordinary depreciation, which can be expected, could in the future be a possible increased rate of corporate or personal income tax, applied to the taxpayer's future tax base, which has already been reduced in previous years due to the extraordinary depreciation already applied. As extraordinary depreciation is determined with an accuracy of months, the benefit associated with the application of extraordinary depreciation may not be shown in the first taxable period, for example for assets acquired towards the end of the tax year. (Hakalová et al., 2022)

The tables below provide an approximate calculation of the corporate income tax savings for a commercial corporation in each year assets are depreciated. Table 1 shows the saving using conventional accelerated and straight-line depreciation, and Table 2 shows the

extraordinary depreciation. A machine was acquired by a commercial corporation that is a VAT payer in November 2020 on credit for a purchase price of 1,200,000 CZK excluding VAT and is under the Income Tax Act classified in the first depreciation group.

Table 1. Accelerated and straight-line tax depreciation and corporate income tax savings

Depreciation year	Accelerated depreciation in CZK	Corporate income tax savings in CZK (if depreciation calculated by the taxpayer is used)	Straight-line depreciation in CZK	Corporate income tax savings in CZK (if the entire depreciation calculated by the taxpayer is used)
2020	400,000	76,000	240,000	45,600
2021	533,334	101,333	480,000	91,200
2022	266,666	50,667	480,000	91,200

Source: author's own calculations

Table 2. Extraordinary tax depreciation and corporate tax savings

Depreciation year	Extraordinary depreciation in CZK	Corporate income tax savings in CZK
2020	100,000	19,000
2021	1,100,000.	209,000

Source: author's own calculations

The calculations show that the savings on income tax can be significant when using extraordinary depreciation and can thus be considered an effective instrument of state assistance to business entities in the area of direct taxes. However, according to the analysis carried out by the Ministry of Finance of the Czech Republic, the institute of retroactive application of tax losses and even the possibility of applying extraordinary depreciation were hardly used by tax entities during 2021, contrary to expectations. Initially, the negative impact on the state budget for 2021 was projected at 18.7 billion CZK. It can also be concluded from the analysis of collections that the sectors most affected by the crisis and anti-epidemic measures do not usually generate such a tax liability that its shortfall would significantly affect the total amount of collections to the state budget (MF ČR, 2022).

4 Conclusion and discussion

The Covid-19 pandemic had significant negative impacts on the economies of all countries of the world, on the business environment of individual countries and, of course, it also had very negative impacts on people's health. Like other countries, the Czech Republic had to take a number of measures to mitigate these negative impacts in all of the above areas. This paper, however, focuses only on the impact of the COVID-19 pandemic on commercial corporations from an accounting and tax perspective in connection with the application of pandemic measures under current legislation in the Czech Republic In the area of accounting, commercial corporations had to deal with a number of extraordinary accounting cases, which involved, among other things, the use of various state subsidy programmes. At this time, it was more than a necessity to consistently use the applicable accounting principles and guidelines, which also had to be presented correctly. It was mainly an honest and faithful capture of the current negative situation and the effects in commercial corporations. At the time of the pandemic, it became absolutely necessary from the point of view of financial reporting to respect the principles of the assumption of continued existence of the accounting entity (going concern). On the other hand, properly reported accounting information can help

the state implement effective aid mechanisms. In the Czech Republic, it was possible to use a number of subsidy programs for such assistance. In addition to them, the state also introduced various measures in the area of taxes, which related to both direct and indirect taxes. The paper tries to point out the most important measures in the area of direct taxes, such as the possibility of claiming a tax loss or using the category of extraordinary tax depreciation. Although the state assumed that the use of these tools would have significant negative impacts on the state budget, it was found from the analysis of the collection of the state budget that commercial corporations did not generate such a tax obligation in 2021 that its shortfall would fulfil the expected negative impact on state budget revenues. The aim of all the measures taken and the introduction of subsidy programs by the state was to ensure financial stability and the maintenance of the activities of business entities during the pandemic.

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The development of the labour market and its dynamic models in the context of Industry 4.0 and the current economic crisis in the Czech Republic

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Abstract

Research background: Since 2001, when Industry 4.0 was first mentioned, there has been a very rapid expansion of this initiative. Given the current economic situation and the increasing pressure of globalization at the beginning of the twenty-first century, the onset of this fourth industrial revolution seems inevitable. Since 2019, however, the markets have been affected by the Covid 19 pandemic, as well as the war in Ukraine, which caused shortages of basic production raw materials, companies are forced to look for new ways to satisfy the needs of customers. These aspects caused the onset of the economic crisis to accelerate.

Purpose of the article: In order for manufacturing companies to survive in the competitive market, they must constantly look for new ways to increase their competitive advantages. The emphasis is on the price, but also the speed of production. One possibility is Industry 4.0 and the substitution of labour with capital. Companies will achieve higher work productivity, and higher efficiency and execute orders just in time. However, this substitution also brings with it an increase in unemployment.

Methods: Substitution of labour by capital will be modelled using Stella Professional software. Dynamic models will calculate the return on the investment period. Data will be obtained from international databases and the International Federation of Robotics.

Findings & Value added: Dynamic models of the substitution of labour by capital will be created. The models will calculate the return on investment for 15 years ahead, and company managers will be able to decide on the basis of them whether to implement the capital investment and especially at what moment.

Keywords: *Stella Professional; substitution, robot, effectiveness, payback period*

JEL Classification: *E20; F66; J24*

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1 Introduction

In recent years, there have been very rapid and dynamic changes. First, the entire world was hit by the Covid 19 pandemic in 2019 and the markets had to react. Industries were affected to varying degrees. Subsequently, a war conflict arose in Ukraine, which disrupted supply-customer chains and slowly resulted in an energy crisis. These aspects led to the search for new possibilities for increasing production efficiency. It is also necessary to produce and deliver the goods to customers on time. The vision (Meindl et al., 2021) of Industry 4.0 is increasingly gaining ground on the market as a concept that goes beyond the area of Smart Manufacturing and thus creates opportunities for synergies with other related fields. The digital transformation under Industry 4.0 is immensely resource-intensive and complex. Smaller manufacturers must have specific capabilities such as change management and digitalization strategic planning capability to reach a certain degree of information, digital, operations and cyber maturity (Ghobakhloo & Iranmanesh, 2021). The requirement of increased productivity, improved flexibility and resilience, and reduced cost in Industry 4.0 manufacturing calls for new paradigms that comply with the changing of production and operations management (Guo et al., 2021).

Collaboration of humans and robots in close proximity in a single work space is a stimulating feature of Industry 4.0. The main field of application of robotics is industry. Technologies contributing to the improvement and automation of processes are constantly improving. (Galin & Meshcheryakov, 2019).

As part of the implementation of Industry 4.0, the interconnectedness and relationships of all relevant stakeholders, i.e. private and state companies, the state, trade unions and employers' associations, are often ignored. However, only by taking these connections into account can individual countries prepare for the social and economic impacts of the current trend of digitization and automation. In the future, industry, science, research and innovative new technologies will increasingly be connected, which needs to be approached comprehensively if the transition to Industry 4.0 or Industry 5.0 is to be successful (Maresova et al., 2018).

The study (Popelo et al., 2021) dealt with the influence of digitization on changes in forms of employment and the labour market in modern conditions in Ukraine. It is documented that digitization processes directly (both positively and negatively) affect the change in forms of employment and the range of occupations on the labour market, as well as the change of job. In the process of digital transformation in the economy, there is: reduction of personal costs of employers; the spread of non-standard, informal employment (electronic freelancer, electronic outsourcing, job initiation); allow employees to manage their working hours; increasing unemployment and imbalance of supply and demand in the labour market; reduction in the productivity of enterprises as a result of reduced productivity of workers with non-standard forms of employment, possibly with a negative indirect impact on productivity.

New technologies will enable manufacturing companies to increase labour productivity, increase the quality of production, just in time, but above all will solve the labour shortage on the labour market. Substitution of labour with capital is an option to increase the overall efficiency of production, but it can also be the only way to satisfy the demand of your customers.

2 The goal of the paper and methodology

The aim of the article is to create a dynamic model of the replacement of labour with capital in the Stella Professional software. This model will calculate for 15 years ahead the payback period of investment in robots and simulate the development of robot prices and labour costs for this period. The benefit of these models is the ease of use for the decision-making

processes of small and medium-sized enterprises. This model will be used for the initial decision-making on the implementation of the investment in the automation of production. Input data for calculating the payback time of the robot as calculated on the basis of the IFR statistical yearbook (International Federation of Robotics, 2022), Panorama of Czech Industry (The Ministry of Industry and Trade of the Czech Republic, 2018), the Czech Statistical Office (Czech Statistical Office, 2022) and information from manufacturers of industrial robots (e.g. KUKA, ABB, Staubli).

First, the key variables on the labour market in the Czech Republic and their development since 2011 will be described. Subsequently, models will be created for the substitution of labour with capital, which will calculate the payback period of the investment in a fifteen-year period.

IFR (International Federation of Robotics, 2022) members use the definitions contained in the international standard ISO 8373. "An industrial robot" is defined to be an "automatically controlled, reprogrammable, multipurpose manipulator, programmable in three or more axes, which can be either fixed in place or mobile for use in industrial automation applications."

The payback period is a widely used capital budgeting tool in the analysis of investment projects. It has come under fire for not considering all project streams in the current valuable context (Boardman et al., 1982). For the purpose of quick calculation of the payback period, Stella Professional software will be used, which enables the creation of dynamic models. As a result, the payback period takes on a new identity that far surpasses the objections raised against it in the past (Boardman et al., 1982).

Payback periods (in years) were calculated through comparing the cumulative annual monetary savings in successive years with the total investment (initial installation cost + cumulative operation and maintenance costs in successive years) of the RWH system. Net savings for a year is the annual monetary savings subtracted by the annual operation and maintenance costs. Net savings under different scenarios for the successive years were converted to equivalent net present value (NPV) as per the following equation 1 (Imteaz et al., 2021):

$$\text{NPV of Savings} = \sum n=1 n AS \, (1 + r) \, n \qquad (1)$$

where "AS" is the net annual savings for a year, "r" is the rate of return and "n" is the number of years since installation (Imteaz et al., 2021).

3 Results

3.1 Developments in the labour market and key macroeconomic indicators in the Czech Republic

The unemployment rate has been decreasing since 2014 to the current 2.8% in 2021 in the Czech Republic. The unemployment rate is thus below the natural rate of unemployment. On the contrary, the inflation rate has been increasing for the last three years and in 2021 it reached the level of 3.8%. However, it began to rise progressively in 2022, and in August 2022 the inflation rate reached 11.7% and the CPI 17.2%. Although the Czech National Bank increased interest rates, inflation increased. GDP responded to the onset of the Covid 19 pandemic and in 2020 GDP fell by -5.5%. In 2021, the economy recovered and GDP reached 3.5%. The following Figure 1 shows these key macroeconomic variables.
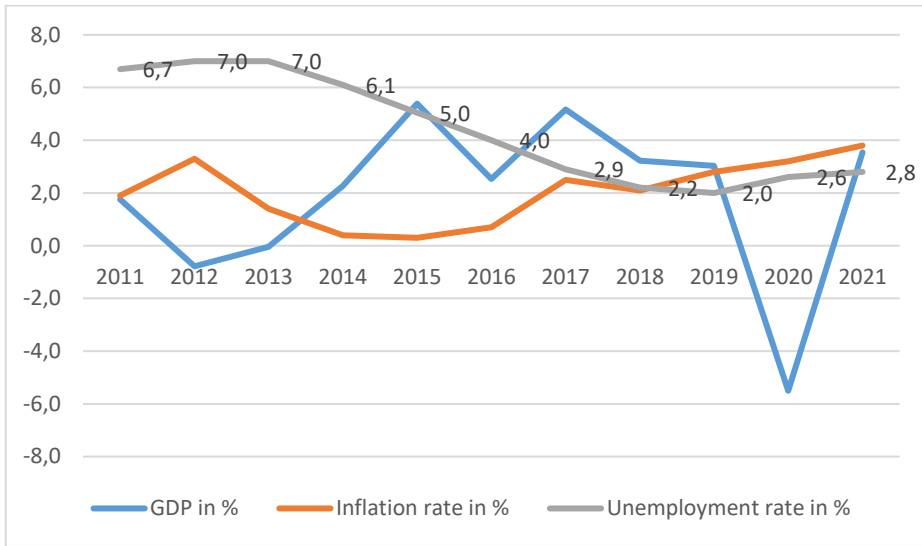
Figure 1. Key macroeconomics indicators in % in the Czech Republic

Source: (Czech Statistical Office, 2022), own processing

From the point of view of the substitution of labour by capital, the key values are the average wage. The average wage responded to the development of the gross domestic product and inflation. It grew until 2018, and from 2019 there was a decrease to the current 4.8% growth of the nominal average wage (see Fig. 2). The average wage for the second quarter of 2022 grew by 4.4% and the real wage fell by 9.8% due to rising inflation. The gross average wage was 40,086 CZK for the second quarter of 2022 in the Czech Republic (Czech Statistical Office, 2022)
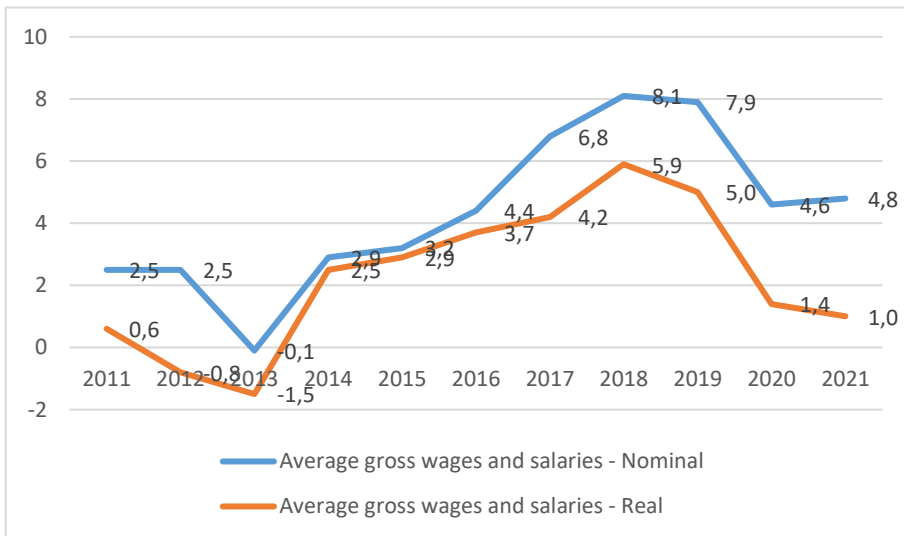
Figure 2. Average gross wages and salaries (nominal and real) in % in the Czech Republic

Source: Czech Statistical Office (2022), own processing

Due to the excess of labour demand over labour supply, the labour market is experiencing an increase in labour costs that do not correspond to the economic cycle. The pressures of trade unions and employees reacting to rising inflation and falling real wages are manifested here. Due to the lack of workers on the labour market, companies are forced to increase personnel costs. At the same time, material costs and especially energy costs are increasing. For these reasons, companies are forced to look for ways to increase their efficiency. One of the possibilities to increase labour productivity is investment in robotization and automation of production. The Industry 4.0 initiative, which was created in 2013 in Germany, also emphasizes the importance of new information and communication technologies in production.

This market situation will be modelled in the following chapter. It is assumed that in order to remain competitive, companies must invest in new technologies. The models can be used primarily in the processing industry of the Czech Republic and in small and medium-sized enterprises. As a result of the introduction of Industry 4.0, there could also be a loss of jobs on the labour market.

3.2 Dynamic models in Stella Profession

Model creation and simulation of system dynamics is implemented in the Stella Professional program. First, the level and flow diagram will be used. After specifying and supplementing the decision rules, he will be able to implement simulations.

The diagram is based on four levels – Price of labour of planned employees, Wages substituted employees, Price of robot and Installation costs of robots.

These elements were chosen because they are considered to be the most significant within the modelled problem. Figure 3 shows the four layers with their respective sources and drains that ensure the change of state over time. Both: Price of labour of planned employees and Wages substituted employees; there is a constant two-way change over time, as new jobs are created and others disappear. Employees also enter and exit the work process. On the contrary, with Price of robot and Installation costs of robot, only increments are calculated. Because, even in the long term, technology (robots) becomes obsolete and is depreciated, but the model assumes, within the framework of maintaining the competitiveness of production, their replacement after the end of their useful life. This is a simplification of the model. The need for repairs and modernization is also not considered here. An analysis of the development of the price of robots showed that the price of robots decreases over time and increases with skills and capabilities. Installation costs are also falling due to the increasing number of installed robots. The other diagram elements are auxiliary variables.
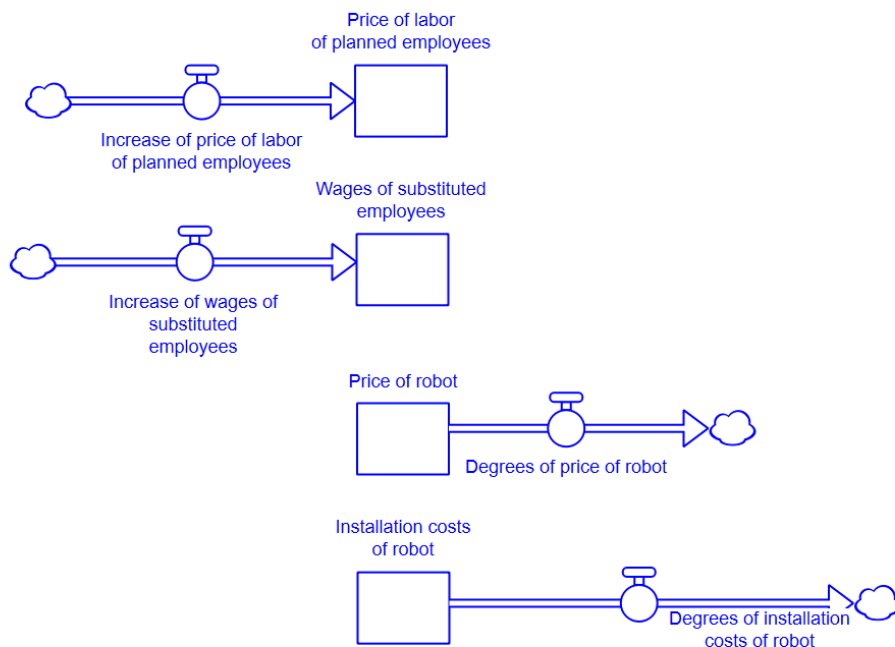
Figure 3. Diagram of levels and flows

Source: autor (2022)

The following figure 4 shows the main variables and their dependence between the input values "Price of labour of planned employees", "Wages of substituted employees", "Price of robot" and "Installation cost of robot" and the effect of this dependence on "Payback period". Individual input variables can undergo changes in their amount over time using indexes and this will of course affect the value of the payback period (Hedvicakova, 2021).
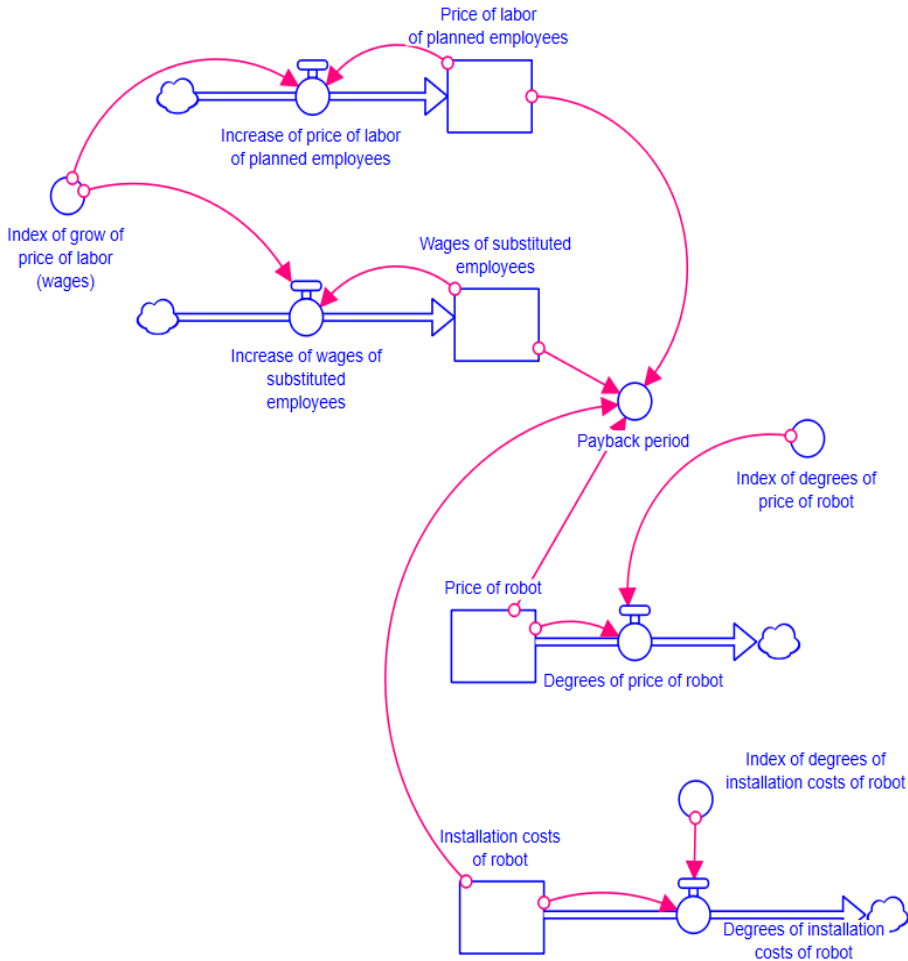
Figure 4. The model of payback period

Source: (Hedvičáková, 2021), own processing

The following Figure 5 shows the simulation of the development of the payback period for 15 years. Figure 5. shows that the payback period decreases over time and for this reason it is more efficient to postpone the investment. However, managers must take into account I nan and increasing competition and whether the firm is able to meet its obligations, because automation can allow it to produce more products at a higher quality.
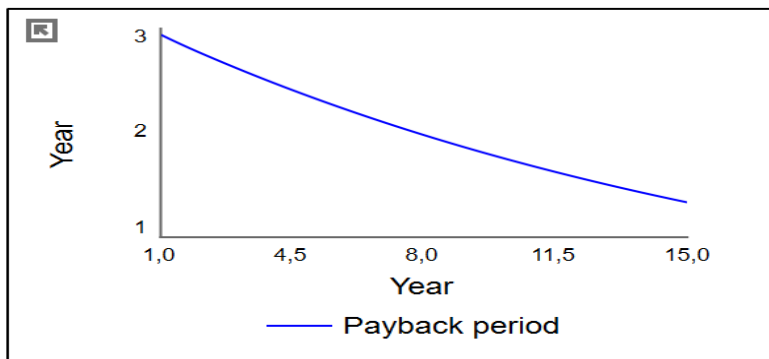
Figure 5. The payback period for 15 years

Source: Hedvičáková (2021), own processing

Figure 6 shows the development of wages of substituted employees, which are increasing over a fifteen-year period. Because wages increase over time, but robot prices are constant or even slightly decreasing, the payback period decreases. It is also necessary to take into account whether the price of robots is constant or slightly decreasing over time, but the skills and capabilities of robots are constantly increasing.
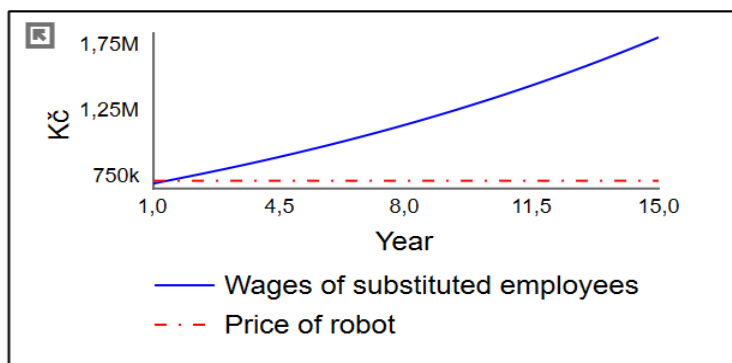
Figure 6. The development of the wages of substituted employees and price of robot

Source: Hedvičáková (2021), own processing

3 Conclusion and discussion

The development of key variables in the labour market of the Czech Republic forces the management of small and medium-sized enterprises to search for new ways to increase their efficiency and competitiveness. One possibility is production automation. Based on the created model, it is possible to calculate the payback period and simply modify the model by key variables. Another possibility of the model is the extension, for example, of depreciation or energy prices, which are currently the most discussed costs.

The current economic situation presents an existential challenge for many businesses. The adverse effects of pandemics, epidemics, economic crises, natural disasters on various macroeconomic variables are not a new phenomenon and are supported by a number of literature, e.g.(Fasanya et al., 2021; Shaikh, 2021; Su et al., 2022).

Acknowledgements

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Growth through innovative business models using the example of the social economy

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Abstract

Research background: Organizations are in the VUCA world and need to evaluate their traditional business models. Megatrends and new digital technologies are changing the established business models of many companies. Further developed, disruptive business models or business model innovations characterize the diverse spectrum of modern, innovative business models. The global corona pandemic, which broke out at the beginning of 2020, is considered a catalyst for the digital transformation of organizations – also in the social economy, to ensure innovation and competitiveness.

Purpose of the article: This research contribution aims to show organizations how organizational change – triggered by (disruptive) technologies and changed market conditions - can be designed. A structured business model is the key to success. The focus is on measuring customer satisfaction as a basis for optimizing stakeholder orientation.

Methods: The author chose the quantitative research approach. The two satisfaction constructs CSAT and NPS were operationalized using questionnaires.

Findings & Value added: In times of disruptive change, serious effects on established business models will occur more and more frequently and strategically challenge organizations. Organizations need to understand the most important drivers for their business as they have a significant impact on the success of the business model. Digital support for the customer when using the product or service is essential these days. At the same time, the holistic understanding of the customer influences the organizational portfolio design of the socio-economic organization.

Keywords: *COVID-19 pandemic; Digitalization; Transformation; Business model; Innovation; Social economy*

JEL Classification: *F60; L31; M10; M31; O30*

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1 Introduction

Many organizations in the VUCA world are in the midst of a fundamental change, which is being shaped by digitization and changed lifestyles, as well as by so-called real-time competition. What began with the digital transformation in the context of the megatrends is being reinforced by the SARS-CoV2 virus (Kröger & Marx, 2020; Ulrich et al., 2021). The associated economic effects require a strategic, innovative rethinking of organizations (Heide et al., 2021). Holistic communication influences the positive acceptance of business decisions, especially at the operational level (Kreidenweis, 2018). The development of the corporate landscape is shaped by changing framework and environmental conditions - new business models are emerging (Brunetti et al., 2020; Kröger & Marx, 2020; Müller, 2019). Stakeholders are increasingly becoming the focus of innovative thinking and action (Brunetti et al., 2020; Rintamäki & Saarijärvi, 2021; Tampio et al., 2022; Thömmes, 2022) by (social economy) organizations.

The term "business model" is now an integral part of any organization in the social economy and is interpreted in different ways. No prose on the subject of "strategy" dispenses with the inflationary use of the term business model. Volatile markets and changing expectations and needs of stakeholders pose key challenges for management (Müller, 2019). Due to the dynamism of (global) competition, innovations have become immensely important, especially when modeling sustainable business models that are intended to offer customers added value (Brunetti et al., 2020; Müller, 2019). The structure of the financing also characterizes the operational growth opportunity.

The theoretical concept is provided by the value-based business model approach, which must be relaunched due to changed framework conditions. Technological progress in communication opens new possibilities for interaction – the customer becomes a co-developer of products and services (Karlsson, 2022; Kucia et al., 2021; Staudacher, 2021). Furthermore, modifications in the earnings mechanics can be observed, also in the context of the platform economy.

In the meantime, online platforms have established themselves as important players in the market. This creates new opportunities for organizations to generate added value for stakeholders. Modularization and intelligent, data-based services provide the answer to a meaningful, pragmatic design of portfolios (Kreidenweis, 2018; Kucia et al., 2021). (Disruptive) technologies form new business models, which at the same time lead to a new value proposition of the organization. In addition to monetization, it is important to understand the customer journey of a customer with all touchpoints as an essential basis of modern business models in the age of digitization (Brunetti et al., 2020; Rintamäki & Saarijärvi, 2021; Tampio et al., 2022; Thömmes, 2022).

The aim of the research contribution is to show social economy organizations how organizational change can be designed. The focus is on measuring customer satisfaction in order to ensure the continued existence of the organization in the long term. Best practice approaches should help to maintain the organizational ability to act in post-corona times and to promote qualitative growth by modeling sustainable and stakeholder-oriented business models.

2 Literature review

At the end of January 2020, the spread of the infectious disease COVID-19 (corona virus) led to the World Health Organization declaring a global health emergency, which had drastic effects on all companies worldwide (Nemțeanu & Dabija, 2020; Heide et al., 2021). The crisis required organizations to find creative solutions (Ulrich et al., 2021) to ensure the continuity of the previous business model.

Due to the changed framework conditions, changes to existing value chains are increasingly gaining in strategic importance (Thömmes, 2022). The portfolio activities are increasingly supported by the use of information and communication technologies and are increasingly discussed in science (Brunetti et al., 2020; Kucia et al., 2021). Social media is one of the SMACIT technologies (Social, Mobile, Analytics, Cloud and IoT) and makes an important contribution to digital transformation (Aloini et al., 2022; Martini et al., 2021).

The term "platform economy" has populated science and practice since the early 2000s. Platforms serve as a strategic source of information (Brunetti et al., 2020; Konhäusner et al., 2021; Kröger & Marx, 2020). In the age of global, digital connectivity, innovation must be a mainstay of organizational competitiveness. Digital technologies and infrastructures have significantly changed the innovation processes in companies and the collaborative approach (Aloini et al., 2022; Chierici et al., 2021; Kucia et al., 2021; Müller, 2019).

The quality of the customer journey has become a crucial factor in the modern business world. The idea of delighting customers through service excellence is one of the basics in service research and practice (Jaakkola & Terho, 2021). In general, existing marketing literature defines the "customer journey" as a series of touchpoints that customers meet and interact with during their buying process (Boßow-Thies et al., 2020; Thömmes, 2022).

Business models implement organizational strategies (Aloini et al., 2022) and the integration of customers into organizational (portfolio) activities is becoming increasingly strategic (Brunetti et al., 2020; Karlsson, 2022). For traditional companies, scientific concepts and tried and tested applications for business models are still not fully available (Müller, 2019; Thömmes, 2022), despite the many research activities (Aloini et al., 2022). Companies invest in new technologies and change their business model (Brunetti et al., 2020).

2.1 Research context

The importance of innovative health services will continue to increase as a result of megatrends, changing framework conditions and demographics (Kreidenweis, 2018; Müller, 2019). In order to achieve this level of performance, all actors must cooperate across sectors. The sustainable use of resources and the use of business tools for company management are gaining in strategic importance. A networked, sustainable stakeholder orientation with new actors and market participants will emerge and gain momentum (Brunetti et al., 2020; Heide et al., 2021; Tampio et al., 2022).

Organizations in the health and social economy must be adaptable and able to combine external and internal factors in an innovative way (Ludwig et al., 2016) in order to be able to implement holistic care concepts. Companies are complex systems that interact with their environment. Due to the complexity and dynamics of the environment, as in post-corona times, agility and flexibility are expected. Nevertheless, the modeling of sustainable strategies in social economy organizations plays a rather subordinate role (Kreidenweis, 2018; Thömmes, 2022). The changing framework conditions of the (global) market are creating new opportunities to establish innovative business models using BMC (according to Osterwalder and Pigneur) (Müller, 2019). In order to be successful in the long term, the use of synergy effects for systematic market cultivation must be focused (Schmitz, 2007). Thinking in terms of competitive advantages is becoming an iterative strategy process for companies (Heide et al., 2021; Kucia et al., 2021; Straub & Sperling, 2016).

The economy and the differentiated communication are an essential basis for the design of the value-added processes in the health and social economy. The management of scarce goods and ensuring organizational competitiveness will become even more important in the future (Kreidenweis, 2018; Kucia et al., 2021). This requires tailor-made, holistic

management and marketing concepts (Heide et al., 2021; Straub & Sperling, 2016) in order to make social change processes stakeholder-oriented (Brunetti et al, 2020; Kreidenweis, 2018).

3 Methods

As part of a project, the author selected all clients (customers) from an IT point of view who had initial contact with the socio-economic organization in the greater Ulm area, Germany, in the defined period (t_0) 10/2022 to 12/2022. The survey was repeated after 6 months in the period (t_1) 06/2023 to 08/2023.

Customer satisfaction and loyalty were determined using two ad-hoc random samples n = 122 (t0) and n = 109 (t1). For this purpose, anonymous, standardized interviews without freedom of variation were organized using survey cards. The questionnaire includes 12 items to measure customer satisfaction (using the construct *"Customer Satisfaction Score"* – CSAT) and 1 item to measure customer loyalty (using the construct *"Net Promoter Score"* – NPS).

Figure 1. Visualization of the CSAT construct

Source: own illustration
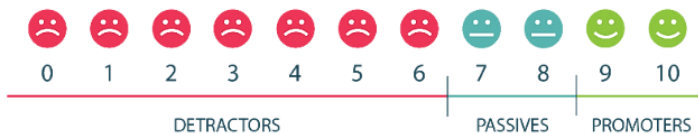
Figure 2. Visualization of the NPS construct

Source: own illustration

After a successful pretest, the participants were able to map their attitude to the categories of personnel (P), administration (A) and service (H) on the 5-level Likert scale as part of the classic customer survey. According to the socio-demographic information, the so-called customer loyalty question **"How high is the probability that you would recommend the service?"** placed. This key question is to be answered by the participants on a scale of 0 to 10, with 0 being very unlikely and 10 being very likely (Staudacher, 2021).

The arithmetic mean and the standard deviation, which belong to the bundle of methods of descriptive statistics, served for the interpretation. The processed data was evaluated using MS Excel and SPSS.

4 Results

High response rates are of qualitative, statistical importance for the project success (Staudacher, 2021). The calculated response rates t_0 = 8.75% and t_1 = 7.45% in the B2C area show that the results are below the typical response rate of 10 to 20% for B2C surveys and

thus limit the representativeness of the sample (Theobald, 2017). Despite the reminder, the response rates could not be increased significantly. Furthermore, the internal consistency calculation of the measuring instrument was carried out and rated as acceptable: > 0.700 (Streiner, 2003). Table 1 shows the results of the questionnaire categories (P, A and H). Cronbach's alpha is an indicator of the reliability of a construct represented by items.

Table 1. Reliability statistics for t_0 and t_1

	Cronbach's alpha		
	P	**A**	**H**
t_0	0.753	0.845	0.865
t_1	0.728	0.838	0.852
Count of items	3	3	4

Source: own illustration

Figure 2 below visualizes very clearly that in the social economy the clients (customers) are generally very satisfied with the service provided, which mean shows. The different criteria for determining customer satisfaction could be evaluated using Likert scaling in five grades from not at all ($= 1$) to completely ($= 5$).

The CSAT calculation is carried out for the respective construct according to the scheme: positive responses (Perfect! & Gut) ÷ total number of responses (Staudacher, 2021).
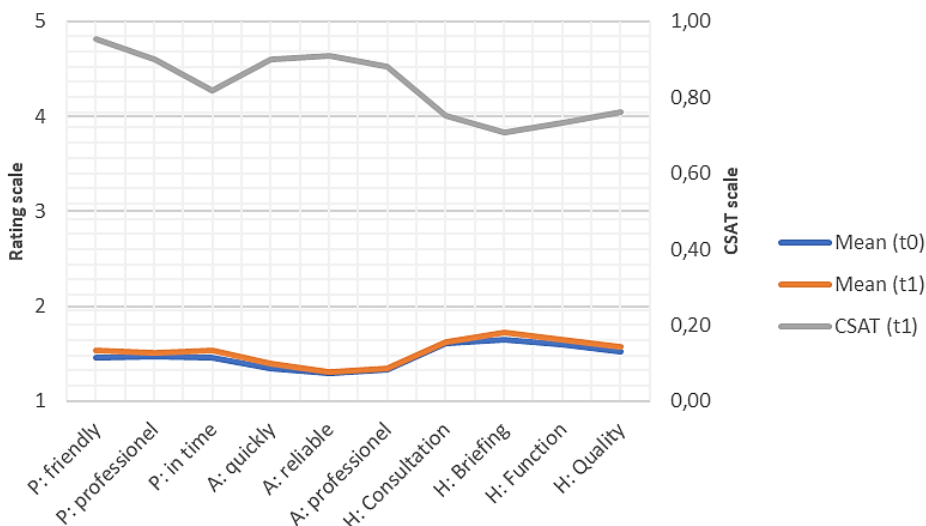
Figure 2. Results of the customer survey

Source: own illustration

The measurement of customer loyalty was operationalized with the construct NPS and calculated as follows: % Promoters – % Detractors (Staudacher, 2021). The result of the calculation of the NPS value ($t_0 = 54$ and $t_1 = 62$) is shown in Figure 3 below.
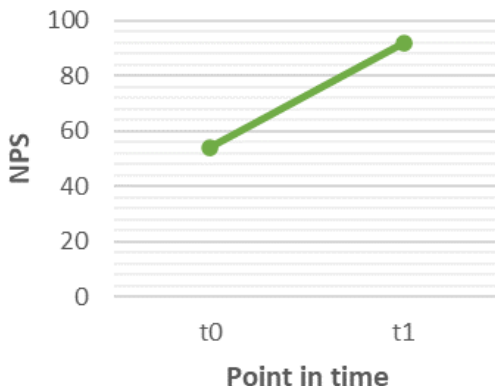
Figure 3. Visualization of the NPS results

Source: own illustration

Standardized interpretations and comparative values from other sectors are used to classify the results. Table 2 below helps to classify and interpret the determined value. From the data at both points in time (t_0 and t_1) it can be seen that the socio-economic organization acts in the market in a very customer-focused manner. From a statistical point of view, a positive NPS value should be aimed for – i.e. have more promoters than detractors. The higher the value > 0, the more customer-focused the organization acts. A value > 30 is remarkable. 50 is excellent and > 70 is exceptional in many industries and business sectors.

Table 2. Help for the interpretation of the NPS value

NPS value	Interpretation of the NPS value
> 70	Exceptionally high and very rare in many industries and business sectors.
$50 – 70$	An excellent NPS value, which means the organization is very customer-focused.
$30 – 50$	A remarkably good NPS score.
$0 – 49$	A positive NPS value with further potential for improvement for the company.
< 0 (negative)	There are more detractors than promoters here, which means the organization must initiate improvement measures.

Source: own illustration

An excellent NPS value can be a bad score in another industry. Benchmarking helps to understand the calculated NPS value and to optimize stakeholder orientation (Staudacher, 2021). Various websites and online platforms provide industry-specific comparative values. In addition, the geographic location and socio-demographic characteristics of the interviewees must be considered.

5 Discussions

Portfolio management occupies many companies (Aloini et al., 2022; Tampio et al., 2022; Thömmes, 2022), because customer centricity has steadily gained strategic importance in

recent years (Karlsson, 2022; Kucia et al., 2021; Staudacher, 2021). Profit and customer added value move into focus and change the established business model of organizations. New technologies, increasing customer requirements and changing framework conditions offer many opportunities in the context of digital transformation. Growth and increase in value must be understood as a conglomerate of organizational measures. The communication behavior of the stakeholders has also changed fundamentally as a result of IT. Organizations speak of the loss of information sovereignty. A paradigm shift in communication is emerging (Kröger & Marx, 2020). Megatrends such as digitization, connectivity, sustainability and changing values are key drivers for central changes in the world of work (Boßow-Thies et al., 2020; Karlsson, 2022; Kreidenweis, 2018; Kröger & Marx, 2020). These new circumstances are forcing socio-economic organizations to massively rethink and act innovatively.

Customer surveys are considered an important tool in the world of marketing and promote active stakeholder dialogue (Karlsson, 2022; Staudacher, 2021; Theobald, 2017). Several methods for generating valuable customer insights are populating science and practice (Brunetti et al., 2020; Jaakkola & Terho, 2021; Karlsson, 2022).

6 Conclusions

Social economy organizations are facing a huge change and need to rethink their current strategy and business model. The increasing relevance of business model strategies has been repeatedly emphasized in practice and science in recent years, especially against the background of increasing global competition and increasing customer requirements (Kucia et al., 2021). So-called standard strategies (according to Ansoff or Porter, among others) can be used to help with general structuring.

If you want to look into the future, you should evaluate the framework conditions of the organization. In the context of business model innovations, the parameters mindset, technology, economy and demographics play an important role.

Digitization is constantly changing all sectors and requires a modification of previous business models (Boßow-Thies et al., 2020; Brunetti et al., 2020). The stakeholders of a (social economy) organization are not only a target group, but also become organizational ambassadors and make a strategic contribution to the significant and innovative competitive advantage (Kröger & Marx, 2020; Kucia et al., 2021; Tampio et al., 2022). Agility and flexibility play an essential role in modeling stakeholder-oriented processes. Operational value creation and business models are becoming "digital" – tools and holistic IT systems are becoming a strategic competitive factor (Thömmes, 2022).

Finally, the author proposes to test empirically whether Eastern EU countries provide comparable results, in order to check whether the results can be generalized, especially in the context of the social economy. Furthermore, the results from the internal and external surveys could be used as a so-called dialogue tool for sustainable organizational and portfolio development. Another construct that could be used is the Customer Experience Score (CES), which evaluates the customer's interaction with the company (Staudacher, 2022). The CES is often used in the eCommerce area.

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Impacts of globalization on the behaviour of young consumers

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Abstract

Research background: Globalization has developed the interconnection of national economies and has become an effective platform in the development of international trade. At the current time, when the world is recovering from the effects of the COVID 19 pandemic and the current political-military crisis between Russia and Ukraine, it can be expected that changes in the behaviour of young consumers will occur in Europe. The increase in consumer goods inflation and high energy prices will be a clear cause of this.

Purpose of the article: The article tries to find realistic ways to minimize the negative effects of the current global crisis of international trade on the needs and interests of young consumers based on a complex analytical reasoning.

Methods: The main methods used are a structured analysis of real facts regarding the impact of globalization on national economic interests and on the behaviour of consumers from generation Z, as well as a cognitive description of the facts, as well as synthesis methods, logical and deductive procedures in order to verify the proposed paths leading to the minimization of the impact of globalization on behaviour of young consumers.

Findings & Value added: The article will present the consequences of the current global crises on the national economy of the Czech Republic and their influence on the change in the behaviour of young consumers of Generation Z, and will provide general recommendations for mitigating the negative effects of the current global trade crisis on the surveyed consumers.

Keywords: *globalization*; *corporate enterprises; consumer behaviour; crisis; incorporation;*

JEL Classification: *M21; M31; L21*

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1 Introduction

Globalization has created the conditions for the rapid development of a consumerist postmodern society that increases its demands for its comfortable lifestyle. Large multinational corporations have emerged, which today also strongly influence political decisions in individual states. The commercial and economic structure was linked in terms of ownership and economy, and thanks to the development of information technology, all links were linked in a strong network with significant interdependence. This process of global interconnection represents an economic driving force for the development of society as a whole in all cultures of the world and is a new trend in international trade. Of course, all this is reflected in changes in consumer behaviour. Although the protests of various civil movements are growing against globalization, thanks to the unevenness of, for example, subsidy titles for some products that bring price disparity in different markets (Stiglitz, 2006), global trade is currently a phenomenon that fundamentally affects the behaviour of consumers, especially the young generation. In a certain way, the young generation behaves differently as a consumer than the previous generation /generations Y and X/. The comfortable lifestyle provided by their parents and especially the global society allows them not to worry about the possibility of certain crises with negative impacts on their standard of living. Generation Z is strongly influenced by social networks, they live on the border between online and offline, from which they draw all possible information, including what to buy and how to behave. They don't just buy what they need to survive, but what they enjoy and what their favourite influencer recommends. Generation Z is surrounded by interactive media and this is significantly reflected in their purchasing behaviour. It is therefore necessary to show this young generation of consumers the possible risks of purchasing decisions associated with the possibility of crises (COVID 19, the war environment in Ukraine) and to create alternative solution paths for them.

2 Material and methodology

The main methods that were used in the processing of the mentioned issue were structured analysis and in particular the description of facts and their arrangement according to general laws, as well as synthesis methods, logical and deductive procedures with the aim of correctly formulating, on the one hand, the sources of possible global crises affecting the purchasing decisions of the young generation Z, on the other hand theoretical starting points leading to the construction of a real solution. The topic is organized according to the logic of facts and through deduction from analyses of scientific texts and real global phenomena, to formulate, identify and characterize real measures to minimize the impact of crises on the young generation of consumers.

3 Results and discussion

Globalization is currently a very topical topic for all economically and property-related countries. The entire system was built on the integration of management and organization of production, including services at an international level. Globalization processes rose above internationalization, where the main characteristic was the promotion of international trade in goods within national economies. However, with the emergence of multinational corporations, the borders between individual states disappeared and they began to take advantage of production factors in local parts of the world in order to minimize production costs and increase their profits. Dicken (1992) already formulated globalization as a functionally integrated system of geographically dispersed economic activities. Despite the

considerable benefits of globalization processes, which have brought about a disproportionately consumerist way of life for the entire society, there is currently an increasing number of crises (financial, health, pandemic, political, energy). The young generation in particular, and generation Z in particular, have become accustomed to a comfortable way of life that does not count on any possible crisis wave. These began to manifest themselves most with the pandemic crisis caused by COVID'19, which became the cause of the global economic recession (Adžić S., Al-Mansour, 2021). Even Hazdra (2013) drew attention to the danger of global phenomena for the tertiary sphere of services. Cross-border crisis was highlighted by Backman (2020) as a result of examining different crisis management within the framework of central crisis resolution. Hall (2010) in turn examined hypermobility in tourism, which is a consequence of increased crisis events in international tourism. The entire process of political crises has been covered by studies that serve to understand the complexity of integration caused by the crisis (Hooghe, Marks, 2019, Moravcsik, 2018, Niemann, Ioannou, 2015, Schimmelfennig, 2018, Saurugger, 2016).

Currently, there is a close interdependence of production and business processes, which leads to the consequences of risky interdependencies, which in the local environment can cause a certain product shortage in the event of a social conflict or crisis. The so-called reverse globalization has a significant non-linear negative effect on the economy and export trade. It has significant inhibition of export of secondary industry followed by tertiary industry. This is evidenced by Chinese exports of industries with high product complexity /for example, metal products, pharmaceuticals, electrical and optical products/, which are significantly affected by reverse globalization than products in the construction industry, land transport or in the export of water transport (Wang, 2022).

The development of companies is also affected by parallel manifestations of the dual economy, which is particularly evident in developing countries. Even though globalization harmonizes and standardizes everything, there are phenomena that can be the cause of crisis waves and subsequent recession and economic crisis. The international market and the international financial system have become the most critical part of national market systems. These are mainly manifestations associated with a dynamic redistribution of labour forces with an erroneous redistribution of resources. This can lead to internal markets being affected by the lack of functional institutions and the growth of social disparities (Popovic, Radevic, 2022).

It is the problem of social disparities both in the internal markets of countries and between countries that causes social insecurity in certain sectors of the labour market. For the young Generation Z, the future of work represents one of the most significant challenges facing most researchers and managers worldwide. The rapidly developing era of digital globalization and smart digitization, trends in robotization and artificial intelligence have completely changed the labour market. Therefore, through accelerated information technologies, most global (multinational) corporations are adopting solutions in the form of total systemic digitization, which is able to replace declining jobs or places where people are not interested in them or there is a very limited number of qualified workers who would fill the given job processes could perform. This is mainly the introduction of robotization, total automation, drones, all controlled by intelligent control processes (Rashid, 2022).

Thus, according to current developments and technological advances, the impact of artificial intelligence on the future of work will be significant. For Generation Z, this means focusing on those jobs that cannot be easily replaced by artificial intelligence. Already, the current increase in automation and computerization poses the risk that many craft jobs will be lost to automation in the future. Behind these development trends, it is necessary to see the efforts of global companies to increase productivity, reduce costs due to innovation and speed up changes. The current trend in the labour market is changing as a result of three global simultaneous significant shifts:

1. Demographic shift, including population aging, especially in Europe
2. The economic shift of digital globalization that creates digital platforms and strengthens the economy of business across borders.
3. Technological shift driven by the Internet including artificial intelligence, big data and cloud computing.

It is clear that current technology will affect jobs worldwide, however some industries could be affected more than others (Eichengreen, 2019).

The digitization of society and the introduction of artificial intelligence into production and work processes will clearly affect Generation Z not only in their employment on the labour market, but also as consumers. The purchasing behaviour of this young generation will adapt to the development of digitization of business processes. Generation Z belongs to the generation that is surrounded by interactive media from an early age and grows up in a Web 2.0 environment. and which is strongly influenced by its surroundings. Their behaviour can be called "methodological collectivism", which is characterized by a strong influence of marketing, communication manipulation skills and the development of consumerism. Mirzoeff (2018) states that generation Z lives in both virtual and physical reality, has a simple approach to world events, sees world problems, wants to find solutions. For this generation Z, the importance and content of information and quality communication will be decisive when making a purchase decision. They will remove uncertainty and the effects of crises. Marketers know this and are working intensively on the wide availability of information sources, which are key for Generation Z to make the right decision. This reduces the risk of a drop in interest in a certain offer, and can also trigger quick and correct reactions in the framework of crisis management for business companies. All new advances, innovations in management and manufacturing, including additive technologies, rely heavily on information (Hannibal, 2020).

The global influence on the young generation is undeniable. In the case of their purchasing decisions, information will be of key importance in shaping their desires, attitudes and values. The retail form will have to gradually change to a digital platform working with information, communication networks and a perfect logistics infrastructure. From a retail position, employees will be educated in new forms and tools of digital communication in order to fully meet the demands of Generation Z. The reason for these changes is that it is the young Z generation whose lifestyle is social networks and their world is strongly influenced by the digital environment. This generation is not so interested in politics, they don't want any conflicts because they realize that it would take away their comfortable life and carefree lifestyle. Thus, one cannot completely agree with Prensky (2001), who refers to this generation Z as digital natives, because they are not led to use technology equally and know how to use the necessary information from it. Practice currently shows /using the method of observing the behaviour of generation Z in their natural environment in 2021/ that this generation of course has the most fun in the digital environment, but they can search for information when they need it and process it according to their mental equipment. Gui et al (2017) considers it as a new digital skill.

The behaviour of the young generation Z is therefore completely under the influence of digital technologies and information. Global network processes bring them all the available information they need to make their own decisions. However, there can be one big problem here. The disproportionate dependence of the young Generation Z on global networked communication processes can make them vulnerable if they malfunction. They may experience psychological problems in the form of frustration, depression, insomnia, anxiety. The starting point and preventive solution to these unwanted consequences of a global network outage is the creation of an educational space in digital form, which would teach Generation Z to understand the parallels of solving their wishes and desires. The goal of this educational process is to teach this generation Z to use information technology more

pragmatically for their growth and self-realization, and to explain to them the dangers of relying on social networks and media noise.

3.1 Predictive buying behaviour of Generation Z

From a global perspective, the studied young generation Z represents a growing and significant force that will significantly influence the dynamics of the global economy. By 2031, their income is expected to increase fivefold. Their number is over two billion worldwide, with nine out of ten living in emerging markets, e.g. in India it is one fifth, in the USA Generation Z represents 40% of all American consumers. When it comes to purchasing decisions, Generation Z has its favourite brands, but only 36% express a strong sense of loyalty to any company's brand. If a marketer's target audience can be identified from Gen Z analytics, here are important factors a marketer must consider:

1. They love sustainable business practices.
2. They monitor affordability.
3. They tend to brand products, are influenced by their peers and influencers.
4. They do not reject green initiatives, they support recycling.
5. They buy from a variety of companies, it is very difficult to cultivate them as loyal and loyal consumers.
6. From communication tools, they will focus on advertising and interesting events, however, this is not key for them when deciding to buy a product.
7. They want to communicate in a digital environment, they expect an immediate response, they are impatient when problems or collisions occur in the product range.
8. They explicitly draw information from the Internet (Wallace, 2022).

Digital communication is key to the behaviour of Generation Z. If the use of individual global means of communication can be evaluated, it can be based on the research of the Polish authors Król and Zdonek. Among the most popular social media services among Generation Z is the tech giant Google. The most frequently used tools are Messenger and Facebook, which the young Z generation uses several times a day, as well as YouTube and Instagram, Snapchat and Spotify. As other social media services and online communication tools, Generation Z uses: Steam, Vinted, Aliexpress, Teams, Zoom, Discord, Tumblr, Reddit, Tiktok, Netflix, Viber, Tinder, Pinterest, Goldenline and Wattpad (Król and Zdonek, 2021).

It can be assumed that the young Z generation will also use these communication tools when choosing a certain product or service. For the business world, this means a signal that without digital information and a networked media environment, it will not make a significant impact on this generation.

The purchasing behaviour of Generation Z can also be characterized using the example of purchasing a specific product. This is proven by the results of research by Brand, Rausch and Brandel (2022), who state on the specific example of buying a jacket that for Generation Z the most important factors are the price of the product (25.95 %), the design (20.79 %) and where the product was made (15.96 %), followed by eco-labels (10.66 %), social labels (10.20 %), used materials (9.54 %) and jacket functionality (6.90 %). Generation Z prefers recycled materials over biological and synthetic ones. They prefer products made in Europe and Germany over products made in Asia. Since the research was conducted in Germany, it is clear that the familiar German patriotism was manifested here.

The global environment is a crucial platform for Generation Z to influence their behaviour. Generation Z belongs to mainstream culture because it has the ability to communicate with the whole world. He does not shop for his own needs, but for pleasure and happiness. This young generation is heavily influenced by media networks and influencers, and although they want to behave diversely and differently from others, their behaviour tends

to show a certain homogeneity and uniformity. Prudký (2009) described her model of behaviour as methodological collectivism, which means that she is an individual who pursues her own benefit, but her actions are influenced by the opinions and values of those around her.

3.2 Current global impacts on Czech consumers and generation Z

Currently, crises are a manifestation of turbulent phenomena in social and economic life and manifest themselves in the form of crisis waves. Crisis waves arise unexpectedly, however, they can be predicted based on changes in society's behaviour. Crisis waves arise in all areas of the national economy and in sectors. Recently, the pandemic crisis caused by COVID 19 has resulted in a recession in economic development and in some sectors, especially in the tertiary service sector, it has caused a real crisis that has threatened the existence of many business entities. Individual countries dealt with the pandemic in different ways, depending on the existence and functionality of the system of early warning before crisis waves and alternative solutions in threatened sectors. The Czech company emerged from this crisis situation on the verge of saving the most threatened business activities, especially in gastronomy and tourism. However, the effects of this crisis wave are still visible in many Czech business entities. So society was able to cope with this worldwide global pandemic crisis and a new crisis wave occurred in the form of a war conflict between two European countries. Political tensions can be observed all over the world, however, Europe has behaved for over seventy years as a non-conflict association of mutually prosperous economies, and global economic interconnectedness guaranteed stability not only in the economic field, but also in the political field. Every player in the international markets was aware of strong trade dependencies, and therefore no one expected that a crisis wave of war conflict would occur, which would bring significant difficulties in the form of availability and limited energy resources, on which European states are heavily dependent.

Czech consumers are most concerned about rising prices, the military conflict in Ukraine, and poverty and social inequality. Far more than other European consumers, Czech consumers worry about their standard of living, which is threatened by high inflation, poverty and the involvement of the Czech Republic in a military conflict. On the contrary, problems with corruption, crime, violence and unemployment receded. Czech consumers, and especially generation Z, are most worried about rising food, energy and transport prices and limited travel, and their confidence in the Czech economy is decreasing. Only 14% of consumers consider the current economy to be strong and only 8% of consumers believe that the Czech economy will be stronger by the end of 2022. Only ¼ of consumers perceive their financial situation as good, only 15% of consumers believe in improving their financial situation by the end of 2022. In the first place, Czech consumers perceive an increase in food and energy, slightly less perceive changes in prices in catering, accommodation and transport (www.ipsos.com).

Generation Z is most concerned about their standard comfort, which they have chosen as a lifestyle. He cannot accept the impending shortage of products and limited services. Generation Z is very sensitive to crisis waves, however, they cannot fully imagine that the crisis will really affect them fully. They always believe in certain procedures that will solve the crisis. However, it is not the generation that could solve the situation on its own. The only way out is how to get Generation Z to actively engage in the economic world with the help of educational programs and further unity of opinion leading to the removal of all indications leading to the emergence of crisis waves and crises themselves, especially in the digital environment.

4 Conclusions

In the case of preparing Generation Z for possible handling of crisis situations that disrupt their standard lifestyle, it is necessary to lead them to pragmatic use of information and communication technologies, divert them from low-quality social networks in a fun way and increase their digital skills with the help of educational game projects. In the area of consumer behaviour, it is necessary to teach them, with the help of sophisticated education in families and in public institutions, to pragmatically and critically evaluate all possible information that could negatively affect Generation Z.

From a global retail perspective, it is clear that Generation Z will be most interested in information in a digital environment. Generation Z requires information that they can evaluate themselves and make a purchase based on it. The young generation Z demands affordability and likes brands of goods, although it is very difficult to turn them into loyal and loyal customers. They tend to brand products especially through global advertising and are heavily influenced by their peers and influencers. Generation Z likes diversity, they do not reject green and environmental projects, however, they identify themselves as a homogeneous and uniform society by their behavior. And this can be used very well in retail strategies.

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Level up: Metaverse as a new marketing channel for medium-sized companies in Germany

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Abstract

Research background: The expectations for the new Metaverse have overturned in the recent past, especially on the part of companies. It almost seems like a paradigm shift has begun in how companies and consumers communicate. The first companies are already utilizing the Metaverse. It was primarily international corporations that made an appearance. They implement the first pilot projects and gather insights into the possible uses of the Metaverse. However, the German economy is characterized by medium-sized companies in particular. They represent the majority in terms of their number and turnover in Germany. This fact makes it evident that the previous perspective on the Metaverse should be completed. This supplement is a medium-sized view, often associated with less personnel and budget resources than international corporations. These arguments create new opportunities in the Metaverse to do marketing with limited resources. Medium-sized companies can participate differently in the new marketing channel Metaverse than large corporations**.**
Purpose of the article: The perception and possible uses of the new marketing channel Metaverse are examined using secondary market data. These are first researched, checked, and analysed. Subsequently, German medium-sized companies are examined using key company figures. It should uncover possible industry focal points. The previous perception is then compared with the demands of medium-sized companies in Germany. It should uncover possible fields of action, and recommendations for action for medium-sized companies in the context of Metaverse should be derived.
Methods: A systematic analysis of information and datasets in Germany's medium-sized companies and the use-cases of Metaverse.
Findings & Value added: Creation of an information base regarding the new marketing channel Metaverse and the application areas.

Keywords: *Metaverse; medium-sized companies; marketing; communication*

JEL Classification: *M10; M13; M30; M31; M39; O10*

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1 Introduction

The Metaverse is a virtual world in which time and place are dissociated. Avatars and virtual reality glasses use this virtual world. In October 2021, Mark Zuckerberg announced that the Metaverse would become the key topic of the social media company. With this announcement, the Metaverse experienced an enormous media discussion. In this discussion, skeptics devalue & decipher the Metaverse, and optimists upgrade the topic. For example, skeptics argue that the Metaverse is seen as a new edition of the well-known Second Life platform and is underdeveloped. Optimistic companies have already bought virtual reality glasses on a large scale and see an announcement of a paradigm shift in marketing. Goldman Sachs has already estimated several trillion US dollars sales forecasts for the Metaverse per year. It is noticeable that large companies, have initiated the first pilot projects in the metaverse (Hennig-Thurau and Ognibeni, 2022). In Germany, however, most companies are small and medium-sized enterprises (SMEs). These SMEs have specific challenges, unlike large enterprises. For example, SMEs generally lack staff and budget compared to large enterprises. In addition, German SMEs face enormous challenges in digitization. However, the marketing strategy of SMEs also differs from large companies. For example, many SMEs operate in a B2B relationship and are represented along the entire value chain (IfM Bonn, 2022a).

The Metaverse approach has extensive disruptive potential for companies and their marketing. To participate in this potential, SMEs must engage with this trend. If they miss this opportunity, SMEs will be left behind in the Metaverse marketing arena. This paper will first explain the Metaverse construct and present the implications for marketing. Subsequently, the German SME is outlined, and the specific challenges are derived. For this purpose, adaptation possibilities of the Metaverse for SMEs are highlighted and discussed.

2 Methods

This paper consists of a literature review. So far, the majority of the Metaverse exists as a concept. Therefore, no robust data basis exists. Instead, SMEs' challenges are contrasted with the theoretical possibilities of the Metaverse. To this end, the possibilities of Metaverse as a marketing tool are explored below.

2.1 Theoretical framework of the research

2.1.1 Definition Metaverse

The term Metaverse combines "meta" and "universe." "Meta" here refers to a transcendent state. In the context of the Metaverse, the term "universe" is understood as a digital simulation that has a connection to the physical environment (Stephenson, 1992). The term Metaverse is not uniformly defined. Thus, different approaches and concepts exist to describe the Metaverse as a digital reflection of reality or spatial Internet. In the Metaverse concept, users can create a digital avatar and move around in digitally simulated worlds using virtual reality glasses (Njoku et al., 2022). A central role in the Metaverse concept is played by the company Meta (formerly Facebook). Meta launched the game "Horizon Worlds" in 2021, but so far, it is only available in America and Canada. The company Meta sees itself as an enabler to make the concept of Metaverse accessible worldwide (ArkInvestment, 2021). According to Hennig-Thurau and Ognibeni (2022), the Metaverse is succinctly defined in terms of three properties:

1. Virtual worlds: The Metaverse provides the third dimension. Users move into a virtual world instead of surfing from one website to the next. The Metaverse is permanently available and usually requires virtual reality glasses.
2. Avatars as identity: Users create avatars with which they move through the Metaverse. Unlike Instagram or Zoom, the communication focus is not on the natural person but on the avatar.
3. Social network: Unlike the Internet, the Metaverse is a social institution. Thus, the benefit comes from the presence of other users. The social factor arises from user interaction and joint activities such as a joint virtual concert visit.

In this work's context, the Metaverse concept is understood as a digitally simulated parallel world (Njoku et al., 2022). It is essential to emphasize that this is a conceptual approach that has only been implemented in part in practice to date.

2.2.2 Implications of the Metaverse for Marketing

The Metaverse concept shows multiple implications for marketing. By dissolving temporal and spatial factors, a variety of re-alignments emerge. At the same time, technological possibilities offer new opportunities for communication with consumers. This paper discusses two relevant approaches: omnichannel and consumer experience. These two approaches have a disruptive character and impressively demonstrate the implications for marketing. However, it remains to be said that there can be many more implications, which can affect marketing with different strengths.

Omnichannel
Linking analog and digital sales channels in the omnichannel concept is common practice for many companies. Ideally, analog, and digital sales channels merge, and consumers jump between these channels. This combination also leads to a merging of analog and digital marketing activities (Hilken et al., 2022). The Metaverse concept reinforces the trend of omnichannel concepts many times over. For example, consumers can check out products via virtual reality glasses during the purchasing process. This new approach creates new opportunities to make products tangible along a purchase decision process (Nevelsteen, 2018). Consumers have different information needs along the phases of the purchasing process. By using the Metaverse concept, reality-enhanced consumer experiences are conveyed (Joy et al, 2022). In addition, new purchase incentives can be explicitly created by marketing. This results in a wider range of cross-selling and up-selling opportunities for marketing (de Ruyter et al., 2020). The first online stores with the Metaverse approach already exist. Here, digital users can buy products such as clothing & home furnishings (Frings, 2022).

Communication channel for Consumer Experience
The critical difference between the Metaverse and social networks is that users can experience things together. Things experienced together can generate feelings in consumers (Hennig-Thurau and Ognibeni, 2022). The Metaverse enables the possibility for consumer experiences that lead to increased consumer engagement. Reality-enhancing technology creates memorable digital experiences. Consumers try products and visit events around a product or brand in a digital environment. This approach enriches communication between companies and consumers (Ibáñez-Sánchez et al., 2022). The first pilot projects are emerging in the form of virtual showrooms. These animations of products, meeting rooms and events are presented to customers (Frings, 2022). In the Metaverse approach, companies and customers enter the dialog. It is currently still unclear if this type of consumer experience has a sustainable character. In the scientific community, for example, the view is that this

consumer experience has a short-term aspect. The novel character attracts the interest of customers. Only time will tell whether this interest is sustainable (Ibáñez-Sánchez et al., 2022).

It becomes evident that many implications of the Metaverse concept still result in theoretical considerations. This circumstance is due to its novelty. The novelty is clearly shown by the fact that so far, there have only been initial pilot projects by large companies with a Metaverse concept (Hudson-Smith and Batty, 2022). Nevertheless, the disruptive character should be underlined at this point. For example, the digital dissolution of space, time, place, and objectivity has an enormously disruptive influence (if not a reordering) on marketing (Hsieh and Vergne, 2022). Companies must come to terms with this new approach. So far, market observations show that only large companies are taking the first steps in the Metaverse.

2.2 Practical framework of the research

2.2.1 Definition of small and medium-sized enterprises in Germany

SMEs can be defined using qualitative and quantitative criteria. On the one hand, the term "small and medium-sized" in Germany is defined based on qualitative criteria. Ownership and management must form a unit in medium-sized companies. The owner of a medium-sized company is, therefore, also the manager. Another qualitative criterion is that the entrepreneur exercises a significant personal influence on the company's activities. He also bears the risk for his entrepreneurial decisions. The company serves the entrepreneur as a means of securing his livelihood (IfM Bonn, 2022a).

The European Commission defines SMEs based on quantitative criteria. These criteria include the number of employees, the annual turnover, and the balance sheet total per year. There are gradations between micro-enterprises, small enterprises, and medium-sized enterprises. Small companies have up to 9 employees, up to 2 million euros in annual sales, and up to 2 million euros in total assets. Small companies are companies with up to 49 employees and up to 10 million euros in annual sales and 10 million euros in total assets per year. The last gradation of the middle class is medium-sized companies. These companies have 249 employees and up to 50 million euros in annual sales or 43 million euros in total assets per year. Companies with more than 249 employees based on the number of employees, more than 50 million annual sales, and more than 43 million euros in total assets are not classified as medium-sized and are considered large companies (European Commission, 2022).

2.2.2 Economic indicators of small and medium-sized industry in Germany

According to the German Business Register, from 2020, 3,374,583 companies were registered in Germany. The proportion of SMEs in Germany is 99.3% of all registered companies. Thus, only 0.7% of German companies are large companies. The cumulative turnover of all registered companies in 2020 is 6,879.85 billion euros. The turnover share of SMEs is only 33.7%. Thus, one-third of the turnover is accounted for by SMEs, while large companies, which nominally make up the clear minority (0.7%), are responsible for around two-thirds (66.3%) of the turnover generated. It also shows that 16.8% of export sales are attributable to SMEs. More than half (54.4%) of employees in Germany (a total of 34.93 million in 2020) work in SMEs. Apprentices, often employed in companies for the first time, are primarily trained in SMEs. 70.6% of trainees in Germany worked in SMEs in 2020 (IfM Bonn, 2022b).

In 2020, 93.93 billion euros were invested in research and development. Only 8.2% of these investments are due to SMEs. This fact underlines that a minority of large companies (0.7%) account for the majority (91.8%) of research and development investments (IfM Bonn, 2022b). The figures clearly highlight that SMEs are an essential pillar of the economy in Germany. These make valuable contributions to the economy itself and the labor market. However, most sales, research, and development budgets lie with large companies. Depending on the different industries, however, a complex picture can emerge. SMEs are often absolute industry leaders in niche markets. Table 1 shows the balance of power in the German economy between SMEs and large companies in general.

Table 1. Germany: SMEs versus large companies, 2020.

Indicators	Total	SMEs	LC*
Number of companies	3,374,583	99.3%	0.7%
Turnover of the companies**	6,879.85	33.7%	66.3%
Dependent employees in***	34.93	54.4%	45.6%
Trainees in companies***	1.54	70.6%	29.4%
Export sales**	1.128,45	16.8%	83.2%
Corporate R&D Expenditure 2020**	93.93	8.2%	91.8%

Source: IfM Bonn, 2022b [Note: All data based on companies according to the company register in the year 2020 in Germany, *LC = large companies, ** = in billion, *** = in million].

2.2.3 Challenges for small and medium-sized industry in Germany

Like large companies, SMEs are shaped by today's volatile economic conditions. Markets cannot be clearly defined, customer needs vary, and product portfolios are less stable. At the same time, there is not only national competitive pressure but rather international competitive pressure. The shortage of skilled workers and the topic of sustainability pose further challenges. However, some of these challenges also apply to large companies (Ludwig et al., 2016). SMEs often have the problem of budget & staff constraint than large companies. This fact means that they often have fewer options within the company. In addition, failures at SMEs are not supported by a broad product portfolio. SMEs face a greater risk when making decisions than large companies (Mueller and Spitz-Oener, 2006). However, a unique challenge for medium-sized companies is digitalization. These digital challenges include the digital design and empowerment of SMEs. Digital design means developing a resilient entrepreneurial and digital strategy. This digital way is the only option to adapt and adapt quickly to volatile market conditions. Recognizing and using the chances and possibilities of big data is essential. Ideally, big data will become a relevant business model for SMEs. Another challenge is to make value chains, production processes, and technologies more digital. This digital design then offers possibilities for automation and the use of artificial intelligence. At the same time, medium-sized companies must ensure data protection and increase IT security. These challenges can only be achieved through the expansion of digital infrastructure. Ultimately, today's SMEs must consider the effects of digitization. It shows that consumer behavior changes from analog customer wish to digital ones (IfM Bonn, 2020).

By bringing together the theoretical and practical frameworks of the research conducted, it is shown that there are enormous implications for marketing from the Metaverse concept. These concepts are theoretical considerations from first pilot projects of large enterprises. Furthermore, the view into the economic structures of Germany shows that SMEs mainly characterize these. At the same time, the unique challenge of SMEs in Germany is lack of digitization. It is, therefore, understandable that large companies are making the first attempts in the Metaverse. This development puts SMEs at a further disadvantage in the context of

digitization. It is, therefore, necessary to examine what opportunities the Metaverse approach promises for SMEs. The challenges and opportunities for SMEs in the context of the Metaverse are examined below.

3 Results

In Germany, SMEs primarily operate in a B2B relationship. Many companies operate in the intermediate input industry and have companies as customers (IfM Bonn, 2022b). This fact corrects the marketing perspective to a B2B perspective. With this perspective, two options for using the Metaverse as a marketing channel are possible: Companies meet customers, and customers meet customers.

Companies meet customers
Especially companies from the intermediate goods industry and thus also SMEs have extensive industrial goods facilities. These are often distributed at decentralized locations worldwide, and individual manufacturing steps are thus performed at different locations. The manufacturing processes are complex and consist of a mesh of input and output factors (Goto et al., 2020). As a result, the manufacturing process is intricate and challenging to communicate to potential customers (Mallapragada et al., 2022). The Metaverse can be a relevant marketing channel here. Through virtual representations of the manufacturing processes, a "walk-through" manufacturing model exists. These virtual machine systems can be explained down to the smallest detail. The complex interrelationships can be experienced and thus become more comprehensible. In addition, industrial plants can be inspected during ongoing production without having to stop production for inspection. This option would be impossible in the analog world. The virtual representation of decentralized industrial goods plants shows the entire manufacturing process. In the analog world, only one site can be visited, but not several at the same time. This fact saves customers' time & travel costs and is also more sustainable. Hence, it is also a straightforward solution in the B2B customer approach. While a firm purchase intention often accompanies an actual site visit, initial prospects can form a virtual picture of a company and its products or services. The efforts required by the customer are, therefore, significantly less in the Metaverse. It can, therefore, also be assumed that the customer approach is simplified in the Metaverse (Hennig-Thurau and Ognibeni, 2022).

Customers meet customers
Another way for SMEs to use the Metaverse as a marketing channel is to create company and customer events. B2B has a network of relationships between customers and companies. Purchasing processes are much more complex as numerous decision makers are involved. As a rule, not one customer makes the decision, but many players make a shared decision. These sales processes include clarification of technical details and legal obligations such as warranties and guarantees. However, social togetherness is a critical point in the purchasing process (Mallapragada et al., 2022). This social togetherness can be redesigned in the Metaverse. Virtual events can connect customers and enable them to experience the company, products, and services. Joint customer events are designed virtually, and customers get into spontaneous conversations with other customers. They can also share their experiences with the company. This option is made possible by overcoming geographical boundaries. This way, customers can enter a conversation with other customers far away from each other. In the analog world, this would only be possible with enormous effort and is unusual for informal conversations. It is also possible to create events without time limits. Therein lies an attraction to overcome time zones from different parts of the world. This fact is where the Metaverse concept can offer real added value. It saves customers' travel costs

and ensures more sustainable communication. The prerequisite is that a Metaverse event creates an authentic customer experience (Hennig-Thurau and Ognibeni, 2022).

4 Discussion

From today's perspective, it is difficult to assess what disruptive character the Metaverse will assume in the future. The forecasting opinions differ widely here. The attitude in science and practice is that the Metaverse is completely overestimated. Nevertheless, there is also the exact opposite opinion. Some representatives emphasize that companies must invest massively in the Metaverse concept. This situation is a classic case of dissent. Currently, pilot projects of large companies show first successes. Only the future will show whether this will be a sustainable success. From the point of view that the Metaverse will become established, there are several opportunities. It is essential for SMEs not to leave the Metaverse marketing channel to large companies alone.

SMEs are often faced with a lack of budget and human resources. The Metaverse concept could address some of this shortage because the implementation is cost-efficient. In addition, costs such as travel expenses are eliminated. At the same time, the Metaverse offers enormous potential for digitizing business processes simply, cost-effectively, and promptly. SMEs especially have difficulties in the context of digitalization. This paper shows the first examples of how to use the Metaverse meaningfully. SMEs must now get a grip on the topic. To do this, they must get to know the Metaverse and try it out. SMEs then must identify possible applications for themselves. Not all the advantages of Metaverse apply to all companies. Here, SMEs must find their ways and options. These possible options must then be implemented in small steps. The "wait" strategy is not an option until more established marketing concepts are successful in the Metaverse. If SMEs continue to be reluctant to join the Metaverse, leave the marketing channel to the large enterprises. Over time, this will increase the competitors' lead, if not make it uncatchable.

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Supporting Young Farmers Within The Common Agricultural Policy

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Abstract

Research background: The Common Agricultural Policy ("CAP") accounts for the largest share of the EU expenditure. The original rules of CAP are in force until December 2022, then the latest reform will come into effect until 2027. One of the top ten objectives is to support young farmers with at least 3% of the budget.

Purpose of the article: This raises the question of how the CAP direct payment funds were distributed to young farmers under the original rules, or rather how their support will change from 2023. The paper assesses the amount of direct payments to young farmers and describes the supporting arguments by reviewing recent studies from scientific databases.

Methods: The analysis of five-year period (2015-2019) was carried out, focusing primarily on the Czech Republic and Slovakia. The authors also compare the situation with the other countries of the Visegrad Group and the founding members of the EU. The statistical yearbooks of CAP of the European Commission are the data source.

Findings & Value added: The CR and Slovakia do not show the same trend in the support for young farmers from direct payments. The method of calculating direct support is also different. The analysis has not revealed any unifying elements common to the Visegrad Group countries or to the EU founding members. Thus, this finding points to national approaches in determining direct support for young farmers. An increase in direct support to 3% will mean a substantial increase, with the CR and Slovakia experiencing the biggest change.

Keywords: *Common Agricultural Policy; direct payments; young farmers; expenditure; support.*

JEL Classification: *F02, F15, Q18.*

1 Introduction

Agriculture is indisputably one of the most important sectors of the national economy. Although the total agricultural production accounted for 1.8% of gross domestic product in

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the European Union between 2016 and 2019 (European Parliament, 2022), the amount of expenditure related to agriculture and rural development (Sustainable Growth: Natural Resources) oscillated between 27% and 35% (Ministry of Finance, 2022a).

Agricultural businesses in the European area primarily receive funding through the Third Spending Heading of the Multiannual Financial Framework for the period of 2021-2027, totaling €401 billion, plus €18.94 billion from the Next Generation EU. The Third Heading consists, among others, of the Common Agricultural Policy of €386.6 billion, the Environment and Climate Action Programme (the so-called LIFE for short) of €5.4 billion, the Common Maritime and Fisheries Policy of €6.1 billion, and the Just Transition Fund of €19.3 billion. The Common Agricultural Policy (CAP) is made up of the so-called first and second pillars. The first pillar, which is used to make direct payments to agricultural entities and to support agricultural markets through the European Agricultural Guarantee Fund (EAGF), will manage €291.1 billion (in current prices) between 2021 and 2027. The second pillar is used to finance rural development through the European Agricultural Fund for Rural Development (EAFRD), with the total amount of €95.5 billion. These figures are in current prices (Ministry of Finance, 2022b).

Based on the latest data available from the European Commission (European Commission, 2022a), the EU support to farmers amounted to €58.82 billion in 2019. This support was directed at three areas, namely income support including the income stability for farmers, rewarding environmentally friendly farming, and support to state farms amounting to €41.43 billion, market measures amounting to €2.37 billion, and rural development amounting to €14.18 billion. The EU long-term budget, or the Multiannual Financial Framework (MFF) sets the rules on how the CAP funds are spent. The original CAP rules expired on 31 December 2020. The transitional rules remain in force until the end of 2022. The new rules will come into force on 1 January 2023 and will be in force until 2027.

The new reformed CAP will focus on a greener and fairer CAP, and on improving competitiveness. Ten specific objectives result from the above-mentioned intentions, which relate, inter alia, to ensuring fair and sustainable incomes of farmers, increasing competitiveness in the short as well as long term, increasing farmers' added value in the entire value chain, mitigating climate changes, caring for the environment, protecting the landscape, generational changes, rural development, food quality, and promoting knowledge and innovation (European Commission, 2022b).

One of the very important ten specific objectives is to encourage generational changes by supporting young farmers under the age of 40 who have become heads of their farms for the first time and are qualified in the field. According to the European Commission (2022c), the increased support to young farmers by the European Union results from concerns about the aging workforce, see the following chart mapping the age distribution of farmers in the European Union in 2016, which shows that young farmers make up only 11% of the farming population.
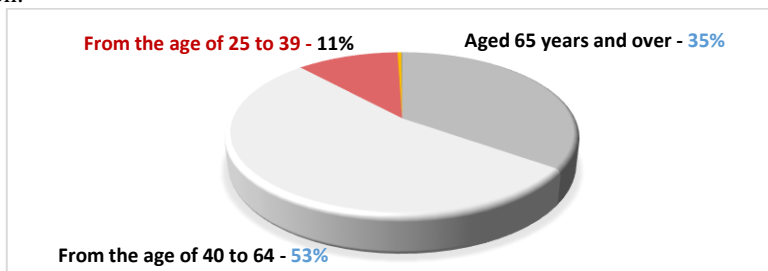
Figure 1. Age groups of farm heads, EU – 28, 2016

Source: own processing in accordance with the European Commission (2022c)

Unless the necessary generational changes take place, agriculture faces the risk of losing food security and reduced competitiveness. Young farmers are either granted income support or support through rural renewal funds. In the case of income support, this involves, for example, earmarking a certain percentage of payments, deciding on the maximum number of hectares to be paid for, choosing the method for calculating payments, etc. In the case of rural development funds, young farmers can benefit from grants, loans or guarantees related to the development of rural farms (European Commission, 2022c).

As one of the instruments to support young farmers within the new CAP, EU countries will be required to allocate at least 3% of their budgets to direct payments to young farmers, either in the form of income or investment support or start-up support (European Commission, 2022d).

In this context, the question arises as to how the funds from direct payments under the Common Agricultural Policy have been distributed to young farmers so far under the original rules of the Common Agricultural Policy, or how their support will change from 2023, both in the Czech and Slovak Republics. In order to answer this question, the following paper has been prepared and is divided into four parts. After the Introduction chapter, explaining the reasons for the defined objective of the paper, there is a Literature Review summarizing the conducted research and published studies on the given topic from recognized scientific databases. The third chapter presents the results in the area of interest. The main benefits are summarized in Conclusion, the last chapter.

2 Literature review

Nowadays, the European Union is facing a shortage of new farmers - this situation is partly caused by the low interest of young people in doing business in this segment of the national economy, and partly by the rapid aging of the existing population of farmers (Zagata & Sutherland, 2015). The EU CAP responds to this situation by introducing various measures to motivate new and especially young farmers. These support measures focus not only on the initial start of their farming activities but also on the subsequent structural adjustment to their business (Kontogeorgos et al., 2014).

As has already been mentioned, young farmers are supported in the European Union under Pillar 1 and Pillar 2 of the Common Agricultural Policy. Pillar 1 includes direct payments, which are higher for farmers aged under 40, and Pillar 2 includes the rural development program. It is within the rural development program that each Member State can determine its own extent of support to young farmers. According to Simpach (2018), some Member States have allocated funds through only one operation, M06, within Objective 2B Generational Renewal, but the majority have funded this objective through multiple operations (e.g., M01, M02 M16). "The amount of funds from the Rural Development Programme earmarked to support young farmers shows how important farmers are in the region. The percentage of farmers supported may indicate the extent to which each country is concerned about the problem of young farmers." For this reason, Simpach (2018) has compared the importance of supporting young farmers in the selected EU countries in terms of financial resources against the total budget of the Rural Development Programme in his paper. This comparison has resulted in the finding that the best situation is in Poland, where 5.3% of the RDP budget is allocated to Objective 2B (for M06).

This paper also continues the research of Brodzinksi (2019), who has sought to answer the question of whether young farmers benefiting from preferences under the Common Agricultural Policy are more willing to modernize farms they manage than other farmers. To answer this question, he conducted a study in 2018 involving two groups - one with 32 young farmers and the other one with 48 farmers aged 40 and over. Both groups ran development

farms with commodity-based production. In the sample of young farmers (who were surveyed), the average area of their farms was 31.47 ha, while the average area of the farms in the second group was 112.46 ha. This means that the older farmers owned 3.5 times larger farms compared to the young farmers. It seems logical to find that the young farmers worked alone, while the older farmers mostly employed hired workers. The result of the study is that in view of the high costs of modernizing production and, above all, the need to increase the scale of production by purchasing land, the further development of farms run by young farmers will be slow and evolutionary, as was the case with farms run by the farmers in the comparative group. Similar research was also published by Pechrova (2015). Her research is based on the European Commission´s assumption that subsidies should support business activities of young farmers, as they bring innovation to farms and achieve higher profitability. However, it is justified to examine the legitimacy of providing these subsidies as they are public financial resources. Therefore, she assessed the technical performance of young farmers and compared it with businesses managed by "non-young farmers". A better performance was identified in the group of young farmers (67.6% compared to 59.1% in case of the control group). However, this result also shows that young and other farmers are not statistically significantly different in terms of technical performance, which does not confirm the above assumption of providing support to young entrepreneurs in the agricultural sector.

Nevertheless, McKillop et al. (2018) point to differences in the overall population of young farmers as they examined differences in innovation between young farmers in Ireland. Their results show differences between real innovation on the farms of young farmers and what is theoretically considered important in professional circles. Young farmers differ in their innovation scores. This finding stems from different areas of farm management, be it overall efficiency, breeding, information technologies or performance monitoring.

The authors of the research also offer a solution to the identified situation - given the relatively small number of young farmers in many European countries (including Ireland), research and expanding organizations can develop specific programs, tailor discussion groups to, and target subject teaching at specific types of young farmers instead of the current general approach that fails to distinguish the interests of young farmers from those of the older generation. Therefore, agricultural education providers should take these differences into account to ensure that courses are comprehensive and targeted to stimulate innovation. In their paper, Munteanu et al. (2021) argue that young farmers are expected to develop more sustainable and profitable businesses. However, young farmers need to adopt a proactive management style and possess technical know-how in order to be able to overcome the current challenges in the agricultural sector. Therefore, these authors call for initial training of young farmers as it is essential for developing the basic skills and know-how necessary for agricultural business, while continuous learning is a must for identifying the managerial and marketing skills necessary for profitable, innovative and sustainable agricultural practices. The same conclusion is also drawn by Balezentis et al. (2020), who present a high demand for advisory services in preparing a business plan by young farmers, which indicates a low level of business administration and marketing skills. Unay-Gailhard and Bojnec (2021) also demonstrate a gap between male and female young farmers. According to their results, women (compared to young farmers) show more interest in environmentally friendly farming practices.

The study by Phiboon et al. (2019) is based on the assertion that many countries have support programs to help young people start their own business. "However, some of the programs have been criticized for not providing enough support, particularly because they do not sufficiently take into account the diverse profiles of young farmers." Their study therefore analyzes the profiles of young farmers, i.e., it examines the extent to which they use support programs. The outcome is that young farmers can be categorized into five types, which differ in terms of motivation, farming systems and involvement in farming. "Some farmers focused

on economic profitability, while other farmers considered environmentally sustainable farming practices important or were actively involved in other activities at home or village level. This wide range of objectives and situations meant different constraints during the early years of farming. The support programs helped farmers overcome their lack of farming knowledge and helped them integrate into rural communities, but the support they received in accessing land and capital was sometimes limited and often none at all." Therefore, to improve the support to young farmers, Phiboon et al. (2019) suggest taking into account the diversity of young farmers´ profiles and taking this into account not only when building capacity but also when gaining access to other types of resources.

The situation of young farmers, or, more precisely, strengthening their position for doing business is not only an issue of the European Union or the European continent, but this issue is addressed by authors all over the world. For example, Can & Engindeniz (2020) or Nainggolan et al. (2020) argue in their study that the sustainability of Arabica coffee business in the Simalungun region depends on young farmers who, as the next generation of farming enterprises, need special attention in order for agricultural products to be competitive in the global era. Hence, these authors conducted depth interviews among young farmers and found that the strategy of strengthening the role of young coffee farmers requires two components: driving and facilitating factors. Driving factors include, in particular, changes in non-market economic systems, changes in client patron systems, an open access to coffee processing tools, shaping the image of young farmers as active and critical agents, and the position of young coffee farmers as dynamic agents in building leadership and entrepreneurial character. Facilitating factors have been identified as follows: building a team, organizing young coffee growers by strengthening social capital, protecting the water and soil resource bases by implementing good agricultural practices, diversifying livelihood, opening market access, and information- and technology-based coffee advice and mentoring.

3 Methodology

This paper evaluates support to young farmers and provides the supporting arguments by reviewing recent studies from scientific databases. The analysis of support to young farmers is carried out for a period of five years (2015-2019), focusing mainly on the Czech and Slovak Republics. However, the authors have also sought to determine whether the situation in these two (historically very related countries) differs from that of the other Visegrad Group countries, and whether the situation differs from that of the EU founding countries (Germany, the Netherlands, Luxembourg, Italy, France and Belgium). Therefore, the data for the Czech Republic and Slovakia were also compared with those of the above-mentioned countries. The statistical yearbooks of the Common Agricultural Policy of the European Commission (Directorate-General for Agriculture and Rural Development) are the source of the data. The data for the European Union as a whole represent the aggregate of the 27 Member States (excluding the EC). MS Excel was used for the comparison.

The paper will result in the confirmation or refutation of two basic assumptions:

Assumption 1: There is no significant difference in the percentage of direct payments to young farmers from the total amount of direct payments between the Czech and Slovak Republics, i.e., the two countries have the same trend due to their recent common history and also tend to have the same methodology for calculating this support.

Assumption 2: There are no significant differences between the Visegrad Group countries and the EU founding countries. In other words, the authors presume that the two groups will show a similar trend in the percentage of payments to young farmers and, in particular, will follow a similar policy of calculating payments to farmers.

4 Results

The following table shows the absolute amount of payments to young farmers within direct payments in the EU as a whole and for the selected Member States - firstly the Visegrad Group countries, with the EU founding countries being listed below.

Table 1. Direct payments to young farmers in the entitlement period of 2015-2019 (in millions of EUR).

State/Year	2015	2016	2017	2018	2019
EU 27	304.4	340.3	367.3	526.9	567.4
Czech Republic	2.2	2.4	2.4	7.0	8.0
Slovakia	0.3	0.4	0.6	0.8	1.6
Poland	62.1	60.0	57.6	63.5	64.2
Hungary	9.5	11.4	12.7	12.1	12.7
Germany	36.1	45.8	50.3	64.4	72.9
Netherlands	10.8	13.00	12.4	13.8	12.9
Luxembourg	0.7	0.6	0.6	0.6	0.7
Italy	28.5	32.5	40.1	75.4	73.5
France	43.9	49.5	50.3	81.00	90.8
Belgium	7.3	8.00	8.4	9.3	9.4

Source: own processing in accordance with the European Commission (2022e)

The table above enables a visual assessment of the trend in the distribution of direct payments to young farmers. There is a very strong shift in the EU time series between the period of 2015-2017 and the period of 2018-2019, or rather in 2018 there is a steep increase in direct payments to young farmers by EUR 159.6 million. The steep increase is also visible for the Czech Republic and the two founding members of the EU - Italy and France. The Polish data also show a rise, but after two years when direct payments to young farmers were reduced. A gradual but annual increase can be identified for Belgium, Germany, and Slovakia. Fluctuations (i.e., alternating increases and decreases) are noticeable for the Netherlands and Hungary. Luxembourg is the only country with a relatively stable level of direct payments.

It follows from the above that it is not possible to find identical elements in the development of direct payments to young farmers within the V4 countries or within the group of founding members of the European Union.

If we were to primarily assess the Czech and Slovak Republics, the development is clearly different. While the level of direct payments to young farmers in the Czech Republic stagnated until 2017, there was a sharp increase in the following years compared to the Slovak Republic, where there was a gradual but steady increase. A more substantial increase can be identified only between 2018 and 2019.

As the absolute amounts of support from direct payments to young farmers are not comparable between the above-mentioned countries, the percentage of this amount in the total amount of direct payments of the selected countries will be further analyzed.
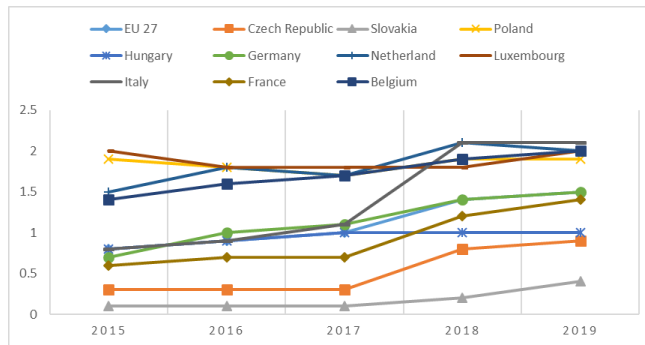
Figure 2. The percentage of payments to young farmers in the total distribution of direct payment expenditure of individual member states (%)

Source: own processing in accordance with the European Commission (2022e)

The graph clearly shows that the percentage of payments to young farmers in the total direct payments ranges from 0.1 to 2.1%. The upper limit results from the fact that national authorities of Member States are supposed to earmark up to 2% of the total income support to payments to young farmers under the original CAP rules.

The graph visually divides the analyzed countries into three levels. The first level of countries oscillates (especially in recent years) around the aforementioned limit of 2% of direct payments. The second level of countries does not reach this 2% limit despite a noticeable growth within the period of 2015-2019, and the third level could include the Slovak Republic, which represents the lowest level in the graph. Luxembourg, Poland, the Netherlands, and Belgium fall under the first level, as well as Italy in the last two years. The second cluster consists of Germany, Hungary, France and, in the last two years, the Czech Republic as well.

The Czech and Slovak Republics show the same trend only until 2017, after which the Czech Republic deviated considerably by increasing payments to young farmers. The graph also failed to identify the cluster of the V4 countries and the cluster of the EU founding countries, or rather both the V4 and EU founding countries are found in both visible clusters.

The above differences can be explained by the different policies chosen by the Member States to calculate the amount of direct payments to young farmers. These policies were published in a separate document by the European Commission for the whole EU in May 2016. An extract from this document concerning the Member States under analysis is presented in Table 2.

Table 2. Policies chosen by the selected Member States for calculating payments to young farmers.

Member state	Calculated as 25 % of the				with the max. limit of	As a lump sum amount per
	National average payment per ha	Single area payment	BPS flat rate	Average value of entitlements held by a farmer		
Czech Republic		x			90 ha/entitlements	N
Slovakia	x				28 ha/entitlements	N
Poland	x				50 ha/entitlements	N
Hungary	x				90 ha/entitlements	N
Germany			x		90 ha/entitlements	N
Netherlands	x				90 ha/entitlements	N
Luxembourg						x
Italy				x	90 ha/entitlements	N
France	x				34 ha/entitlements	N
Belgium	x				90 ha/entitlements	N

Source: European Commission (2016)

Table 2 presents the differences in the methodology for calculating payments to young farmers between the Czech Republic, Germany, Italy, and Luxembourg. Specifically in the Czech Republic, only beneficiaries of the Single Area Payment Scheme (SAPS) are thus entitled to the payment which is calculated by multiplying the value corresponding to 25% of the SAPS payment by the number of eligible hectares up to a maximum of 90 ha. The limit of 90 hectares can be identified for the majority of the countries analyzed. The only exceptions are France and Poland. The Slovak Republic has the lowest limit of only 28 hectares.

Again, the Czech and Slovak Republics do not use the same method of calculating direct payments to support young farmers, nor is there a common methodology within the group of V4 and founding Member States of the EU.

On the basis of the above, the authors have to reject both assumptions formulated in the Methodology chapter.

Nevertheless, the reformed Common Agricultural Policy, which will enter into force in 2023, allocates at least 3% of the budget to young farmers. As this rate has not been reached by any of the countries analyzed, it is clear that young farmers will actually receive higher payments, and these are the young farmers in the Czech and Slovak Republics who should experience the greatest change, as they are (according to Figure 1) at the very bottom of the support range.

5 Conclusion

The performed analysis of the support to young farmers through direct payments rejects both assumptions defined by the authors, i.e., the comparison of the Czech and Slovak Republics has not revealed the same trend of support development. The amount of direct payments to young farmers in the Czech Republic stagnated until 2017 and there has been a sharp increase in the following years (from EUR 2.4 million to EUR 7 million) compared to the Slovak Republic, where there has been a gradual but steady increase. A more significant increase in support from direct payments to Slovak farmers can be identified only between 2018 and 2019. Also, the method of calculating direct support differs between these two previously united countries, namely both in the basic value on which the calculation is based and in the hectare limit. The analysis has also not revealed any unifying elements common to the Visegrad Group countries or to the founding members of the European Union. The graphical representation of the percentage of payments to young farmers in the total distribution of direct payments divides the countries into three levels, and each level includes both the V4 countries and founding members of the EU. This finding therefore points to national concepts in determining the amount of direct support to young farmers.

Thus, an increase in direct support to the 3% limit will mean a significant increase in support to young farmers, with those from the Czech and Slovak Republics being the ones to experience the biggest change. This finding is also the only connecting point between the two (for a long time united) countries discovered in this paper.

Acknowledgements

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Information and Knowledge Society in the Global Era of New Media and Technoference

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Abstract

Research background: Current global trends include the information explosion, the constant use of digital technologies, new media and certain disruptive influences associated with them, which can be comprehensively described by the term technoference. In addition to the speed, availability and quality of information, knowledge and expertise play a key role in society. Terms such as the knowledge economy and the knowledge society have become global catchwords, which also bring with them certain risks in the field of education, such as the reduction of knowledge to results, the atomisation of knowledge or the weakening of linear, logical thinking.

Purpose of the article: The paper presents a brief overview of the state of contemporary society at the current stage of technological development with regard to its information and knowledge-based nature. The aim of the paper is to identify and examine the specifics of the information and knowledge society and to determine the differences between them. Emphasis is also placed on the possible negative consequences of these phenomena.

Methods: In particular, the author used analytical, inductive, deductive and comparative research methods.

Findings & Value added: The paper contributes to clear definitions of information and knowledge society. It highlights the importance of critical thinking and reflects on the possible risks associated with the topic presented.

Keywords: *information society; knowledge society; new media; technoference; risks*

JEL Classification: *I25; Z13; O33*

1 Introduction

An important popular notion of the 21st century is the term information. Therefore, their growth and expansion into all areas of the human world naturally caused a change in the overall character of society. With the continuous development of the world, technology and civilization, individual changes took place, from the gradual change of lifestyle through

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hunting, agrarian, industrial and technological revolution to the present day. Today's society is often referred to as an information society. It is mainly related to the huge expansion of new information and communication means, new media, and technologies, and undoubtedly to the expansion of information as such. We are of the opinion that it is the information society primarily linked to digital media and the Internet that represents the paradigmatic metamorphoses of individuals, society, and the entire human culture. This new situation delivers changes in all spheres of society's functioning, it is reflected in various scientific fields and disciplines. The information society represents an environment where information is of primary importance. Knowledge grows from information (and information is also a frequent product of knowledge), a knowledge society is created, the economic basis of which is in the global knowledge economy.

2   Methods

The main objective of the paper is to identify and examine the specifics of the information and knowledge society in the global era of new media and digital technology use at a time of technological interference. The author also focuses on the basic differences between the notion information and knowledge. For the topic to be examined comprehensively and systematically, several scientific methods were used, especially structured analysis and description of facts, as well as synthesis methods, logical, inductive, and deductive procedures for exploring the topic and fulfilling the set objectives. We proceeded to the critical processing and evaluation of domestic and foreign literary sources. One of the established objectives was to logically link all important elements related to the discussed issue to the final formulations of the conclusions. The subject is organized according to logical facts and deduction of the results of the analysis of professional scientific texts into a complex meaning unit that identifies the basic differences between the information and knowledge society in the current global era.

3   Results and Discussions

3.1 Information vs. Knowledge

Understanding information and knowledge, their mutual relations and hierarchy should be a basic competence in an information or educational society. However, for this we need to understand their basic units such as information and knowledge. The term information is a multi-meaning notion and accompanies humanity throughout the entire historical development of society. Especially in recent decades, there has been an explosion in the use of the term information, its meanings have changed, and today we understand it mainly in the context of digital technologies or computer technology. Currently, it can be described as one of the most important and frequented terms of various theoretical-scientific disciplines as well as practical fields, especially computer science, media studies, philosophy, sociology, economics, or management. It is obvious that there are innumerable quantities of data, quantities and knowledge, and their definitions vary from author to author. Several terminological confusions also arise between the terms information and knowledge (insight, know-how).

Galik (2015) characterizes information as an elementary unit of meaning, which is contextual. It means that its complete numerical calculation is not possible, as is the case with data in computers. On the contrary, the author defines knowledge as a higher level of information, which represents a complex of meaningfully arranged information. However, it is important and necessary to distinguish between information and knowledge - information itself

is not knowledge but is its premise and basis. In this context, we consider information as raw material, the processing of which creates knowledge. The result of information processing is knowledge that can influence our personality fund, enrich, or restructure it (Lei and Duan, 2021). Other definitions state that knowledge is a certain explanation of information. It is an insight that follows from the information, or rather a certain opinion about the given information. Knowledge gives a person the ability to put individual information into context - knowledge is thus contextualized information (Renze, 2019). The difference between information and knowledge can also be observed based on their ability to answer basic questions - information answers the questions who?, where?, when?, what?, while knowledge answers more precisely the questions why?, in what way?

Therefore, what constitutes the basis and fundamental essence of the education of a person? We believe that it is different knowledge, insights, and information. H. Meter presents the hierarchy of education as follows:

- data (unprocessed symbols that do not have meaning in themselves);
- information (data that has meaning through a relational connection; may or may not be useful);
- knowledge (useful information, only the question "how?" has meaning in this case);
- understanding (it is important to understand the causes and connections, in comparison to the question "how?" the question "why?" is more important);
- wisdom (this is the highest level of knowledge and includes visions of the overall connections between various, even very distant phenomena. Knowledge is acquired through an experience-verified system of values (Meter, 2020).

Wisdom is a combination of theory and practice, which can also include a person's complex experience with a system of values and ethical behaviour. We can therefore include, for example, tacit knowledge, which significantly contributes to human creativity and innovation, to wisdom as a broadly understood education. In knowledge management, we most often encounter the terms tacit - implicit and explicit knowledge, which form two basic groups of knowledge. Explicit knowledge can be understood as uniformly defined, codified, or structured, and it is possible to express them easily with letters, words, signs. It is similarly easy to communicate and share them in a formal language, as well as capture and represent them in documents, databases, or information systems. We can imagine them as knowledge recorded in books, articles, or other media, and it is also possible to transfer, store or share them. More complex, and more important for the category of wisdom, are implicit - tacit knowledge (i.e., quiet, silent). We can describe them as a opposition to explicit knowledge. It is yet unexpressed knowledge acquired through training or education, it is a hidden type of knowledge that we normally acquire through socialization with the environment and whose existence we often do not even know about. However, the problem arises when trying to externalize them, which is often very difficult, sometimes even impossible. That includes, for instance, an attempt to verbally describe a colour or written instructions for swimming or cycling (Asher and Popper, 2019; Ibidunni et al., 2022).
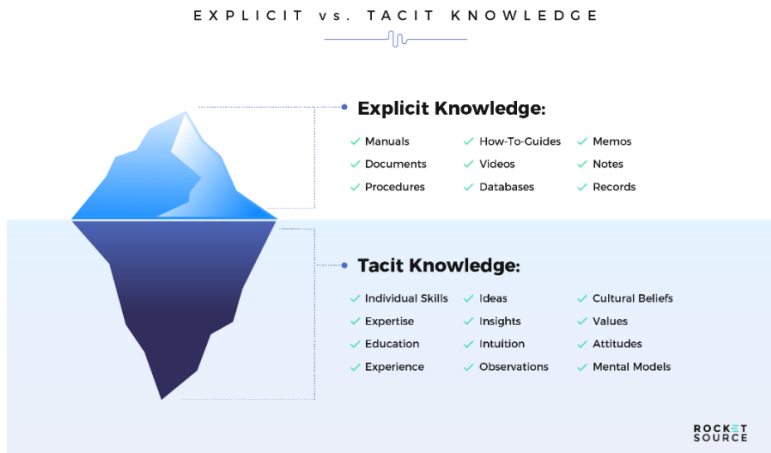
Figure 1. Explicit and tacit knowledge

Source : Explicit & Tacit Knowledge Iceberg Infographic. Retrieved from https://slidemodel.com /templates/explicit-tacit-knowledge-iceberg-infographic/

Thus, the basic determinant of education is meaningfully organized information, which, however, is already related to a large amount of tacit knowledge, experience, morality, as well as the ability of intuition and creativity - which we can summarily describe as wisdom. However, we do not consider it accurate to focus only on the understanding of education as a systematized body of knowledge that can be applied in practice. Developing wisdom can be related to the expansion and deepening the basic amount of knowledge. Sometimes even "useless" knowledge can significantly innovate established thinking patterns and bring new meanings and messages. In this context, Greenfield (2016) adds that wisdom requires a more extensive system of connections, while the associations made are based on an even wider range of experiences and individual memories, which allow us to assign more general values to things or events.

4 Information and Knowledge Society. Selected Risks of the Knowledge Society in the Context of Technological Interference

Information society as a concept enters the social sciences at the end of the 1970s. It finds its place not only in the field of sociology, where it serves as a term that covers new forms of communication and social behaviour, but also in the field of new technologies, from the development of which transformation mechanisms are derived, and in the political sphere, where the information society becomes the ideal to which countries should reach. The notion information society is said to have first appeared in Japanese. A group of social scientists used it to mark the era into which Japanese society at that time was entering. According to them, the sign of the information society was a quantitative but also a qualitative excess of information. In this context, we can also mention M. McLuhan, who in the 1960s developed his concept of an information society metaphorically called the global village. It was a form of "tribal" society in which creative dialogue using global consciousness recorded in computers prevails. It can be concluded that it was the medium of the Internet that gave McLuhan's visions regarding the global village a more concrete form.

The information society can therefore be characterized by using digital technologies, digital communication and especially digital storage, processing, and transmission of

information. Shevchenko et al. (2022) also agree with this theory, who define the information society as the connection of information, communication, and mass media technologies.

This term is one of the most frequent when discussing the current state and the general current situation of humanity. The path to the information society was accompanied by a technological revolution, which is based on the interconnection of information, communication, and mass media technologies (Roztocki et al., 2019). The result is, for example, a dramatic reduction in space and time constraints and an increase in access to a large amount of public information. Compared to previous technological waves, the impact of connected information, communication and media technologies is characterized by a wide area, miniaturization, digitization, and high speed of penetration into all areas of society or communication in general. These changes affected practically all areas: industry and services, public and private sector, the whole society at work and outside, education and entertainment in everyday life.

The current definition of the information society suggests that it is a situation in which work (or manipulation) with information is more effective than work with matter.

It is a society in which information is intensively used through modern information and communication technologies for its comprehensive development. In this context, it is also possible to define several possibilities and opportunities of the information society:

- increasing the quality of life through a greater selection of services and entertainment;
- better support for education and continuing education during an active career, support for the company's professional flexibility;
- new possibilities to implement people's creative abilities;
- increasing the company's ability to respond to changes in the structure of supply and demand for workforce qualifications;
- new possibilities of applying cultural traditions and identity of regions, elimination of remoteness of peripheral areas;
- more efficient and transparent state administration, closer to the citizen, operating with lower costs, higher share of citizens in public administration;
- more efficient business management and facilitation of the connection of producers and service providers with customers, increasing competitiveness; new services provided within telecommunications and new markets in the field of software (Abramova and Popova, 2019).

When analysing the information society, emphasis is often placed on its network character. It is especially the network that can be considered as a key feature of the information society. Therefore, this era can also be called "the age of network intelligence". The Spanish theorist Castells (2022) approaches the perception of the information society in a similar way, who refers to the information society as a network society. He states that networks constitute the new social morphology of our society. It is thus a new technical-economic paradigm, which manifests itself in the network logic of each participating system.

In the context of the information society, the term *knowledge society* is often used, sometimes they are also confused. As we have already demonstrated, information and knowledge are close to each other, but despite their seeming, external resemblance, it is necessary to differentiate them. For this reason, it is not correct if the term information society and knowledge society are equated. The idea of a knowledge society is based on the concept of an information society, its understanding continues in the form of an information society, but the priority of information is replaced by knowledge. The author of the term knowledge society is the American philosopher of Austrian origin Peter F. Drucker, who put this term into practice mainly in connection with the so-called knowledge economy. The emergence of the knowledge society was preceded by the enormous development of information

technologies as well as the process of informatization and computerization in the second half of the 1990s. Peter F. Drucker elaborated his theory in the work *Post-Capitalist Society* in 1992. The fundamental ideas of his work were gradually incorporated into the economies of the USA and the European Union, which resulted, for example, in the creation of a document known as the *Lisbon Strategy*. Its aim was to make the EU the most competitive and dynamic knowledge-based economy in the world by 2010, capable of sustainable growth, with more job positions and greater social cohesion. It can be stated that the knowledge-based economy is characterized by its globality, the exceptional use of human thinking and knowledge, materialized in technology in a remarkable way (Sira et al., 2022; Pacalajova and Kubinec, 2021).

If we talk about the knowledge economy, it is a description of the way in which several industries with a high technological level – for example, information and communication technologies, biotechnologies, nanotechnologies, etc. - as well as educational or scientific institutions contribute significantly to the creation of wealth in the country. In a broader sense of the word, we discuss a knowledge society, which requires a change in the functioning of principles in society (following economic life). The knowledge society therefore invests purposefully and actively in the development of the personal potential of each individual and develops its innovative capacity through the support of education, scientific or research activities. In this context, it is possible to summarize several basic principles of the knowledge society:

1. Knowledge is the most productive economic resource.
2. In a knowledge-based society, effective circulation of knowledge and not capital is ensured.
3. The inexhaustibility of the raw material of knowledge.
4. Knowledge is enriched by use and is therefore unique and inalienable.
5. Every human being is the owner of knowledge and can use it individually or socially (Hargreaves, 2022).

A knowledge society is a form of society in which, instead of information, priority is given to knowledge, know-how and insights as the most important and valuable aspect of capital. We consider the individual's ability to orientate in information sources, effectively search them and correctly interpret the information sought, put it into context, creatively process and create knowledge and insights from them as one of the elementary prerequisites for the existence and development of a knowledge society. If we talk about a knowledge-based society, it means that knowledge has become a decisive factor in the quality of life. A knowledge society is a society that enables open access to information and education, assumes the capacity of society members to absorb and interpret the information obtained, creates opportunities for using knowledge for qualified decisions and for proceeding to a qualitatively higher level of life (Perez Zuniga et al., 2018). The most valuable capital of the knowledge society is education and creativity. A knowledge society can be understood as a society in which the basis of social and economic coexistence is increasingly formed by individual and collective knowledge and their organization (Dovgal, 2021). It is a society in which knowledge is applied in all its areas, namely social, economic, cultural and others. Progress in these areas is achieved in the knowledge society mainly by applying knowledge to the effective use of social resources with the aim of improving the quality of life of society members and the environment. A fundamental increase in social knowledge is the first essential condition for the emergence of a knowledge-based society and its main feature. A person is the value for society from which everything else depends. It is a key subject of education. Today, education is becoming a significant element of the way of life, a life goal, the way of spending free time and a significant value (Ambrozova and Kaliba, 2019). Therefore, all requirements for the educational system and for the education of society stand, but also fall with the person. The central focus of the knowledge society is education and

knowledge sharing. Therefore, individual states should pay attention to the quality of their human resources, as well as place emphasis on increasing the level of education, qualifications, and ensuring appropriate retraining of the workforce. Educated people are more flexible and productive because they can use their potential more effectively or adopt new technologies.

The ability to create new knowledge and use it effectively is exclusively a product of a person's creative mental activity. We consider a comprehensive system of objectively true knowledge about nature, man, and society to be the basis of that part of social knowledge that can be used for the creation and functioning of a knowledge-based society. The responsibility of creating and constantly expanding this knowledge system is mainly fulfilled by science, therefore its support is another condition for the creation, existence and functioning of a knowledge society. In this context, it is possible to formulate several basic key conditions for the creation and effective functioning of a knowledge society:

- fundamental increase in social knowledge;
- permanent quantitative and qualitative development of human capital;
- support of science;
- increasing social cohesion in society;
- implementation of an economic policy supporting innovation.

One of the conditions for the development of a knowledge-based society is the use of information and communication technologies in production, education, as well as in the everyday life of a person (Sagikyzy et al., 2020). The introduction of information and communication technologies and the streamlining of processes through their use contribute significantly to a much higher efficiency and effectiveness of the implementation of all elements of the knowledge society. Santa (n.d.) formulates several recommendations for practice related to education in the information and knowledge society:

- to educate a flexible and competitive workforce capable of applying itself in the conditions of the information and knowledge society;
- provide education enabling residents to use the benefits that computerization brings;
- to raise the level of education so that it is competitive in terms of quality and forms with the developed countries of the EU;
- to innovate the content and form of teaching based on demand and requirements, the use of information and communication technologies;
- create conditions for obtaining and maintaining quality teachers at all levels of schools;
- to ensure constant innovation of the population's knowledge through lifelong education;
- in accordance with the principle of equal opportunities, ensure education in the field of computerization for all;
- ensure the corresponding information and communication infrastructure.

At the same time, it is possible to discuss whether and to what extent the knowledge society benefits people and society. Knowledge places high demands on people's abilities, on their ability to think critically and judge (Khamidov, 2017).

It can be confirmed that we live in the digital age. Mastering digital technologies, computers, and the Internet – to be informationally and digitally literate means having power in your hands in today's world and society. However, several theorists (Clinton, 2019; Varga, 2020) also point to the negative consequences of the use of new media and the Internet, for example in the context of misinformation, the spread of fake news and a generally low level of education. Electronic communication and digital media innovate the traditional understanding of space and time and significantly change the ways of human thinking,

behaviour, perception, experience, and education. Connecting to the Internet via a smartphone or tablet allows owners to continuously interact with their device and offers the ability to be always available – online in cyberspace (Bezakova et al., 2021). Through this constant connection and perceived accessibility, mobile devices provide endless opportunities for distraction.

In this context, a current phenomenon related to communication in the digital environment can be mentioned - the so-called technological interference (technoference). These are constant disruptions to interpersonal interactions and can interfere not only with relationships, but also weaken attention, ability to concentrate, accuracy, precision and other factors that are related to education. The main symptoms of such behaviour include, for example, interrupting offline conversations, constantly checking online content and notifications (for example, during a family dinner), feelings of disturbance that an individual experiences if his or her partner checks his or her device during free partner moments (even if the partners at that time did not interact with each other), etc. In general, we can summarize that technoference is any disruption of a real event that is caused by modern technologies and digital devices.

A suitable example is the research of Bauerlein (2010) who investigated American high school and university students, their skills and knowledge in the context of using electronic media. Research results have shown that the students' ability to read and interpret text is declining dramatically, which is related to a simple thing, namely excessive use of electronic media, especially Internet communication via mail, chat and Facebook, and minimal reading of books. Based on the decline in reading, Bauerlein found that there was also a decline in knowledge, which the author perceives as a great risk for the entire globalized society, while digital disruption - technoference - plays an important role. In this context, Galik (2014) also draws attention to several risks of the knowledge society, such as reducing knowledge only to results or expressible knowledge or atomized knowledge, the weakening of a logical, linear way of thinking or the weakening of a person's relationship to the past and the future. It can be stated that the digital revolution touches most spheres of human life. Although we consider information, knowledge, and insights to be the basis of education, we must not forget that it is the technologies, especially media that we use, that change and influence our thinking and cognition.

New cognitive habits under the influence of technoference can have different structural forms, such as network arrangement, non-standard links between information, or interrupted information flow, especially by entertaining information. It is therefore necessary to appeal to the continuous development of critical thinking, which is one of the key competencies of a globalized knowledge society. Critical thinking represents an ability that is a prerequisite for attention, caution when searching for, using and interpreting information. The current (digitalized) society can only progress successfully and efficiently and rightfully bear the status of a knowledge society based on the application of critical thinking, differentiation between information, facts, opinions, and knowledge, together with the awareness of possible negative consequences related to understanding (education) and wisdom.

5 Conclusion

Information can be viewed as any data that has an abstract character and is accessible to human perception. Knowledge, on the other hand, is transformed from information in the process of human cognitive activity and represents formulated judgments, concepts or principles that are available for transmission in the process of communication. Thus, the notions of information and knowledge are not equivalent, and information cannot be recognized as knowledge until a person processes it through mental operations.

In the context of globalization, information technology, digital media, and technological interference, we should not overestimate the importance of information exchange in modern society. Although information is a tool for creating knowledge, it is not knowledge itself. In the absence of healthy and critical thinking skills, as well as the necessary educational foundations, information may remain just a mass of bland data, or the basis for manipulative techniques of the media, politicians, or other power elites.

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Analysis of Factors Determining Competitiveness of Slovak Forest Based Industry

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Abstract

Research background: Slovak companies are located in an environment characterized by increasing market openness and economic integration. Competition is constantly intensifying and uncertainty in the business environment is increasing. As customer demand is increasing, it is necessary to respond quickly and accurately. Businesses try to cope with all the changes and turn them into their own competitive advantage.

Purpose of the article: The aim of this article is to analyse the competitiveness factors of Slovak forest based industry. Knowing the current situation in the industry can lead to an improvement in its economic performance.

Methods: The paper is focused on definition of factors influencing competitiveness, which are divided into external and internal factors. To achieve the main goal, a review of the literature was made. A method of the research is a systemic, comparative and logical analysis of factors determining competitiveness of Slovak forest based industry.

Findings & Value added: Based on the literature review, internal and external factors for increasing competitiveness are identified forest based industry.

Keywords: *competitiveness, forest based industry, market factors*

JEL Classification: *L21; M21; O12*

1   Introduction

Economic globalization has provided numerous opportunities for many manufacturers to participate in international trade and foreign direct investment. The operating environment of the forestry sector is becoming more complex and maintaining competitiveness is more difficult (Korhonen et al., 2017). Recent years have witnessed repeated waves of deglobalization that have adversely affected global supply and value chains (Su et al., 2020). The current business environment is characterized by high competition, uncertainty, growing customer demand, to which it is necessary to respond quickly and accurately. Businesses try

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to cope with all the changes and turn them into their own competitive advantage (Belyaeva, 2018).

Competitiveness as a concept has several definitions. Theories dealing with competitiveness were derived from Adam Smith's theories of international trade, adapting as other influencing factors emerged over time and affected competitiveness at the company, regional or country level (Dima et al., 2018). OECD offers general definition of competitiveness: "the ability of companies, industries, regions, nations or supranational regions to generate, while being and remaining exposed to international competition, relatively high factor income and factor employment levels on a sustainable basis" (Hatzichronoglou, 1996). Esser et al. (1996) proposed the concept of system competitiveness, which consists of levels:

- Macro – observation of state policy affecting the macroeconomic environment,
- Meso – are the structure and political actions supporting the business of enterprises,
- Micro – directly related to the functioning of the enterprise.

Many authors dealt with the concept of competitiveness at the business level. Basically, it can be defined as a firm's ability to design, manufacture and market products better than those offered by the competition, taking into account price and non-price qualities (Korhonen et al, 2017). It is the ability of an economic entity to assert itself in economic competition with similar economic entities. Beneš (2006) understands competitiveness as a reflection of competitive advantages determined by specific market situations. Oral (1999) links competitiveness with the level of productivity. The existence and growth of the company's competitiveness are largely determined by the field of business and the nature of the company's production. According to Módos (2001), company's competitiveness is connected to profitability. Competitive enterprise is capable of achieving profit in the long-term time horizon when performing individual activities, as well as maintaining or expanding its position on the domestic and foreign markets. Freebairn (1986) states that competitiveness is an indicator of the ability to provide goods and services at a place and time so that customers can purchase them at prices that are better than those offered by other potential suppliers.

Porter et al. (2006) identified competitiveness factors as the level of employee education, the source of competitive advantage, the willingness to delegate authority and the innovative capacity of the enterprise. At the highest stage of development based on innovation and services, customer orientation and the use of marketing come to the fore. The implementation of information technologies is changing the nature of the classic competitive environment, a new type of competition was created, which is called e-competition. An important factor in the growth of the company's competitiveness is ensuring the improvement of current production, increasing the utility value, functionality and simplifying control while simultaneously reducing production costs (Grznár, Szabo, 2002). In the transition to production with higher added value and a higher share of sophisticated work, investment in research and development is therefore emphasized as another of the main factors.

Chavarro et al. (2018) published the Green Book 2030 on the National Policy on Science and Innovation for Sustainable Development and defines innovation as a decisive factor of competitiveness, which manifests itself in the form of: renewing and increasing the range of products and services and relevant markets, the emergence of new methods of production, supply and distribution, introducing changes to management, work organization, working conditions and workforce know-how. Chatzoglou and Chatzoudes (2017) emphasize that businesses with a high level of innovation achieve better competitive advantages. The introduction of new products or services can bring higher value for the company's customers, especially when its competitors cannot provide the same range of products or services. Innovation in business processes can reduce production time or service delivery time and again provide added value to existing (or new) customers. Moreover, the more innovative an

organization is, the more it is possible to develop and successfully implement new strategies that face negative fluctuations in the external environment.

Voinea and Simionescu (2005) identified a strong positive correlation between competitiveness and the existence of specialized research and development departments in companies. Cantwell (2003) emphasizes inter-enterprise cooperation on the creation of knowledge and innovation. With increasing technological complexity, the importance of human capital increases. Businesses often say that people are their most valuable asset. Surveys among top managers confirm that the development of human capital is rarely mentioned among the highest priorities. According to Ravindran (2004), the most mentioned are increasing sales, reducing costs and research and development costs.

Parobek et al. (2016) analyzed the competitiveness of Slovakian wood and semi-finished wood products. Using modified Balassa index and comparative price level index the authors found that the abundance of forest resources and competitive prices determine the comparative advantage in industrial coniferous roundwood trade for Slovakia. The Slovak forest based industry is located in an environment characterized by increasing market openness and economic integration. This has the effect of increasing the importance of mutual comparison of individual companies, countries and regions. In order to successfully ensure the long-term progress of companies and their competitiveness, it is important to objectively evaluate the current situation of the industry. The paper is focused on the research of specific factors influencing the competitiveness of enterprises in forest based sector in Slovakia. It explains the factors affecting the competitiveness of companies and provides information on the competitiveness of the selected industry.

2   Methodology

The aim of this article is to analyse the competitiveness factors of Slovak forest based industry. Knowing the current situation in the industry can lead to an improvement in its economic performance. At the company level, factors are divided into internal and external. To achieve the main goal, a review of the literature was made. A method of the research is a systemic, comparative and logical analysis of factors determining competitiveness of Slovak forest based industry.

The methodological approach was as follows:
- Definition of the concept of competitiveness.
- Review of the literature on competitiveness in the forest-based sector.
- Two main areas of main factors were identified – one of them the internal factors competitiveness, another one its external factors.
- Four factors were identified within the internal area and three factors within the external area.

Based on the literature review, internal and external factories were identified, taking into account the forest based sector. The evaluation was based on external and internal influences on competitiveness. The degree of influence on the external and internal factories was determined.

External factors come from the surrounding environment, they are independent of the company. These factors are related to the state policy, the market mechanism and the overall economic situation in the country. On the other hand, internal factors are related to company's financial condition, physical resources, intellectual capital, organizational structure, adopted development strategy, management methods, entrepreneurship, innovation, the quality of the offered products and services (Walczak, 2010). Considering the specific character of business conditions in Slovakia, we paid attention to factors related to the forest-based sector.

3   Results and discussion

Firm-level competitiveness has been identified to be driven by tangible and intangible factors such as cost efficiency, innovativeness, and quality, as well as socially focused issues such as ethical standing, social (or environmental) responsibility, and working conditions of employees (Castro and Roldán, 2013). According to Zhelev (2013) European manufacturers have as main factors of competitiveness their advanced skills, quality and design, which generate greater added value. However, Slovakia's comparative advantage, for instance in case of sawnwood production, is a higher share of exports compared to imports. It is necessary to increase the production of products with higher added value even at the cost of comparative disadvantage (Parobek and Slašťanová, 2020).

According to the literature review, four internal factors were identified – Firm-level strategy, Cost efficiency, Innovativeness, and Workforce qualification (see Table 1). Korhonen et al. (2017) show that strategies and firm characteristics related to innovation and differentiation provide the key for understanding competitiveness at the firm level. Cost efficiency, which increases the competitiveness in company was confirmed in several research studies (e.g. Vokurka et al. 2002, Tahvanainen and Anttila, 2011). These authors also emphasised the essence of supply chain management focused on delivering the right product at the right time at each level within the supply chain. This requirement is defined by its quality, dependability, flexibility, agility, and efficiency as necessary capabilities for achieving this goal. The priorities should not be considered as tradeoffs for each other, but rather as complimentary and cumulative. All of these capabilities are necessary for value to be delivered to each customer at each level in the supply chain. Innovativeness is the innovations that belong currently among the factors that have the greatest influence on increasing productivity and thus also the competitiveness of businesses (Ciocane and Pavelescu, 2015; Cantwell, 2009). Kajanus et al. (2014) illustrate that the profitability of the companies was negatively correlated with the amount of enterprises' own risk funding, but positively correlated with the number of new products that have entered into the markets and the share of exports. Workforce qualification idea was also confirmed and elaborated by Lentner (2007), whose study clearly showed that alongside a stable environment for public finances, modern education and healthy highly skilled workforce are also prerequisites for national economic competitiveness. Kocianová et al. (2022) mentions that more than a half of woodworking and furniture enterprises consider a lack of qualified workforce and increasing intensity of competition to hinder their development along with specific problems arising from the nature of family business, which is the underestimation of the issue of succession.

Table 1. Factors affecting competitiveness of companies in the forest based sector

Competitiveness factors	
Internal	*External*
Firm-level strategy	Environmental concerns
Cost efficiency	Bioeconomy strategies
Innovativeness	Customer demand
Workforce qualification	

Source: own processing

External factors represent those factors that companies do not have control over and can affect their competitiveness. The external environment of the sector is currently connected with the need to respond to environmental challenges and issues of sustainability. An important factor of future change for the forestry sector is related to ongoing structural changes, the implementation of national and international bioeconomy strategies. This may

result in new opportunities for the traditional forestry sector. On the other hand, there are also new risks if companies do not adapt to the changing operating environment (Korhonen at al., 2022). In this context, the importance of innovation is emphasized. A competitive forest based industry brings many benefits to society and the national economy. Studies suggest that innovation can be fostered through collaboration through clusters. One of the main goals of business clusters is to create competitive advantages Among the main drivers of cooperation in forestry and woodworking are: cost reduction, support of competitiveness and environmental sustainability. In clusters, companies constantly compare their achievements with others, which stimulates positive competition, innovation and increased productivity (Weiss et al., 2017).

The three external factors were identified in the forest based sector. Environmental concerns, use of resources, compliance with environmental legislation, management of its significant direct and indirect environmental aspects increase industry competitiveness. (Slašťanová, 2021; Dechezleprêtre and Misato, 2017). Maťová and Kaputa (2018) came up with findings of their research, that most of the active architects do not propose wood as a construction material and prefer substitute materials on a silicate base, especially in cases of civil and industrial buildings. In Slovakia, mistrust continues to be found towards wooden constructions where fire resistance remains the most negatively perceived property of wood. In bioeconomy strategies, using modified Balassa index and comparative price level index it was found that the abundance of forest resources and competitive prices determine the comparative advantage in industrial coniferous roundwood trade for Slovakia (Parobek et al., 2020). Customer demand and the intensified demand for ecological materials increases the interest of customers in buying wood, which increases the demand of companies and thereby increases competitiveness (Xu et al., 2013). Loučanová and Olšiaková (2020) state that Slovak consumers are rather traditional what is reflected in their preferred type of building construction. Only university educated consumers and respondents from the lowest age category present higher interest in wood houses, that is connected with their properties such as type of construction, fire safety, housing costs, quality, thermal insulating properties and lifetime.

4   Conclusion

Globalization affects the economic and social environment, and significantly increases the need for companies to increase their competitiveness in the market. It is therefore essential for businesses to face these challenges and focus on promoting innovation, adapting to customer needs and creating market advantages. The wood processing industry has the potential to achieve high competitiveness on international markets, create an active trade balance and contribute to economic growth of the sector and country. Knowledge is the place to begin of 'everything' and of all of the elements of competitiveness. On the premise of knowledge, the concept of innovativeness is created from competitiveness factors, understood as new products, services, processes at what time on which marketplace and how. From the results of the literature review, we have identified four internal factors: Firm-level strategy, Cost efficiency, Innovativeness, Workforce qualification. External factories have been identified as: Environmental concerns, Bioeconomy strategies, Customer demand. When supporting the aforementioned elements of competitiveness, it is necessary to observe the principle of environmental protection, which is a prerequisite for business and development strategies.

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Research of significant aspects of electronic commerce and their impact on consumer purchasing behaviour and preferences

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Abstract

Research background: This paper addresses the issue of e-commerce and its impact on shopping behaviour and consumer preferences. The paper further specifies the advantages of e-commerce, factors influencing shopping behaviour and decision-making and the impact of the COVID-19 pandemic on online shopping.
Purpose of the article: The main goal of this paper is to find out whether there are statistically significant associations between the feeling of safety when shopping online and shopping online using a smartphone.
Methods: Analytical data processing took place in two chronological parts. The first part points to the rough findings of the research and descriptive statistics. The second part of the analysis examines deeper relationships through inductive statistics. Due to the established hypothesis and the nature of the data, the second part made use of the Kolmogorov-Smirnov normality test and the Spearman correlation test.
Findings & Value added: The research results showed statistically significant associations between the frequency of shopping using a smartphone and the feeling of safety when shopping via the Internet. The results point to the fact that the safer consumers feel in the online environment, the more they are likely to shop using mobile communication platforms.

Keywords: *E-commerce. Consumer behaviour. Shopping behaviour. Consumer preferences*

JEL Classification: *M30; M31; M37*

1 Introduction

E-commerce means the purchase and sale of goods and services on the Internet. In addition to buying and selling, many people use the Internet as a source of information to compare prices or check the latest products on offer before making a purchase (Kumar 2014). E-commerce is a tool that helps develop new forms of business. An online store is open 7 days

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a week, 24 hours a day and does not require any special-purpose premises, salespeople, complicated accounting systems or stores in every country. An online store is available to everyone despite geographical location and without any time constraints. When shopping online, consumers do not need to leave the house to buy products they like, all they need is to click the "buy" button and the shipping company delivers the desired item directly to their home (Išoraitė and Miniotienė 2018). Kita et al. (2017) argue that marketing communication taking place online has a significant impact on consumers' choices and decisions to purchase products online. Online store or e-shop could be defined as a selling point that mainly offers goods and services based on available catalogues or organized product categories. An online store accepts an order placed by a consumer, mediates payment, provides various information about products or services, and handles complaints (Zamazalová et al. 2010). Electronic business's biggest advantages in the current world of technological and economic changes include (Commerce Mates 2022): Faster shopping process: e-commerce has sped up the entire shopping process. Consumers no longer need to visit brick-and-mortar stores as they can shop while sitting at home. E-commerce saves time, makes transactions faster, and eliminates operating costs. As a result, the total operating costs of businesses have been reduced. E-commerce has eliminated the need for businesses to open brick-and-mortar stores. Running a store is a huge expense in terms of rent, utilities, miscellaneous bills, and staff salaries. E-commerce saves all these expenses as it runs all business activities through a website or e-shop. Personalization of the shopping experience: E-commerce allows consumers to enjoy a personalized shopping experience. Consumers can search for and browse a wide range of products of their choice and in line with their needs without any restrictions. Online stores show products to consumers according to their interests and their location. Available 24/7: Online shopping is available 24 hours a day, 7 days a week. This is one of the main advantages of e-commerce. Consumers can browse online products at any time. Unlike brick-and-mortar stores, there are no official opening and closing hours. Unlimited connectivity: Online businesses can reach and connect with consumers in remote locations without geographical limitations (Lins &Aguino 2020). Consumers can place their orders from any location and have them delivered to their place of residence. Detailed product information: Consumers can get detailed product description online to compare the viewed product with other products and make an informed decision. Gaining customer insights: Online shopping has made it easier for a business to retarget its customers. Thanks to e-commerce, businesses acquire a lot of information about their customers when they shop online. Customers may be contacted by businesses from time to time, via personalized emails, messages, coupon, and promotional discounts offers. Steven et al. (2014) perceives consumer behaviour as the study of the processes involved when individuals or groups select, purchase, use, or dispose of products, services, ideas, or experiences to satisfy needs and desires. Businesses and organizations rely on knowledge of consumer behaviour, needs and desires. Ryantika and Hidayat (2020) identify cultural, social, personal, and psychological factors as four major influences on consumer purchasing behaviour, and these factors allow consumers to develop preferences for products and their brands. Although they note that these factors are not directly under the control of marketers, marketers are advised to gain a better understanding of them as this knowledge will help them create marketing mix strategies that appeal to their target markets' preferences (Kennett-Hensel 2012). Before the final purchase of a product or service, customers make decisions based on the following general factors (Bhasin 2019): Product price is the first thing almost 80% of consumers study before buying a product as every consumer has their own budget and they usually tend to spend within the budget unless they get some extraordinary quality for the slightly higher price. Experience – nowadays everyone is busy and wants to buy products that are readily available. The market is full of alternatives to particular products. Therefore, it is important that the shopping experience as well as the quality of the product is excellent. Product design should be

attractive (Labanauskaite et al. 2020). Functionality – the product should have all the functions the consumer expects when buying. Convenience – the product and services should be convenient for consumers. Otherwise, they will not buy them. Reliability – the product should be reliable and should always meet the consumer's needs. Compatibility – the product should be compatible with other products that the consumer is already using. The COVID-19 pandemic was not only a health crisis, but also an economic one as it has significantly affected societies and economies. The COVID-19 outbreak has changed the way we work, communicate and shop more than any other event of this decade (Despin 2020). As can be seen from the analysis of economic data on sales, this dramatic situation has significantly influenced the attitudes and behaviour of consumers. According to a study conducted by the Nielsen Company, the COVID-19 pandemic has led to a globally manifested change in the level of spending related and consumer behaviour (Nexcess 2022). The sale of necessities skyrocketed as consumers prioritised the most basic needs, including food, hygiene products and cleaning products. As Italy was the first country in Europe to have a hands-on experience with COVID-19 (from March to April 2020), the behaviour of consumers changed drastically. Consumers tended to focus on purchasing of essential goods, especially those deemed to prevent the spread of the virus, such as protective equipment and disinfectant gels (Cannito et al. 2021). The pandemic has completely changed consumption patterns, e.g., reduced sales of some product categories (e.g., clothing) and higher sales of other product categories (e.g., entertainment products) (Degli Esposti et al. 2021, Vysekalová et al. 2011; 2012). The perceived risks of COVID-19 can negatively influence the behavioural intentions of consumers (Troise et al. 2021), and lead to changes in people's behaviour and consumption patterns (Brewer and Sebby 2021). In a pandemic context, the perceived risk and the threat of contagion influenced consumer behaviour changes, emerging a greater preference for using technologies to socially distance themselves from other people (Kim et al. 2021). Consumers' electronic shopping behaviour is evolving at a rapid pace, online payment methods are becoming more common, more people are shopping via mobile phones, and, ultimately, consumers are more willing to use e-commerce than they used to be. Globally, more than four out of five consumers bought goods online in 2020. Online shopping has become second nature to many people in recent years and shows no signs of slowing down.

2 Methodology

The main goal of this paper is to find out whether there are statistically significant connections between feeling safe when shopping online and shopping online via a smartphone.

Based on the set goal, the following research question was formulated:
- Are there statistically significant associations between feeling safe when shopping online and shopping online via a smartphone?

Based on the above research question, the following research hypothesis was formulated:
- We hypothesize that there are statistically significant associations between feeling safe when shopping online and shopping online via a smartphone.

The research carried out for the purposes of the paper can be defined as primary, interdisciplinary and quantitative. The inputs to the analyses were obtained through the implementation of primary research using the questionnaire. Data collection via an electronic questionnaire took place in the month of June 2022. The link to the electronic questionnaire was distributed via the relevant Facebook pages and e-mail (private database of the authors). The research sample was selected based on the availability and willingness of participants to participate. The research sample consists of 421 respondents. Analytical data was processed in two parts. The first part points to the rough findings of the research and descriptive

statistics. The second part of the analysis examines deeper relationships through inductive statistics. Due to the established hypothesis and the nature of the data, the second part made use of the Kolmogorov-Smirnov normality test and the Spearman correlation test. Each of these tests was carried out at the level of the hypothesis in question in accordance with the nature of the specific data. The statistical analysis was carried out in the SPSS 22 program.

The object of research are respondents of the following generations:

Table 1. Age distribution of respondents by generation

Generation	Year of born
C	(2001 – 2009)
Y	(1984 – 2000)
X	(1964 – 1983)
S	(1963 and earlier)

Source: Young (2017)

Regarding the age groups, the paper follows the methodology of Miles Young (2017) from Ogilvy & Mather, which imposes the following classification: Generation C, or Centennials, are currently between the ages of 13 and 21, Generation Y, or Millennials, are currently between the ages of 22 and 38, Generation X, or Baby Boomers, are currently between the ages of 39 and 58, and Generation S, or Snow Flakes are currently 59 and older.

Table 2. Representation of respondents by generation

	Number	%	Cumulatively %
Generation C	42	9.9	9.9
Generation Y	151	35.9	45.8
Generation X	173	41.1	86.9
Generation S	55	13.1	100
In total	421	100	

Source: own elaboration

The largest age group of respondents was Generation X (respondents born between 1964 and 1983 (N=173; 41.1%)). Generation Y (1984 – 2000) was represented by 151 respondents, or 35.9% of the research sample. Generation S (born in 1963 and earlier) was represented by 55 respondents (13.1%). The youngest group of respondents, Generation C (2001-2009) was represented by 42 respondents (9.9%). The research sample consisted of 421 respondents, of which 270 (64.1%) were women and 151 (35.9%) were men. The gender composition of the research sample reflects the fact that women are generally more willing to fill in questionnaire surveys. As the respondents were selected based on availability and in the research, certain disproportions compared to the general population in Slovakia were expected. The same applies to disproportions in terms of regions of the Slovak Republic which were caused by a narrowly focused research sample (the questionnaire was primarily filled out by respondents from the author's private database primarily residing in Kosice (N=147; 35%) and Presov region (N=65; 15.4%). Together they made up almost half of the respondents.

3 Results

This chapter presents research results in easy-to-read tables using descriptive statistics.

Table 3. Frequency of online shopping via smartphone

	Number	%	Cumulatively %
1 – I don't shop	50	11.9	11,9

2 – Very rarely (several times a year)	41	9.7	21,6
3 – Rarely (several times in half a year)	51	12.1	33,7
4 – Sometimes (several times in 3 months)	54	12.8	46,5
5 – Regularly (several times a month)	95	22.6	69,1
6 – Often (several times a week)	76	18.1	87,2
7 – Very often (at least once every 2 days)	54	12.8	100
In total	421	100	

Source: own elaboration

Most of the respondents (N=95; 22.6%) shop online using a smartphone regularly (several times a month). 76 respondents (18.1%) shop online via smartphone several times a week. 54 respondents (12.8%) shop online via smartphone several times in 3 months, and the same number of respondents state that they do so very often, or at least once every two days. 51 (12.1%) respondents shop online via smartphone several times in six months. 50 respondents (11.9%) do not shop online via smartphone. 41 respondents (9.7%) stated they shop online via smartphone only a few times a year.

Table 4. Frequency of online shopping via smartphone

	Number	%	Cumulatively %
1 – I strongly disagree	24	5.7	5.7
2 – I do not agree	29	6.8	12.5
3 – I partially disagree	42	10.0	22.5
4 – I neither agree / neither agree	69	16.4	38.9
5 – I partially agree	94	22.3	61.2
6 – I agree	130	31.0	92.2
7 – I strongly agree	33	7.8	100
In total	421	100	

Source: own elaboration

Most of the respondents feel safe when shopping online (N=257; 61.1%). 69 respondents (16.4%) took a neutral attitude towards the feeling of safety when shopping online. 95 respondents (22.5%) do not feel safe shopping online.

3.1 Verification of the research hypothesis

The research hypothesis was formulated in the introductory chapter of the paper. The hypothesis was verified in this subchapter. The verification process provides a probabilistic model of accepting or rejecting a presumed proposition.

H: We hypothesize that there are statistically significant associations between feeling safe when shopping online and shopping online via a smartphone.

Table 5. Descriptive statistics - shopping frequency using a smartphone

N	421
Average	4.299
Median	5.000
Std. deviation	1.8975
Skewness	-.328
Kurtosis	-1.019
Range	6.0
Minimum	1.0
Maximum	7.0

Source: own   elaboration
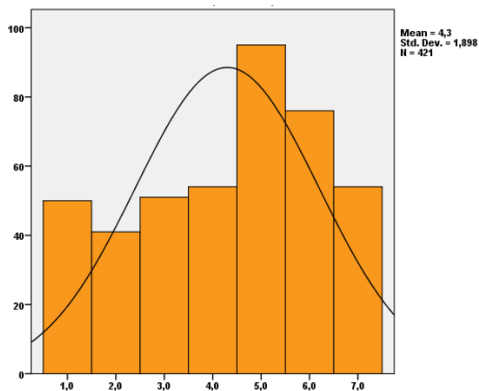
Figure 1. Descriptive statistics - shopping frequency using a smartphone

Source: own elaboration

Table 6. Descriptive statistics - feeling safe when shopping

N	421
Average	4.667
Median	5.000
Std. deviation	1.6165
Skewness	-.691
Kurtosis	-.356
Range	6.0
Minimum	1.0
Maximum	7.0

Source: own elaboration
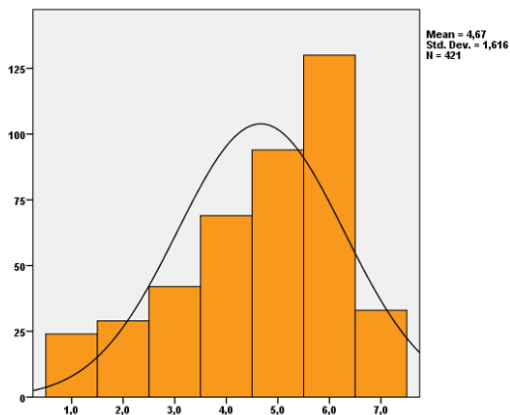
Figure 2. Descriptive statistics - feeling safe when shopping

Source: own elaboration

The results in Tables 5 and 6 and Figures 1 and 2 show that on a scale from 1 - the lowest frequency to 7 - the highest frequency, the average value of the frequency of shopping using a smartphone was 4.23 points. Furthermore, the results show that on a scale from 1 - the least safe to 7 – very safe the average value in terms of feeling safe when shopping online was

4.67 points. The Kolmogorov-Smirnov normality test was used to obtain knowledge about the normality or abnormality of the data distribution, as this information was necessary to verify the hypothesis.

Table 7. Normality test

	Kolmogorov-Smirnov		
	Statistic	df	Sig.
Frequency of shopping using a smartphone	.178	421	.000
Feeling safe when shopping online	.192	421	.000

Source: own elaboration

Since the normality test shown in Table 7 found that the data do not show a regular distribution pattern, non-parametric tests will be used to test the hypothesis instead. The aim of the hypothesis in question was to examine whether there are statistically significant associations between the frequency of shopping using a smartphone and the feeling of safety when shopping online. After considering the tests of normality of the data distribution and the nature of the variables, the non-parametric Spearman correlation test was used to analyse the hypothesis.

Table 8. Spearman's correlation test hypothesis

Spearman´s rho	Correlation Coefficient	.596
	Sig. (2-tailed)	.000
	N	421

Source: own elaboration

Based on the results shown in Table 8, it can be concluded that there are statistically significant associations between the frequency of shopping using a smartphone and the feeling of safety when shopping online. Therefore, the hypothesis in question has been accepted.

4 Conclusion

E-commerce is the process of buying, selling, transferring, or exchanging products, services or information through computer networks and the Internet. E-commerce and the use of the Internet in various industries benefit both consumers and businesses, as it enables the faster, easier, more convenient, and more flexible provision of goods and services. In addition to providing goods and services, the Internet also serves as an important promotional tool. Moreover, the Internet has become an important communication tool for businesses. Today, online communication tools are inexpensive, provide instant international reach, offer great real-time feedback, and can reach millions of people for whom the Internet is the centre of virtually all communication.

Based on the research discussed hereunder, it can be concluded that online shopping is important for most of the respondents (64.7%). Most of the respondents (67%) intend to shop online soon. 60.2% of respondents feel safe when shopping online. As much as 67.2% of respondents have a positive experience with online shopping.

Most of the respondents (26.1%) shop online several times a month. 19.7% of respondents shop online several times a week. 69 respondents (16.4%) shop online several times in 3 months. 14.3% of respondents (60 respondents) shop online only a few times in six months.

37 respondents shop online several times a year. 8.3% of respondents shop online very often, or at least once every two days. Only 27 respondents (6.4%) do not shop online. Most of the respondents (22.6%) shop online regularly (several times a month) using a smartphone. 76 respondents (18.1%) shop online using smartphones several times a week. 54 respondents (12.8%) shop online via smartphone several times in 3 months, and the same number of respondents stated they shop online via smartphone very often, or at least once every two days. 51 respondents shop online via smartphone several times in six months. 11.9% of respondents do not shop online via smartphone. 41 respondents (9.7%) shop online via smartphone only a few times a year.

Most of the respondents (61.1%) feel safe when shopping online. 60.6% of respondents are influenced by organic content provided by search results (e.g., Google) when shopping online. 56.1%, (236 respondents) are influenced by paid search content when shopping online. Most of the respondents (57.9%) are influenced by organic content on social networks when shopping online. Similarly, 56.2% of respondents are influenced by paid content on social networks when shopping online.

Most of the respondents (73.1%) are influenced by reviews and recommendations of family and friends when shopping online. Almost half of the respondents (49.4%) are influenced by the opinion of influencers, or celebrities they follow on social media when shopping online. Slightly more than half of the respondents (55.5%) are influenced by the newsletters they subscribed to when shopping online. The majority (69.1%) of respondents use price comparison engines (e.g., Heureka) when shopping online.

The hypothesis established hereunder assumed the existence of statistically significant associations between the frequency of shopping online using a smartphone and feeling safe when shopping online. This association was confirmed.

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Efficiency of businesses` digital transformation for sustainable development

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Abstract

Research background: Currently, the process of digital transformation in businesses is very important and often discussed. It decreases probability of businesses` bankruptcy and increases their sustainability on the market, which was also confirmed by the ongoing COVID-19 pandemic. An important goal is to speed up the digitalization processes taking place in businesses. It is very important to use already established digitalization elements more efficiently.

Purpose of the article: The aim of the paper was to evaluate the efficiency of the introduction of enterprises' digitalization elements in EU countries for the period 2019-2020.

Methods: To assess the efficiency of digital transformation selected business-oriented Digital Intensity Index (DII) indicators are applied. As part of the research, Malmquist Index (MI) based on the DEA (Data Envelopment Analysis) approach is used. The results of this model make it possible to assess how the change in technical efficiency and technological change contribute to the change in efficiency of the digital transformation in businesses within EU countries. Heat map is applied to graphically illustrate these results.

Findings & Value added: The contribution of the paper is the finding that dynamic evaluation brings new results in measuring the efficiency of businesses` digital transformation compared to static one. The finding is also the fact that leaders in the field of efficiency of digital transformation achieve 100% implementation of individual elements of digitalization, and therefore there is no need to evaluate their efficiency.

Keywords: business; digital transformation; efficiency; Malmquist index; sustainable development

JEL Classification: *O11; O33; C44*

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1 Introduction

The process of digitalization is essential to ensure economic growth of EU countries. This path is particularly important for businesses in individual countries, as the economic growth of these businesses and their sustainability is a prerequisite for the growth of the country's economy. Digitalization also represents „a powerful mechanism for enhancing the sustainable competitiveness of economies worldwide" (Petkovski et al. 2022, p. 79). „Because of its transformational power, digitalization is discussed as an enabler of environmentally sustainable development" (Isensee et al. 2020, p. 2).

With the introduction of new digital technologies, the traditional ways of doing business have changed fundamentally. „Firms can stay competitive using the benefits of digital technologies, such as the internet of Things, social computing, Cloud computing, cyber-physical systems, big data and analytics, wireless networks, artificial intelligence, robotics, simulation, etc. The spread of the coronavirus disease in 2019 (COVID-19) all over the world has created a better understanding of the importance of organizations` ability to keep up with digital innovations" (Coskun-Setirek, Tanrikulu 2021, p. 1)

Within the EU, some countries have picked up these trends earlier and are leaders in the digitalization of their processes, whether at the level of the country, businesses or people. On the other hand, there are countries that lag behind for many reasons and still have considerable room to improve in the given area and to gradually introduce individual elements of the digitalization process.

Therefore, our research was focused on the level of introduction of individual digitalization services of businesses within the EU countries, since the sustainability of businesses is a prerequisite for the sustainability of the country's economy. Six key elements of enterprises` digitalization were implemented. Their use was evaluated by expressing the percentage of companies that apply them. Dynamic DEA and the Malmquist index (MI) were applied to evaluate the efficiency of the introduction of selected digitalization elements. The MI application can be considered a contribution in the given field of research, since with the use of this index it is possible to assess not only the static situation in the area of the introduction of digitalization services, but also to evaluate the efficiency of their introduction, in relation to the GDP and employment of the countries. The results of this research complement the DII index, which measures the percentage of businesses with introduced digital tools, by measuring the efficiency of their implementation.

Based on the above-mentioned the aim of the paper was to evaluate the efficiency of the introduction of enterprises' digitalization elements in EU countries for the period 2019-2020.

The remainder of the paper is structured as follows: Section 'Literature review' defines digitalization, briefly describes Digital economy and society index (DESI) and DII and lists the applications of various methods in the measurement of the efficiency of digital transformation. Section 'Data and methodology' specifies the source of the data and describes MI used to assess the efficiency of the introduction of enterprises' digitalization elements in EU countries. Section 'Results and discussion' offers the results of the change in efficiency over time calculated with the use of MI and compares its results with the outcomes of DII index. Section 'Conclusion' offers conclusions, limitations and future research.

2 Literature review

Digital transformation is „the modern mainstream of social and economic development promising significant digital dividends to citizens and businesses worldwide" (Dobrolyubova 2021). The introduction of quality digital infrastructure is crucial for almost every branch of the modern and innovative economy and society (Stankovic et al. 2021).

Digital competitiveness is a part of the overall concept of competitiveness. It represents „a multidimensional structure that encompasses various factors of the process of digital transformation through the ability of learning and application of new technologies, technology factors that enable digital transformation, and digital readiness factors that assess the preparedness of an economy and citizens to assume digital transformation" (Stankovic et al. 2021, p. 117).

Digitalization can be defined from different perspectives, it depends on whether we take into account the point of view of society, businesses or individuals. „Digitalization has been identified as one of the major trends changing society and business. It causes changes for companies due to the adoption of digital technologies in the organization or in the operation environment" (Parviainen et al. 2017, p. 63). Brennen and Kreiss (2016, p. 1) define digitalization as „the way many domains of social life are restructured around digital communication and media infrastructures ". Schallmo and Williams (2018, p. 6) define digitalization as „fundamental changes made to business operations and business models based on newly acquired knowledge gained via value-added digitization initiatives".

In line with the focus of the research, Gartner's (2015) more businesses-oriented definition of digitalization should be mentioned: „Digitalization is the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business."

In order to measure progress in the development of the digitalization process, the Digital Economy and Society index (DESI) was developed and introduced in the European Union. DESI addresses the four interconnected principal policy areas of 2030 Digital Compass. These are Human capital, Connectivity, Integration of digital technology and Digital public services. These dimensions are of equal importance; therefore, they have equal weights (European Commission 2022). Among these policy areas, Connectivity and Integration of digital technology are the most important in relation to businesses. Olczyk (2022) in his research also found out that Connectivity has the largest impact on digital transformation in EU countries.

The level of digitalization in businesses is measured by the DII. It is a composite indicator derived from a survey on the use of ICT and e-commerce in businesses. A company's DII score (0-12) is determined by the number of selected digital technologies, which it uses. The higher the score, the higher the digital intensity of the enterprise. The composition of the DII varies between surveyed years depending on the questions included in the survey, so comparability over time may be limited (European Commission 2021a, European Commission 2021b).

Several authors have investigated the efficiency of the digitalization process using different methods, some of them are presented in the following text.

Petrovic et al. (2022) measured the efficiency of the use of information and communication technologies in businesses in order to assess the intensity and success of their digitalization process. Research sample consisted of businesses in the Republic of Serbia. To analyze the efficiency of digital business transformation the data envelopment analysis was applied, while for the robustness analysis of values of average efficiency they used bootstrapping method. They revealed that the process of digital business transformation in the Republic of Serbia is relatively efficient. The efficiency of e-commerce in businesses in most years was over 80%, on the other hand the use of software packages was insufficient. Kao et al. (2022) also applied Data Envelopment Analysis to investigate efficiency in implementing a digital transformation in Taiwanese firms. The study resulted in defining the inputs and outputs for the evaluation of performance of digital transformation of businesses. Authors also proposed performance evaluation approach which can help businesses to minimize risks associated with digital transformation.

Do et al. (2021) studied the impact of digital transformation on performance of Vietnamese commercial banks. They applied the GMM system (SGMM) of Blundell and Bond. To test he robustness of the estimated model they performed Bayesian analysis. The results of the research revealed that digital transformation has a positive influence on the performance of Vietnamese commercial banks.

Kalogiannidis et al. (2022) studied the effect of the digitalization on the performance of circular economy. Research sample consisted of 200 investors and entrepreneurs from Kozani in Greece. They applied regression analysis, while the dependent variable was a circular economy. The results of the regression analysis revealed positive relationship between digital practices and performance of a circular economy. Thai et al. (2022) also examined the impact of digital transformation on performance of businesses with the use of multiple regression model. Research sample consisted of Chinese firms. The results revealed that digital transformation enhances businesses` performance. Added value of the research was finding that businesses that have implemented digital transformation have lower costs, better operating efficiency and better innovation success, which means better performance.

3 Data and methodology

Indicators representing the digital transformation of EU companies, from the field of ICT usage in Enterprises, were selected as input data for fulfilling the aim of the paper and for assessing the efficiency of the digital transformation of enterprises and its impact on GDP and the unemployment rate. Indicators from the fields of E-commerce, Connections to the internet, Websites and use of social media, E-business and ICT security were chosen. The following inputs were used: E-commerce sales, Use of computers and the internet by employees, Type of connections to the internet, Websites and functionalities, Use of mobile connections to the internet, Cloud computing services.

GDP per capita and unemployment rate were used as outputs. The data of the EU-27 member states as well as the EU average were collected for the period 2019-2020. Descriptive statistics for selected indicators of the digital transformation of enterprises are presented in table 1.

Table 1. Descriptive statistics of selected indicators of businesses` digitalization

Variable	Descriptive statistics				
	Valid N	Median	Minimum	Maximum	Std. Dev.
E-commerce sales	27	18	8.0	38.0	7.9
Use of computers and the internet by employees	27	53	34.0	83.0	12.4
Type of connections to the internet	27	94	81.0	100.0	4.9
Websites and functionalities	27	76	46.0	96.0	12.5
Use of mobile connections to the internet	27	76	53.0	97.0	11.2
Cloud computing services	27	33	11.0	75.0	17.4

Source: Eurostat (2022)

The median of the share of E-commerce sales represents 18% of total sales. This share can be considered low. The median is slightly higher in the area of Use of computers and the internet by employees, in which 53% of participants use computers and the internet. Broadband Internet connection is used by up to 93% of employees. Websites and their functions are used by 76% of businesses, and the same % of businesses use a mobile Internet connection. Cloud computing services are used on average by only 33% of companies in the EU. Especially in this area of services, it is necessary to develop activities towards improving their use.

To assess the efficiency of the introduction of enterprises' digitalization elements in EU countries over-time, Malmquist index was applied. This index „measures the Total Factor Productivity (TFP) change between two data points by calculating the ratio of the distances of each data point relative to a common technology" (Casu et al. 2004, p. 2525). The index is based on the use of distance functions, which allow to describe production technology with multiple inputs and outputs without the need to specify the objectives of the company's behavior. It is possible to define both input and output distance functions (Fandel, 2002).

Several methods can be used to estimate distance functions, which are the starting point for calculating TFP. Linear programming is most often used, especially the Data Envelopment Analysis (DEA) method proposed by Färe, Grosskopf, Norris and Zhang in 1994 (Fandel, 2002). The use of DEA models to calculate TFP is related to the assumption that homogeneous data are available over several periods. Calculating the change in efficiency requires solving four linear programming problems, assuming the use of technology with constant returns to scale (Fandel, 2002).

Suppose that each $DMU_j(j = 1,2, \dots, n)$ uses a vector of inputs $x_j^t = \left(x_{1j}^t, \dots, x_{mj}^t\right)$ to produce vector of outputs $y_j^t = \left(y_{1j}^t, \dots, y_{mj}^t\right)$ at each period of time $t, t = 1, \dots, T$. Efficiency of DMU_0 can change or the frontier can shift or both changes may occur in the same time. The Malmquist Productivity Index is than defined as follows (1) (Zhu, 2014):

$$MI_o = \left[\frac{\theta_o^t(x_o^t, y_o^t)}{\theta_o^t(x_o^{t+1}, y_o^{t+1})} \frac{\theta_o^{t+1}(x_o^t, y_o^t)}{\theta_o^{t+1}(x_o^{t+1}, y_o^{t+1})} \right]^{\frac{1}{2}} \qquad (1)$$

where MI_0 measures the change in productivity between the periods t and $t + 1$. $\theta_o^t(x_o^t, y_o^t)$ is calculated by comparing x_o^t to the EPF (Empirical Production Frontier) at time t with the use of input oriented CRS DEA model, while $x_o^t = (x_{1o}^t, \dots \dots \dots x_{mo}^t)$ and $y_o^t = (y_{1o}^t, \dots \dots \dots y_{so}^t)$ are the input and output vectors of DMU_0 among others. Similarly $\theta_o^{t+1}(x_o^{t+1}, y_o^{t+1})$ is calculated by comparing x_o^{t+1} to the EPF at time t+1, $\theta_o^{t+1}(x_o^t, y_o^t)$ by comparing x_o^t to the EPF at time $t + 1$; and $\theta_o^t(x_o^{t+1}, y_o^{t+1})$ is calculated by comparing x_o^{t+1} to the EPF at time t applying input-oriented CRS DEA model.

This model is also available in its modified form (2) (Zhu, 2014):

$$MI_o = \frac{\theta_o^t(x_o^t, y_o^t)}{\theta_o^{t+1}(x_o^{t+1}, y_o^{t+1})} \times \left[\frac{\theta_o^{t+1}(x_o^{t+1}, y_o^{t+1})}{\theta_o^t(x_o^{t+1}, y_o^{t+1})} \frac{\theta_o^{t+1}(x_o^t, y_o^t)}{\theta_o^t(x_o^t, y_o^t)} \right]^{\frac{1}{2}} \qquad (2)$$

According to Fandel (2002) the term (3) represents the change in technical efficiency, it is the efficiency known according to Farrell (1957). The change in efficiency is equivalent to the ratio of Farrell's efficiency at time t and at time $t + 1$ (technical efficiency change between periods t and $t + 1$). Usually, this term expresses the improvement, deterioration or stability of technical efficiency.

$$\frac{\theta_o^t(x_o^t, y_o^t)}{\theta_o^{t+1}(x_o^{t+1}, y_o^{t+1})} \qquad (3)$$

The term (4) represents the frontier shift (FS) in the EPF between periods t and $t + 1$ (Zhu, 2014).

$$\left[\frac{\theta_o^{t+1}(x_o^{t+1}, y_o^{t+1})}{\theta_o^t(x_o^{t+1}, y_o^{t+1})} \frac{\theta_o^{t+1}(x_o^t, y_o^t)}{\theta_o^t(x_o^t, y_o^t)} \right]^{\frac{1}{2}} \qquad (4)$$

The values of indicators can be interpreted as follows:
$TECH > 1$ the efficiency of the DMS improved, it approached production possibility frontier, the decisions taken were correct,

$TECH = 1$ the efficiency of the DMS did not change,
$TECH < 1$ the efficiency of the DMS declined; the decisions taken were incorrect.

TECH informs about a change in technical efficiency but does not inform about a shift in production possibility frontier as a result of technological change. This is reported by frontier shift as follows:

4 Results and discussion

The resulting MI index for the years 2019-2020 is presented in Table 2. From this table it is obvious that the change in the efficiency of the use of digitalization elements in companies over time in relation to the change in GDP and unemployment is above the value of 1 in most EU countries, which can be evaluated positively. Slovenia, Lithuania and Croatia achieve an MI value below 1. The digitalization process in these countries appears to be inefficient from the point of view of applied inputs and outputs. Bulgaria achieved the highest efficiency value, followed by Latvia, Poland, Luxembourg, Romania, and Hungary. Slovakia ranked 13th with a value of 1.04. Based on the results, it can be concluded that Bulgaria achieved a significant result compared to other EU countries, including in the area of Efficiency Change, where it reached a value of 1. This means that the efficiency of using the already established elements of enterprise digitalization does not change and is stable.

Table 2. Results of the Malmquist index

DMU No.	DMUs	Malmquist Index	Efficiency Change	Frontier Shift
1	Belgium	1.02053	0.97854	1.04291
2	Bulgaria	1.20524	1.00000	1.20524
3	Czechia	1.03444	0.98212	1.05327
4	Denmark	1.00829	0.97815	1.03082
5	Germany	1.05252	0.99694	1.05575
6	Estonia	1.02621	0.96412	1.06440
7	Ireland	1.00327	0.99333	1.01001
8	Greece	1.07202	0.96676	1.10888
9	Spain	1.02094	0.97402	1.04817
10	France	1.02046	0.96868	1.05345
11	Croatia	0.98715	0.94342	1.04635
12	Italy	1.03389	0.96336	1.07321
13	Cyprus	1.04210	0.96765	1.07694
14	Latvia	1.11587	1.03357	1.07963
15	Lithuania	0.98042	0.92888	1.05549
16	Luxembourg	1.09327	1.00000	1.09327
17	Hungary	1.07574	1.00000	1.07574
18	Malta	1.02505	0.96914	1.05769
19	Netherlands	1.05520	0.97472	1.08257
20	Austria	1.04301	0.99786	1.04525
21	Poland	1.10820	0.96570	1.14755
22	Portugal	1.05470	0.97765	1.07881
23	Romania	1.07917	1.00000	1.07917
24	Slovenia	0.97342	0.91687	1.06168
25	Slovakia	1.04207	0.97671	1.06692
26	Finland	1.03218	0.98948	1.04316
27	Sweden	1.01798	0.98360	1.03495

Source: authors (2022)

In the area of technological change in the process of businesses` digitalization, Bulgaria even ranked 1st with a value of 1.21. The most efficient country in the area of Efficiency change is Latvia, which reached a value of 1.03 in the given area, which indicates an increase

in the efficiency of the use of already established digitalization elements in enterprises. Romania, Luxembourg and Hungary achieved a value of 1 in the field of Efficiency change, which means that they use the already established elements as efficiently as Bulgaria. In the case of other EU countries, there was a decrease in efficiency. The results in the field of technological change can be evaluated highly positive, as every EU country reached a value above 1. This is due to the introduction of new digitalization elements or an increase in the number of companies that switch their activities to use these elements.

A more detailed analysis of the results shows that Bulgaria has achieved an increase in the number of businesses using selected digitalization elements (E-commerce sales, Use of computers and the internet by employees, Type of connections to the internet, Websites and functionalities, Use of mobile connections to the internet, Cloud computing services). In the case of Slovakia, there was an increase in all areas of digitalization process evaluation as well. In the case of e-commerce, the number of companies that introduced this element increased the most in Denmark and Croatia. The number of businesses in the indicator "Use of computers and the internet by employees" increased in all 27 EU countries. The most significant increase in the number of businesses was recorded for the Cloud computing services indicator, especially in Denmark, Estonia, Italy, Malta, Finland and Sweden. This area is currently a priority for EU countries in introducing digitalization services. These services include the use of services such as e-mail, which is used by 76% of EU companies, storage of files by 67% of companies and office software by up to 57% of EU companies. Other services used include: hosting the enterprise's databases, which is used by 47% of enterprises, financial and accounting software – 45%, computing power for enterprises own software – 24%, CRM (Customer Relationship Management) software applications – 27%.

Apart from the assessment of efficiency over time and the impact on GDP growth and employment, Denmark is the leader in the introducing digitalization elements. In the field of e-commerce, Ireland and Denmark are the leaders, in the field of Use of computers and the internet by employees, Sweden is the best country. Type of connections to the internet is 100% applied in companies in Denmark and 99% in companies in Finland. Websites and functionalities are 94% - 96% established in Finland and Denmark. Finland and Sweden are leaders in the introduction of the indicator: "Use of mobile connections to the internet". The last analyzed indicator was Cloud computing services, while the best achieved values of the introduction of this indicator were achieved by Finland, which was able to increase the percentage of enterprises in which cloud computing technologies are introduced by 10% within 2 years. Based on the above-mentioned, it can be concluded that especially Denmark should be excluded from the evaluation of the efficiency of enterprises, as it reaches 100% in some indicators, as a result of which no further improvements can be expected.

The DII results show that Finland, Denmark and Belgium have a higher share of companies with a high degree of digitalization, while the lagging countries have a lower share of companies with a high degree of digitalization. For example, in Bulgaria and Romania (both 66%), Greece (60%), Latvia (57%) and Hungary (53%), most businesses show a very low DII, indicating a small investment in digital technologies. These countries are expected to increase the value of the index by 2030, so that 90% of small and medium businesses reach a higher level of DII. The results of the DII are monitored for several years, and it should be noted that they cannot be compared over the years, as the DII is processed according to the questions included in the survey, and these are different in individual years and are scored.

Based on the above, it would be appropriate to implement a method of measuring the efficiency of the digitalization process in companies within the EU, which would assess the digitalization process more precisely. It would also be appropriate to maintain the same parameters for measuring the digitalization level to ensure comparability over time. For this reason, the DEA and MI method appears to be a suitable alternative. The results of the MI model show that according to selected indicators of digitalization of EU businesses Slovakia

ranked 13th. Results of efficiency change and frontier shift are displayed graphically with the use of heat map (see figure 1).
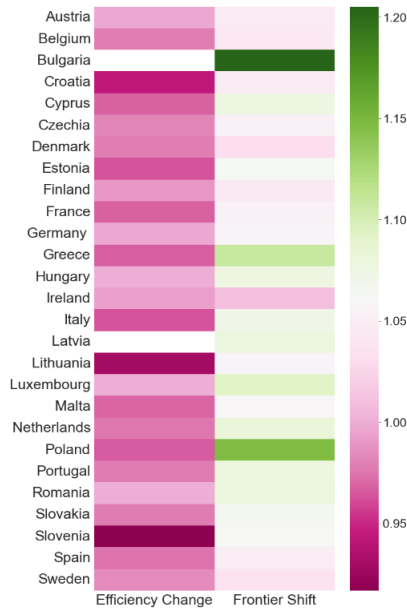
Figure 1. Heat map.

Source: authors (2022)

4 Conclusion

It is necessary to look at the results of the research from a static as well as a dynamic point of view. The static view records the state of the digitalization process at a given period, for example a year, while the dynamic one measures the efficiency of the transformation over the years, in relation to selected output parameters (GDP, unemployment rate, production, turnover, etc.). From a static point of view, countries like Denmark, Finland, Sweden and Belgium have achieved almost 100% enterprise adoption in most applications of digital tools, and further increase in the number of enterprises is not possible. These countries can be considered leaders, so in the case of these countries, the dynamic measurement of efficiency is irrelevant. It follows that when analyzing the digitalization process of enterprises, it is important to evaluate not only the quantity of introduced digitalization elements, but also the efficiency of their implementation and use, also in relation to GDP growth and employment growth in the country. This more or less confirms the findings of Inel (2019) and Yalcin (2021).

Slovakia should focus on its weaknesses. It lags behind Denmark in the area of e-commerce sales by 11%. At the same time, it should be noted that even Denmark, despite being a leader in the field of digitalization of companies, achieves coverage in this area at the level of 38% of companies. In the tool "Use of computers and the internet by employees" Slovakia lags behind Finland, which is the leader in the given area by 40%. Websites and functionalities is a category in which Finland is the leader and Slovakia lags behind by 20% of companies. Finland and Sweden achieve the highest % in the area of Use of mobile connections to the internet, while Slovakia lags behind by 20% of the companies that use this digitalization element. Probably the biggest losses are recorded in Slovakia in the field of

Cloud Computing Services. These services are implemented in 26% of enterprises in Slovakia, while Finland is the leader in this area with 75% of enterprises in which these services are applied.

Based on the above, it can be concluded that Finland, Sweden and Denmark are the leaders, which achieve a high % coverage of enterprises in which digitalization elements are introduced. Therefore, when evaluating the efficiency of the implementation of digitalization tools, less developed countries that were in the analyzed period in the phase of their introduction, appear in the leading positions.

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Career counselling on a virtual reality platform as an emerging global trend to increase employability of young people

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Abstract

Research background: The accelerating global development is reflected in the changing qualification needs of the labor market. If higher education is to fulfill its role well, it must be able to respond to these changes. It is necessary to align competences, areas of interest with education and training and the demands of the global labor market so that they correspond to the individual needs of the university student.

Purpose of the article: The aim of this paper is to identify emerging trends in application of virtual reality (VR) technologies in career counseling / guidance at universities as one of the forms of education of university students with regard to their successful employability in the global labor market.

Methods: The bibliographical analysis is carried out primarily on the platform of Web of Science, or others eventually. This is organically combined with the analysis of the current technological solutions in the field of career counselling by means of VR.

Findings & Value added: Current findings reveal following trends in using career counseling using virtual reality: job exploration or immersive job tasting, job simulation with varying degree of interactivity, career and personality diagnostics, job shadowing and virtual company immersions, soft-skills and job interview simulations. The use of virtual reality in the career counseling process will prepare university students for the complex challenges of the global age.

Keywords: *Virtual reality, career counselling / guidance, university education, global trends*

JEL Classification: *A11; A14; B16*

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1 Introduction

Industry 4.0, the coronavirus pandemic, the globalized world and the serious social and economic consequences associated with them have accelerated and accentuated fundamental changes in the global labor market. We have entered a world where the virtual world, digital literacy, flexibility in the labor market and the ability to proactively approach a career are no longer just buzzwords, but an absolute necessity for future employment on the global labor market. (Hirschi, 2018). The coronavirus pandemic and the serious social and economic consequences associated with it have accelerated and accentuated fundamental changes in the labor market. Youth unemployment is currently a problem facing many regions and countries. The unemployment rate over the past decade has been historically high, exposing college students to the long-term negative effects of unemployment (Musset and Kurekova 2018). Career counseling could help in this situation. Virtual reality has spurred concrete changes in the field of career counseling. The use of technologies based on virtual reality fully covers the first two subsets of career counseling (career education and career information) and psychometric testing and the development of competences in the field of job search are also considered as part of the activities.

The aim of the article is to identify trends in the use of virtual reality in the career counseling process in the form of bibliometric analysis based on the Web of Science Core Collection platform, which allows identifying current scientific and professional trends in academic publications.

2 Theoretical Background

Virtual reality (VR), as well as the so-called augmented reality (originally augmented reality; AR) they are a technological achievement of recent years. Although for many people this term primarily means a connection with computer games and entertainment activities, it is gradually finding use in the field of human resources in companies and career counseling in secondary schools and universities (Alhalabi, 2016). Virtual reality (VR) is the use of computer technology to create a simulated environment. VR can be defined as a newer technology system in which virtual objects are added to the real world in real time during the user experience (Azuma, et al., 2001). Virtual reality can be defined generally: "The use of computer technology to create an interactive three-dimensional world in which objects create a sense of spatial presence; virtual environment and virtual world are synonyms for virtual reality." (Lopreiato et al. 2016, in Kardong-Edgren et al., 2019). Definitions of VR vary, but they emphasize three common features of VR systems according to three aspects:

- The degree of immersiveness represents the intensity of the feeling of immersion in a computer-generated environment.
- Interactivity is a measure of the intensity and complexity of interaction with the world within virtual reality.
- Information corresponds to the quantity and quality of information that the user shares with the virtual space as part of interactions in the virtual space (Parveu and Adda 2018).

There are a wide variety of applications for virtual reality, from training and certification programs to career exploration and client assessment tools. These are some of the areas where virtual reality could start to be used for career development. According to (Target Connect 2019, in Senichev), the use of virtual reality in career counseling appears in the areas of:

- virtual practice,
- simulation of specific jobs,
- virtual career fairs and

- provision of career consultations in VR.

Obviously, this calculation will not be final and it is possible to expect the emergence of new platforms and their combinations. Students often find choosing the right career to be exhausting as there are so many opportunities but also many uncertainties. They usually choose several occupations of interest that match their abilities and interests to analyze through research. Fortunately, virtual reality makes it much easier to better understand your preferred occupation and explore the occupations of the future (Chircu, 2014). Career counseling offers a supportive space that helps job seekers navigate the complex and ever-changing global world of work and enables them to find their own solutions to various challenges (Whiston and Rose, 2015). Career counseling is defined by the OECD as: "a system of counseling services. Its aim is to help individuals of all ages make decisions about

- education,
- vocational training,
- employment and career choices at any stage of their lives." (WGCG OECD 2019).

NCDA understands KP as a form of working with a client based on the establishment of a professional counseling relationship and the potential to assist clients with career and personal development issues beyond those covered in career planning" (NCDA, 2015). Career counseling is based on the three paradigms of

- professional counseling,
- career education and
- life design (Savickas, 2012).

Traditional approaches can respond to challenges arising from changes in the world of work, therefore using new approaches in career counseling becomes a necessity (Maree, 2015). Through the use of VR, job seekers can experience first-hand the pros and cons of different occupations by seeing, hearing and feeling what they are really like. At a job interview, they have to face many challenges such as

- introversion,
- insecurity,
- lack of technical or
- social skills.

During this process, the teacher, career counselor can observe and gain valuable information about the individual that traditional pen and paper style assessments may not indicate, e.g. how he reacts to high-stress situations. Therefore, quality preparation can be decisive for success on the labor market. By combining various technologies, such as

- virtual reality,
- tracking the direction of gaze during an interview,
- recognizing emotions,
- analyzing verbal aspects,

it can provide the candidate with valuable experience and feedback (Stanica et al. 2017).

3 Methodology

The literature is increasingly recognizing the potential benefits of VR as a tool supporting a unique process of competency development and career adjustment. As part of the analysis of current professional and scientific trends, a bibliometric analysis based on publications in the Web of Science (WoS) was used.

The basic unit of bibliometric research are scientific journals, as they have a long-term important position in scientific communication, further clearly defined publishing standards and a high-quality assessment system (peer review), which ensures the originality of the published results of scientific research (Glänzel, 2003). The basic measures of bibliometric

research for the analysis of scientific production are the number of publications and the number of citations.

Bibliographic analysis within the platform reveals scientifically and professionally established trends. The analysis was carried out in logical steps, first a narrower search according to the occurrence of terms in the title, then according to the occurrence of terms in the text. In the search, terms defining the exact wording were used: "Virtual reality", "Career guidance", "Career counselling", "Career advisory", which are used in the sense of career / career advice. Additional search parameters: search within the WoS Core Collection database, unlimited languages, unlimited time range, unlimited other parameters.

3.1 The bibliographical analysis

For a more comprehensive view of the content of the article, we present terms with aspects of career counseling (career - counseling / guidance / advisory /planning) within the WoS platform (abbreviation CC):
-    1 227 (term in the document title), 3 604 (expression in the text of the document);
-    and terms based on the term "virtual reality", (abbreviation VR):
-    25 683 (VR or virtual reality in the title of the document),
-    69 294 (VR or virtual reality in the text of the document).

The analysis based on the occurrence of the word in the text is less accurate, since the text can discuss other topics as well. On the other hand, this approach to analysis can provide a more comprehensive overview of research topics and trends in a given area. The following tables present the output of the citation analysis.

Table 1. Bibliographic analysis: VR and career counseling in the title of the article

Year	Publication	Number of citations	Topic
2021	Demareva, V., Petrova, I., & Zhukova, M. (2022). **Digital Career Guidance Technologies: Using Virtual Reality**. Annual Review of Cybertherapy and Telemedicine 2022, 131.	0	Technologies in VR for CC
2022	Estrada, J. G., & Prasolova-Førland, E. (2021, March). **Developing VR content for digital career guidance in the context of the pandemic**. In 2021 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW) (pp. 38-43). IEEE.	0	Technologies in VR for CC

Source: WoS, Citation Report, 8/2022

The first article discusses technologies using VR in career counseling, and the second article discusses a similar topic, but with an emphasis on the context of the pandemic situation. Not a single publication has so far been cited in a publication indexed on Web of Science, which is not surprising given the recent publication date.

Table 2. Bibliographic analysis: VR and career counseling in the text of the article

Year	Publication	Number of citations	Topic
2005	Kim, G. J. (2005). **A SWOT analysis of the field of virtual reality rehabilitation and therapy**. Presence, 14(2), 119-146.	478	Vision, medicine
2018	Hardcastle, T., & Wood, A. (2018). **The utility of virtual reality surgical simulation in the undergraduate otorhinolaryngology curriculum.** The Journal of Laryngology & Otology, 132(12), 1072-1076.	11	Medicine
2020	Prokhorov, O. V., Lisovichenko, V. O., Mazorchuk, M. S., & Kuzminska, O. H. (2020). **Developing a 3D quest game for career guidance to estimate students' digital competences**. In CEUR Workshop Proceedings (pp. 312-327).	5	Testing career competencies in VR
2020	Rölfing, J. D., Jensen, R. D., & Paltved, C. (2020). **HipSim—hip fracture surgery simulation utilizing the Learning Curve–Cumulative Summation test (LC-CUSUM)**. Acta orthopaedica, 91(6), 669-674.	3	Medicine
2012	Chen, C. T. (2012). **Development and Evaluation of Senior High School Courses on Emerging Technology: A Case Study of a Course on Virtual Reality.** Turkish Online Journal of Educational Technology-TOJET, 11(1), 46-59.	3	Technique in VR for CC
2021	Lin, A. P., Trappey, C. V., Luan, C. C., Trappey, A. J., & Tu, K. L. (2021). **A Test Platform for Managing School Stress Using a Virtual Reality Group Chatbot Counseling System**. Applied Sciences, 11(19), 9071.	1	Technique in VR for CC
2019	Fominykh, M., & Prasolova-Førland, E. (2019, March). **Immersive Job Taste: a Concept of Demonstrating Workplaces with Virtual Reality**. In 2019 IEEE Conference on Virtual Reality and 3D User Interfaces (VR) (pp. 1600-1605). IEEE.	1	Technique in VR for CC
2019	Prasolova-Førland, E., Fominykh, M., & Ekelund, O. I. (2019, March). **Empowering young job seekers with virtual reality**. In 2019 IEEE Conference on Virtual Reality and 3D User Interfaces (VR) (pp. 295-302). IEEE.	1	Technique in VR for CC
2022	Zhu, L. (2022). **Work Emotion Intervention and Guidance Training Method for Enterprise Employees Based on Virtual Reality**. Occupational Therapy International, 2022.	0	Tréning
2021	Demareva, V., Petrova, I., & Zhukova, M. (2022). **Digital Career Guidance Technologies: Using Virtual Reality**. Annual Review of Cybertherapy and Telemedicine 2022, 131.	0	Technique in VR for CC
2022	Estrada, J. G., & Prasolova-Førland, E. (2021, March). **Developing VR content for digital career guidance in the context of the pandemic**. In 2021 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW) (pp. 38-43). IEEE.	0	Technique in VR for CC

Source: WoS, Citation Report, 8/2022

The highest number of citations (478 in total) goes to a visionary article from 2005, which talks about the perspectives of using VR in the field of therapy. Two articles are devoted to the use of VR in the training of surgical skills. Five publications are focused on the use of VR in career counseling. One publication is devoted to the testing of work competencies on a game platform in virtual reality and the application of emotion work competency training intended for employees.

From the citation analyses, it is clear that the number of publications indexed in Web of Science on the given topics is surprisingly low, as is the number of citations. This clearly points to the fact that these are really new and unexplored areas.

4 Discussion and Conclusion

Career counseling is not immune to VR experiences. There are a wide variety of applications for virtual reality, from training and certification programs to career exploration and client assessment tools. These are some of the areas where virtual reality is beginning to be used to develop careers in the global job market through virtual experiences for individuals. Career exploration and development takes

- time,
- resources and
- effort.

And there are many stakeholders in this process, from students and employers to university support services. New technologies open more doors to information and experience, but the real innovation will come when these tools connect with students in ways that help them make career decisions (Greenidge, 2013). John Sumser, founder of HRExaminer, said that turning job interview and workplace simulations into VR experiences could help in recruiting large numbers of employees. A key benefit of using VR is that students are immersed in the experience and not distracted, notes Dan Eckert, executive director of PwC's AI and Emerging Technologies Applied Research Lab (Lawton, 2021). In the presented article, the basic terms in the field of career counseling and virtual reality are defined and a bibliometric analysis was carried out based on the Web of Science Core Collection platform, which made it possible to identify current scientific and professional trends in academic publications. From the bibliographic research within science and research, it emerged that the topic "application of virtual reality in career counseling" represents a very young, little-established and practically just starting scientific discipline. Based on the analysis, we have identified the following trends, directions and visions of the use of VR in career counseling, which are likely to appear in the near future:

- virtual tour (exploration) of the workplace with varying degrees of interactivity,
- simulation of the workplace in a virtual space,
- practice of a job interview in virtual reality,
- job shadowing and participation in sample company events in real time,
- use of VR in the field of HR with the direct possibility of use in career counseling (diagnosis and assessment centers, training for specific job positions in VR).

The findings can be used as a starting point for further research on VR as a career guidance tool. The use of virtual reality in the career counseling process will prepare university students for the complex challenges of the global era. VR also shows strong potential for career guidance. Businesses and universities will have to overcome several challenges on the way to widespread adoption of VR in career guidance.

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A global view of the bibliometric analysis of creative accounting and earnings management

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Abstract

Research background: Looking back on history, it is possible to identify certain circumstances that could have stimulated the emergence of creative accounting, such as the emergence of individual states in the world, or the need for economic entities to establish a good position in the market. Over time, the terms creative accounting and earnings management began to appear more and more in the global business environment. Several keywords were created, with the help of which it was possible to identify them more deeply and also to monitor the growing importance of the given issue in a global aspect.

Purpose of the article: The purpose of this article is to analyze keywords accompanying the issue of creative accounting and earnings management in the global business environment for the period 1989-2021 through bibliometric analysis.

Methods: For this article, the scientific database Web of Science will be used as a database, containing a large number of professional and scientific publications related to the addressed issue in the period 1989-2021. Based on the acquisition of input data from this database, a bibliometric analysis of keywords will then be performed using the VOSviewer program.

Findings & Value added: With the growing number of publications, the number of keywords also increased, which signals a growing interest in the issue of creative accounting and earnings management. The global economic crisis resulted in a significant increase in publications and keywords in countries around the world since 2008. After 2008, the number of publications as well as keywords continues to grow significantly, so we can say that the issue of creative accounting and earnings management is attracting more and more scientific attention. researchers in the field of finance.

Keywords: *bibliometric analysis, creative accounting, earnings management*

JEL Classification: *M41; F60*

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1 Introduction

Accounting is the primary source of information based on which individual entities make all financial decisions. This is precisely the reason why the importance of accounting in the financial field is growing. Accounting provides important information not only to entrepreneurs performing their business activities but also to other entities whose decisions are based on accounting. Since accounting represents the main source providing very important information, it must provide all interested entities with a faithful and true picture of the accounting reality. According to the current Slovak legislation, the Accounting Act defines a faithful and true presentation of accounting as follows: "the presentation of accounting in an accounting unit is faithful if the content of the items in the financial statements corresponds to the facts and is by the established accounting principles and accounting methods and the presentation of accounting in the accounting unit is true if the principles and methods of accounting leading to the achievement of a true picture of the facts in the given financial statements are used within it." Based on the definition of true and fair presentation of the accounting facts, there should be no distortion of the accounting information, and there should also be no manipulation of accounting unit statements. However, the growing importance of accounting also brings with it certain risks. Accounting units in the business environment are aware that their evaluation takes place based on the achieved financial results, which are recorded in the accounting statements, which the accounting units must publish if they are entered in the Commercial Register. This may be the motive to "embellish" the actual financial results and thus resort to the use of creative accounting, through which accounting units can in a certain way modify the economic result either by reducing it or transferring a lower amount of funds to the state or by increasing it to attract more attention from investors. As part of the development of the global economy, creative accounting is written about in the professional literature in a positive but also a negative sense. Some of the authors think that creative accounting provides savings accounting units from bankruptcy. Other authors consider creative accounting illegal and violating accounting principles. Salustro and Leburn (2000) think that for companies in a period of crisis, the crisis is a test for these companies, in which the cash flows of the company are affected and the risks arising from the performance of business activities increase, which motivates managers to use creative practices. accounting (Salustro and Leburn, 2000 in Balaciu et al. 2009). Watts and Zimmerman (1978) are representatives of positive accounting theory. Their research studies became the basis for several empirical studies investigating the relationship between the choice of accounting practices and political costs. Brown and Steele (1999) compiled a portfolio of a total of twelve accounting techniques, in which they additionally combined a selection of accounting procedures tied to decisions made by business managers. According to Kovanicova (2005), creative accounting represents "the process of manipulating accounting data to transform financial accounting statements from the form in which they should be properly kept within the framework of a faithful and true representation of the accounting reality to the form that would be desired by those who are responsible for keeping accounting data and implementing economic transactions to report the required financial performance and cash flows of the given accounting unit." Griffiths (1995) points to the fact that companies report such results that are not a true and fair image of their transactions, but rather adjust them according to the desired goals. The economic results reported by companies are based on appropriate, adjusted, or changed data. These practices used in reporting business operations or performance are considered creative accounting. Mulford and Comiskey (2002) define creative accounting as "steps taken to game financial statements, including aggressive selection and application of accounting principles, either within or outside generally accepted accounting principles, and fraudulent accounting reporting." These authors in the context of

the definition of creative accounting, explain fraudulent accounting reporting as the deliberate misrepresentation or omission of certain values and attachments in financial statements made to mislead the users of these financial statements and perceived as fraudulent from an administrative, civil or criminal point of view. Baloun (2004) refers to creative accounting with the term tendonitis. This term is understood in the professional literature as a criminal act of distorting accounting data on the state of management and capital, which in the case of capital markets represents a serious problem indicating the error rate of the system in the reporting of assets and profit and the misuse of the information in business relations. Jameson (1987) explains creative accounting as an accounting sphere in which, as part of the accoing process, there is an assessment and resolution of conflicts regarding the approaches to the presentation of the company's financial results associated with financial cases and their transactions, which, from the author's point of view, creates an opportunity for the modification of financial data and deceptive presentation of the company.

2 Methods

For the bibliometric analysis, the Web of Science scientific database was used as a database, which contains a large number of scientific articles by domestic and foreign authors dealing with the issue of creative accounting and earnings management. For this article, four areas were analyzed, namely economics, management, corporate finance, and business, respectively entrepreneurship in the period 1989-2021, while the minimum number of publications per author was set at the level of 5 publications. The VOSviewer program was used to analyze the total number of articles, with the help of which it was determined in which countries the issue of creative accounting is mostly addressed. Using this program, a total of 65 countries with the largest number of articles related to the addressed issue were identified. Individual countries were divided into nine clusters according to similarity, with each cluster marked with a different color. Within the professional and scientific publications found in the Web of Science database, keywords in the field of creative accounting were further detected through bibliometric analysis. The development of keywords for the given issue was analyzed in the period 1989-2021, while the total analyzed period was divided into ten years. The total number of analyzed keywords reached 8306.

3 Results and Discussions

Using a bibliometric analysis, we found out in which countries the issue of creative accounting and earnings management is mostly addressed, as well as which of the authors deal with the given issue the most in a global environment. As a database, we used the Web of Science scientific database, which contains countless scientific articles by domestic and foreign authors on the given issue. We focused on four areas, which are economics, management, corporate finance, and trade, respectively entrepreneurship in the period 1989 - 2021. In total, we identified 65 countries with the largest number of articles on the given issue, while individual countries were divided into nine clusters according to similarities.
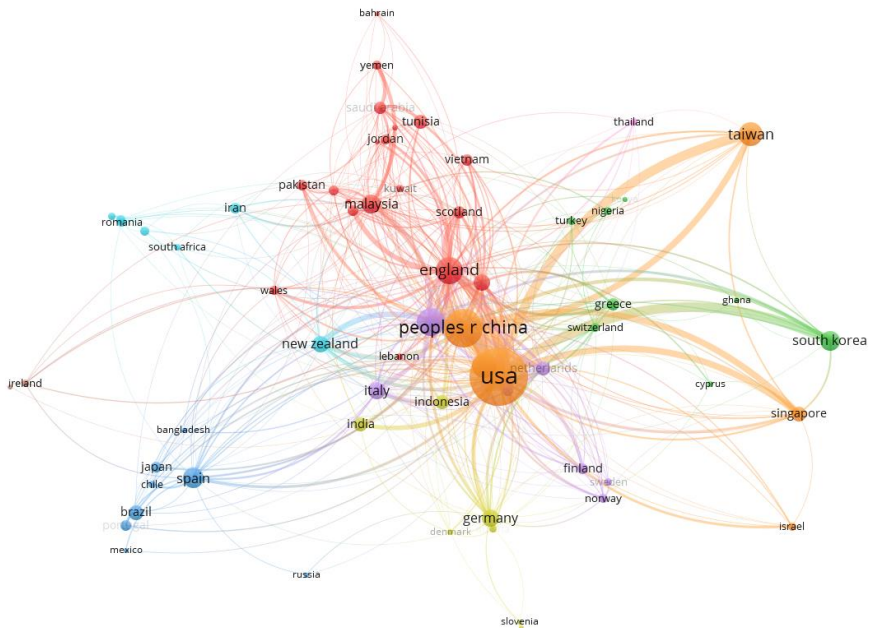
Figure 1. Bibliometric analysis of Creative accounting from a global perspective

Source: Own processing using the VOSviewer program

The first cluster includes nineteen countries, including Bahrain (11 articles), Egypt (53 articles), England (430 articles), France (138 articles), Jordan (48 articles), Kuwait (23 articles), Lebanon (21 articles), Libya (12 articles), Malaysia (194 articles), Oman (13 articles), Pakistan (50 articles), Qatar (14 articles), Saudi Arabia (75 articles), Scotland (72 articles), Tunisia (100 articles), United Arab Emirates (46 articles), Vietnam (59 articles), Wales (34 articles), Yemen (34 articles). The second cluster includes eight countries including Cyprus (14 articles), Ghana (14 articles), Greece (72 articles), Kenya (8 articles), Nigeria (28 articles), South Korea (200 articles), Switzerland (36 articles), Turkey (33 articles). The third cluster includes a total of eight countries, including Bangladesh (11 articles), Brazil (114 articles), Chile (22 articles), Japan (53 articles), Mexico (9 articles), Portugal (51 articles), Russia (9 articles), Spain (238 articles). The fourth cluster contains a total of seven countries, namely Austria (23 articles), Denmark (14 articles), Germany (160 articles), India (99 articles), Indonesia (95 articles), Kosovo (5 articles), and Slovenia (10 articles). The fifth cluster includes a total of seven countries, namely Australia (468 articles), Belgium (53 articles), Finland (51 articles), Italy (154 articles), the Netherlands (101 articles), Norway (35 articles), and Sweden (26 articles). The sixth cluster consists of seven countries, which include the Czech Republic (23 articles), Iran (51 articles), New Zealand (142 articles), Poland (37 articles), Romania (41 articles), the Slovak Republic (34 articles), South Africa (19 articles). The seventh cluster includes six countries. These are Canada (353 articles), Israel (31 articles), China (931 articles), Singapore (105 articles), Taiwan (315 articles), USA (2373 articles). The eighth cluster consists of two countries such as Ireland (25 articles) and Monaco (8 articles). The ninth cluster is made up of one country, namely Thailand (25 articles).

The total number of foreign and domestic publications generated by the scientific database Web of Science is 5890 articles. The following graph shows the number of studies in the studied period 1989 - 2021.
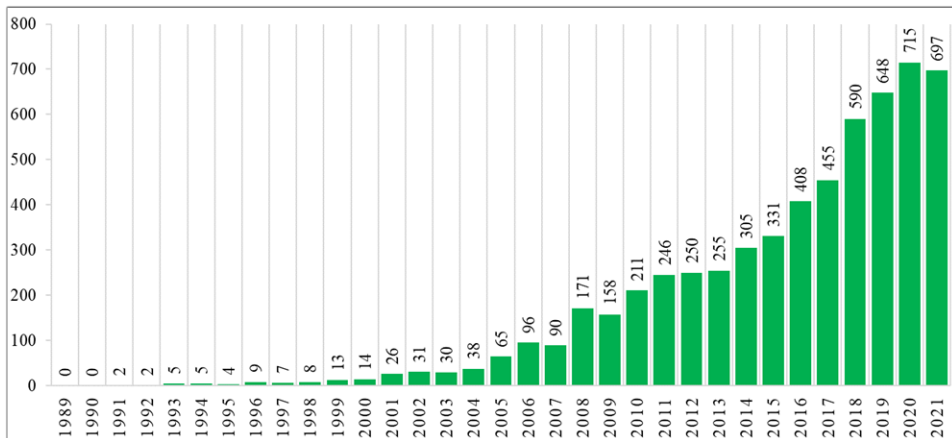
Figure 2. Number of publications in the period 1989-2021

Source: Own processing using the VOSviewer program

The growing number of publications captured through the graph signals a growing interest in the issue of creative accounting and earnings management. The global economic crisis resulted in a significant increase in publications in the countries the world since 2008. Since 2008, the number of publications continues to grow significantly, so we can say that the issue of creative accounting and earnings management is attracting more and more attention from scientific researchers in the field of finance. Among the countless studies related to the issue of creative accounting and earnings management, we present some of them. Aygun (2013) considers creative accounting as an essential tool for informing third parties about an accounting unit. He explained the possible strategies and their effectiveness in practicing creative techniques in the company. Dias et al. (2016) examined auditors' opinions on the issue of creative accounting and earnings management from an ethical point of view. Nica and Ionita (2016) describe the practices of creative accounting and its impact on the quality and reliability of financial data. Stangova and Vighova (2016) characterized creative accounting as a common phenomenon in the recording of financial results in companies. They also pointed out methods by which it is possible to avoid the practice of creative accounting in accounting units with an impact on public finances. Dugar and Gujarathi (2018) analyzed the company Toshiba Corporation to identify the use of possible procedures in adjusting the reported profit in the period 2008-2014. The results of the study showed that this company adjusted its profits by almost two billion US dollars in the analyzed period of 2008-2014. Remenaric et al. (2018) presented in their publication the main incentives for the manipulation of financial data, the most used creative techniques, and also the steps necessary to eliminate the use of creative accounting procedures. Falcon, Sanchez, and Vizcaino (2019) analyzed the incentives through which accounting information is modified to report economic results that do not correspond to reality. Another of the authors, Renu and Sharma (2020), focused their attention on creativity in the field of human resources. Through their study, they tried to identify the scope of creative accounting in the company as well as the influence of auditors representing the key human factor. Saleh, Jawabreh, and Abu-Eker (2021) focused on identifying the motives leading to the use of creative accounting in hotels operating in Jordan and their impact on financial statements. Olojede and Erin (2021) investigated the impact of corporate governance mechanisms on the use of creative accounting in the country of Nigeria. They included a sample of seventy companies in the analysis, while their study pointed to the elimination of the use of creative accounting through corporate governance mechanisms, which is significantly influenced by regulation. Studies

by other authors deal with the questions in which countries' earnings management occurs the most, to what extent, how this phenomenon can be measured and whether company managers are also involved in its practice. Based on these questions, it is clear that the issue of earnings management is very topical in the financial sphere and more and more authors are interested in it. Linhares, da Costa, and Beiruth (2018) verified whether there is a relationship between the quality of accounting data assessed based on earnings management and the efficiency of investments made through companies operating in Brazil listed on the stock exchange in the period 1996-2012. The results of the study demonstrated the impact of earnings management on the level of investments. Based on the results of the given study, the authors think that a higher scope of earnings management is associated with a higher probability of deviation from the ideal investment level. Valaskova, Kliestik, and Kovacova (2019) detected earnings management through the Jones model and the Modified Jones model in Slovak companies operating in the automotive industry. The results of their study demonstrated a higher ability of the original Jones model in detecting earnings management in Slovak companies compared to the Modified Jones model.

Through bibliometric analysis, they further detected keywords in the field of creative accounting and earnings management in the period 1989-2021. The total number of keywords that were analyzed is 8306. The following images show the development of keywords related to the issue of creative accounting and earnings management in individual periods, divided by year.

Figure 3. Keywords in the period 1989 - 1999

Source: Own processing using the VOSviewer program

Due to the low number of existing publications in the observed period 1989 - 1999 focused on the issue of creative accounting and earnings management, we also identified a low number of keywords. Accrual, earnings management, and discretionary accrual were among the most important keywords related to the presented issue in the given period.

The number of publications from 2000 to 2010 has increased significantly compared to the previous period 1989 - 1999. As a result, the number of keywords has also increased. In the following picture, we can see their mutual connection, while in the years 2000 - 2010, the motives for the creation of creative accounting and earnings management were already gaining attention. Through a long-term period, it is possible to compare significant changes in the development of the issue of creative accounting and earnings management, as well as changes in the perception of the solved issue before and after the onset of the global economic crisis.
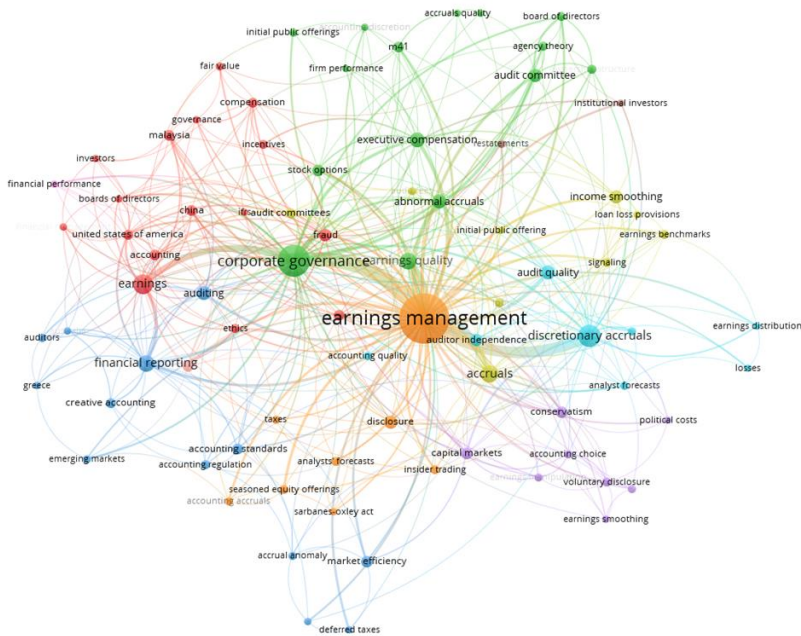
Figure 4. Keywords in the period 2000 - 2010

Source: Own processing using the VOSviewer program
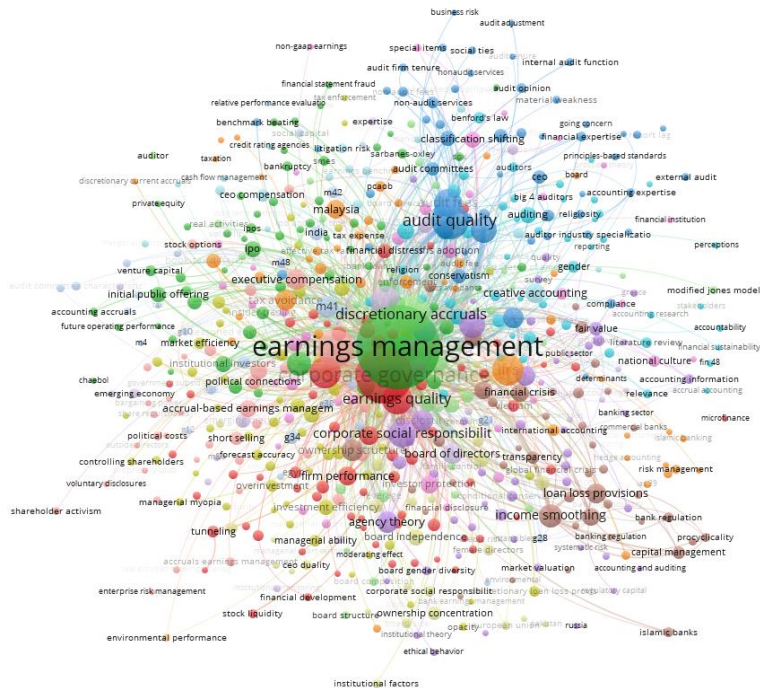
Figure 5. Keywords in the period 2011 - 2021

Source: Own processing using the VOSviewer program

In the period 2011 - 2021, we can observe a more complex connection of keywords compared to the two previously analyzed periods 1989 - 1999 and 2000 - 2010, as a significantly larger number of professional and scientific publications in the world were created in this period. In addition to basic concepts such as creative accounting and earnings management, techniques or motives for their creation, attention is also paid to the division of earnings management according to its forms, profit models used to detect and identify the presence of earnings management, the countries in which the presented issue is mostly solved or entities that can practice creative accounting and earnings management in the financial sphere in world countries and many other keywords.

Conclusion

Based on the results of the bibliometric analysis, it can be concluded that the issue of creative accounting is a global phenomenon that is becoming more and more popular not only in the V4 countries, but also in other countries of the world, and which it is necessary to pay due attention since the manipulations of financial data and profit occurred not only because of the global economic crisis, but it is also occurring now. When we look at the current economic situation due to the Covid-19 pandemic, we can say that its effects on world economies are negative. Partial or complete restriction of business operations results in a fundamental reduction of revenues, profit, and cash flow, or the generation of permanent costs. Not to mention the credit risk, as a result of which there may be a fundamental reduction in the receivables turnover time or the receivables will not be paid in full. All these negatives can lead to a decrease in the market capitalization of companies.

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Digitalisation in the Public Sector as a Potential Approach to Reduce Tax Evasion in EU Countries

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Abstract

Research background: Digitalisation was one of the key drivers of economic growth during the 5th cycle of Kondratieff Waves. Moreover, digitalisation is still an important factor enabling future changes during the 6th cycle. While the private sector is often, a leading one in digitalisation, the public sector should also keep pace with it. Our paper deals with digitalisation as a potential approach to reducing tax evasion.

Purpose of the article: We assume that tax evasion is to some extent affected by the degree of digitalisation in the public sector. The usage of digital technologies in the public sector can have several consequences for the effectiveness of tax administration, tax audits as well as the willingness of taxpayers to pay a tax. The paper aims to identify the potential relationship between the degree of digitalisation in public administration and the estimated level of tax evasion in EU countries.

Methods: We analysed secondary panel data for 27 EU countries in the period 2008-2021. The analysis is based on Pearson correlation, Granger causality and cointegration tests. This approach allows us to identify the significance and the directionality of potential effects between tax evasion and the usage of digital services.

Findings & Value added: We found a significant relationship between both factors and effects in both ways. However, the effect arising from tax evasion on digital public services seems to be even more evident. Based on the results we can make certain conclusions and recommendations for tax policy and public policy supporting digitalisation.

Keywords: *tax evasion, digitalisation, digital transformation, public services, e-government.*

JEL Classification: *H26; H10; H83*

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1 Introduction

The process of gradual digital transformation has been present in the private as well as the public sector for a rather long time. Despite this fact, the process is far from completed and become even more inevitable during the Covid-19 pandemic accompanied by social distancing. The public sector often lagged behind the business in several aspects of digitalisation. Improvements in digitalisation and e-government can have several other benefits except for the increase in the quality of public services and expected decrease in administration and compliance costs. The induced reduction of tax evasion can be seen as one of them. This paper is focused on examining the relationship between digitalisation in the public sector and the estimated level of tax evasion. There are various reasons why we can expect a such relationship to exist. Firstly, digitalisation usually improves the efficiency of the process of tax audits and increases the possibility of detecting tax evasion. From the perspective of taxpayers, there are fewer possibilities for undetected free-riding. Online communication with the government also eliminates personal contact between officials and taxpayers to a minimum which reduces the possibility of bribery or any other corrupt practices. Furthermore, online information and consultations improve the awareness of the tax law and potential fines among taxpayers. All these aspects can lead to a decrease in tax evasion in countries with higher intensity of digitalisation in the public sector.

   The main aim of this research is to identify the potential relationship between the degree of digitalisation (the use of digital technologies to change a business model and provide new revenue and value-producing opportunities) in public administration and the estimated level of tax evasion in EU countries. We used available secondary macro-level panel data to examine trends and the potential relationship between both problems in the short-run as well as in the long run. To fulfil the aim, we apply correlation analysis, panel Granger causality test as well as panel cointegration tests. In the next section, we briefly summarize the theoretical assumptions related to the examined problem and provide some examples of previous research in this field. The methodology and data used in the analysis are described in the third section of the paper. The fourth section shows the most important results of our analysis with economic interpretation. Finally, we make conclusions and policy implications in the last section of the paper.

2 Literature review

Today, society and digital technologies are very closely connected. They dynamically transform the world, simplify many activities and bring more accessible and transparent information to people. Their influence on many social sciences is undeniable. We also notice the impact of digitalisation in the area of tax systems. Thanks to digitalisation, the administrative burden can be reduced, cooperation between tax authorities can be improved, tax systems can be managed more efficiently, and the amount of tax evasion can also be eliminated. By tax evasion we mean economic activity that is unregistered, illegal and dishonest, but otherwise would contribute to increasing the gross national product (Schneider and Enste, 2000; Orviská and Hudson, 2003; Orviská, 2005; Kiabel and Nwokah, 2009). When defining tax evasion, we also encounter the concept of tax avoidance, which represents a reduction of tax liability that does not violate the law, but on the other hand, uses the possibilities that the law allows. Tax avoidance occurs when using the imperfections and ambiguities of legislation in the area of tax policy, but also through the use of legal adjustments in the form of a preferential tax regime (Fuest and Riedel, 2009; Prebble and Prebble, 2010; Alm, 2012). Medina and Schneider (2018) advise one of the reasons that lead to hiding economic activities mainly regulatory ones, which mainly include avoiding

government bureaucracy and the absence of more effective methods of communication with institutions - digitalisation.

Under digitalisation, we can imagine the process of converting information into digital form. According to Veber et al. (2018) this is a process that leads to the capture of data, its preservation, analysis and evaluation. However, it should be kept in mind that the digitalisation process does not take place evenly, mainly due to the existence of territorial differences, the level of literacy of the population and, last but not least, the availability of the Internet network and many other factors.

According to Alm (2021), rapidly changing technologies probably influence the development of tax evasion in a positive direction from the point of view of the governments of individual countries. Technological changes ensure a faster and smoother flow of information between tax subjects and public administration bodies and their subsequent analysis. They also facilitate the process of taking measures, or policies to eliminate tax evasion. The ability of governments to monitor and subsequently analyze transactions about which they have information makes it possible to increase the revenues of state budgets. The authors Kitsios et al. (2020) claim that digitalisation represents an opportunity for fiscal policy because it depends on information about economic actors, respectively. tax subjects and can improve tax compliance by increasing the efficiency and quality of information in business transactions. However, digital technologies are available not only to public administration bodies, but also to tax entities, which, thanks to their use, can circumvent legal regulations, thereby increasing tax evasion. In their publication, the authors Remeikiene et al. (2017) define the digital shadow economy and identify its characteristic features and channels.

There are currently several studies that examine the relationship between e-Government initiatives and tax evasion. E-Government is an indicator that measures the efficiency of public administration and also measures the achieved level of digitalisation in the field of public services. The level of electronic public administration increases in direct proportion to the increasing number of digital public administration services, operations and transactions that take place in the digital space. In connection with tax evasion, we encounter the opinion that tax evasion has a decreasing tendency in countries where the public administration and tax system are efficient from the point of view of tax collection and subsequent allocation of income (Sidani et al., 2014). Alm and Liu (2018) offer a different perspective on the issue, who claim that corruption is an important determinant of tax evasion. Thanks to digitalisation, the level of corruption can be reduced, which ultimately has an impact on reducing tax evasion. A study by Uyar et al. (2021), in contrast to previous studies, provides empirical evidence that the direction of the governments of individual countries and their ability to respond to changes plays a significant role in the elimination of tax evasion. The long-term orientation of governments towards the provision of effective digital services and prompt response to technological changes are decisive factors for achieving the digital transformation of the public sector, which in turn causes a decrease in tax evasion.

3 Methodology and data

The paper aims to identify the potential relationship between the degree of digitalisation in public administration and the estimated level of tax evasion in EU countries. To do so we analysed secondary macro level panel data. Tax evasion has been proxied by the estimates of the shadow economy in EU countries provided by Schneider (2021). To analyse the activities in e-Government and their development, we used data for the Digital Public Administration Factsheets, compiled by the European Commission annually. It evaluates the activities of EU states in this field. The report is divided into main 7 parts, and its overall goal is to support best practices in the field of digital service provision and their sharing

among EU countries. It focuses on the public administration and infrastructure of e-Government and the services provided for citizens and entrepreneurs. Data for each indicator is available in the Eurostat database. Based on the theoretical background and our main aim we have chosen the following Digital Public Administration Indicators:

- interaction with public administration bodies,
- obtaining information from the websites of public administration bodies,
- downloading official forms,
- sending completed forms to public administration bodies.

All variables used in the analysis are described in Table 1. Tax evasion was indirectly captured by the estimates of the shadow economy as a percentage of GDP. The other four variables are used in the form of the percentage of individuals who used mentioned feature of e-government.

Table 1. Description of variables used in the analysis

Variable	Description	Source
Tax evasion	Schneider (2021) estimation of the shadow economy (in % of off. GDP) – as a proxy for tax evasion	Schneider (2021) Development of the Shadow Economy of 36 OECD Countries over 2003 - 2021
Online interaction	Percentage of individuals using the internet for interacting with public authorities (%)	Eurostat (2022) Digital Public Administration factsheet - 2022
Downloading forms	Percentage of individuals using the internet for downloading official forms from public authorities (%)	
Online filling	Percentage of individuals using the internet for sending filled forms to public authorities (%)	
Obtaining information	Percentage of individuals using the internet for obtaining information from public authorities (%)	

Source: Authors based on the data from Eurostat and Schneider (2021).

Our dataset consists of panel data. Thus all variables include a cross-sectional (country) dimension as well as a time dimension. The panel was balanced and it includes the data for EU27 countries in the period 2008 – 2021. Together 378 observations have been used in the analysis. Basic descriptive statistics of each variable are shown in Table 2.

In the first stage of the analysis, we graphically display the data and use Pearson correlation coefficients to identify potential linear relationships between each pair of variables. Next, all variables have been tested for weak stationary by using the Levin et al. (2002), Im et al. (2003) tests as well as the Fisher ADF and PP tests defined by Choi (2001) and Maddala and Wu (1999). Results are shown in the analysis. Variables that appear to be stationary at levels have been used directly in the further analysis. On the other hand, variables become stationary at their differences.

Table 2. Basic descriptive statistics of variables used in the analysis

	Obs.	Mean	Median	Std. Dev	Min.	Max.
Tax evasion	378	18.73	19.1	14.35	5	77
Online interaction	378	58.25	60	19.55	60	94
Downloading forms	378	36.33	37	14.35	5	77
Online filling	378	34.76	31	19.70	3	83

Obtaining information	378	51.60	53.0	18.80	8	92

Source: Authors.

To fulfil the main aim of the paper we tested the short-run causalities in the Granger sense by panel Granger causality tests. We also assume that potential relationships should appear to be evident not only in the short-run but also in the long run. To further test the long-run relationship we apply panel cointegration analysis.

Firstly, we need to demonstrate the same level of integration for the variables entering the cointegration analysis. This has been tested by the panel unit root tested mentioned in the text.

Only two non-stationary variables with the same level of integration are those capturing tax evasion and the percentage of individuals using an online filling. Thus we tested for the existence of cointegration of these two variables by panel cointegration tests developed by Pedroni (2004) which are widely used in the empirical literature. They are testing the null hypothesis of no cointegration between selected variables. Pedroni uses seven different statistics. Four of them are panel cointegration statistics based on the within the approach and three of them are group-mean panel cointegration statistics which are based on the between approach.

4 Results

Firstly, we examined the tendencies in the extent of tax evasion proxied by the share of the shadow economy on GDP. To see the trend during the selected period in the EU we take into account the average values for all 27 EU countries. The development of tax evasion can be seen in Figure 1.
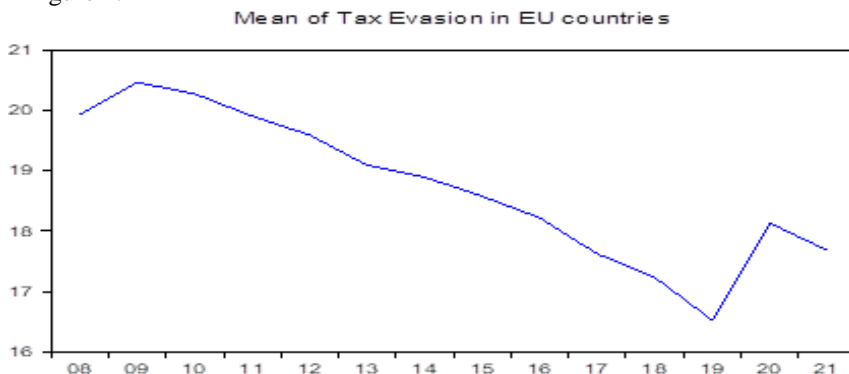
Figure 1. The development of mean estimates of tax evasion in EU countries during the period 2008-2021.

Source: Authors based on the Schneider (2021) estimates.

During the period 2008-2019, the trend appears to be significantly decreasing from more than 20% to less than 17%. However, there is an increase during the year 2020.

Similarly, we also show the trend in the usage of online interaction with the government and obtaining information online (Figure 2 and Figure 3). The situation is similar in both indicators. Despite some short-term slump in the year 2013, there is an increasing trend during the selected period. Hence, in general, we can conclude that the usage of selected e-government tools is increasing while tax evasion is mostly decreasing in the EU as a whole.
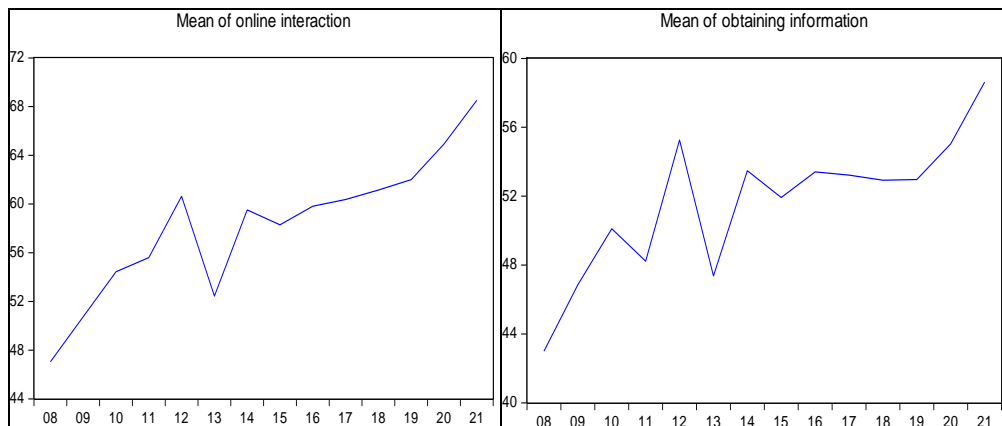
Figure 2 and 3. The development of mean percentage of individuals using online interaction with government and obtaining information online.

Source: Authors based on date from Digital Public Administration factsheet – 2022.

All five variables have been further put into correlation analysis. The results can be seen in Table 3. The table shows the Pearson correlation coefficients for variables without incorporating any potential lags or leads. The results indicate that there is a negative linear correlation between tax evasion and all four variables capturing the usage of e-government tools. The correlation coefficients are in the range between -0.33 and -0.4 which indicates a rather less intensive correlation. On the other hand, the correlation between all four variables of e-government is positive and significantly more intensive. These results are mostly in line with our theoretical expectations. The strongest positive correlation is between the percentage of individuals using the online filling and those using online interaction with the government.

Table 3. Pearson correlation coefficients between examined variables

	Tax evasion	Online interaction	Downloading forms	Online filling	Obtaining information
Tax evasion	1	-0.399	-0.402	-0.354	-0.333
Online interaction	-0.399	1	0.846	0.850	0.952
Downloading forms	-0.402	0.846	1	0.762	0.802
Online filling	-0.354	0.850	0.762	1	0.782
Obtaining information	-0.333	0.952	0.802	0.782	1

Source: Authors.

To proceed further in the analysis, we need to test the stationarity of all variables used in the analysis to avoid any potential spurious correlation. For this purpose, we used panel unit-root tests (as described in the methodology). The results are shown in Table 4. As it can be seen two out of five variables are not stationary (weak stationarity) at levels. Hence we further used their first difference when are all stationary. Variables capturing online interaction, downloading forms and obtaining information are all stationary even at their levels so we can use them in the analysis in this form.

Table 4. Panel unit root tests of all variables used in the models

	Levin, Lin & Chu	Im, Pesaran and Shin W-stat	ADF - Fisher Chi-square	PP - Fisher Chi-square
Tax evasion	-0.82	2.51	26.86	20.44

Δ Tax evasion	-14.7***	-10.52***	211.01***	262.01***
Online interaction	-12.57***	-4.66***	122.35***	101.89***
Downloading forms	-2.99***	-1.37*	85.04***	75.34**
Online filling	1.36	3.74	45.27	48.41
Δ Online filling	-13.67***	-9.98***	192.74***	215.95***
Obtaining information	-10.68***	-5.34***	131.52***	143.03***

Source: Authors.

After the unit-root test, we can proceed to Granger causality between selected pairs of variables. The results are summarized in Table 5. Granger causality is using lags to capture potential delay and identify the direction of potential effect. We decided to use from one to three years lag. Our results appear to vary especially with different pairs of variables but significantly less with different settings of lags. There seems to be no statistically significant effect either from online interaction to tax evasion as well as in the opposite direction. On the other hand, we found a positive effect in the Granger sense acting in the direction of tax evasion to downloading online forms and online filling. This is significant for all three lags. Hence, it seems that the extent of tax evasion and the shadow economy in the country is affecting the way and intensity of how taxpayers and other individuals are using e-government tools serving for sending information about themselves to the government. The usage of pre-peppered online forms and online fillings can be affected by the trust in the government, general attitude to digital technology as well as the intention of potentially illegal behaviour. Hence, we assume that in the middle of higher tax evasion, the willingness to provide information online to the government could be lower. On the other hand, we also found the effect arising of informing online to the share of tax evasion. Getting information from online government sources can increase the awareness of public services, public administration as well as tax laws and potential penalties for violating them. On one hand, this can lead to more information on correct tax returns, tax payments and the extent of public services provided from collected taxes which can positively increase willingness to pay a tax. On the other hand, more information about the fines and penalties for tax evasion can lead to a lower incidence of tax crime.

Table 5. Results of Pairwise Panel Granger causality tests

	F-statistic		
Number of lags:	1	2	3
H0: Online interaction does not Granger cause ΔTax evasion	0.46	0.75	0.47
H0: Δ Tax evasion does not Granger cause Online interaction	2.39	1.06	0.54
H0: Downloading forms does not Granger cause ΔTax evasion	0.26	1.17	1.07
H0: Δ Tax evasion does not Granger cause Downloading forms	15.98***	9.48***	6.09***
H0: Δ Online filling does not Granger cause ΔTax evasion	0.07	0.06	0.21
H0: Δ Tax evasion does not Granger cause Online filling	7.31***	3.68**	2.87**
H0: Obtaining information does not Granger cause Δ Tax evasion	6.24**	2.37*	1.12
H0: Δ Tax evasion does not Granger cause Obtaining information	1.1	1.34	1.80
Observations	324	297	270

Source: Authors own computation.

Note: */**/*** means significance at the 10%/5%/1% level of significance

The Granger causality tests allow us to identify potential effects with certain lags in the short run. However, the effects between tax evasion and the usage of e-government tools can be even more evident in the long run. Therefore, we also test for a potential long-run relationship. In this case, we examine the relationship between tax evasion and usage of online fillings because both variables have the same order of integration which is a necessary condition for the cointegration test. We use the set of Pedroni panel cointegration tests

described in more detail in the methodology section. The results of all tests are summarised in Table 6.

Table 6. Results of Pedroni panel cointegration tests

Cointegration: Tax evasion, Online filling			
Pedroni tests (Engle-Granger based) – individual intercept & trend, lag length selection based on SBC	Panel v-Statistic (within dimension)	4.67***	3.48***
	Panel rho-Statistic (within dimension)	-2.42***	-1.85**
	Panel PP-Statistic (within dimension)	-2.52***	-1.98**
	Panel ADF-Statistic (within dimension)	-3.03***	-2.97***
	Group rho-Statistic (between dimensions)	0.82	
	Group PP-Statistic (between dimensions)	-1.43*	
	Group ADF-Statistic (between dimensions)	-2.54***	

Source: Author´s own computation.

Note: */**/*** means significance at the 10%/ 5%/ 1% levels.

As it can be seen a vast majority of the test suggest the rejection of the null hypotheses at a 5% level of significance. Hence we found that there is a long-run relationship between the level of tax evasion and usage of online fillings. Based on this methodology solely we are not able to directly identify the intensity and direction of the long-run effect. However, we can still conclude that both problems are not connected only in the short-run but there is also a long-run relationship between them.

Despite our best effort to use the best possible methodology to achieve our main aim, there are also several limitations related to our approach. First of all, due to the chosen methods, we are not able to estimate any direct causal effect and apply any control variables. This approach allows us only to examine the relationship between the pairs of variables. To further examine the intensity and significance of potential causal effects, it would be more appropriate to use regression analysis based on fixed effects, random effects regressions, or the GMM approach. Moreover, we are not able to capture potential differences among EU countries. This can be solved for example by using separate correlation analysis for every state or at least incorporating the dummy variables into regression analysis. However, we believe that our research provides unique and interesting results which can be further examined in detail.

5 Conclusions and policy implications

The paper was focused on the examination of the relationship between tax evasion and digitalisation in public services. Based on the results of correlations analysis, Granger causality tests and cointegration tests we found empirical evidence for this relationship in the short-run as well as in the long run perspectives. Both problems appear to be connected at different levels. The short-run effect is evident in the direction from tax evasion to the share of individuals filling online forms and downloading prepared forms. This means that the current level of tax evasion is affecting the willingness of individuals to share information online with the government in the future. This means that to achieve more intensive usage of these e-government tools it is firstly necessary to lower the level of tax evasion in the country. Trust in government, social responsibility and ethical norms can be seen as a factor affecting both of these problems. On the other hand, more frequent obtaining information online from the government is related to a lower level of tax evasion. The increase in awareness of tax laws and potential fines among taxpayers can deter tax evasion. More information about public services as well as social and individual benefits owing to public expenditures can positively influence the willingness to pay taxes for some individuals. This means that more

online information and consultation can potentially lead to the reduction of tax evasion. We also identify a significant long-run relationship between filling online forms for the government and tax evasion. Our results suggest that certain type of digitalisation of online services is positively related to a reduction of tax evasion in the country. Hence, it is likely that the cost related to digitalisation in the public sector can be to some extent partly paid by the increased tax collection.

Acknowledgement

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The impact of internal marketing on human resource management effectiveness in the Vietnamese public sectors

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Abstract

Research background: In response to the increasing demands of the public for the quality of public services, state administrative agencies recognize the necessity for cultural changes inside the organization. In public administration, maintaining and promoting the organization's basic values, purpose, and mission in the face of social trends is a crucial responsibility.

Purpose of the article: The purpose of this research is to comprehend how internal marketing influences human resource efficiency and employee performance in public administration when organizational and cultural innovation is prevalent. Based on the suitable, scientifically sound, and trustworthy findings of the research on the factors impacting the efficacy of human resources management in public services, it is then possible to provide options for improving the performance of the government unit.

Methods: This quantitative study employs the PLS-SEM methodology to analyze a dataset of 202 samples gathered from 300 public sector officials in Vietnam to determine the relations between internal marketing, leadership style, employee performance, and human resource effectiveness.

Findings & Value added: Empirical study verifies the partial mediating role of employee performance in relationships of charismatic leadership style and internal marketing to human resource management effectiveness. The findings suggest that to ensure the effectiveness of the organizational structure, organizational system, and staff retraining, public organizations should prioritize the human element during the restructuring process. Leadership style contributes significantly to the ability to care more about employees, better assist them, and notably allocate work more effectively to fit employees' personalities and preferences, hence enhancing employee productivity and human resource efficiency.

Keywords: *internal marketing; human resource effectiveness; charismatic leadership; public administration*

JEL Classification: *K42; P43; L21*

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1 Introduction

In response to changes in citizen demand and the quality of public services, the public administration acknowledges the need for organizational reform to fulfill civilian requirements. At the current time, internal marketing plays a significant part in the resource efficacy of the providers who make the pleasure of the public service for the citizen and contribute to the operation of the organization. Internal marketing is crucial to the success of an organization because it conveys necessary information and messages to the right people at the right time, with the main content being the vision, purpose, core values, and the objectives of developing, consolidating, and disseminating corporate culture. In the meanwhile, human resource management (HRM) is responsible for recruiting, applicant and staff data management, course organization and administration, etc. Human resource management is the act of hiring and managing people for public administration organizations, whereas internal marketing is responsible for disseminating information and engaging staff.

During the age of innovation, local governments in Vietnam have used internal marketing campaigns to achieve human resources effectiveness under government policies and legislation that promote the delivery of successful public services. However, simultaneously keeping internal staff and attracting externally skilled recruits is a difficult challenge. This challenge illustrates the importance of leadership in managing internal market operations and sustaining the performance of followers. Therefore, the need to comprehend how internal marketing influences the efficacy of human resources and employee performance in Vietnam's public administration when organizational and cultural innovation is a top concern.

Human resource management (HRM) duties are the effective activities of hiring, developing, and motivating able personnel. Meanwhile, internal marketing and the organization's internal customers may have an impact on human resource performance in public administration (Huang, 2020). Prior study is less likely to investigate the function of leaders in constructing their followers and mostly disregards the leadership trait of enhancing internal marketing and employee performance outcomes. In the meantime, the significance of an employee's role inside a company focuses significantly on organizational performance (Hartline et al., 2000). Internal marketing and employee performance have a significant impact on the effectiveness of human resources in organizations and businesses, a phenomenon that has been extensively researched in several disciplines. However, the study on internal marketing and employee performance with the efficacy of human resources in public administration has not been well-received in public administration, particularly in Vietnam. Consequently, it is important to pay attention to these gaps due to their significance to employee performance and internal marketing efforts.

This research focuses on the ideas of internal marketing and the effectiveness of human resources at the local government level in Vietnam to remedy the gaps that have been identified. In the present phase of public sector reform and innovation, it is essential to acknowledge the importance of variables influencing the efficiency with which local governments use their human resources.

2 Conceptual frameworks

HRM policies have important short-term impacts in addition to long-term effects that contribute to sustainable development. In an analysis of the idea and definition of HRM, (Ewing & Caruana, 1999) suggest that HRM is a required and beneficial determinant of organizational performance. To be more precise, the programs that supervisors deliver to their followers have the potential to affect the workers' ability, competence, and dedication, as well as raise the degree to which the objectives of organizations and employees are aligned (Guest, 1992). The transition from human resource management theory to practice did not

occur naturally but was necessary in terms of both time and resources to effectively manage the sociopolitical, environmental, and constructional problems. As a result, to improve their organizational efficacy, businesses have focused their efforts on implementing the fundamental components of human resource effectiveness (Ruel et al., 2007).

2.1 Internal marketing and employee performance

Internal marketing is the activities and processes to keep all members of an organization up to date with the necessary information, whether it is the work on a project or the general direction of the organization. In many organizations, when employees understand the workplace environment, they are likely to comprehend communication (Huang, 2020). The framework of internal marketing was initially introduced as a marketing strategy to enhance external marketing performance (satisfaction and loyalty). The organization can motivate employees to perform a high capability and distribute extraordinary customer service since they transfer the services to the organizational external customers. Consequently, internal marketing drives organizational orientation (Vella et al., 2009).

The term "human resource initiatives" is used in the internal market to illustrate how practices of HRM that affect performance may be managed by focusing on the formulation of performance evaluations (Carlson et al., 2006). The conceptual model on the link between internal marketing and employee performance in terms of behavior reveals itself as the result of efforts made in the area of internal marketing from the point of view of human resources (Huang, 2020). Internal marketing examines the positions of employees, in contrast to human resource practices, which center on the workers from the organization's point of view (Ewing & Caruana, 1999).

Employees are seen as a vital precondition in internal marketing, which increases internal marketing performance and will strengthen employee performance, according to the internal marketing concept and multi-dimension identified proposed by (Y.-T. Huang & Rundle-Thiele, 2014). Management academics have identified employee motivation as one of the most important characteristics of a business, particularly concerning the performance of employees in their jobs (Oh et al., 2011). Communication inside the organizational hierarchy that is effective and efficient is connected with employee attitudes, and employee attitudes are what create the quality of internal service (To et al., 2015). Employees who encourage interactive marketing may be satisfied and inspired by a robust internal marketing program that offers a variety of options. The workflow of HRM gives priority to training and continues to prioritize exceptional workers even after evaluating employees who have worked experience-related qualities (Huang, 2020). Earlier research shows that there is a positive association between employee work attitude and performance and internal marketing practices. This finding lends credence to the idea that successful internal marketing is associated with favorable employee job performance and attitudes (Boswell et al., 2006). The fact that a qualitative study was conducted by (Huang, 2020) on evaluating all papers concerning internal marketing and internal customer also shows that there is a link between internal marketing and employee performance. According to the findings of the research on internal marketing, HRM practices, and employee work performance in organizations, there is a substantial correlation between internal marketing and employee work performance.

Previous researchers in a wide variety of sectors have provided evidence that supports the relationship between internal marketing and employee performance. Despite this, there is a clear deficiency in the research carried out by public institutions. As a result, a hypothesis on the relationship between internal marketing and the performance of public servants in public organizations is provided as follows in this study:

H1: Internal marketing impact positively on employee performance.

2.2 Internal marketing and HR effectiveness

The areas of internal, external, and interactive marketing all play an important part in HR management and application. However, the value of internal marketing to the efficacy of HR among internal employees is far larger (Ewing & Caruana, 1999). According to (Grönroos, 1981), the active and continuous effect of internal marketing on employee development and good performance in profitability in the business was cited as a significant factor. Internal marketing is also regarded to be part of the organizational strategy that includes human resource management and marketing to attract and retain high-caliber service professionals to provide the highest possible level of service quality while interacting with customers (Gummesson, 2000). In addition, internal marketing is the instrument that managers use to inspire, motivate, engage, and control their employees when they approach marketing and HRM to improve the quality of services they provide for their workforce (Joseph, 1996). (Barnes et al., 2004) provide evidence that suggests employees are more likely to be highly motivated and to contribute to the achievement of organizational visions, goals, and effectiveness when their managers and supervisors satisfy the demands of internal customers. (Barnes et al., 2004) also found that this was the case.

The view in psychological theory that HR professionals serve as internal customers may be most suitable if they get dedication and contributions from marketing and the human resource function (Lewis & Varey, 2000). The fact that internal marketing plays a part in the development and growth of human resource effectiveness is indicative of the close connection that exists between internal marketing and HRM. The positive results of internal marketing may be attributed to several characteristics of human resource management, including the accomplishment of duties by workers, their level of satisfaction with their work, the view that the tasks have been completed properly, and trust. As a result, the association is strengthened as a result of the execution of internal marketing activities and human resource management effectiveness and practices (Bansal et al., 2001).

According to the workers' point of view, the role of HR professionals is to care for them and the needs they have in the workplace; this is the primary emphasis of the idea of internal marketing (Ewing & Caruana, 1999). It has been established that the empirical results of the effect of internal marketing on employee happiness, service quality, and job performance are demonstrated (Tansuhaj et al., 1991). Therefore, the internal customers (workers) will fulfill the expectations of external customers (climates of the firm) with the utmost effort from the service of internal marketing. Scholars have supported the relationship between internal marketing and human resource effectiveness, particularly in the public sector, who argued that internal marketing in fulfilling the needs and demands of the internal customers is the essence of developing HRM and has an impact on the human resource effectiveness in the organization. These scholars argued that internal marketing has a relationship with human resource effectiveness because it fulfills the needs and demands of internal customers (Ewing & Caruana, 1999). This article, which is part of a comparable research topic, tests a hypothesis on the internal marketing and human resource effectiveness in the local government. The hypothesis is as follows:

H2: Internal marketing impact positively on human resource effectiveness.

2.3 Employee performance and HR effectiveness

The performance of the employees influences the outcomes, which are displayed in the form of service quality, customer satisfaction, brand loyalty, and customer value. At the same time, an individual's performance has an impact on the overall success of the organization, which can be seen in terms of the firm's efficacy and performance (Huang & Rundle-Thiele, 2014; Huang, 2020). Although human resource effectiveness is primarily responsible for defining

organizational objectives and effectiveness, employee performance is also an extremely important factor in determining how successful a company is. As a consequence of this, there may be an existing connection between the performance of employees and the HR effectiveness in the business. Regrettably, there is a dearth of research that investigates the nature of this connection. In light of the prior research, the following direct associations will be investigated in this study:

H3: Employee performance impact positively on HR effectiveness.

2.4 Charismatic leadership and employee performance and HR effectiveness

The leaders in charismatic leadership are those who command attentiveness to the working environment and the needs of workers, transmit a clear vision and perspective for the organization, and drive followers to grasp and comprehend the attitudes and actions of subordinates. Several studies have shown that leaders are the factors that have a greater influence on the mental state of workers. This influence may vary from low levels of argument and equivocation to high levels of inspiration, all of which help to progress and enhance performance (Wieseke et al., 2009). A message is an essential component of social contact, serving as the medium through which communication takes place (Fiske, 2010). Within the company, it is recommended that service marketers work to strengthen and maintain fluent manager-employee communication to maximize their performance to the organizational goal. This is because fluent communication between managers and employees helps to reduce the negative effects of misunderstandings while also ensuring that good services are effectively delivered (Wang et al., 2014).

The previous researcher has stressed the critical role that leadership plays in maintaining open lines of communication with employees to improve individual performance inside the organization (Wieseke et al., 2009). The leader of a charismatic organization is skilled in altering their followers' awareness of their job performance, motivating them to complete the specified ideas and objectives in the organization, and improving an intensive collective alignment among the workers (Conger, 1999). In addition, workers have a greater tendency to be drawn to and adopt a leader's vision when they are motivated. In this study, the functions of charismatic leadership, such as encouraging employees and decreasing conflict, as well as being able to define a transparent vision, are investigated to see how they affect the performance of employees and human resource effectiveness via the following hypothesizes:

H4: Charismatic leadership impact positively on employee performance.
H5: Charismatic leadership impact positively on HR effectiveness.

3 Methodology

Most of the measurement items used for this study have been adapted from previous research. Moreover, two journalists were invited and then agreed to participate in individual interviews and focus on clarifying the technical and appropriate terms in the context of research such as local government in Vietnam. The items for internal marketing and human resource effectiveness were adopted from (Ewing & Caruana, 1999). The charismatic leadership scales relied on the role of leadership in internal marketing adopted from (Wieseke et al., 2009). Lastly, employee performance scales were adapted from the prior study in the public sector of (Henttonen et al., 2016).

The observations are the public servants who have been working at the administrative offices, agencies, and departments in a local government in Vietnam. According to (Hair et al., 2014), the minimum number of samples necessary to do exploratory factor analysis (EFA) for research consisting of 18 observed variables is 100. The needed ratio of a sample size to

the number of observed variables is 1:5, hence with 18 observed variables, the survey sample size must be more than 100 samples.

4 Data analysis

4.1 Measuring model assessment

The measuring model evaluation was carried out to evaluate the reliability and validity of measurement scales. The measurement model satisfies all criteria, including the requirement of reliability as well as its convergent and discriminant validity (Hair et al., 2014).

Table 1. Convergent validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
	> 0.6	> 0.7	> 0.7	> 0.5
Employee performance	0.875	0.878	0.915	0.728
HR Effectiveness	0.863	0.864	0.907	0.709
Internal marketing	0.915	0.915	0.936	0.746
Leadership	0.915	0.92	0.936	0.746

Table 2. Fornell-Larcker Criterion

	(1)	(2)	(3)	(4)
Employee performance (1)	0.853			
HR Effectiveness (2)	0.569	0.842		
Internal marketing (3)	0.534	0.54	0.864	
Leadership (4)	0.525	0.402	0.544	0.864

Table 3. Heterotrait-Monotrait Ratio (HTMT)

	(1)	(2)	(3)	(4)
Employee performance (1)				
HR Effectiveness (2)	0.653			
Internal marketing (3)	0.592	0.603		
Leadership (4)	0.582	0.449	0.59	

4.2 Path analysis
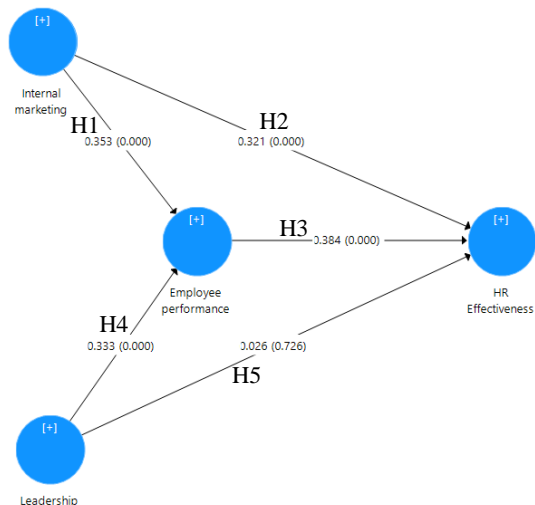
Figure 1. Structural model results

To get p-values for significant values, we analyze the structural model using bootstrapping using 4999 samples. As can be seen in Figure 1, four out of the five hypotheses are demonstrated to be acceptable when evaluated using p-values of 0.05, which is equivalent to a confidence level of 95%. The overall R-square of the research model is 0.402. Having regard to the outcomes, the implementation of internal marketing will foster employee performance (ß = 0.353, p <0.001) and human resource effectiveness (ß = 0.321, p <0.001) in the public organization. In other words, the results support these hypotheses that internal marketing has a positive relationship with employee performance and HR effectiveness which means H1 and H2 are supported. The findings accept H3 that employee performance has a positive influence on the HR effectiveness in the local government (ß = 0.384, p <0.001) meaning H4 is supported.

4.3 Discussion

The findings indicate that if an organization properly manages its internal marketing, the employee will function effectively and efficiently. These results demonstrate the link between internal marketing and employee performance. Moreover, the findings are consistent with those of (Huang & Rundle-Thiele, 2014), who describe the core notion of internal marketing as an increase in employee performance, given that the employee is the essential condition of the company and the internal customers of these businesses. Similar to Huang (2020), the findings provide evidence to demonstrate the existence of a strong link between internal marketing and employee perspectives, particularly employee performance. Prior study indicates a clear association between internal marketing and employee work performance in the organization. This study revealed that using internal marketing in public administration improves the organization's human resource effectiveness. When internal marketing by employers satisfies the desires of internal consumers, workers are more likely to be engaged in and achieve the organizational objectives and missions.

This study is consistent with recent studies which indicate that the performance of public agency personnel will boost the human resource effectiveness of the company. When workers accomplish a task effectively and efficiently, they anticipate receiving their human resource effectiveness rewards (such as their perks in public administration, remuneration, safety, and health care) first. The results provide significant evidence to support the previous study's conclusion that the performance of internal customers in businesses would grow steadily when internal marketing in HRM is effectively implemented (Huang, 2020).

Although there is a considerable association between charismatic leadership and employee performance, leadership is not significantly related to human resource effectiveness. To encourage and motivate people to offer their efforts to government agencies, leaders must enhance the remuneration based on the productivity of employees. Importantly, local government officials must also develop good communication skills regarding the organization's objective and vision. Empowerment is essential for organizational effectiveness, which necessitates charismatic work assignment decisions based on individual capabilities. In the innovation phase of boosting internal marketing, executives are responsible for altering employees' perspectives, catching up with the latest trends, and considering long-term advantages.

5 Conclusions

This study aims to grasp how internal marketing affects human resource effectiveness and employee performance in the public sector. Taking into consideration the results of the analysis of the 202 public servant, the implementation of internal marketing in the public organization will help to improve the overall performance of its staff members. To put it another way, the findings provide credence to the hypothesized favorable connection between internal marketing and employee performance as well as the efficiency of human resource practices. According to the findings, the efficacy of the human resources department in the local government is positively impacted by the performance of the employees. Even if there is a high correlation between charismatic leadership and employee performance, there is not a significant link between leadership and human resource effectiveness.

Acknowledgments

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The effectiveness of the development of intermodal transportation within the framework of the «Intertran» project

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Abstract

Research background: Currently, the transport industry is facing non-traditional challenges for it, such as the need for digitization of transport services, increasing the mobility of transportation and reducing dependence on paper technologies for its design. At the same time, at the moment, only rail transport demonstrates high-quality development to the market with a reorientation of the geography of services and plays an important strategic role in the development of the eastern polygon, offering exactly what shippers need: regular shipments, the shortest possible time and stable prices despite the global restructuring of markets and economic fluctuations.
Purpose of the article: The purpose of this research is determination of the relationship between the expansion of the use of digital technology and the effectiveness of the development of intermodal transport. We confirm that the «Intertran» project allows railway companies, seaports and regulatory authorities to interact effectively.
Methods: The research methodology is based on the analysis of the order of electronic interaction between seaports and railways in the process of intermodal cargo transportation through seaports using electronic documents and data. The information base of the study is based on reports of Asian and European railway companies – members of the International Union of Railways, Russian and foreign forwarding companies, as well as data from the Federal Customs Service of Russia and foreign customs authorities.
Findings & Value added: As a result of the study, the participation of Russian railways in the development of innovations and the digital market environment is justified, the procedure for processing documents in electronic form within the framework of the «Intertran» project using mobile workstations is determined, the effects of the organization of pilot cargo transportation within the project are determined, the need to expand the digital environment of trust between participants in transport and logistics processes is established. The study confirms that the basis for the effective development of the «Intertran» project and the interaction of railway companies, seaports and regulatory authorities is a set of actions aimed at

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electronic interaction of participants in the transportation process and further optimization of processing technological operations

Keywords: *digitalization, paperless technologies, intermodal transportation, railway transport*

JEL Classification: *L92; L98; O 32*

1 Introduction

In 2022, the change in the networks of routes and locations for the transportation of goods is taking place at a pace exceeding the record indicators of the pandemic crisis (SPARK, 2022). At the same time, it should be taken into account that fluctuations in economic activity lead to comparable fluctuations in demand for transport and logistics services. One can observe an extremely difficult situation in the maritime transportation market, where the shortage of container equipment due to unprecedented demand, as well as various force majeure circumstances, led to a jump in the cost of transportation and a decrease in the level of reliability of supplies. In turn, air cargo transportation, judging by the main metrics, managed to recover almost to pre-crisis levels by the beginning of 2022, but the long-term growth momentum was lost due to the sanctions imposed. In total, at the moment only rail transport demonstrates qualitative development to the market with a reorientation of the geography of services, which attracts the attention of shippers (Gulyi, 2022). Russian railways play an important strategic role in the development of the eastern polygon, offering exactly what shippers need: regular shipments, the shortest possible time and stable prices (Gulyi, 2020).

2 Methodology

The purpose of this study is to determine the relationship between the expansion of the use of digital technology and the effectiveness of the development of intermodal transport. Our task is to prove that the «Intertran» project allows railway companies, seaports and regulatory authorities to interact effectively.

It is necessary to take into account the advantages of cargo transportation by rail, namely:

- speed – today, for some companies, the proposed speed of delivery by rail is the only way to ensure mobility and speed of transportation (Kazanskaya and Shaykina, 2020);
- regularity – thanks to the uninterrupted and regular dispatch of trains, it is much more reliable to plan the loading of production with raw materials or the delivery of goods to retail (Zhuravleva et al., 2019a);
- safety – ensuring the highest level of cargo safety, which is confirmed by the absence of similar indicators in alternative delivery methods;
- environmental friendliness – statistics confirm that, taking into account the global trend towards the transition of companies to ESG approaches, the prospects for railway companies, infrastructure and transportation proper are quite optimistic.

The research materials were reports of Asian and European railway companies – members of the International Union of Railways (UIC), Russian and foreign forwarding companies, as well as data from the Federal Customs Service of Russia (FCS) and foreign customs authorities.

The basis of the developed information technology "Intertran" is the determination of the order of electronic interaction between seaports and railways in the process of intermodal transportation of goods through seaports using electronic documents and data (Fig. 1).
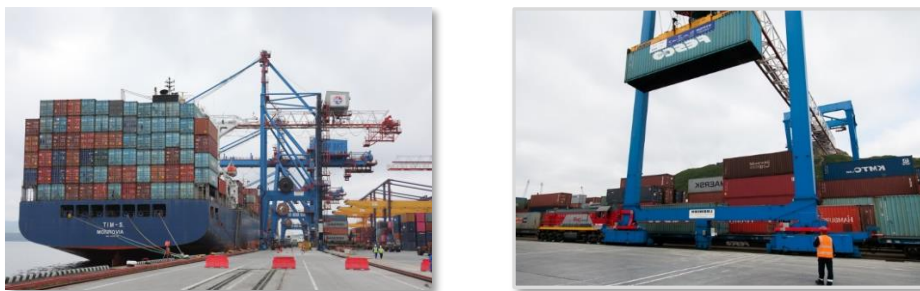
Figure 1. Intertran technology in the commercial sea port of Vladivostok

Source: author (2022)

It is necessary to note the preliminary trend of Russian railways in compliance with the principles of environmental protection and compliance with safety measures, which is enshrined in the Environmental Strategy of the Holding until 2020 and for the future until 2030 (Zhuravleva et al., 2019b). Currently, the company's share in atmospheric emissions, wastewater pollution and the creation of waste substances is no more than 1% compared to all organizations operating on the territory of the Russian Federation. At the same time, in 2019 in accordance with the corporate Program of measures to increase environmental responsibility, there is a reduction in atmospheric emissions, wastewater discharges and water consumption in the range of 3-4% compared to the previous period.

In order to reduce the negative impact of railway transport on the environment, the Holding actively uses "green" technologies for the electrification of track lines intended for passenger transportation. The economic effect of the implementation of energy-efficient projects amounted to more than 2 billion rubles in 2019, which indicates the leading positions held by JSC "Russian Railways" among international freight and passenger rail carriers in terms of energy and environmental efficiency.

If we consider the chronology of the Intertran project, we can note the key stages of its implementation. In 2016, the Economic and Social Commission for Asia and the Pacific (ESCAP) The UN publishes the results of a study aimed at optimizing intermodal rail services in Northeast and Central Asia. In 2017, Intertran was identified as a priority project for 2018 with the support of UIC APRA and international organizations such as ESCAP, OSZhD, CCTT. In 2018, the vector of further development of the project in terms of its practical implementation has been established. In 2019 Information technologies have been developed and implemented for the Intertran project, as well as pilot transportation on the Yokohama – Vladivostok – Silicate route (Fig. 2).

Figure 2. Pilot cargo transportation route

Source: author (2022)

Determining the relationship between the expansion of the use of digital technology and the effectiveness of the development of intermodal transportation, the results of the study of the expert group for 2020 on the topic "Legal regulation of multimodal transportation in the Asia-Pacific region" were taken into account, which made it possible to expand the scope of paperless technologies in terms of freight transportation by rail and identify priority areas for further work in this area, which is also reflected in the our research.

3 Results

3.1 The participation of Russian railways in the development of innovations and the digital market environment is justified

The pandemic crisis, shifting markets, and economic fluctuations as a result of the sanctions imposed accelerated the general trend of digitalization of cargo transportation and logistics activities. In the context of a sharp increase in the importance of the railway in international communication, the development of integration processes in the field of digitalization in the space of Asian economic cooperation is one of the most important areas of development. Digitalization of processes can provide a reduction in the cost of transportation, as well as an increase in speed and reliability, which will allow to induce a significant share of additional volumes (Volykhina, 2021). In this situation, a practical solution may be an additional expansion of the digital market environment through the active implementation of the Intertran project as an integrator of the transport and logistics space in order to unite the changing geography of transportation (Zhuravleva et al., 2019b).

3.2 The procedure for processing documents in electronic form within the framework of the Project using mobile workstations has been established

An additional factor in the growth of digitalization of technological processes of cargo transportation in JSC "Russian Railways" is the development and implementation of a domestic IT solution that allows processing documents in electronic form at ports when receiving cargo for departure and its delivery (Fig. 3).
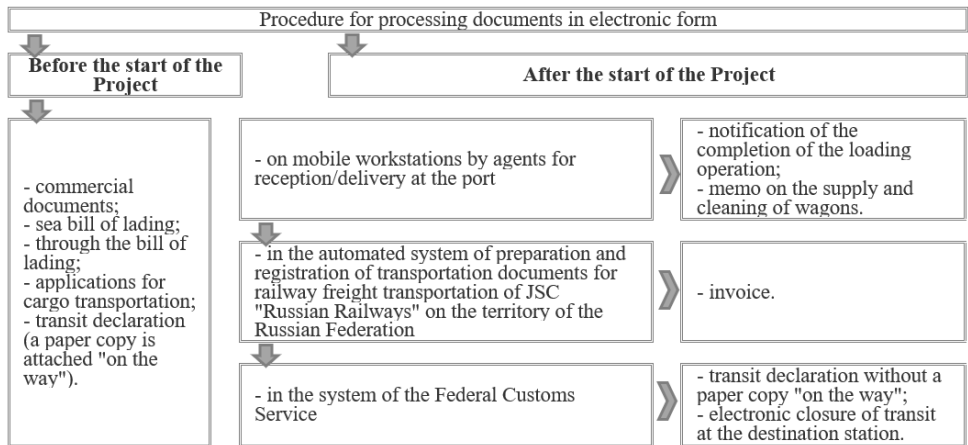
Figure 3. Features of processing documents in electronic form

Source: author (2022)

3.3 The effects of the organization of pilot cargo transportation within the framework of the Intertran project are determined

The creation of the Intertran information technology and the development of a consistent project implementation plan were carried out by the working group of JSC "Russian Railways" and TG "FESCO" on the development of intermodal transportation using electronic document management. The work carried out made it possible to carry out a pilot shipment of containers from the Japanese Port of Yokohama, through the Port of Vladivostok to the Silicate station of the Moscow Railway.

The pilot cargo transportation scenario within the framework of the Intertran project provides for the implementation of practical measures for the introduction of electronic document management in intermodal transportation, as well as the creation of a unified environment for information exchange in order to ensure the automation of business processes in railway transport. This is an additional incentive that increases the attractiveness of through intermodal rail transport for shippers and freight forwarders (Fig. 4).
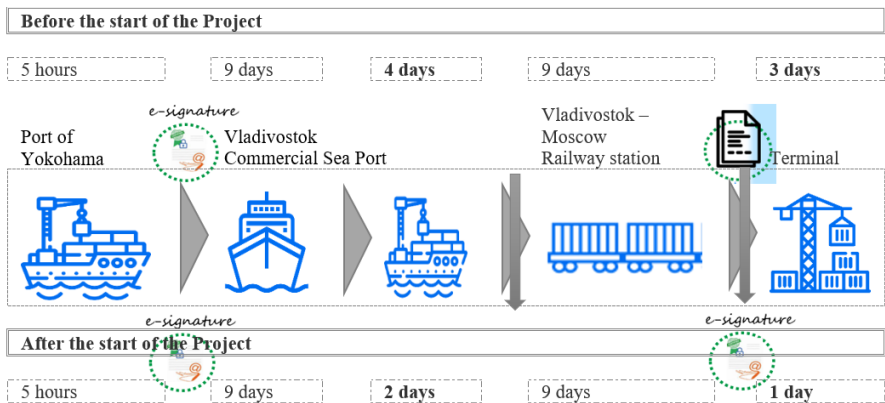
Figure 4. The sequence of processing documents in electronic form

Source: author (2022)

Thus, the main positive effects of the Project implementation include a reduction in the total cargo handling time by 4 days and a reduction in total costs for participants in the cargo transportation process.

3.1 The necessity of expanding the digital environment of trust between participants in transport and logistics processes has been established

It should be noted that the jump in cargo transportation volumes during the pandemic crisis showed the limited capabilities of the railway infrastructure – the bottleneck, first of all, is the capacity of checkpoints (Tomicova et al., 2021).

Undoubtedly, the speed of transportation is significantly reduced as a result of downtime at the customs border. At the same time, one of the strategic goals of the development of JSC "Russian Railways" is to accelerate the movement of trains with a reduction in transportation time. But achieving this goal is difficult if the train will stand at the border, despite the introduction of digital technologies into the work of the Federal Customs Service of Russia, for example, electronic customs transit (Gudkova et al., 2015).

The reasons for this problem lie in the presence of a direct connection between the introduction of paperless technologies and document management, since the current paper technology is actually digitized and albums of electronic document formats are created for each participant in cargo transportation. In this regard, it is proposed to create a unified digital environment of trust between participants in transport and logistics processes with the possibility of exchanging meaningful data within paperless technologies for all participants, including state bodies that operate exclusively with the necessary data to ensure control functions. Since the issue of the development of multimodal transportation has recently become particularly relevant, the approach of exchanging significant data significantly simplifies the transportation process and increases its mobility.

4 Discussion

Undoubtedly, the shift in the stereotypes of digital development will lead to the transformation of production and consumption technologies, which, in turn, will affect the emergence of new business models of transport companies and a change in the structure of the cost of transport services

The main discussion on the goals and essence of future trends in the development of rail transport, shown by the authors (Guliy et al., 2019), reflects the necessary key indicators of sustainable development of rail transport based on the use of program and planning documents and confirms that the problem of digital development is of great importance for the global and national economies and coordinated actions between them. At the same time, the importance of the SDGs in the formation of relations is emphasized: developed and developing economies aimed at partnership and management of agreed SDGs in the interests of global growth.

The analysis of the impact of the digitalization process on the business model of global corporations, economic growth and business quality revealed the most promising ways of digitalization development in global corporations: the introduction of digital automation, during which the existing process in the traditional business model is digitized; the emergence of new IT services that improve the traditional business model; digital transformation of the traditional business model into a new one with the core of the digital platform. It should be noted that the authors proposed a visual model for monitoring the digitalization process within the company along with technologies that change the structure

of the global market through an active strategy and behavior of the company (Tretyak et al., 2021).

In recent years, many empirical studies have studied the impact of intelligent technologies on traffic control. Most of these studies were devoted to the creation of experimental models using various types of software. In particular, the authors (Zhuravleva et al., 2020) propose an agent-based traffic model and prove the possibility of reducing the average waiting time by 2.5 times. Based on these results, as well as the pilot implementation of the algorithm on other infrastructure facilities will allow achieving a positive effect with the help of intelligent traffic control, which is part of the global concept of intelligent logistics.

The methodology of economic evaluation of the implementation of distributed data registry platforms in multimodal transportation is presented in (Gulyi, 2020). Analysis of trends in the multimodal transportation market, in particular the European segment, allowed us to systematize the effects resulting from the introduction of block chain in transportation on the railway network, indicating the sources of their occurrence and quantification for the railway complex, taking into account global integration. The results obtained are in demand by managers of transport companies, development specialists and analysts who evaluate digital technologies in transport.

In the context of the ongoing research, an empirical study conducted to evaluate and analyze algorithmic control and technological guidance of connected and autonomous use of vehicles is undoubtedly significant (Lyakina et al., 2019). The authors took as a basis the results of the assessment regarding the technologies of automated vehicles and their impact on future mobility, the expected public benefits from autonomous vehicles. The work fills an important gap in research, since the proposed model contains a clear formulation of structural equations and is of interest for further research.

5 Conclusion

The conducted research confirms that the basis for the effective development of the Intertran project and the interaction of railway companies, seaports and regulatory authorities is a set of actions aimed at:

- electronic interaction with customs authorities at the port when declaring goods and using electronic transit declarations;
- the use of electronic invoices (paperless technology) in the processing of railway transport documents;
- optimization of processing of technological operations at the railway station using mobile workstations;
- the passage of the customs transit procedure in electronic form by the customs authorities of the destination on the territory of the Russian Federation without providing documents on paper.

A new vision for the further development of digitalization through the introduction of paperless technologies with a focus on intermodal transport appeared in 2016 within the framework of the UNESCAP project "Development of uninterrupted intermodal transport with a railway element in Northeast and Central Asia to strengthen Euro-Asian transport links" (Poliak et al., 2021). This situation can be considered as the primary "pilot" of the concept for the development of paperless technologies. For Russian railways, participation in the «Intertran» project is not only a project aimed at developing the Company's digital services, but also a contribution to the implementation of global development goals in terms of digital transformation.

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Monetary policy of the European Central Bank in the context of the COVID-19 crisis

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Abstract

Research background: The growing threat of COVID-19 virus, known as coronavirus, is affecting companies and investor communities around the world. The global and interconnected nature of today's business environment poses a significant risk of disrupting global supply chains, which can lead to significant revenue losses and adversely affect the global economy. The impact on the global economy may increase depending on the extent of the geographical spread of the virus. But the pandemic has already adversely affected the entire global economy.

Purpose of the article: This paper focuses on the initial actions taken by the European Central Bank (ECB) to mitigate the impact of the pandemic. The first section emphasizes the context; The global spread of the virus has led financial markets into turmoil, while blocking measures implemented by countries to mitigate the spread of the virus have led to large economic losses in the short term.

Methods: Mix research technique has been used. While qualitative research entails in-depth literature readings and reports, quantitative analysis entails presenting data via graphs and tables

Findings & Value added: Following this research, the link between the Covid-19 pandemic and the magnitude of the economic system, both at European and global level, was found. The article adds value through the analysis performed at macroeconomic level, by interpreting statistical data related to this phenomenon of great relevance and notoriety that has brought major changes in all areas of socio-economic life..

Keywords: *Covid-19*, *economy, financial system;pandemy*

JEL Classification: *E42; F65; G32*

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1 Introduction

Metaphorically, the crisis shows us, from time to time, most often against our will, that life is dangerous, but also that life has priority (Ladaru et al., 2022). And even if we do not like confronting it at all, because it suddenly forces us, as it happens now, the radical change of the status quo, the crisis is an integral part of our lives (Belostecinic et al., 2022).

Our individual and social existence could not be conceived in the absence of crises, which play the role of extremely valuable variables in everything we are today and what we will become tomorrow (Popescu et al. 2021). For this reason, we can characterize crises as natural and normal in the development of our existence having an extremely important role in our evolution and maturation as individuals (Balu et al., 2021).

In order to achieve its main objective- maintaining price stability- the ECB has pursued three main objectives; ensuring a sufficiently accommodative overall position, supporting market stabilization to protect the transmission mechanism and providing ample liquidity to the central bank, in particular to maintain the provision of credit (Aalbers, 2016). Asset acquisitions have been intensified, both within the existing asset acquisition program and by the launch of a new temporary pandemic emergency procurement program (Burlacu et al., 2022). The ECB has also provided banks with more opportunities to borrow liquidity in its long-term refinancing operations, while easing their collateral requirements. Emphasis is placed on the motivation, purpose and impact of these measures rather than on their technical details (Sokol, 2017).

2 Monetary policy measures adopted by the European Central Bank in the context of the pandemic

In early 2020, the world was turned upside down by a new viral infection called COVID-19, the spread of which the World Health Organization (WHO) declared a pandemic on March 11 (Baumöhl et al., 2020). The virus combines three shocks: health, financial and economic, causing one of the deepest crises ever seen in peacetime. Governments around the world have quickly taken unprecedented steps to fight the pandemic, with the main priority being to limit the virus, followed closely by limiting financial panic and economic consequences, in which they have been helped by central banks and supervisors (Lane, 2021).

In these circumstances, the Governing Council, at its monetary policy meeting on 12 March 2020, decided that a comprehensive package of monetary policy measures should be adopted. It aimed, on the one hand, to mitigate the risk of sharp declines in liquidity and credit, by maintaining significant volumes of liquidity in the banking system and protecting the flow of credit to the real economy and, on the other hand, maintaining the accommodative direction of monetary policy. avoiding the pro-cyclical tightening of financing conditions in the economy.

At the beginning of the crisis, the orientation of monetary policy in the euro area was already very accommodative. Since the end of 2011, the ECB has continuously reduced its interest rates, with its main policy interest rate - the deposit facility rate (DFR) - hitting a record low of - 0.5% since September 2019. In addition, , acquisitions of assets under the ECB's Asset Acquisition Program (APP) was resumed in November 2019 at a monthly rate of EUR 20 billion. In addition, the ECB's early guidance ensures that a very light policy is maintained until inflation in the euro area converges strongly towards the target below, but close to 2% in the medium term.

To support the banking channel in a world of negative interest rates, the ECB also launched a third series of long-term refinancing operations in September 2019 - the so-called TLTRO III - on more favorable terms than before. originally planned. While the maturity of

operations was extended by one year, loan rates were also reduced, to the interest rate on the deposit facility (DFR), or -0.5% (Borri and Di Giorgio, 2021).

2.1 Peep-pandemic emergency purchase programme

There was a rapid deterioration of the situation due to the covid pandemic 19 and it was decided to launch a new temporary asset acquisition program- the pandemic emergency purchase program (Mewes and Broekel, 2020). Benefiting from an overall package of EUR 750 billion, PEPP was to include all categories of assets eligible under the Asset Purchase Program (APP).

The PEPP was introduced in 2020 and all categories of assets eligible under the PPA are also eligible under the PEPP. For purchases under the PEPP, a derogation was granted from the eligibility requirements for debt securities issued by the Hellenic Republic.

PEPP aimed to play a dual role. First, it aimed to ensure the necessary degree of monetary accommodation so as to support price stability in the medium term by supporting the economic recovery following the pandemic crisis (Holston et al., 2017). Second, acquisitions under the PEPP were intended to be carried out in a flexible manner, allowing fluctuations in the distribution of procurement flows over time, depending on asset classes and jurisdictions.

The value of this program increased from 770 billion euros to 1,350 billion euros and eventually reached a total value of 1,850 billion euros, after an increase of 500 billion euros.
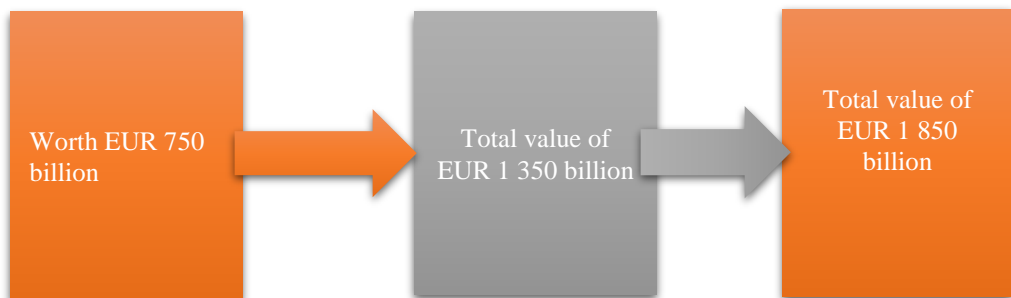
Figure 1. The evolution of the value of the PEPP program

Source: Own processing based on data taken from the website www.ecb.europa.eu

2.2 Targeted longer-term refinancing operations (tltros)

The Board of Governors has decided to conduct TARGETED LONG-TERM OPERATIONS (TLTROS) translated into Romanian in additional longer-term refinancing operations (ORTL) at an interest rate equal to that of the deposit facility. It also decided to apply, from June 2020 to June 2021, much more favorable conditions for all operations under the third series of operations aimed at longer-term refinancing (OTRTL III). The interest rate on OTRTL III operations has been reduced by 25 basis points, being able to fall by 25 basis points below the average interest rate on the deposit facility between June 2020 and June 2021 for all OTRTL III operations in progress during that period.

At the same time, the maximum total volume that counterparties were entitled to borrow in OTRTL III operations was increased to 50% of their stock of eligible loans. Accordingly, as an effective and immediate consequence of the additional ORTLs, banks were to lend on very favorable terms, effectively covering the period until the start of the recalibrated OTRTL III operations, which aimed to relax the financing conditions for banks in - in a more sustainable way, to support the flow of credit to the affected sectors and to avoid constraints

from the perspective of credit supply. In addition, due to these measures, the population and companies benefited from favorable financing conditions, with interest rates on bank loans in relation to both categories reaching historic lows, respectively 1.32% and 1.46% (Figure 2).
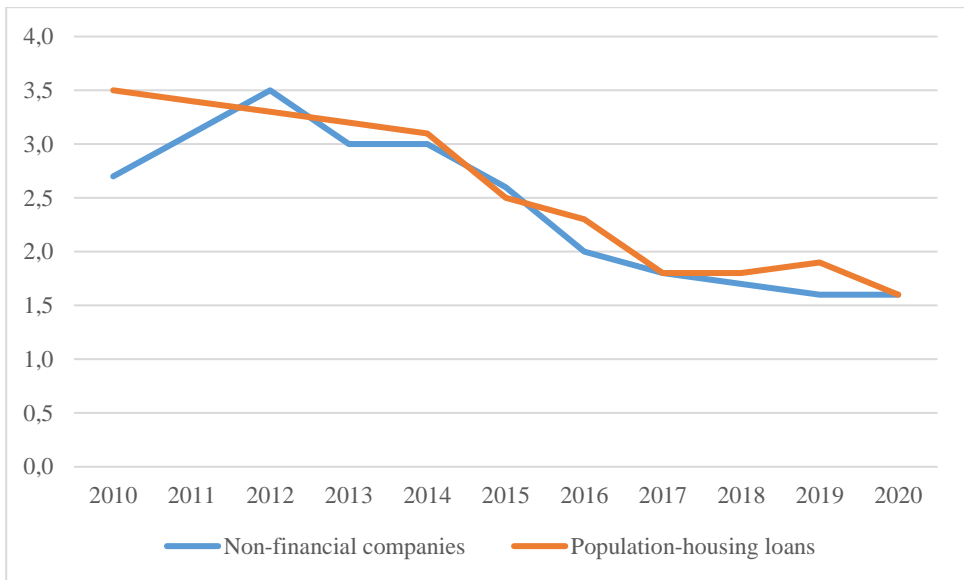
Figure 2. Aggregate interest rates on bank loans to non-financial corporations and the general public

Source: www.ecb.europa.eu

3 Impact of monetary policy measures implemented in the context of the COVID-19 pandemic

3.1 Impact of policy measures on financial conditions

This subchapter examines the impact of the ECB's response to the crisis, focusing on asset acquisitions and long-term refinancing operations (TLTRO III). The ECB's monetary policy response focused on addressing three key issues: (i) market stabilization, which is a precondition for avoiding fragmentation and safeguarding the transmission of monetary policy in the euro area; (ii) providing ample central bank liquidity to support lending to the real economy; and (iii) ensuring that the general position is sufficiently accommodative (Bernanke, et al., 2019; Burlacu et al., 2019).

As the severity of the pandemic crisis emerged, investors rebalanced their portfolios, causing liquidity to dry up in more securities markets and demand for safe-haven assets to increase (Altavilla and Giannone , 2017).

The sharp decline in stock and bond market indices, combined with rising market-based financing costs for firms, contributed to a significant tightening of financial conditions between mid-February and mid-March 2020 (Burlacu et al., 2021) . In this environment, there was a very tangible. the risk of adverse liquidity spirals and an overrun of asset price corrections in many markets, which would jeopardize financial stability and impede the transmission of monetary policy. In a monetary union, the increased perception of risk can

lead to a dynamic flight to safety in the form of reallocations in sovereign bond markets (Bodislav et al., 2020).

As sovereign yields are often the benchmark in setting asset prices and credit interest rates, the unfounded volatility of sovereign spreads affects the transmission of monetary policy in the euro area (Camous and Cooper, 2019).

At the same time, the provision of ample central bank liquidity to support credit flow to the real economy has also been key to the ECB's monetary policy response to the COVID-19 crisis (Radulescu et al., 2021). This is particularly relevant in the euro area, where banks play a key role in financial intermediation (Orzan et al., 2020).

The liquidity supply of the central bank comes in the form of targeted and non-targeted programs . With regard to the first, the recalibration of TLTRO III in April 2020 included a considerably more favorable interest rate for TLTRO III operations between June 2020 and June 2021. This followed the March 2020 decision to increase the maximum amount to which counterparties are entitled. . to borrow in TLTRO III operations.

Accordingly, banks indicated in the April 2020 euro bank lending survey that TLTRO III has a net relaxing impact on borrowers' terms and conditions and a net positive impact on their lending volumes, in particular on the volume of lending. expected loan over the next six months.

The changes to the TLTRO III terms were followed by a significant extension of central bank funding. In the June 2020 operation of TLTRO III, banks bid for a total of EUR 1 308 billion in TLTRO funds, which is the largest amount allocated to date in any lending operation. With regard to non-target programs, the ECB announced in March 2020 additional long-term refinancing operations (LTROs) to provide immediate liquidity support to the euro area financial system and, in April 2020, a series of pandemic emergencies. untargeted. long-term refinancing operations (PELTRO). PELTROs serve as a means of protection, helping to ensure sufficient liquidity and good money market conditions in response to the crisis.

Once the market stabilization and the provision of credit for the real economy have been achieved and the ramifications of the pandemic crisis on the macroeconomic outlook have become clearer, the June 2020 PEPP recalibration has further eased the direction of general monetary policy (Rossi, 2013). In line with the dual role of the PEPP in restarting the initial stages of monetary policy transmission and easing the broad monetary policy stance and in response to the downward revision of pandemic inflation on the horizon, the recalibration of the PEPP in June 2020 has further eased much the direction of the general monetary policy, in order to make it proportionate to the medium-term inflation outlook.

By extracting long-term investor risk through its acquisitions, the ECB strengthens the impact of its negative interest rate policy and forward guidance on rates by pushing down the middle and long ends of the yield curve.

3.2 Macroeconomic impact

Countering the tightening of the financial conditions facing the euro area economy in the face of the COVID-19 crisis, the ECB's policy measures have provided crucial support to the real economy and, ultimately, to price stability (Braun, 2020).

This support works in two major dimensions: (i) supporting the medium-term growth and inflation prospects and (ii) eliminating the risks of queuing around the baseline scenario.

In terms of supporting the medium-term growth and inflation outlook, ECB staff estimates that, taken together, the PEPP, the enlargement of the JPA and the recent TLTRO III recalibration will add about 1.3 percentage points cumulatively to real euro area real GDP growth. on the projection horizon and contributes about 0.8 percentage points cumulatively to the annual inflation rate over the same time horizon (see Chart B).

At the same time, while monetary policy usually acts with a transmission gap, the positive impact on consumer and business confidence created by swift and decisive action during a crisis should not be overlooked and can accelerate and support the transmission of monetary policy to growth and inflation (Bodislav et al., 2021) .

These estimates do not fully capture the benefits of avoiding feedback loops between the real economy and financial markets that may arise in an economic crisis such as that caused by COVID-19, in which the main contribution of monetary policy is to eliminate tail risks around the value of the basic macroeconomic perspective (Gräbner et al., 2020).

Econometric evidence indicates the existence of large nonlinearities in the macroeconomic response to shocks to financial conditions. In other words, the impact of a certain change in financial conditions depends on the state of the economy (Sarbu et al., 2021). This means that, under conditions of acute financial market stress, the presence of financial frictions and balance sheet constraints implies severe non-alignments that can translate into much greater contractual effects caused by tightening financial conditions.

Given the severity of the shock associated with the COVID-19 crisis, a tightening of financial conditions in the current environment is expected to have an impact several times greater than that captured by the average elasticities used in Chart B to quantify the policy impact (Swanson, 2021). Therefore, monetary policy measures aimed at counteracting such a deterioration in financial conditions would make a stronger contribution to price stability than is captured by the standard elasticities derived from the more normal conditions underlying the above quantification (Walter and Wansleben, 2020).

Overall, the ECB's measures have been an effective and efficient response to the COVID-19 crisis and are proportionate to the current conditions in fulfilling the ECB's price stability mandate (Basu and Bundick, 2017). The effectiveness of the ECB's measures is evident in improving the financing conditions for the general economy, and the implementation of a combination of asset acquisitions and TLTROs reflects the fact that they are effective instruments in the current circumstances.

In addition, they are proportionate to the severe risks to the ECB's mandate, the net impact of the COVID-19 crisis on the medium-term inflation outlook is expected to be disinflationary to a considerable extent. While the ECB continuously monitors the side effects of its policies, the arguments for monetary easing through the PEPP have been overwhelming, given that the ECB's objective of price stability would have been subject to further downside risks in the absence of such measures.

4 Conclusion

The inflation response reflects the exceptional circumstances we are in. These effects are expected to pass in the end. However, the pandemic has also introduced new trends that could affect the dynamics of inflation in the coming years. These trends could lead to both upward and downward price pressures.

Therefore, monetary policy must remain focused on safely targeting the economy in the event of a pandemic and on sustainably raising inflation to our 2% target.

In conclusion, a substantial degree of monetary policy adjustment was implemented during 2020 in order to counteract the negative impact of the pandemic. The comprehensive set of measures and their subsequent recalibrations were a key stabilizing force for the markets and contributed to the reversal of the tightening of financial conditions in the first part of the year.

The measures have proved effective in limiting the yields on sovereign bonds, which are the basis for financing costs for the population, companies and banks. They also helped maintain very favorable bank financing costs throughout the pandemic.

However, although policy makers have led the economy relatively well in the depths of the crisis, their task is far from over and may become even more complex.

Acknowledgements

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Theoretical aspects of the application of the mathematical model in economic analysis

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Abstract

Research background: The relevance of the study lies in the fact that the era of technology today is spreading to the very heart of everyday existence and, thanks to this, is actively involved in the intersubjective construction of realities, clearly marks the planetary triumph of the cybernetic paradigm. An economic cybernetics model is a model created by applying economic cybernetics and modern control theory to identify and evaluate a macroeconomic system in order to realize optimal or suboptimal control over the macroeconomic system through computer simulation.

Purpose of the article: The purpose of the study is to consider aspects of the development of economic cybernetics in the world, as well as mathematical models and their comparative characteristics.

Methods: To create a model of economic cybernetics, the various concepts of management should be given clear economic meanings, taking into account the characteristics of the macroeconomic system. Treating it as a linear system is an approximation that introduces large errors and sometimes even economic fluctuations. Identification and simulation data are mainly obtained by periodic sampling, the available data is insufficient, the reliability is low, and in most cases, there are serious noise interferences.

Findings & Value added: The results of the study determined the generations of the development of cybernetics, as well as its economic models, including mathematical ones. The practical significance lies in the analysis of the paradigm and models of development of economic cybernetics in the modern world.

Keywords: *macroeconomics; mathematical models; control system; computer modeling; automation.*

JEL Classification: *G17; M2; C6*

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1 Introduction

A person's desire to understand the world and manage it intelligently is the reason for the gradual development of the economy. This aspiration has led humanity today from conventional manufacturing to digital manufacturing. The first automatic regulator used in industry was the flying ball regulator, invented by J. Watt in 1769 to control the speed of a steam engine.

In the second half of the nineteenth century, many scientists began to study the theory of self-control based on mathematical theory, which had a positive effect on improving the efficiency of the control system (Boulding, 1956, Boulding, 2013). In 1868, J. Maxwell established a mathematical model for the differential equation of a flying ball regulator and analysed the stability of the system by solving the differential equation. In 1948, the mathematician N. Wiener developed "cybernetics", which has been continuously developing for more than half a century, and its content and research methods have changed greatly (Wiener, 1965). Briefly, the development of cybernetics has gone through three periods: the first stage is the classical period of cybernetics from the late 1940s to the 1950s, when the focus was on the study of autonomous automation and the solution of SISO-Single Input Single Output. System with one input and one output. Its main mathematical tools were differential equations, Laplace transforms, transfer functions, the time domain method, the frequency domain method, and the root locus method. The main problem was speed, stability and accuracy.

Based on Wiener's idea, medical scientists at Harvard Medical School discussed scientific methods with mathematicians, physicists, and engineers. He emphasizes the interdisciplinary nature of his approach and refers to his work with Vanivar Bush and his differential analyzer (primitive analog computer), as well as his earlier reflections on the functionality and principles of future digital computers. He traces the origins of cybernetic analysis to the philosophy of Leibniz, citing his work on universal notation and the calculus of reasoning.

In the 1960s, focused on solving the problems of controlling MIMO-Multi-Input Multi-Output systems in block automation and biological systems. The instruments were: first-order differential equations, matrix theory, state-space method, variational method, maximum value principle, dynamic programming theory.

The emphasis was placed on optimal, stochastic and adaptive control, the main control device of which was an electronic computer (Piketty and Goldhammer, 2017, Piketty, 2021). From a cybernetic point of view, man is the most ingenious and flexible control system. He is good at responding correctly to changing conditions. How to apply human intelligence to a real automatic control system is an important problem (Mason, 2021).

Since the 1970s, people have not only solved social, economic, managerial, environmental and other systemic problems, but also formed a new discipline to solve the simulation of human brain functions. The science of artificial intelligence, which is the frontier of the development of cybernetics, and the development of computer technology provide a solid foundation for artificial intelligence. People improve artificial intelligence with the help of computers' powerful information processing capabilities and use it to simulate the human brain (Beer, 1993).

Information is an important characteristic of an organizational system, it allows the system to achieve self-regulation and is the main way of communication between systems and the environment. System, information and management are inseparable (Snowdon, 2008 ; Leijonhufvud, 1968).

2 Methodology

The methodological basis of the study was the following approaches to the study of this topic: systemic, formal-model, dynamic. The system method introduced the relevant theories and mechanisms of economic cybernetics, paying special attention to the prerequisites for the development of economic cybernetics, the creation of models for managing the economic system, the analysis of their state space, the analysis of the stability of economic structures and manageability, highlighting the problems of performance and observability, feedback control strategies for economic systems, optimal management strategies using appropriate tools. This methodology made it possible to consider the system as a simple control with negative feedback of one control variable, but due to the limited understanding of the economic system within the framework of the model of an indefinite structure in accordance with the characteristics of the input variables. The systems research method is a further development of the decision research mechanism and consists in studying how the external economic structure adapts and coordinates in order to ensure smooth development. This is a process in which the elements of the mechanism observe the market from time to time, detect and evaluate various factors in a timely manner.

3 Results and discussion

The mass globalization of the world's economies and the digitalization of information processes and the multiplication of data, the search for the effectiveness of processes has eliminated all anthropological questions. However, in its way of collecting, sorting, analyzing and presenting information, managerial control causes a certain approach to people, society and their environment. Key aspects of his considerations are such tasks: to integrate economic, social and environmental information; be a node through which digitized information passes, a control point that ensures the reliability and relevance of the information transmitted; make sense of abstract information, turning numbers into a meaningful story for all stakeholders of the economic system. Cybernetics also translates the desire to mathematize knowledge about organisms not in the biological sense, but at the mechanical level of an organized structure that implies a connection between its parts. This is primarily a semantic issue, because mathematics, compared to words, promotes clarity and precision through its symbolism. Thus, the concepts of correlation and pattern echo each other and oppose the chaos generated by the general law of entropy, where all organisms function according to an individual model that structures the mechanisms of their bodily apparatus. Through their method of structuring phenomena, both release the individual from his metaphysical conception in order to rationalize and model him mathematically (Nordhaus, 2015). They see form as movement, defending genetic geometry, which alone can give the affirmative or perfect definition of any mathematical object and even more of an individual that is part of physical and real beings.

The regular increase in the computing power of electronic machines makes it possible to simulate more and more natural or artificial systems. This processing power is all the more effective when an abstract mathematical model is available that summarizes the dynamics in a few symbols. The concept of a controlled system and regulation also allows the formation of many technical, economic or social systems. From a completely different point of view, scale-invariant systems in which "big is like small" seem to be approximated by "fractal geometry". One might wonder what good work is on the dynamics of such systems. In addition, economic cybernetics introduces a dual mathematical model to describe, on the one hand, the free evolution of the system, and, on the other hand, the interactions between the observer and the system. For more than a century, management tools have been able to meet the needs of increasingly complex process control. The need to delegate decision making as

closely as possible to actors while maintaining a global vision of processes has led to the development of numerous tools ranging from budgetary control to balanced scorecards, including costing and reporting. But managerial control is not only a tool for coordinating processes, but also a tool that shapes organizational processes and influences social and environmental interactions.

In order to create a model of economic cybernetics, clear economic meanings must be given to various concepts of management. The creation of a model of economic cybernetics must fully take into account the characteristics of the macroeconomic system. The macroeconomic system is often constrained by the uncertainty of people and economic phenomena, and is essentially a random non-linear structure. Considering it as a linear system is an approximation that introduces large errors, and sometimes even economic fluctuations (Bayro-Corrochano, 2019). Identification and simulation data are mainly obtained by periodic sampling, the available data is insufficient, the reliability is low, and in most cases there are serious noise interferences. The macroeconomic system belongs to the category of large systems, which, as a rule, are difficult to decompose accurately. The strong coupling of each subsystem often causes difficulties in mathematical processing. The stability, manageability and predictability of the economic system are the main discussions that go through the development of macroeconomics. System identification mainly studies the stability, controllability and predictability of economic systems. The choice of the optimal economic policy in macroeconomics is actually an optimization method. The essence of the optimization method is to find the optimization mechanism and element with a known system performance indicator and certain restrictions. Based on the mathematical model of a physical system, the mathematical description of problems is inherently complex, however, these important ideas can be found both in nature and in human evolution and human behavior: feedback, filtering, shock fluctuation system, system characteristics, optimization methods .

Mathematical modeling can deepen the knowledge of reality, using the mathematical apparatus not only as a description tool, but also as a research tool, where it is about emphasizing that mathematical formalization should reveal new facts that can bring closer to the essence of the phenomenon under study. Thus, it is mathematical formalism that is at the center of this concept of cybernetic modeling, since it has the amazing power, characteristic of the mathematics from which it is made, to discern in the dimensions what has gone unnoticed. However, if you use a computer to process this model, then automatically there is a "transcription" of the mathematical formulation on a machine that is able to solve and calculate it. The use of computers makes it possible to convince more experimenters of the need for a clear and precise formalization step. But, with the advent of computers, the change in the use of mathematical models, strictly speaking, is only quantitative in a more general sense, because mathematical modeling comes from a mathematical innovation of an essentially formal and logical type in a broad sense. That is, in terms of a set of categories that serve to connect signs and express mathematical relations, cybernetic thought goes so far that in this context it represents a fundamental epistemological update that allows you to go beyond binarism, the bivalent logic that has reigned in science and philosophy since the time of Aristotle, in favor of polyvalent or even continuous logic. The mathematical apparatus allows us to show that after reaching a certain critical threshold, the system can choose a new adaptive behavior. When the target to be reached differs from the existing output power, the system detects the difference and sends instructions to change the input in the desired direction (Youngblood, 2020, Perez, 2).

Feedback is now a commonly used concept in almost every field. In a system, positive feedback will cause the system to diverge, oscillate and become unstable, while negative feedback will cause the system to converge and keep the system stable. In economics, this state is called equilibrium. In fact, this means that there is a negative feedback loop in the

own system, and autonomous action brings it to equilibrium. The basis of cybernetic analysis is system identification, control, evaluation, appropriate macroeconomic modeling, macroeconomic control and regulation, and optimal policy and welfare analysis. Due to the application of feedback to the system, the system is kept in a stable state, in the economic field such a state is called equilibrium. Equilibrium was introduced relatively early in the economic field, such as the equilibrium price determined by the action of supply and demand. Regardless of the mathematical form or intuition, what this really means is that there is a negative feedback loop in her own system, and autonomous action brings the system to equilibrium. With the development of the economy, everyone understood that the state of equilibrium known in the past is a static concept and may even be a long-term concept. With the advent of Keynesianism, everyone gradually showed a strong interest in the short-term adjustment of the economy. From comparative static analysis to dynamic analysis, it can be described in cybernetic language: although the system itself has negative feedback, it can be autonomous in the long run (Medina, 2011 ; Moon, 2013 ; Zacarias, 2013).

A steady state is reached, but due to external shocks, it often deviates from the steady state equation. Even when the shock is too large, the system will deviate from the original equilibrium point, meaning the system is likely to be stable within a certain range of motion.

The economic system is essentially the same as other dynamic systems that can be described by mathematical language, it has its own characteristics, such as stationary and dynamic, which determine the static position of the system and the trajectory of the reaction under certain conditions of external shocks. This can be seen from the path of evolution of the classical theory of economic crisis. Initially, during the Great Depression, Fisher attributed the financial crisis to "over-indebtedness" and, based on this, proposed an explanation for the financial crisis and its consequences by the "debt deflation" theory of recession. According to it, a company overborrows at an early stage, when the economy cannot achieve the expected growth or asset prices fall, it is forced to facilitate and sell assets due to the inability to repay the debts due, or even go bankrupt and reorganize. The spread of this situation leads to a decrease in the growth rate of deposit money and the velocity of money circulation, which, in turn, leads to a decrease in the general level of prices. At a constant nominal interest rate, deflation will increase the real interest rate of debt and increase the debt burden of businesses, causing the economy to fall into a vicious cycle of "excessive debt - deflation - more debt - more deflation". When the economy enters a growth phase, corporate profitability increases, balance sheets improve, asset prices for companies and households rise, default risk decreases, and credit availability increases, which can expand investment (Dubberly and Pangaro, 2015). As a result, both the financial and economic systems enter a phase of growth. When the economy enters a downturn, corporate profitability deteriorates, balance sheets shrink, corporate and household assets shrink substantially, default risk increases, credit opportunities decrease, and output and profits also decline.

The term "filtering" comes from communication theory, which is a method of separating useful signals from received signals containing interference. The received signal corresponds to the observed random process, and the useful signal corresponds to the estimated random process. In engineering it deals with a series of signals, and in economic systems with a series of time series. Due to the limitations of observation methods and sampling periods, the data often contains a lot of noise, which also needs to be estimated by filtering. There are two types of filtering methods: the time domain method and the frequency division method. The time domain is the real time domain and the frequency domain is the mathematical construct after mathematical transformation. Time domain analysis uses the time axis as coordinates to express the relationship of dynamic signals. Frequency domain analysis transforms the signal into a frequency axis as coordinates for an expression. The time domain moving average method can smooth out fluctuations over a period of time, and high-pass filtering or

frequency-domain low-pass filtering can filter out signals in a specific frequency range. Although the proposal of a filtration theory was not originally intended for the purposes of economics, the ideas of a general filtration theory and the corresponding methods of information processing play a very important reference role in economics. The general theory of filtering offers a set of methods for extracting and analyzing the state of information confusion. The information referred to in economics differs from the information in communications and control, however, they have very similar descriptions of the nature of the phenomenon reflected by the information (Arca, and Mariategui, 2021 ; Mancilla, 2020).

There are two sources of system fluctuations. One is determined by the internal equation of the system, that is, the fluctuation state is determined by positive feedback and negative feedback within the system. The other is an externally applied shock signal. The nature of the impact depends on the mathematical form. For example, a pulsed shock signal has strong differential characteristics, and this response decays exponentially with time. Economic volatility is also a fundamental issue in macroeconomics, and the origin of volatility is a key issue. Fr. Hayek believes that economic volatility is in itself the greatest challenge to equilibrium theory. The value of each economic component in economic fluctuations is not the same, and even in different countries the difference is also very large. For example, in multiplicative economies, fluctuations in demand are the main macroeconomic factors, and supply factors are relatively stable, while in developing countries, economic fluctuations mainly occur on the supply side - investments. Economics basically divides the process of exogenous shocks into: demand shocks, exogenous spending shocks, risk premium shocks, investment technology shocks, supply shocks, total factor productivity shocks, markup shocks, and policy shocks. In the basic DSGE (Dynamic Stochastic General Equilibrium) mainstream model, developed on the basis of the RBC model, negative shocks are amplified through six transmission mechanisms: intertemporal substitution, uncertainty, irreversible investment, labor adaptation costs, concentration over time, and the role of financial markets (Helvey, 1971).

Dynamic performance refers to the relationship between output and input during system operation, which can be expressed by a differential equation. If it is a discrete time series in economics, it can be expressed as a differential equation. In particular, the system deviates from the equilibrium point. To the characteristics of the movement of the return to the equilibrium point, the measurement indicators are the speed of adjustment, stability and the amount of overshoot. The static response characteristic refers to the state of the system when it is in equilibrium, and most of the time refers to the steady-state error, that is, fluctuations at the moment of equilibrium. In fact, this is a fundamental principle that is used in everyday life. In order to quickly adjust the system to the ideal equilibrium point, more feedback control can be applied to the manipulated variable so that the dynamic performance of the system is ideal, but this will cause even poor static performance of the system to be overshooted, and even make it have poor static performance (Lorentz 2002). The system deviates from the equilibrium point. Therefore, there is no need to apply excessively large and strong signals to immediately or directly bring the system to the desired state. If an excessive external force is applied, the system will deviate from stability. This concept was first proposed by Hall in 1907 and some engineers. Hall, comparing the behavior of political economists, believed that the reasonable operation of the law of supply and demand must allow fluctuations, and the operation of the system requires a certain degree of fluctuation, which is a very general principle.

Arithmetic or algebraic calculations are, by their very nature, fixed and deterministic. Given certain data, certain results inevitably follow. These results do not depend on anything other than the originally received data. And the question to be decided is, or must be, moving towards a final decision on a number of infallible points which are not subject to any change and are not subject to any modification. Having accepted this, one can easily imagine the

possibility of constructing a mechanical part, which, taking a starting point in the data of the problem being solved, will continue its movement regularly, progressively, without any deviation towards the required solution, since these movements, no matter how complex they may seem, will be finite and deterministic. The thesis is that computation is mechanizable. For any calculation, it is possible to design a machine that can perform it (Shanken, 2003). Identifying computation with the operation of a machine is not, strictly speaking, demonstrable, but represents a kind of axiom which is justified by reflections on the concept of computation, and which, one might say, defines this concept. The well-known mathematician and economist P. Dupin summarizes the difference between analysis and mathematics with the following formula: "any calculation in itself is not an analysis." Calculus seems to represent the essence of mathematics. Thus, in its very extension, the notion of calculus retains a certain vagueness. This also applies to the machine that has to perform these calculations.

The design of self-regulating control systems for a real-time planned economy was studied by the economist O. Lange, the cyberneticist V. Glushkov, and other Soviet cybernetics in the 1960s. By that time, information technology was advanced enough to make computer-based economic planning possible. Cybernetics, developed simultaneously with the mathematical theory of communication by engineer K. Shannon, is part of the development of the so-called information theory, where it was determined that some economic systems are unstable without feedback, but if the economic system can be controlled, then the closed system can be stabilized due to feedback. In problems of optimal control of economic systems, many equilibrium states are saddle points. For a two-dimensional system, its structure is assumed to have two real eigenvalues, one positive and one negative. The straight line of the overbalance point, in which the eigenvector corresponding to the positive eigenvalue is located, is called the unstable shoulder, and the straight line of points is called the stabilizer shoulder. Influenced by social development, this era was indeed a period of development of "system analysis" and "system" in its applications, sometimes the most bizarre. However, it is she who encourages to strengthen their contacts with cybernetics. It should be remembered that the mathematician N. Teodorescu was then an influential person in the field of applied mathematics. A whole school of cybernetics soon formed around him. In 1963, building on his interdisciplinary experience in applied mathematics dating back to the late 1940s, he published a work in Romanian that extolled the virtues of this new method of formalization, mathematical modelling. He defended the idea that cybernetic modelling deals with a new stage of mathematization and that it should be considered as a break with the previous stage of biometrics (Geipel, 2019, Baylis, 1971).

In the same way, the pattern of Wiener, the founder of cybernetics, includes the dynamic principle of feedback, without which the organism as such would not exist. This is why the form of the individual is a geometric abstraction that can only be understood paradoxically by refusing to separate its element from the efficacy of physical mechanisms. The mathematical rule that governs the functioning of an individual, contrary to vision, is produced by the activity of that organism, and not vice versa. Thus, we are not talking about translating a quantitative relation, but about expressing a qualitative model characterized by its dynamism, and then the difficulty lies in the algebraic form of this relation or individual model, since the mathematical language is fixed by numerical values. A ratio, and even more so a regularity, is not so much a number as an operation, that is, a logical relationship that a mathematical function can completely restore. Indeed, the logarithm embodies both the dynamic aspect of mathematics and the possibility of taking into account individual homeostasis. On the other hand, feedback is the process of stabilizing the initial state or regulating towards an acceptable state, which allows a particular system to respond to the action of an external element, while maintaining itself. However, the trends of conservation and increase are paradoxical, but complementary, and they manifest themselves in the cyclic

causality of the logarithmic function. The logarithm causes the repetition of the same operation, a dynamism that preserves the logic according to which a number raised to a certain power increases its value. Thus, mathematization through the apparent immobility of an algebraic function, which has nothing incompatible with the dynamism of its curve variations, contributes to mastering the mechanisms of the economy (Warburton, 1955).

Thus, models of economic cybernetics are always associated with an epistemological context, a set of scientific as well as literary discourses that make its conceptualization possible. Digital post-humanity is primarily a paradigm shift in relation to the development of computing, and not a modification of the modern look by technology. The corresponding determinism is related to the fact that the dynamic model can be translated into the form of mathematical relations, where computer algorithms act as a means of digitizing the system by restoring processes that create order and a single sequence of ideas, as well as actions arising from them. From this it follows that the system is equal to the lines of the program in its interactions with exteriority, which modifies it retroactively without violating its integrity. In economic cybernetics, one should not see the threat of dehumanization controlled by the economic system, which provides only for productivity and inhuman use of a person. As for the digitization of personality, it has nothing to do with virtual imitation and the totality of physical and mathematical processes that form it on a material basis, the infinite variability of which reveals a fundamentally plastic individual. The digital system is not dematerialized and its existence is internally connected with the existence of an infinitely open and developing body.

4 Conclusion

The mathematical difference between economic systems allows us to determine their dynamic model, program. This operational image, in contrast to the digital aspect, fixes the structure of a functional system, which can be translated into an algorithmic form in order to be transmitted, reproduced or multiplied. Her affective interactions also reveal the plasticity of the material form, capable of radical transformation. Considering the system as a computer seems obvious, especially in regard to the workings of thought, because automatism goes far beyond the mechanisms of the body alone. A computer is an information processing software structure, that is, it works on the basis of a series of instructions that cause it to perform operations in a certain way in a certain order, as indicated by its etymology. The connection with cybernetics is obvious, which explains why memory is understood as a certain sequence of ideas enveloping the nature of things outside the human body. Indeed, for cybernetics there is no absolute distinction between transmission types. By mathematizing what makes explicit the notion of a model, the system can be communicated in such a way that the hypothetical instrumental mechanism can rearrange the mechanical elements appropriately and is able to continue the processes that existed before.

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Factor analysis of Summary Innovation Index

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Abstract

Research background: There is no doubt that innovation is an important source of competitiveness, economic growth, as well as the image of each country. Therefore, it is necessary to measure it and monitor the development of the measured values over time. There are several indicators to measure innovation and innovation performance of a country. European innovation scoreboard provides a comparative analysis of innovation performance in EU countries, other European countries, and regional neighbours. It assesses the relative strengths and weaknesses of national innovation systems and helps countries identify areas they need to address.
Purpose of the article: The main purpose of the article is to analyse the main areas of Summary Innovation Index (human resources, attractive research system, digitalisation, finance and support, firm investments, use of information technologies, innovators, linkages, intellectual assets, employment impacts, sales impacts, environmental sustainability) that affect the final SII value and to find out whether it is possible to define a smaller number of factors influencing the SII value based on their mutual correlation.
Methods: To achieve the purpose of the article the factor analysis is applied. Input data consists of the values of individual SII areas of Slovakia for the period 2014 – 2021.
Findings & Value added: A large number of variables influence the innovation performance of countries. Their monitoring and management is therefore very difficult. Factor analysis will makes it possible to define a smaller number of factors representing the analyzed variables, which can facilitate their management and analysis.

Keywords: innovation, innovation performance, factor analysis, Summary Innovation Index

JEL Classification: *O30, O32, O39*

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1 Introduction

Globalization increases competition and competition contributes to the increase in innovation. Globalization brings new opportunities (Vagner, 2016) and innovation is the way to take advantage of these opportunities. Innovation are characterized by great economic value (Gavurova et al., 2021). Global competitiveness has been one of the major goals of countries worldwide in the last few years, especially after the financial crisis emphasized the need for new strategies, innovations and dynamics in the economic and business environment (Dima et al., 2018). The innovative activity is perceived to be the source of competitiveness and economic growth. The innovation performance varies from one company to another and from one country to another, being influenced by a variety of factors (Sipos et al., 2014; Nica et. al., 2017; Popescu, 2017; Popp et. al., 2018; Regnerova & Regnerova, 2017). It is very difficult to measure the innovative activity of a country. The innovative activity consists of several different areas that affect the innovation performance of the country. There are two the most famous ways to measure and evaluate the innovation performance of the country: global innovation index (GII) and summary innovation index (SII). Our research focuses on the summary innovation index (hereinafter the SII) only, and the aim is to analyze the main areas of Summary Innovation Index (human resources, attractive research system, digitalization, finance and support, firm investments, use of information technologies, innovators, linkages, intellectual assets, employment impacts, sales impacts, environmental sustainability) that affect the final SII value and to find out whether it is possible to define a smaller number of factors influencing the SII value based on their mutual correlation. The European Commission detailed the most popular ways for the European Union countries to support creative activities at the European level in order to achieve the level of performance recorded in this area by the United States and Japan following the positive impact of innovation. In order to measure the level of innovation performance and apply some useful techniques to increase its impact on the macroeconomic level, an aggregate indicator of innovation (SII) was developed.

SII is synthetic indicator expressing innovative performance of countries in the form of a single value, but on the other hand it is the source of a lot of data that can be analyzed. Many scientist try to analyze in their research the factors that influence the innovation performance of countries to the greatest extent. Svagzdiene and Kuklyte (2016) analyzes factor which have impact for SII in Germany, Estonia and Lithuania, Scholleova (2009) deals with analysis of SII in Czech Republic, Janoskova and Kral (2019) implemented an in-depth analysis of the SII in the V4 countries, and many others (Stec, 2009; Kowal et al., 2020; Murswieck et al., 2020; Onea, 2020; Dworak, 2020, etc.) . Innovative performance is affected by many factors, therefore the factor analysis will be used to analyze this field of research. Factor analysis is an extremely popular model for scale development prior to other modeling in much research in business and the social sciences (Iacobucci et al., 2022). There are two main technically distinctive approaches to exploratory factor analysis: i) common factor analysis and ii) principal component analysis. Factor analyst use principal component analysis more frequently because they believe that principal component analysis could yield less accurate estimates of factor loadings compared to common factor analysis but most often produce similar pattern of factor loadings, leading to essentially the same factor interpretation. Jung and Seo (2013) realized a simulation study to evaluate the relative performance of the two approaches in terms of recovering factor patterns under different experimental conditions of sample size, overdetermination, and communality. Their results show that principal component analysis performs better in recovering factor for small sample sizes. Furthermore, this tendency has been shown to be more pronounced when there are a small number of variables per factor. Therefore, for the need of our research, we implemented the principal component analysis.

2 Methodology

The main purpose of the article is to analyse the main areas of Summary Innovation Index (human resources, attractive research system, digitalisation, finance and support, firm investments, use of information technologies, innovators, linkages, intellectual assets, employment impacts, sales impacts, environmental sustainability) that affect the final SII value and to find out whether it is possible to define a smaller number of factors influencing the SII value based on their mutual correlation. Input data consists of the values of individual SII areas of Slovakia for the period 2014 – 2021 and the IBM SPSS Statistics 26 was used to the calculations.

To achieve the purpose of the article the factor analysis is applied. Factor analysis is a statistical method used to describe variability among observed, correlated variables in terms of a potentially lower number of unobserved variables called factors.

Factor analysis is based on a p-dimensional data set $\begin{pmatrix} y_{11} & \cdots & y_{1p} \\ \cdots & \cdots & \cdots \\ y_{n1} & \cdots & y_{np} \end{pmatrix}$. The basic principle of factor analysis is that each of the observed random variables $Y_j (j = 1, \ldots, p)$ can be expressed as the sum of a linear combination of a smaller number of m unobservable (hypothetical) random variables $F_1, \ldots, F_m$ – the so-called common factors and another source of variability $E_j (j = 1, \ldots p)$ – the so-called specific (residual) components. The variables Y_j are sometimes called manifest variables and the factors $F_1, \ldots, F_m$ are called latent variables (Figure 1).
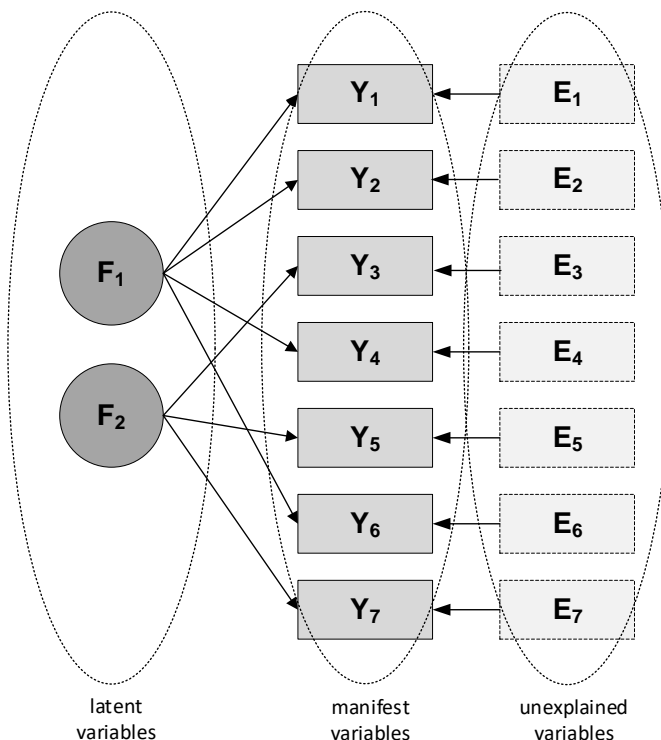
Figure 1. Illustration of factor analysis model

Source: own processing

We assume that the model $Y = \Lambda F + E$ holds for the random vector $Y = (Y_1, \ldots, Y_p)'$, where $F = (F_1, \ldots F_m)'$, $E = (E_1, \ldots E_p)'$ a $\Lambda = (\lambda_{jk})$ is unknow real matrix of type $p \, x \, m$. Matrix Λ is called factor matrix. E_j is random deviation from the exact model corresponding to the jth variable, where $j = 1, \ldots, p$. The element λ_{jk} of factor matrix is the factor weight (load) of the kth common factor corresponding to the jth variable, where $k = 1, \ldots, m$. The factor analysis model expresses the relationship between latent variables and manifest variables. Coefficient λ_{jk} is the conversion coefficient of F_k to Y_j.

The Kaiser-Mayer-Olkin statistics (KMO statistics) i sused to assess whether correlations between variables $Y_1, \ldots Y_p$ are explained by means of other variables $F_1, \ldots F_m$. KMO statistics is based on the sample correlation and partial correlation coefficients of variables $Y_1, \ldots Y_p$. KMO statistics reaches takes on values between 0 and 1. To assess whether it makes sense to implement factor analysis, we can use the following values (tab. 1).

Table 1. KMO test – levels of acceptance

KMO value	Level of acceptance
$KMO \geq 0.90$	marvelous / super
$0.80 \leq KMO < 0.90$	meritorious /great
$0.70 \leq KMO < 0.80$	middling /good
$0.60 \leq KMO < 0.70$	mediocre
$0.50 \leq KMO < 0.60$	miserable
$KMO < 0.50$	unacceptable

Source: own processing

Simultaneously with KMO statistics, we can use Bartlet´s test of sphericity, where the null hypothesis states that the sample correlation matrix is a unit matris. The statistics test is given by the relation $\chi^2 \frac{11+2p-6n}{6} \ln|R|$. If the null hypothesis holds, the statistics test asymptotically follows a distribution $\chi^2 \left(p \frac{p-1}{2} \right)$. The null hypothesis is rejected at the asymptotic significance level α if $\chi^2 \geq \chi^2_{1-\alpha} \left(p \frac{p-1}{2} \right)$. If the null hypothesis is not rejected, factor analysis is not suitable.

3 Results and discussion

We obtained initial information about the correlation structure of the data set from the implementation of a sample correlation matrix, in which 12 evaluated variables are included (tab. 2).

Table 2. Correlation matrix

Var.	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
F1	1.000	0.873	0.721	0.740	0.544	0.751	0.374	0.813	0.752	0.671	0.500	0.548
F2	0.873	1.000	0.677	0.744	0.440	0.767	0.471	0.815	0.715	0.713	0.467	0.487
F3	0.721	0.677	1.000	0.634	0.185	0.857	0.390	0.702	0.600	0.297	0.161	0.594
F4	0.740	0.744	0.634	1.000	0.586	0.615	0.378	0.793	0.569	0.516	0.442	0.457
F5	0.544	0.440	0.185	0.586	1.000	0.324	0.328	0.528	0.548	0.679	0.704	0.357
F6	0.751	0.767	0.857	0.615	0.324	1.000	0.538	0.746	0.679	0.506	0.324	0.554
F7	0.374	0.471	0.390	0.378	0.328	0.538	1.000	0.648	0.324	0.627	0.146	0.270
F8	0.813	0.815	0.702	0.793	0.528	0.746	0.648	1.000	0.609	0.707	0.422	0.448
F9	0.752	0.715	0.600	0.569	0.548	0.679	0.324	0.609	1.000	0.575	0.549	0.626

F10	0.671	0.713	0.297	0.516	0.679	0.506	0.627	0.707	0.575	1.000	0.412	0.313
F11	0.500	0.467	0.161	0.442	0.704	0.324	0.146	0.422	0.549	0.412	1.000	0.414
F12	0.548	0.487	0.594	0.457	0.357	0.554	0.270	0.448	0.626	0.313	0.414	1.000

Notes: F1 – human resources; F2 – attractive research system; F3 – digitalisation; F4 – finance and support; F5 – firm investment; F6 – use of information technologies; F7 – innovators; F8 – linkages; F9 – intellectual assets; F10 – employment impacts; F11 – sales impacts; F12 – environmental sustainability

Source: own processing using IBM SPSS Statistics 26

As we can see the correlations range from 0.146 to 0.873. To assess whether it is appropriate to implement a factor analysis on a given data set, the KMO statistics was used (tab. 3).

Table 3. KMO and Bartlett´s test of sphericity

Kaiser-Mayer-Olkin Measure of Sampling Adequancy		0.799
Bartlett´s Test of Sphericity	Approx. Chi-Square	400.234
	Df	66
	Sig.	0.000

Source: own processing using IBM SPSS Statistics 26

The value of KMO statistics is 0.799, so the implementation of the factor analysis appears to be good. The value of Bartlett´s test of sphericity is 400.234 and the number of degrees of freedom is 66. P-value is very close to zero, that is, the null hypothesis (the sample correlation matrix by the 12 considered variables is unitary) is rejected at the asymptotic level of significance 0.05.

The table 4 presents the initial eigenvalues and the percentage of variance explained. The first component

Table 4. Initial Eigenvalues

Component	Total	Cumulative Total	% of Variance	Cumulative %
1	7.192	7.192	59.932	59.932
2	1.410	8.602	11.751	71.683
3	1.096	9.698	9.137	80.820
4	0.640	10.338	5.332	86.151
5	0.471	10.809	3.926	90.077
6	0.362	11.171	3.016	93.093
7	0.278	11.449	2.320	95.413
8	0.202	11.651	1.680	97.093
9	0.145	11.796	1.210	98.303
10	0.093	11.889	0.773	99.076
11	0.069	11.958	0.575	99.651
12	0.042	12.000	0.349	100.000

Source: own processing using IBM SPSS Statistics 26

The first component explains 59.932% of the variability contained in the twelve observed variables, the second component explain 11.751% of the variability, the third component explain 9.137% of the variability, etc. (figure 2).
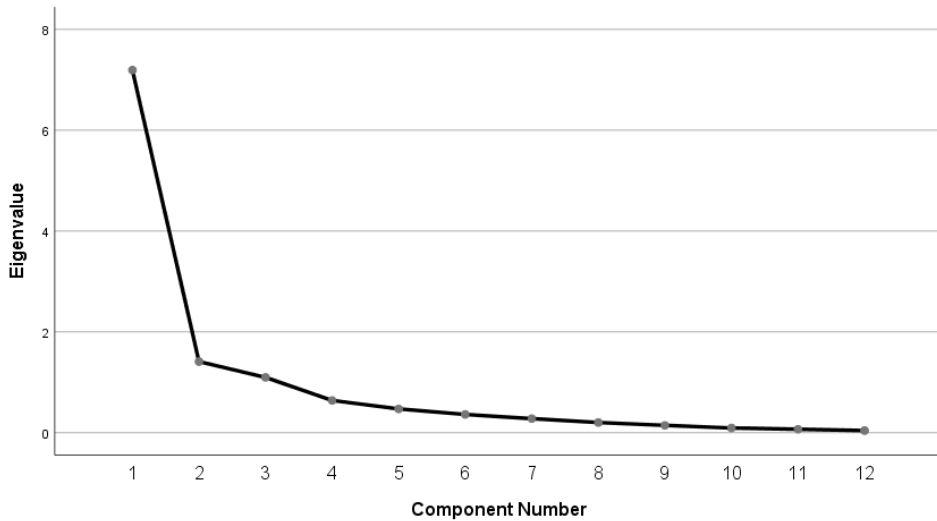
Figure 2. Eigenvalues – Scree Plot

Source: own processing using IBM SPSS Statistics 26

Based on the scree plot and the explained variance, three common factors were chosen. The total percentage of variability explained by the first three components is 80.820%. The Principal Component Analysis was applied for factor extraction.

Table 5. Component Matrix – 3 components extracted

	Component		
	1	**2**	**3**
Human resources	0.913	-0.041	-0.098
Attractive research system	0.901	-0.090	0.043
Digitalisation	0.757	-0.562	-0.177
Finance and support	0.820	0.007	-0.032
Firm investments	0.655	0.658	0.022
Use of information technologies	0.843	-0.376	-0.023
Innovators	0.585	-0.112	0.651
Linkages	0.902	-0.088	0.235
Intellectual assets	0.821	0.067	-0.275
Employment impactc	0.758	0.305	0.433
Sales impacts	0.580	0.616	-0.317
Environmental sustainability	0.649	-0.116	-0.456

Source: own processing using IBM SPSS Statistics 26

Then the factors were rotated using the rotation method called Varimax method with Kaiser Normalization (rotation converged in 5 iterations). Table 6 contains a variable´s

communality that is a useful measure for predicting the variable´s value. Communality is the total amount of variance a variable share with all factors.

Table 6. Rotated Component Matrix

	Component		
	1	**2**	**3**
Human resources	0.724	0.384	0.415
Attractive research system	0.681	0.499	0.331
Digitalisation	0.925	0.244	-0.077
Finance and support	0.603	0.392	0.395
Firm investments	0.114	0.345	0.855
Use of information technologies	0.820	0.417	0.079
Innovators	0.197	0.860	0.006
Linkages	0.595	0.665	0.282
Intellectual assets	0.678	0.183	0.510
Employment impactc	0.194	0.756	0.497
Sales impacts	0.231	0.016	0.873
Environmental sustainability	0.731	-0.058	0.323

Source: own processing using IBM SPSS Statistics 26

For example, the communality estimate of the variable „human resources" is 0.415, which means that 41.5% of variability of the variable „human resources" can be explained by the action of three common factors.

The plot below (figure 3) shows the variables in the rotated component space. It shows how the variables are organized in the common factor space.
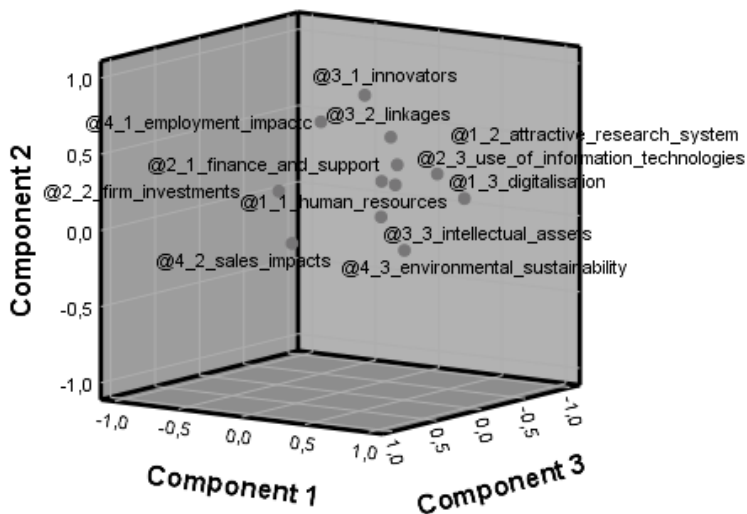
Figure 3. Component Plot in Rotated Space

Source: own processing using IBM SPSS Statistics 26

4 Conclusion

One of the key attributes of a competitive economy is the ability to innovate. In an effort to benefit from strengths and strengthen areas where there are weaknesses, it is necessary to monitor the factors influencing the innovation performance of countries. There are several ways how to measure innovation performance. This research was focused on analysis of Summar innovation index (SII), that is a composite index annually published by the European Union within an Innovation Union Scoreboard (a tool to measure the innovation performance of EU member states). The main purpose of the article was to analyse the main areas of Summary Innovation Index (human resources, attractive research system, digitalisation, finance and support, firm investments, use of information technologies, innovators, linkages, intellectual assets, employment impacts, sales impacts, environmental sustainability) that affect the final SII value and to find out whether it is possible to define a smaller number of factors influencing the SII value based on their mutual correlation. To achieve the purpose of the article the factor analysis was applied. The appropriateness of applying factor analysis was confirmed by KMO statistics and Bartlett´s test of sphericity. By implementing principal component analysis, three main factors were identified that explain 80.820% of variability.

Acknowledgements

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Comparison of speed creating of raster map tiles

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Abstract

Research background: One of the most used part of any information systems could be any kind of a map viewer. From a global to local information systems, many of them have used map services with their requirements. The most important requirements for map services and maps themselves are accuracy and actual data. High accuracy and actual data are parameters of maps, which bring along a requirement for high capacity of storage, high network data throughput, and powerful hardware to processing data, etc. Therefore, to focus on these requirements, we compare speed of creating raster map tiles with high precision in this paper.
Purpose of the article: The aim of this paper is to compare the methods and processes for creating raster map tiles of the Czech Republic for the purpose of the Fire Rescue Service, and to propose solution on how to reduce the time needed for their creation. The whole process of creating raster map tiles is applied from central data store (CDS).
Methods: To create a complex map with all important information, it is necessary to have suitable source data, method or process of map creation, and powerful hardware.
Findings & Value added: The paper compares approaches of creating raster map tiles, and especially compares processing time and speed of creating tiles. The output approach proposes help to faster creation of a raster map tiles in the modern globalized world.

Keywords: *central data store; GIS; raster image data; performance; map tiles;*

JEL Classification: *C63; C80; I20; L86; Y91*

1 Introduction

One group of today's global needs are Maps (road maps, orthophoto maps, historical maps, urbanism maps) (Laurance and Balmford, 2013). Nowadays, precious and updated maps are required. Input data for maps are quite easily available, depends on providers and their pricing. In addition, the map creating is a process, which demands many recourses.

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Today's globalized world brings great benefits in obtaining, ascertaining, and sharing data or information. Those data or information can be used separately, or as an input for creating maps.

The process of creating maps has a long history and corresponds with cartography. Firstly, it is very important to define the purpose of a map, meaning what information the map brings to a map viewer or user, e.g. street net map, orthophoto map, etc (Brumarova et al., 2020).

Development of computer technology brings many advantages for the creation of maps. One direction in the development of computer technology was the creation of information systems. There is one specific way for managing geographic data in information system. Such direction is referred to as GIS - Geographic Information System (Clarke, 1999). Modern technology allows to share and show geographical data in many different ways. (Skopeliti and Stamou, 2019). GIS provides a lot of opportunities for countless institutions, scientist, services, etc.

Globalized world with all its possibilities opened a new way for using GIS. GIS analysis originated the trend of publishing many interesting studies (Werther et al., 2021), (Andreev, 2020), (Špica, 2021). Those studies are applied to the exististing and complex datasets. The datasets contain many information and viewers work with the existing map models or projects. A Map project is a basemap, which contains a big scale of information. Map projects or basemaps are defined by possibilities of showing a detail. The detail is called spatial resolution and interprets how many real world meters respond to 1 pixel of a digital map. A basemap can combine raster and vector data, but for high quality basemaps it is better to use only vector data (Netek et al., 2020). Basemaps created only by vector data look better in every detail with sharp lines; this is define by using vector data. This approach is more hardware intensive. Therefore, it is good choice to cache a basemap base on vector data into raster map tiles. Raster map tiles make up a grid, mostly a square grid, which changes for each scale level. The grid, which shows of a different scale level is called pyramid scheme. The Pyramid schemes are used to improve a display performance. They are a downsampled version of the original raster dataset and can contain many downsampled layers. Each successive layer of the pyramid is downsampled at a scale of 2:1, see Figure 6 (ESRI, 2022).
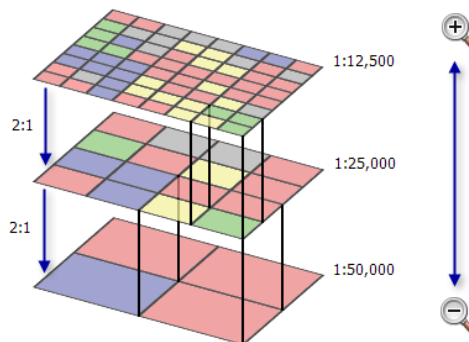
Figure 6. Raster pyramid scheme

Source: Esri (2022)

2 Methodology

The aim of this paper is to compare methods and processes for creating raster map tiles of the Czech Republic for Fire Rescue Service (FRS CR), and propose a solution of how to

reduce the creation time. The whole process of creating raster map tiles is implemented in a data warehouse (CDS) (CDS).

There are a few options how to browse maps, especially online maps. Google Maps is the most frequently used map service. It has a respectable speed of loading maps (Li et al., 2020). The Czech Republic has its own map service called "Mapy Seznam" (Seznam, 2022). But for the FRS CR needs, the CDS and GIS project group created their own map and map service (HZS ČR, 2022), (GISportal.cz, 2022).

The map project is formed by information layers, boundaries, scales, individual colour palette, etc. This paper is focused on the map project of the Czech Fire Rescue Service (FRS CR), which cooperates with neighbour countries. For this reason, the border of the Czech territory, called "*nuts0*" (ČSÚ, 2022), is extended to 20km away from the Czech border. The FRS CR used their own scales from 1:2 000 000 to 1:1 000, showing in the Table 11, and examples in Figure 7 and Figure 8. The main part of the FRS map project are input data layers. The data layers were obtained from spatial data suppliers, and for the map project data from 11 suppliers are used, which contain altogether 150 layers of spatial information. The map project use all three kind of vector type geo-features (point, line, and polygon).

Table 11. Table of FRS scales

Level of scale	Scale	Showing detail
L00	1:2 000 000	Country
L01	1:1 000 000	Region
L02	1:500 000	County
L03	1:200 000	District
L04	1:100 000	Metropolitan area
L05	1:50 000	City
L06	1:20 000	City district
L07	1:10 000	Neighbourhood
L08	1:5 000	Street
L09	1:2 000	City block
L10	1:1 000	Address

Source: author (2022)

Figure 7. Scale 1:2000000 - Country

Figure 8. Scale 1:1000 - Address

Source: author (2022)

The data are stored on the servers in the Central data store (CDS) using multiuser geo-database PostgreSQL (actual in version 12). The database is connected via 1 Gbps full-duplex link with the corporate network. To transfer data layers or layer packages through the

corporate network is very fast. Raster map tiles were historically cached on the server. Such approach used to take a considerable amount of time (approximately 1 month) to process a less complex map project into 11 map display levels. With the increased content of information in the data layers, the creation of the map project was switched over on local PCs. Another reason was to lighten the load on the server. The structure of created folders has been original since the first caching and it is based on pyramid scheme for map tiles. Each level responds to a level of pyramid scheme and its exponential growing, see Table 12.

Table 12. Pyramid scheme of tiles

Level of scale	Scale	Count of tiles	
		256x256 tile size [px]	512x512 tile size [px]
L00	1:2 000 000	1	2
L01	1:1 000 000	1	2
L02	1:500 000	1	2
L03	1:200 000	4	2
L04	1:100 000	4	4
L05	1:50 000	4	4
L06	1:20 000	8	4
L07	1:10 000	28	9
L08	1:5 000	104	30
L09	1:2 000	620	150
L10	1:1 000	2340	600

Source: author (2022)

As the number of generated tiles increases, so does the size of each folder level, see Table 13. Total size of map project is 169 GB for tile size 512 by 512 pixel, resolution 96 dpi, and setup to 85 compression.

Table 13. Size of level folders

Level of scale	Size
L00	324 KB
L01	1,28 MB
L02	4 MB
L03	20,3 MB
L04	68 MB
L05	228 MB
L06	1,15 GB
L07	3,35 GB
L08	9,36 GB
L09	38,4 GB
L10	117 GB

Source: author (2022)

Processing requires many resources, both overall time and especially processing time, By using local high powered PC (8-core, 32 GB RAM, 1TB SSD), the caching process time on PCs was reduced was decreased from 1 month to 1 week (Ruan et al., 2021). Updating caching into new gaming PC (16-core, 64MB RAM, 2TB SSD) the processing time

decreased even more - to 5 and half days. Now comes the question: "Did we reach limit? And limit of what?" Limit of:

- Software
- Hardware
- Network – database access

The ArcGIS PRO is a 64bit software tool that is quiet "limitless". By monitoring task manager and performance usage, it was found that processor CPU usage was around 50%, memory usage around 20% and a solid state drive had a very high speed of writing and reading (Tripathy and Satpathy, 2022). For that reason, it was decided to make a copy of the database on a local cache machine.

3 Results

Moving whole tile caching process with all its requirements to a local machine was an optimal way. The entire tile process of map project includes powerful hardware, optimal software with local database access, and fast network connection. The gaming PC was used as a powerful hardware with configuration of 16-core processor, 64 GB RAM, fast storage to store data, and high-speed connections to deliver data. This computer contains gaming GPU, because some software tools are available to use for computing GPU. The used software equipment was: ArcGIS PRO (version 2.9.1) as a map tile processing tool, PostgreSQL (version 12) as an input data layers store, Windows 10 as an operating system.

Such combination of all key aspects led to an optimal processing of map tile caching. Hardware usage was on maximum and provided much better processing time. The whole process was reduced from almost one week to less than 1 day. Table 14 shows processing time for each scale level.

Table 14. Processing time according to scale levels

Level of scale	Count of tiles	Size	Processing time
L00	2	453 KB	0:01:00
L01	2	1,14 MB	0:01:00
L02	2	3,95 MB	0:01:00
L03	2	20,9 MB	0:01:00
L04	4	70,8 MB	0:03:00
L05	4	235 MB	0:10:00
L06	4	1,20 GB	0:29:00
L07	9	3,51 GB	0:24:00
L08	30	10 GB	1:08:00
L09	150	42,6 GB	5:35:00
L10	600	133 GB	14:36:00

Source: author (2022)

This processing is much efficient comparing to the use of a high-speed network shared database. Figure 9 shows a comparison of processing time for each level according to the processing entirely on a local equipment, and processing on a powerful machine with a network database.

Comparison of Proccessing time
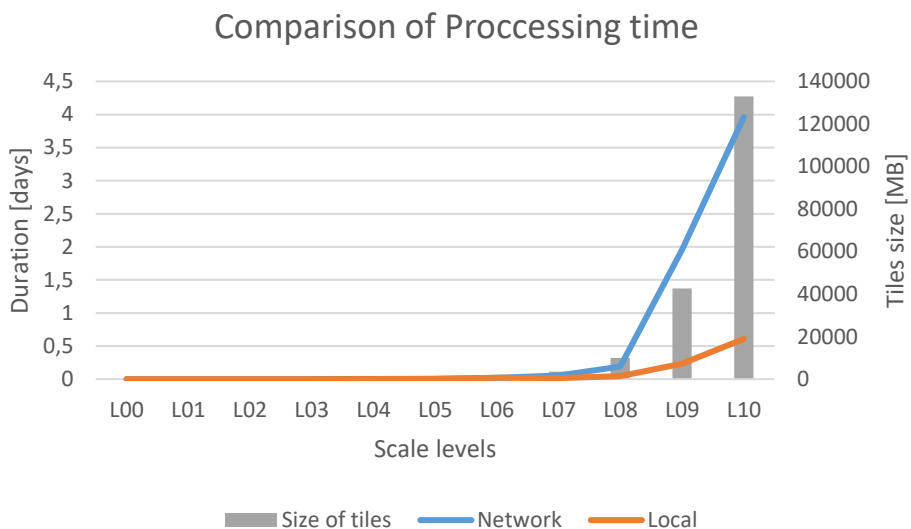
Figure 9. Comparison of data processing

Source: author (2022)

4 Discussion

The decision to process the entire map project using a local machine with all its requirements brought many positives. The biggest positive was the significant reduction of the processing time of the map project, from 1 week to less than 22 hours. This processing configuration leads to an immediate response to correct errors in the map project or to update it.

The proposal for the optimal process of caching map tiles from a map project is to use a powerful local PC with a local database. This solution led to a significantly faster process of the map tiles. This solution has only one disadvantage, and that is the need to keep one extra database.

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Spherical camera for creating 3D models

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Abstract

Research background: Modern globalized world requires precious, verified, and photorealistic data. Utilization of 3D data belongs to contemporary trends in maps production. 3D image data acquisition and processing are resource intensive procedures. Drones can be used to collect suitable image data. This paper is focused on the collection of image data by means of a spherical camera mounted on a drone.
Purpose of the article: The aim of this paper is to propose a procedure how to process image data from a spherical camera mounted on a drone to a 3D model. The whole procedure is applied to data of a chosen building.
Methods: The paper compares approaches for data acquisition to the circular 360-degree method. Pix4D software was used to create digital surface model and generate point cloud. 3D cartographic methods to visualize results are used in the last step.
Findings & Value added: The paper shows the entire procedure leading to a 3D model based on 360-degree source data collected by a drone. The proposed procedure helps to create 3D models in the modern globalized world.

Keywords: *3D model, drone, spherical image data, DSM*

JEL Classification: *Y91; Z33; R59; R39; L86*

1 Introduction

Today's globalized world wants to have realistic model of everything - processing, physics-based, behaviour, etc. (Verma et al., 2011; Li, 2022; Manivasagam, 2022). A new trend has started in this millennium – a realistic and precious modelling of physical objects, especially 3D modelling. These models cover scale from small objects (e.g. statues) to big areas (e.g. cities).

With modern technologies and possibilities available thanks to the globalization, it is very easy to create own 3D model of physical object.

3D modelling has a lot of approaches how to create 3D model. First of all, the object of the modelling must be defined. Particularly, it must be clean if it is a single object or if it is

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an object with its surroundings. For single modelling, some CAD software or a model based of real images are usually used.

3D models have wide areas of application, from medical issues (Awori et al., 2021), forensics (Leipner et al., 2016), constructions (Adán et al., 2020), to GIS (Khayyal, 2022).

Modern approach is using spherical cameras for obtain an image for 3D models. Spherical camera is made by using a multiple lens, at least 2 with 180° angle of view. This approach of data acquisition is mostly used for creating 3D models (Barazzetti et al., 2022). Especially 3D models of interiors and randomly taken images (Barazzetti et al., 2018). For outside 3D models is better to use an UAV (Pepe and Costantino, 2021), (Karachaliou et al., 2019). These models are created by images from an UAV camera itself. New possibility of spherical cameras allow to get better input data. Combination spherical camera and an UAV brings new opportunity for 3D models, especially large outside 3D models (Calantropio et al., 2019), (Humpe, 2020).

2 Methodology

The aim of this paper is to propose a procedure how to process image data from a spherical camera mounted on a drone to a 3D model. By acquisition spherical image data, it is possible to modelling focused object with the surrounding area. The procedure will be designed that uses UAV planned flight with mounted spherical camera and meshing software methods are used for 3D model processing.

The drone or an UAV quickly capture the area of interest or object of interest. For high-quality and precious data acquisition, it's important to use a planned flight. Planned flight provide best results without necessary time delays or redundant image data. For scanning areas of interest or objects of interest for 3D models, there is exist 2 main approaches of planned flight. First one is double grid planned flight, see Figure 10, which is basically classic orthophoto scanning in two directions (Röder et al., 2017). Double grid planned flight usually use -90° pitch of camera gimbal. This setting can be used as input data for 3D model. But there can be missing parts of scanned object because perpendicular scanning cannot see object which is cover by different one from above. This approach is useful for scanning open areas or objects. For more complex or articulated objects is better use different gimbal angle, mostly -45°. This camera gimbal setting can see more objects hidden by different objects. But planned flight must be oriented to centre of object. Generally, this approach is better for bigger areas.
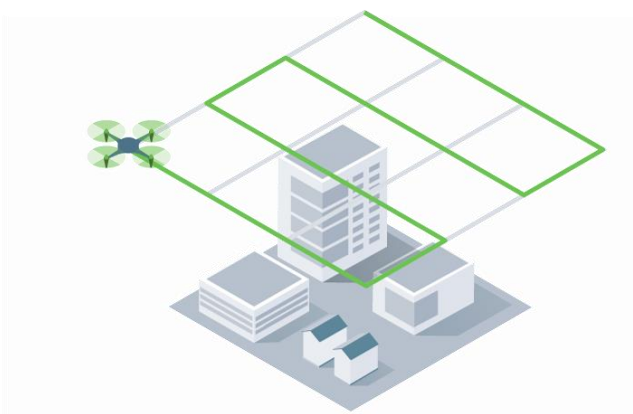
Figure 10. Double grid flight plan

Source: Pix4D (2022)

Second approach for 3d scanning is circular scanning. This approach is based on circular planned flight, which is directly focusing to object, see Figure 11.

Figure 11. Circular flight plan

Source: Pix4D (2022)

Also, for this approach exist more setups. Fastest setup is planned circular flight with only one setting of angle camera gimbal. This approach can be used for scanning object from a quite great distance, where gimbal pitch setting can cover a big part of scanned object. Better setup is flight in more flight levels with different gimbal angle setting, see Figure 12.
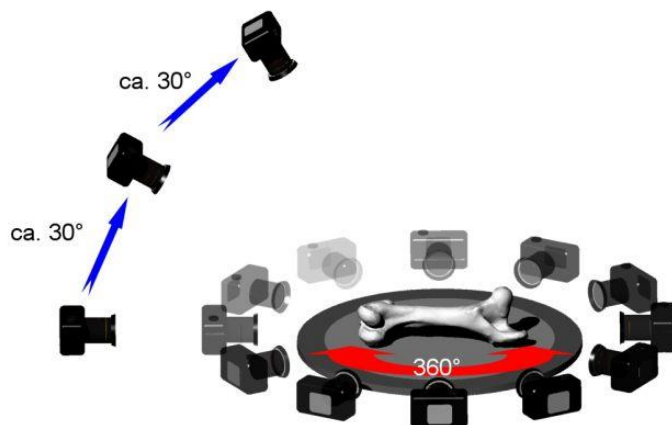
Figure 12. Positions for 3D scanning

Source: Dinosaurpalaeo (2022)

These two approaches are most used for classics scanning by an UAV. Modern possibility is used spherical 360-degree camera for 3D scanning. Big advantage of this spherical camera is angle of scanning. From the name of camera, the angle of scanning covers all directions, so it is scanning in 360° of view. For comparison, build-in camera in drones can cover up to 80° of view. This is quite modern approach of scanning object for 3D models.

This finding led to try new possible way of 3D scanning and that is using one level circular planned flight with spherical camera. This combination guarantees wide shooting angle for scanned object in only one planned flight path. Moreover, outputs from spherical camera allow to create more complex 3D model with more wider boundaries around scanned object. Comparison of angle of view: see Figure 13, it is image taken by drone camera. Figure 14 shows spherical image transferred to flat projection; red boundaries represent drone camera's view angle.

Figure 13. Drone camera angle of view

Source: Author (2022)

Figure 14. Spherical camera angle of view

Source: Author (2022)

The DJI Mavic 2 DUAL Enterprise (DJI, 2022) was used. This drone is a small size drone with 899 grams take-off weight and maximal take-off weight 1100 grams. For flight planning was used an iPad application Pix4D capture (Pix4D, 2022). This app is freeware and provides interactive flight planning in multiple ways and controlling planned flight itself. For collecting, prepare and align images was used Pix4Dmapper software (Pix4D, 2022). Pix4Dmapper is advanced photogrammetry software which provides a lot of functions, include build-up 3D models from an images or videos.

3 Results

The new approach of data acquisition provides very good quality of 3D model. For all calculation was used Pix4D software and output models were exported in triangle meshes. In Figure 16 and Figure 17, there is a comparison of new approach and circular shooting, both taken in one flight level. Because object of intertest was quite far away from drone flight plan, there was no need take more flight levels. The 3D model from circular planned flight is bad, there is missing parts of examined object. The 3D model build from spherical data is complex and contains wider area around object of interest. The detail is also different for both models, see Figure 15.

Figure 15. Detail comparison; left circular, right spherical

Source: Author (2022)

Figure 16. Output 3D model - circular approach

Source: Author (2022)

Figure 17. Output 3D model - spherical approach

Source: Author (2022)

4 Discussion and Conclusion

As already mentioned, using circular planned flight with spherical camera is very useful combination as input data for 3D models. This approach is very suitable for fast data acquisition for 3D models.

There is one limitation of this approach: a loss of spatial information when is using 360-degree video as an input for 3D models. It is important to address this issue when it is planned to use 3D models together with spatial data and maps. Solving this problem is using georeferencing, that 3D model is registered to real world object with spatial coordinates, when it is showed in GIS software.

Acknowledgements

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Simulation model in project management planning: case study

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Abstract

Research background: The field of project management as well as the main world standards and methodologies of project management is divided into classic approaches and agile approaches. Beyond these two approaches a number of recognized authors mention and present a third way out which is created by a mutual combination of these two (classical and iterative (or agile)) approaches. The current question of today is the possibilities and approaches of digitization of both two (or three) approaches that the present time or all stakeholders of each project are increasingly demanding.

Purpose of the article: This article focuses on and compares the possibilities of digitization of planning and management of selected project representative. The presented contribution shows the importance of using digitization in project management. Supplementing the existing approaches with modelling and simulation of the project process itself can bring another dimension to project planning.

Methods: The basic research methods used are a qualitative form of research, through observation, comparison, analysis of text and documents, which are supplemented by the so-called basic scientific methods (i. e. modelling, simulation etc.). Our approach was verified on a specific construction project.

Findings & Value added: The results on the example of a real project show that the usage of simulation during the project planning phase can point out possible issues during project management and increases the probability of project success. Thus, our approach supports the achievement of the value expected from the project by stakeholders.

Keywords: *project management; digitalization; simulation; planning*

JEL Classification: *M11; M15; M16; M21; O32*

1 Introduction

The whole of human history is connected with many historical milestones, buildings or achievements, as evidence or examples of project management and its connection with

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business management. Project management is a relatively new, dynamically developing discipline, with practically the first complete mentions of project management appearing in the second half of the 20th century.

Tools and techniques are used within project management processes. This article is focused on the project planning process, in which we can give examples of work breakdown structure (WBS), gantt chart and network diagrams. The use and mutual combination of these basic management approaches is supported and developed by a number of software products.

In the advanced layer of project management today, there is a reflection, of the current needs of linking, sharing, coordination, analysis and presentation of both individual tasks, but especially a comprehensive effort to unify technical documentation from the preparatory stage (e.g. at the CAD level) to the implementation and final stage of each project.

The use of simulation is recommended already in the project definition phase, as it facilitates the delivery of the value expected by interested parties (Mrzygłocka-chojnacka et al., 2021).

The following article focuses on and compares the possibilities of digitizing project planning and management. The contribution shows the importance of using digitization in project management, when supplementing existing approaches with modelling and simulation of the project process itself, can bring another dimension of results or benefits. The existing static view of the project plan is supplemented with a time dimension and adds new possibilities.

We are aware of the limitations that this approach brings in different types of projects and in today's different approaches to project management (agile, waterfall, hybrid).

2 Literature review

As stated by (Agbejule and Lehtineva, 2022), traditional project management emphasizes disciplined methods of planning and control and brings formality to project management. The traditional schedule-driven approach is most effective in projects with stable and well-known requirements. On the other hand, this approach usually faces challenges in projects with a high degree of uncertainty. Simulation can also be used for project management techniques in an agile environment, but only at the level of sub-situations (Damij and Damij, 2021). If the condition of accurately specifying the project goal is not met, the only option is to proceed in an agile way (Vanzant, 2020). Many authors have been dealing with the combination (so-called hybrid) model of project management recently, while a systematic view (Reiff and Schlegel, 2022) presents not only their direct definition, but especially the method of their combination.

Dynamic simulation techniques have shown to be a flexible method for modelling the dynamic complexity and the associated risks of the projects. In the context of dynamics and feedback loops, the application of control measures taken by the project managers can increase the reliability of the change management decisions (Shafieezadeh et al., 2020).

Some authors also point to the fact that a form of scenario simulation can be a useful way of supporting skill development (Salminen-tuomaala and Koskela, 2020) or (Tarpey, 2022). In the area of building demolition, there were simulations finding out inappropriate sequences in schedule, conducting evaluation of issues related to constructability, and identifying disagreements in time and space. The proposed guideline could help identify errors in construction scheduling, which have the potential to reduce project cost and duration (Alzarrad et al., 2021).

The study (Ying et al., 2021) evaluates the importance of the supply of material to a construction project as one of the important elements of construction operations and an important factor influencing the quality of construction projects. In fact, they refer to logistics

processes as supporting and indicate the potential of developing control of these processes through simulations. There is a need to postpone possible preparatory work away from a construction site (Choi et al., 2022).

Although the existing approaches of some software products are aimed at achieving a 4D view of the project, including the necessary interconnection, it is becoming increasingly clear that modeling or simulation must be involved in both the preparatory part of the project and the operative level.

3 Methodology

The aim of this research was to verify the appropriateness of using modelling and simulation of the project process for a specific project.

The added value of the contribution is in the area of the selected project type, the compilation of a simplified WBS of the first level necessary for the sequence of the chronology of the project plan, which leads to the orientation and achievement of the value expected from the project by the stakeholders.

Research of secondary information sources, modelling and simulation methods were used in the creation of the paper. The basic research methods used are a qualitative form of research, through observation, comparison, analysis of text and documents, which are supplemented by the so-called basic scientific pair methods.

Project management tools based on IPMA and PMBoK international standards were used for the project plan. These are WBS, Gantt chart, Network diagram tools. Processing was implemented with software support. MS Project was used for the project plan. Visualization in SkatchUp and the simulation itself in 4D virtual builder.

The main limitation of the research process is determined by the chosen typology of the project, but at the same time it is based on the research methodology used. None of the international standards of project management (PRINCE2, PMBoK, ICB) use any classification point of view enabling the categorization of individual types of projects (Axelos 2017), (PMI, 2021) and (IPMA, 2015). We cannot forget the limitations related to the professional focus of the authors, when it would be necessary to assemble a multi-member interdisciplinary research team of international composition. Similarly, last but not least, orientation towards English literature or authors publishing in the English language can be perceived as a limiting level of the contribution and research results.

3.1 Presentation of the project solution

We focused on a traditional/waterfall approach to project management. In it, the goal is fixed at the very beginning of the project and should ideally be unchanged until its completion. Based on this definition, it is clear that simulating a variable project would be practically impossible. Due to the availability of documentation, a construction engineering project from the field of building construction was selected. These projects use classic tools in project planning and it was therefore possible to supplement them with the subject of our research (simulation).

In particular, it was about the visualization of the building over time. This visualization is created to better understand the project plan and individual deliverables in the timeline. Last but not least, also as a basis for a presentation for the project's main stakeholders and the implementation team.

Research Questions:
What unpredictable situations will the simulation show us?
What is the point of using simulation in project planning?

The progress of the project as a basis for the processing of the plan, understand work packages, continuity and determining the duration.

The tasks in the project are divided into several main groups of outputs. These are: Bypass route, Land transportation. There are also three separate tasks for which it was not necessary to model (Preparation, Quality Tests and Construction Handover) and start and end milestones. For clarity, a WBS of the first level was created, which was further worked with.
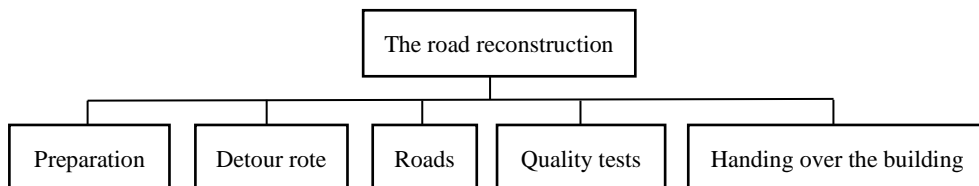
Figure 1. Work breakdown structure.

Source: own processing

3.2 Task chronology

Specification of the main structural systems, the sequence of activities and technologies and the method of their supplier availability. Their progress is based on technological procedures and best practices from previous implementations. Specification of the main construction machines and mechanisms. Determination of the basic concept of construction site operation, its connection to surrounding roads and energy sources. Establishing principles for ensuring work quality and quality control, including environmental protection and work safety conditions.

The duration of construction works is determined mainly on the basis of the performance of machines or workers. For each machine, it is known how much power it has and how much time it needs can be calculated. Management assigns a time reserve to each task. The company thereby protects itself against contractual fines for time delays, and since the investor checks the timely completion of each task, there is a reserve for each of them.

The project starts with the first output called preparation. The first activity here is measurements, prices, other documents. This part is processed by the preparer. From the available technical documentation, he/she calculates the necessary amount of material for which he/she announces a tender. Subsequently, the competition for suppliers of material takes place. Duration is one week. The output of this task is the selected supplier. The logical next step is to draw up a contract for the supply of material, which takes one day. The last task of preparation is the equipment of the construction site. It is mainly a background for construction workers. This activity takes one day and can be done at any time during the entire preparation package. The entire preparation output does not need to be modelled at the activity level and in our system represents a time span of ten days.

The following outputs are of a professional and technical nature and relate to the construction process. Here they are listed briefly, without details.

The second output of the project is the bypass route. It contains only one activity, and that is Milling and straightening the cover of the bypass route. 4 days are reserved for this.

The main output of the project is roads. these are grading (earthworks), design of the earth body, building materials for the construction of transport structures, structural layers. It starts with site preparation, marking bypass routes, which will be done in two days. The successor is work on the soil removal. Namely: removal of topsoil - excavation work on the culvert and

repair of the culvert and reconstruction of the inlet. Six and eleven days are set aside for these activities. The package continues with milling the asphalt cover, which has five days to spare. Followed by local repairs of broken cover, with the same duration. The laying of new asphalt layers takes four days to complete. The roadside reconstruction will take two days. Traffic markings are implemented within two days. The package ends the activity cleaning the construction site, which will be carried out in one day.

Quality tests are a separate activity.

The last task is the handover of the building, which will take place within one day. Its contents include running errands after the construction and writing the protocol. Everything ends with a milestone, which is also specified in the contract, from which contractual fines for non-compliance with the work contract start.

The Figure 2 gives a preview of the Gantt chart in MS Project.
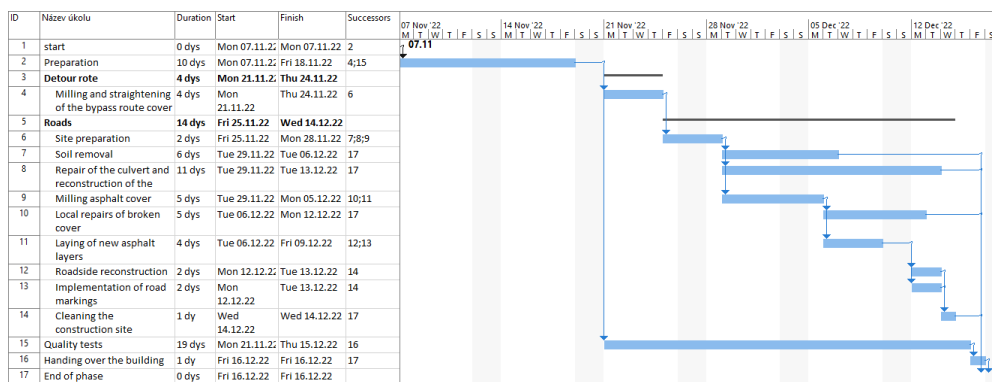
Figure 2. Gantt chart in MS Project

Source: own processing

4 Results and discussion

As part of the research, theoretical insights from project planning organization (Igberaese, 2022) and (Vanzant, 2020) were applied. The verification took place on the reconstruction plan of the selected road. Modelling and simulation in Microsoft Project software in combination with 4D Virtual Builder was used. SkatchUp software was used as a resource for processing graphic outputs.

4D Virtual Builder is a powerful modelling plugin for SketchUp that allows you to create complex and large-scale graphic projects and designs. Simulation includes the ability to visualize models based on a timeline and visualize changes being made in real time. In our case, the finished visualization also represents a connection with other logistical topics such as space limitation, space arrangement and necessary input-output material flows, or Illustrations documenting their size and intensity.

The simulation created in the 4D Virtual Builder program connected the time schedule from the Gantt diagram and the 3D model of the solved civil communication created in SketchUp. The applicability of this simulation is shown mainly when carrying out construction work in a small area. When the plot designated as the background of the building is small, there is a need to plan the use of the space over time. This means arrivals of materials and its schedule, space location (storage) of machines and more. This is where the simulation of the project model used by us stands out. In this way, the probability of additional change management costs is reduced. Additional costs can then arise from time delays tied, for example, to contractual fines.

Every competitive advantage of a construction company can bring new customers. The change in the planning area will also contribute to limiting the release during the project implementation itself. Therefore, the costs of implementation will be reduced and with them, better results of the company's management can be expected. Other factors such as job security, the possibility of risk management, etc.

The minimization of undesirable situations and savings related to the solution of change management (or crisis situations) has a multiplicative nature (i.e. when used on a larger number of buildings (projects), their multiplication occurs). This finding was clearly confirmed in the investigated company, where the company's historical data showed a similar solution to the situation, which could have been detected in advance by simulation and occurs in 20% of cases. If the company were to use the simulation, in the long run, the introduction of the mentioned method of project modelling and simulation would pay off.

It would be possible to supplement our simulations with virtual reality, which, however, has additional limitations (Boton, 2018). A possible future of project planning is also in artificial intelligence (Salem and Dragomir, 2022).

5 Conclusion

Current modern approaches for the creation and management of construction projects based on the existing planning model enable the design and management of ground infrastructure through connection to CAD tools, beyond the scope of project management. In this way, the required BIM (Building Information Modelling) methodology is being implemented both at the European (for example: Commission decision of 28 November 2011 setting up the European multi-stakeholder platform on ICT standardization) and at the national level. It will bring the cooperation of a whole range of solving entities and their cooperation in real time on the model of a large whole to which sub-projects contribute. This fact is similarly mentioned by (Vilutiene et al., 2019) and (Martinsuo and Geraldi, 2020).

Building Information Modelling forms the beginning of a sequence of real-time (4D) project management steps; (5D, costs) and (6D, the so-called life cycle of the building), which indicates its wide range of uses. On the other hand, the mere fact that not every structure is a building is a fact that will always limit the use of standard Building Information Modelling approaches.

Similarly, the case study proved that the project planning stage often contains a number of related (secondary) issues that may not be directly related to the project, but their effective resolution becomes a necessity in a wide range of industries.

The main knowledge and findings show that while the pace of digitization of planning and management by classical approaches has progressed considerably to such an extent that a number of project management tools are already fully integrated in IS, a non-negligible dynamic development can be expected for the remaining two approaches. The result of the implementation of the spatial simulation surprisingly pointed out the need to also plan the use of space in time. Simulation should become part of the entire life cycle of the construction portfolio and not just one separate project.

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Formation and development of the electric vehicle market in the global market

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Abstract

Research background: There are two directions for the creation of electric vehicles: the first is the development of new models, the second is the adaptation of mass-produced cars. The second direction has become more widespread since it is less expensive. Various governments have developed strict CO2 emissions regulations that have increased the demand for electric vehicles and provide incentives and subsidies to boost sales of electric vehicles.

Purpose of the article: There is a gradual shift of the main interest from car makers to electric vehicles. The purpose is to show the formation and development of the electric vehicle market, analyse current volume of produced vehicle, and observe planned targets of vehicle producers in international market and research investments budgeted.

Methods: The characteristics of electric vehicles will be explained followed by the study of the international sales by well-known companies, and considered forecasts made based on STEPS and APS scenarios. The investments allocated by different vehicle manufacturers for the next decade would be analysed and concluded the expected investment forecasts in the Chinese market.

Findings & Value added: Different countries use their own charging standards and big problem is that several charging stations can only be compatible with a certain type of voltage. The growth in sales of electric cars will increase the demand for electric filling stations in the world and given the fact that they are already in short supply in several countries, especially where the number of electric car owners is high, this could become big problem.

Keywords: *development; electric; vehicle; global; comparative*

JEL Classification: *Q42; Q5; O13*

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1 Introduction

The global pandemic has been a huge stress test not only for companies, but for humanity. The crisis has shown which companies can take care of their employees even with reduced or zero income. Sewing workshops stopped sewing covers for car seats and readjusted machines to cotton masks, disinfection was produced by companies that do not deal with this field at all. The bonding was huge and showed the need for Social Responsibility. Just as people cannot think only about their needs, companies must behave in the same responsible way. Authors of review on Electric Vehicles: Technologies and Challenges. Smart cities, Sanguesa et al. (2021) describes an electric vehicle as a vehicle that is powered by one or more electric motors. The electric motor can be powered either from a battery or solar battery, or from fuel cells and also determines that most of the electric vehicles in use are battery-powered designs.

Richardson (2013) emphasizes that there are two directions for the creation of electric vehicles: the first is the development of new models, the second is the adaptation of mass-produced cars. The second direction has become more widespread since it is less expensive unlike a car with an internal combustion engine, an electric car has a simpler design, which has a minimum number of moving parts, which has a positive effect on its reliability.

Based on extreme fast charging of electric vehicles a technology overview shows that the main building blocks of an electric vehicle are battery, electric motor, transmission, on-board charger, inverter, DC-DC converter, and electronic control system. The battery is designed to provide power to the electric motor. The most widely used lithium-ion battery, which is a series of modules connected in series. At the output of the battery, a DC voltage of about 300V is removed. The capacity of the battery must match the power of the electric motor.

Tu et al. (2019) noted that an electric motor is also one of the main elements of an electric vehicle. It is designed to create the torque necessary for the movement of the machine. We observe that a traction motor, three-phase synchronous (asynchronous) AC motors with a power of 15 to 200 or more kW are used. Compared with the internal combustion engine, the electric motor has high efficiency and less energy loss. For example, the efficiency of an electric motor is 90%, while that of an internal combustion engine is only 25%.

Based on Christensen (1997) study, some electric vehicle designs use multiple electric motors to drive the individual wheels of the vehicle, greatly increasing its propulsion power. There is also a design where the electric motor is installed directly into the wheel of the car, reducing the transmission to a minimum. But such a scheme has a serious drawback - the unsprang mass increases and the handling deteriorates. In his research Mousavi et al., (2015) describes that the transmission of an electric vehicle has a fairly simple design and, on most models, is a single-stage gear reducer and demonstrate that an on-board charger is required to charge the battery of an electric vehicle from a household electrical outlet. Solution of car producers and research studied by Poorfakhraei (2021) affirms that the inverter is used to convert the high DC voltage of the battery into the three-phase AC voltage needed to run the electric motor. The DC converter is designed to charge an additional 12V battery, which is used to power such consumers of the car's electric power as electric power steering, air conditioning, lighting system, windshield wipers, multimedia system and others.

Technical passports of electric vehicles demonstrate that an input sensor is used to evaluate the position of the gas and brake pedals, the gear selector, and the pressure in the brake system and the state of charge of the battery.

2 Methodology

The main characteristics of electric vehicles will be clarified at first. Next step would be the analyses of the international sales by well-known companies.

Recent studies according to Cuma and Koroglu (2016) show that the research of estimation strategies is one of the main interests in the field of electric vehicles as well as battery technologies, vehicle control, charging and grid interaction issues. Estimation of any fault, state or information plays an important role in ensuring vehicle stability and reliability.

Forecasts in the article are made based on STEPS and APS scenarios which are exploratory. They define a set of policies and targets, and then forecast based on model representations of energy systems, containing market dynamics and technological progress. The latter implies the intensification of policies to limit emissions (including regulatory restrictions), large-scale investments in the creation of infrastructure at a faster pace, as well as stimulation of the purchase of electric vehicles.

The Stated Policies Scenario (STEPS) is the baseline scenario of the IEA flagship reports. This scenario mirrors all existing policies which have been implemented or announced by governments around the world.

It includes current electric vehicle related policies and regulations, as well as the expected effects of announced deployments and plans from industry stakeholders. STEPS aims to hold up a mirror to the plans of policy makers and illustrate their consequences. The Announced Pledges Scenario (APS) appears for the first time in the WEO-2021. The version published in the WEO-2021 takes account of all of the climate commitments made by governments around the world up to early October 2021, (IEA, 2021).

BEVs mentioned in the article stands for a battery electric vehicles. PHEVs are plug-in hybrid electric vehicles. FCEVs are fuel cell electric vehicles. EVs talk about to all electric vehicles (BEVs + PHEVs).

In the last part, the study of the investments allocated by different vehicle manufacturers for the next decade and comment on the expected investment forecasts in the Chinese market will be made.

3 Results and discussion

The table 1 shows the main characteristics of electric vehicles. As can be seen from this table, electric vehicles are not inferior to traditional cars in terms of dynamic qualities, but in terms of energy efficiency, as shown, they are significantly superior. In terms of speed properties, an electric car is significantly inferior to traditional cars, but for urban conditions this is not a disadvantage.

In terms of sales volume, the electric vehicle market is closest to the tipping point. Data from ICCT briefing 2021 shows, that in 2020, sales of electric vehicles in the world amounted to 4.2% of the total volume of the global passenger transport market - 3.1 million vehicles. As stated in electricity market report (2022) expected institutional changes and technological breakthroughs in the global market will lead the industry to move from a market growth stage to a mass rapid transition stage in the coming years.

Table 1. Characteristics of electric vehicles

Electrovehicle	Weight	Engine power	Acceleration time to 100 km/h	Max. speed	Battery	Power reserve on full charge
Tesla Model X	-	567	3,8	250	90	400
Jaguar Land Rover "I-Pace"	2100 -	294	4,8	200	90 (Li-Ion)	480
Porshe Taycan	-	560 (1050)	2,8	260	93,4 (Li-Ion)	412
Nissan Leaf E	1525 - 1965	80 (280)	11,9	144	24 (Li-Ion)	175
Volvo Polestar 2	-	300	5	-	78 (Li-Ion)	500
Renault Fluence	1605 - 2025	70 (226)	13	135	22 (Li-Ion)	185
Renault Zoe	1390	60 (222)	-	135	(Li-Ion)	160
Roll-Royce	-	290 (800)	8	165	Li-NMC	200
Chevrolet Bolt	-	147 (360)	7,2	160	60 (Li-Ion)	380
BMW I3	-	125 (250)	-	-	42 (Li-Ion)	-
Mazda MX-30	-	107 (265)	-	-	35,5	200
Audi E-tron	-	265	6	200	95 (Li-Ion)	400
E Lada	1250 - 1610	60 (275)	14	130	17,3 (Li-Ion)	150

Source: own processing based on brand's official sources (2022)

In Global EV Outlook data (2021) based on STEPS, shown for publicity demonstrates that the electric vehicle market in the base case will reach sale of 15 million vehicles in 2025 and more than 25 million vehicles in 2030, which correspond to 10 and 15% of the total car market, respectively (Figure 1). The APS scenario assumes that in 2030 the level of global sales will reach 45 million units, which will be about 35% of the total market (Figure 2).
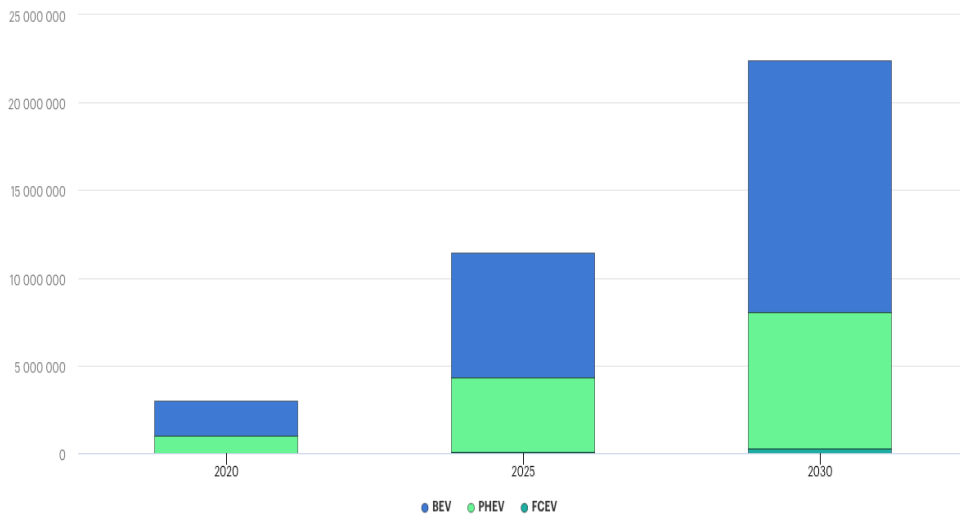
Figure 1. Sales of EV forecasts based on STEPS

Source: own processing based on iea.org (2021)

Investments by vehicle manufactures

We observed that United States electric car maker Tesla has opened a "Gigafactory 3" plant in China, near Shanghai. The construction of the company's plant took only one year. Currently, the plant assembles cars and about 30% of components, and the construction of the second production line was completed by 2021, which allowed to increase the percentage of components produced locally and expand the range of cars. It is not without reason that the company turned its attention to China. Technode analysts assess that despite 25% import duties, China remains Tesla's second largest market, trailing only the Unites States and ahead of Norway and the Netherlands. But in the United States, the period of state tax crediting for Tesla cars is coming to an end (Edmunds, 2022), which means that interest in them is likely to gradually fade. In China, certain laws were passed (Liu F. et al., 2020) that resulted in increased price of cars with internal combustion engines. This further spurred the demand for electric cars.
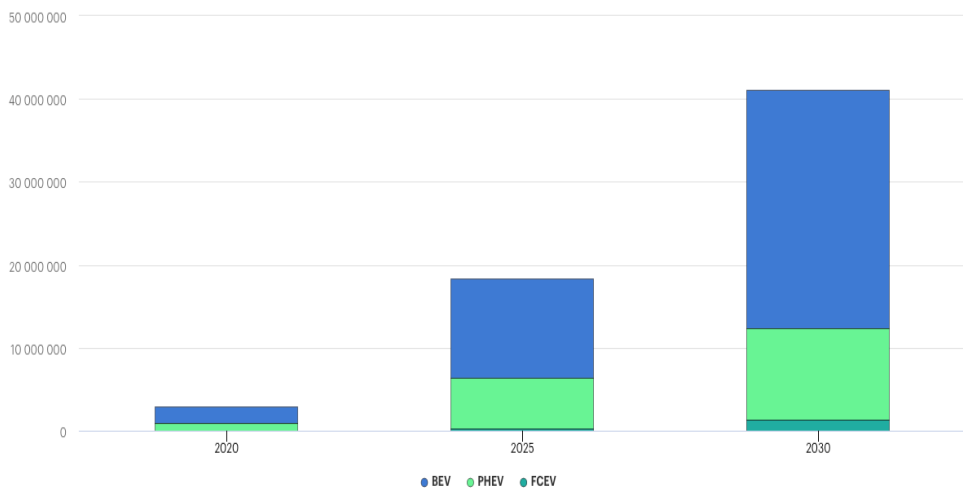
Figure 2. Sales of EV forecasts based on APS

Source: own processing based on iea.org (2021)

The German non-profit organization Center for Research on Solar Energy and Hydrogen Baden-Württemberg (Nieder and Püttner, 2020), states that sales of electric and hybrid vehicles in China reached 1.2 million in 2018, which is 61.8 of all electric vehicles sold in the world last year.

According to many experts, building a factory in China will allow Tesla to cut shipping costs and avoid import duties. The starting price for the Chinese-made sedan, which will be sold only in the local market, is approximately 328,000 yuan (White, 2022). Thus, an elite American brand will be able to compete even with manufacturers of cheap Chinese cars like BAIC Motor Corp. and BYD, which offer sedans for about 200,000 yuan.

Thanks to Chinese government support, the plant was built in record time. It took Tesla just 168 days (or about six months) to go from getting building permits to bringing electricity to a brand-new plant. The company has made a big bet on process automation: most of the plant area is occupied by hundreds of robots that are involved in almost all stages of production. However, the complete rejection of the human workforce is still far away, although Elon Musk seriously assures that over time, all Tesla enterprises will become completely autonomous, turning into "machines that make machines".

As we observed the Model 3 was the first car to be produced in a wholly foreign-owned factory in China. As of 2022, Model 3 weekly output has risen to 3,000 units, giving an annual production capacity of 150,000 vehicles. The next planned milestone is 250 thousand, while the Model Y crossover joined the sedan.

Reuters published an analytical study (Lienert and Chan, 2019) of the activities of 29 of the world's largest automakers. The study showed that the total investment in electric transport is more than $300 billion, with about 45% of these funds concentrated in China. In the next 10 years, world industry leaders intend to invest huge financial resources in the development of battery technologies and the development of electric vehicles in general. According to study forecasts, a significant part of these investments will be directed to the Chinese economy.

Table 2. Companies investing in Chinese market

Producer	Country	Investments (in U.S dollars, milliard)	Investments in batteries (in U.S dollars, milliard)	Investments in China (in U.S dollars, milliard)	Share of China
Volkswagen Group (Volkswagen/Audi/ Porsche)	Germany	91	57	45,4	50%
Daimler (Mercedes/ Smart)	Germany	42	30	21,95	52%
Hyundai/Kia	South Korea	20	–	–	–
Changan	China	15	–	15	100%
Toyota	Japan	13,5	13,5	–	–
Ford	USA	11	–	–	–
Fiat Chrysler	Italy / USA	10	–	–	–
Nissan	Japan	10	–	4,5	100%
Renault	France	10	–	0,11	100%
Tesla	USA	10	5	5	50%
General Motors (GM)	USA	8	–	–	–
Great Wall	China	8	–	8	100%
BMW/Mini	Germany	6,5	4,5	0,385	6%
GAC	China	6,5	–	6,5	100%
Anhui Jianghuai Automobile (JAC)	China	6	–	6	100%
Mahindra & Mahindra	India	5,5	–	–	–
Geely	China	5	–	5	100%
SAIC	China	5	–	5	100%
Dongfeng	China	4,5	–	4,5	100%
BYD	China	3,86	3,8	3,86	100%
BAIC	China	2,45	–	2,45	100%
Jaguar Land Rover	The Great Britain	2,34	–	–	–
Tata	India	0,9	–	–	–
PSA Peugeot Citroen	France	0,77	–	0,26	34%
Volvo	Sweden	0,725	–	0,725	100%
Honda	Japan	0,545	–	0,235	43%
Chery	China	0,435	–	0,435	100%
FAW	China	0,25	–	0,25	100%
Mazda	Japan	0,25	–	–	–
Overall investments in China				135,56	

Source: own processing based on iea.org and reuters.com (2022)

Based on annual car producer reports, in a sum, China will receive 135 billion dollars. The country is actively promoting the production and sale of electric vehicles through a system of government-approved quotas, loans, and incentives. As a result, spending by major Chinese automakers such as SAIC and Great Wall Motors can be equal to, and in some cases even less than, their foreign counterparts such as Volkswagen, Daimler, and General Motors. Reuters (2019) analysed the investment budgets released over the past two years by automakers from the US, China, Japan, South Korea, India, Germany, and France.

The study does not include the amount of associated costs incurred by auto parts suppliers, technology companies and large corporations in industries ranging from energy and aerospace to electronics and telecommunications.

Daimler plans to introduce 130 electrified vehicles by 2030, including hybrids and fuel cell models, and has budgeted about $30 billion for batteries. The entire range of the Smart brand consisted exclusively of electric vehicles by 2020, while Daimler will expand its product line with electric vans and heavy-duty trucks. The company is investing $1.9 billion in the Chinese economy through cooperation with BAIC. Negotiations are also underway with the Chinese firm BJEV to launch the production of Smart electric vehicles in China.

Hyundai and its subsidiary Kia reported that they will invest $20 billion over the next 3 years in electric and self-driving vehicles. By 2025, it is planned to produce 14 electric cars, 12 hybrids and 2 fuel cell vehicles. The group is also investing $6.7 billion in the development of hydrogen engines.

Toyota affirmed their plans of $13.5 billion investments in battery technology by 2030. Together with Mazda and Denso, the company owns enterprises involved in the development and production of electric vehicles. Also, Toyota plans to produce 10 new electric vehicles in China by 2023, and by 2025 to introduce electrified versions of all existing models. It is expected that by 2030, 5.5 million electric vehicles of this brand will be sold worldwide.

Ford Team Edison Product Development Director stated that Ford plans to launch production of 24 new hybrid models and 16 electric vehicles by 2022. According to the company publications, by 2025, 70% of the brand's vehicles made in China will run on electricity. The cost of the joint venture between Ford and Zotye, which produces electric vehicles in China, is estimated at $750 million.

The Renault-Nissan alliance's R&D emphasized their budget of $20 billion. The group plans to launch 17 electric vehicles, including 8 new Nissan-branded electric vehicles. In addition, Nissan is investing $9 billion with Dongfeng to manufacture 20 electric vehicle models in China. Another $335 million will be invested in the construction and launch of a battery cell plant in Thailand.

GM plans the launch of 23 new electric cars by 2023, and by 2025 will introduce electrified versions of almost all Chevrolet, Buick and Cadillac models sold in China. GM, together with SAIC, will be engaged in the production of battery cells for electric vehicles in China. Based on report, the American automaker is also investing in new design solutions for electric vehicles and battery systems. However, according to company representatives, over the next few years, the amount of capital investments in electrification and automation will be only $ 8 billion.

BMW asserted their plans to introduce 12 new electric vehicles and 13 hybrids. The company is investing $340 million to build a plant in Leipzig and another $225 million to launch battery production in Munich. In addition, BMW will invest $700 million in a joint venture with Chinese automaker Great Wall.

Figure 2. Visual share of investments in China by brands

Source: own elaboration based on iea.org (2022)

4 Conclusion

Various governments have developed strict CO2 emissions regulations that have increased the demand for electric vehicles. In addition, governments provide incentives and subsidies to boost sales of electric vehicles.

Different countries use their own charging standards. At the same time, a big problem is that several charging stations can only be compatible with a certain type of voltage. As mentioned earlier, the growth in sales of electric cars will increase the demand for electric filling stations in the world and given the fact that they are already in short supply in several countries, especially where the number of electric car owners is high, this could become a big problem soon the future.

It is impossible to speak in full about the fact that electric vehicles can solve the environmental problem, because. They have different impacts on the environment. On the one hand, there is a reduction in CO2 emissions, but on the other hand, at present, in many countries there are no regulations governing the process of recycling and disposal of batteries.

Those lobbying for the idea that electric vehicles will reduce dependence on traditional energy sources, which in turn will improve the energy security of developed countries, are

also not entirely correct in their statements. Yes, dependence on traditional sources (oil, gas, etc.) will decrease, but dependence on rarer sources of raw materials (lithium, cobalt) used in the manufacture of batteries will increase.

By 2025, this number will be 25,000,000 per year. By the same year, electric vehicles will account for 20-22% of all cars. The major carmakers are far behind Tesla and Chinese manufacturers in terms of innovation in the electric car market, but they have serious intentions regarding it. Thus, Volkswagen, which sold 8,000 electric cars (including hybrid ones) in China, sold 400,000 such cars in 2020, and by 2025 it will sell 1,500,000 units a year.

Experience shows, however, that forecasts rarely go unadjusted, especially in the face of uncertainty in which we live today. On the one hand, market developments may encourage other carbon-neutral countries to adopt similar targets, to reduce emissions from transport, which is problematic to decarbonize. On the other hand, a massive transition to the production of electric vehicles can provoke an increase in the cost of batteries (according to one of the world's leading investment banks, by an average of 18%), whose share is estimated at 20-40% of the total production costs for an electric car. Such a jump threatens to slow down the growth in demand for electric vehicles.

Acknowledgement

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The Impact of Globalization on the Slovak Electrical Engineering Sector from the Aspect of Financial Management

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Abstract

Research background: The electrical industry can be considered one of the main pillars of the Slovak economy. The Slovak electrical engineering sector is one of the areas that have been quite strongly affected by globalisation over the last 20 years. This is evidenced by the fact that in 2021, 39% of all sales in the sector were produced by only 4 transnational corporations: SAMSUNG Electronics Slovakia s.r.o., Foxconn Slovakia, spol. s.r.o., Panasonic Industrial Devices Slovakia s.r.o., WHIRLPOOL SLOVAKIA spol. s.r.o.

Purpose of the article: Our research aims to highlight the impact of globalization on the Slovak electrical industry, to compare the development of selected financial ratios of selected companies operating in the electrical sector in Slovakia and to determine the effectiveness of financial management in the Covid-19 period from 2019-2021.

Methods: For the 4 largest players in the Slovak market, following indicators have been examined: net profit, net cash flow, return on assets, return on equity and net profit margin. The subsequent correlation analysis between net profit and net cash flow has been carried out.

Findings & Value added: The impact of globalisation on the Slovak electrical industry is pointed out. Selected profitability indicators are analyzed from 2019 to 2021. According to the research the enterprise with the most effective financial management is determined in the selected sector.

Keywords: *globalization; financial management; electrical industry*

JEL Classification: *L63; G32; F61*

1 Introduction

The electrical engineering sector is considered as one of the main pillars of the Slovak economy. The current situation on the market reflects both — traditional electronics

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manufacturing (power generators, telephones, radios, etc.) and new trends especially connected to the growing automotive industry in Slovakia (electric motors, microelectronics, sensors). The ongoing shift towards e-mobility is creating whole new opportunities for all electrical component suppliers. The electrical engineering sector is one of the strongest contributors to the country's GDP, plays a significant role in the industrial output, and is also one of the biggest employers in the country. This sector employs over 45 000 people (SARIO, 2021).

The Slovak electrical engineering sector is one of the areas that have been strongly affected by globalisation over the last 20 years. Globalization has significantly influenced the electrical engineering industry as a specific representative of the latest science and technology results by a synergistic effect that greatly improves the quality of production of other industrial sectors, especially the mechanical engineering industry. This is evidenced by the fact that in 2021, 39% of all sales in the sector were produced by only 4 transnational corporations which are more than 51% owned by investors from South Korea, Taiwan, Japan, and the USA (Finstat, 2022). Electrical engineering companies are located across whole Slovakia. Some regions have had historically a strong tradition in this sector, while others have been shaped by new global players and their suppliers coming to the region. A significant number of companies are connected to the automotive industry supplier network. The electrical engineering industry is not created by just a few big companies. A large number of medium and small companies have a long tradition. Moving to a circular economy requires manufacturers and producers to rethink their business models for a stronger value proposition and delivery. Many businesses have implemented circular economy business models with different design options to accomplish sustainable business goals and economic prosperity (Pollard et al., 2021; Vishwakarma et al., 2022; Kim et al., 2022; Naik and Eswari, 2022). The most important 4 enterprises in the Slovak electrical engineering sector are SAMSUNG Electronics Slovakia s.r.o. (LCD moduls and LED screens), Foxconn Slovakia, spol. s.r.o. (LCD and OLED TVs and printed circuit boards), Panasonic Industrial Devices Slovakia s.r.o. (control boards, chargers, speakers, sensors) and WHIRLPOOL SLOVAKIA spol. s.r.o. (household appliances). These 4 key representatives generated the bigger volume of operating revenue in the selected sector in 2021 (SARIO, 2021). This study aimed to analyze and describe financial management by using profitability indicators of electrical engineering companies and determine the effectiveness of financial management from the aspect of the pandemic.

Financial management enables us to decide responsibly on business investments and to ensure the necessary financial stability. Financial management focuses on decisions with a tendency to obtain the necessary capital. Profitability is the best measure of a company. Increasing profits show that a company can pay dividends and that the share price will trend upward (Kiseľáková and Šofranková, 2020; Jang and Ahn, 2021). Creditors will loan money at a cheaper rate to a profitable company than to an unprofitable one. The common profitability measures compare net profit with sales, assets, or equity: net profit margin, return on assets and return on equity. Return on assets (ROA) presents the overall effectiveness of the inserted capital using regardless of the source of coverage. The indicator is released about the amount of profit-generated assets (Kuč and Kaličanin, 2021). Return on equity (ROE) presents the profitability of capital inserted by shareholders or business owners. ROE is a key indicator based on which investors decide to pick stocks (Yu et al., 2022). Net profit margin represents the company's ability to achieve profit at a given sales amount (Zhang and Xie, 2022). Assessing the uncertainty of cash flows, along with where they originate and where they go, is one of the most important objectives of financial reporting. It is essential for assessing a company's liquidity, flexibility, and overall financial performance (Kiseľáková et al., 2020). Financial indicators provide relevant information that helps to determine if companies lead to bankruptcy or will have other financial problems in the future.

It is demonstrated by the fact that even experienced companies regardless of their age may commit a failure process in which financial problems or performance decreases are not observable in the last financial report before bankruptcy (Lukason and Laitinen, 2019).

In 2019 there was research that examined the financial health of individual electrical engineering companies in Slovakia by using the Taffler model, Springate model, and the Aspect Global Rating (Stefko et al., 2019). In the Slovak electrical engineering sector, research has not previously been done to compare profitability indicators to determine the enterprise with the most effective financial management. After an extensive review of the literature, it is understood that there has not been a substantial study on the financial management performance of the Slovak electrical engineering sector considering underwriting profitability indicators. The main contribution of this study is a comparison of financial management of 4 key enterprises in the electrical engineering industry in Slovakia.

The research question is which company in the Slovak electrical engineering sector has had the most effective financial management during the COVID-19 pandemic? We want to compare an attitude in financial management in the electrical engineering sector during the COVID-19 pandemic and explore which attitude seems to be the best way. The paper is structured as follows: in the introduction was carried out the literature review and were introduced basic research goals, in section 2 are introduced the data used in the analysis and the methodology. In the next step are presented results, which are discussed in section 4.

2 Methodology

The analysis has been performed by using the data from the statistical database FinStat.sk, which monitors enterprises' income and business activities in the Slovak Republic and is the only source of microeconomic data based on harmonized bookkeeping principles. This database provides accounting information that has been necessary for our research. Finstat analyzes the accounting resources of each company. Finstat cooperates with reliable resources such as the Commercial Register, Trade Register, Register of Financial Statements, Register Bankruptcies, Lists of Insurance Borrowers, and Judicial Decisions (Finstat, 2022).

The first research question is which company in the Slovak electrical engineering sector has had the most effective financial management during the COVID-19 pandemic? We have chosen these 4 key representatives of the selected sector because of the bigger volume of Operating revenue. Operating revenue including the sale of non-current assets and securities of the sample is presented in Table 1.

Table 1. Operating revenue in 2019-2021 [€]

Operating revenue	2021	2020	2019
SAMSUNG Electronics Slovakia s.r.o.	1 696 779 000	1 310 098 000	1 506 890 000
Foxconn Slovakia, spol. s.r.o.	1 138 542 000	1 004 596 000	1 205 095 000
Panasonic Industrial Devices Slovakia s.r.o.	337 254 722	269 425 693	249 101 271
WHIRLPOOL SLOVAKIA spol. s.r.o.	286 669 000	253 272 000	260 467 000

Source: Finstat (2022)

The database Finstat provides already calculated profitability indicators for every electrical engineering company in the period and this paper's results of indicators have been compared. In this study profitability indicators have been used: ROA, ROE, and net profit margin. The calculation for profitability indicators is expressed in Table 2.

Table 2. Profitability indicators formula

Profitability indicators
$ROA = \dfrac{Net\ Profit}{Total\ Asset}$
$ROE = \dfrac{Net\ Profit}{Total\ Equity}$
$Net\ Profit\ Margin = \dfrac{Net\ Profit}{Total\ Revenue}$

Source: Kabát et al. (2013)

Return on Asset (ROA) is the net profit expressed as a percentage of the total asset. A higher ROA number means better utilization of the company's assets. Return on Equity (ROE) is net profit expressed as a percentage of the total equity. ROE expresses how profitably the company is using the owners/shareholders' funds to yield profits. Net profit margin is the percentage of profit a company produces from its total revenue. It measures the amount of net profit a company obtains per euro of revenue gained (Kabát et al., 2013).

3 Results

Financial profitability is the individual ability to make a profit from a particular investment. It is a measure closer to investors and owners and is conceived as the relationship between net profit and net worth of the company. The indicators of profitability in a business or a company are those that serve to determine the effectiveness of the project in the generation of wealth, that is, that allows to control of the balance of expenses and benefits, and thus guarantee the return.

The financial statements of these 4 enterprises have been used as resources for our research. We have analyzed financial statements for calculating profitability indicators. Financial statements and data from their health insurance companies in Slovakia from 2019 to 2021 have been collected to fulfill the aim of the study.

The results for the ROA indicator in the period from 2019 to 2021 are aggregated according to individual electrical engineering companies and are presented in Figure 1.

The ROA indicator expresses the net profit as a percentage of the total asset. A higher ROA number means better utilization of the company's assets. Due to IFRS financial reporting companies, the ROA median value of industry ratio was 1,1% (2019), 2% (2020), and 2,8% (2021) (Ready Ratios, 2022). Based on the results in Figure 1 there was an approximately constant level of ROA indicator from 2019 to 2021 in three companies. Only Panasonic reached a significant increase in the selected period. In terms of the ROA indicator in 2021, Whirlpool performed best at 5,3%. In other words, every 1 euro of assets produced 5,3 cents of net profit. Samsung produced 4,6 cents of net profit for every 1 euro of assets and Foxconn produced 2,5 cents.
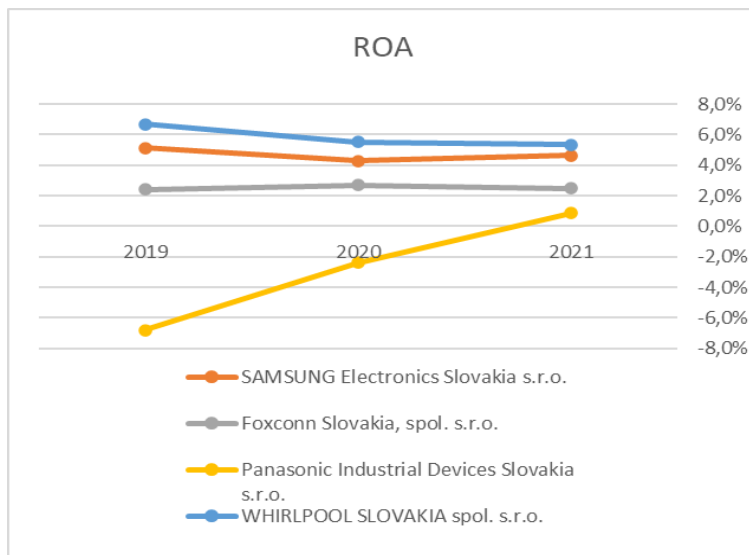
Figure 1. ROA growth in the electrical engineering sector 2019-2021

Source: own elaboration (Finstat, 2022)

In comparison, Panasonic produced 0,9 cents of net profit for every 1 euro of assets. We should notice an obvious difference in 2019 Panasonic produced 6,8 cents of net loss for every 1 euro of assets.

The results for the ROE indicator in the period from 2019 to 2021 are aggregated according to individual electrical engineering companies and are presented in Figure 2.
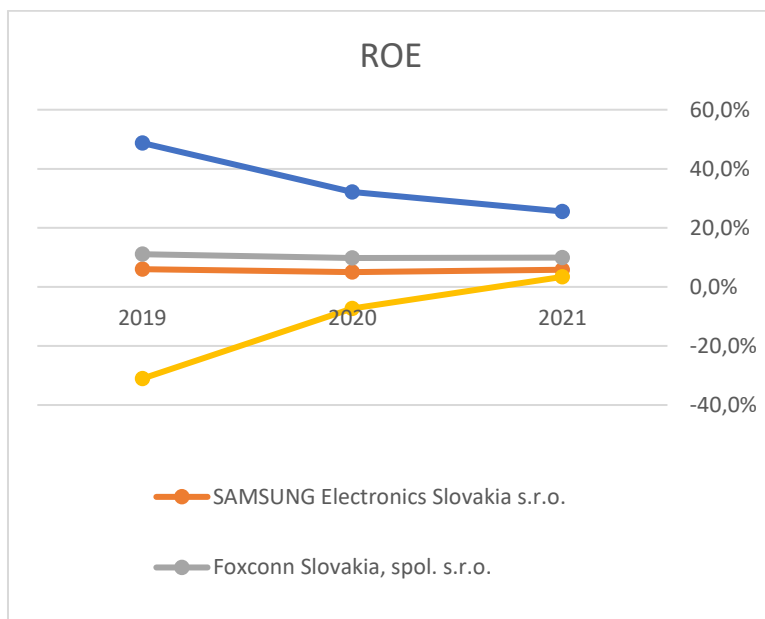
Figure 2. ROE growth in the electrical engineering sector 2019-2021

Source: own elaboration (Finstat, 2022)

The ROE indicator expresses net profit as a percentage of the total equity. Due IFRS financial reporting companies, ROE median value of industry ratio was 0,6% (2019), 1,5% (2020) and 4,7% (2021) (Ready Ratios, 2022). Based on the results in Figure 2 there was a significant depression in the ROE indicator from 2019 to 2021 in Whirlpool but still reached the best position at 25,5%. The other two companies noticed an approximately constant level of ROE in the reporting period. There was an obvious difference from 2019 to 2021 when Panasonic produced at the level of 31,1 cents of net loss for 1 euro of equity and moved to the level of 3,4 cents of net profit.

The results for the net profit margin indicator in the period from 2019 to 2021 are aggregated according to individual electrical engineering companies and are presented in Figure 3.

Figure 3. Net profit margin growth in the electrical engineering sector 2019-2021

Source: own elaboration (Finstat, 2022)

Net profit margin is the percentage of net profit a company produces from its total revenue. It measures the amount of net profit a company obtains per euro of revenue gained. Due to IFRS financial reporting companies, the net profit margin median value of the industry ratio was 1,2% (2019), 2,7% (2020), and 3% (2021) (Ready Ratios, 2022). There was an approximately constant level in the net profit margin indicator from 2019 to 2021 in three companies and a significant increase in Panasonic. In terms of the net profit margin indicator in 2021, Samsung performed best at 3,5% and Whirlpool performed very similarly at 3,4%. In other words, every 1 euro of total revenue produced 3,4 cents of net profit. Foxconn produced 1,2 cents of net profit for every 1 euro of total revenue. In comparison, Panasonic produced 0,5 cents of net profit for every 1 euro of total revenue. There was an obvious difference from 2019 to 2021 when Panasonic produced at the level of -3,5 cents of net loss for 1 euro of total revenue and moved to the level of 0,5 cents of net profit.

The results for the net profit in the period from 2019 to 2021 are aggregated according to individual electrical engineering companies and are presented in Table 3.

Table 3. Net profit in 2019-2021 [€]

Net profit	2021	2020	2019
SAMSUNG Electronics Slovakia s.r.o.	56 927 000	45 874 000	52 298 000
Foxconn Slovakia, spol. s.r.o.	13 710 000	12 115 000	12 362 000
Panasonic Industrial Devices Slovakia s.r.o.	1 742 155	-3 627 558	-8 661 812
WHIRLPOOL SLOVAKIA spol. s.r.o.	9 641 000	9 082 000	9 687 000

Source: own elaboration (Finstat, 2022)

Net profit is the amount of money that a company has after all its expenses are paid. In the pandemic year, 2020 the value of net profit decreased in 3 companies and only Panasonic improved the level of net loss to -3 627 558 €. In terms of the net profit in 2021, all 4 enterprises generated a higher volume of net profit. The highest increase in net profit produced Samsung by 24%. For Panasonic, there was an obvious difference between 2020 when generating net loss and 2021 when already generated net profit with an improvement of 148%.

The results for the net cash flow in the period from 2019 to 2021 are aggregated according to individual electrical engineering companies and are presented in Table 4.

Table 4. Net cash flow in 2019-2021 [€]

Net cash flow	2021	2020	2019
SAMSUNG Electronics Slovakia s.r.o.	-23 450 000	11 993 000	161 251 000
Foxconn Slovakia, spol. s.r.o.	-8 000	9 000	-18 000
Panasonic Industrial Devices Slovakia s.r.o.	361 371	-57 991	-667 773
WHIRLPOOL SLOVAKIA spol. s.r.o.	-2 832 000	1 609 000	1 365 000

Source: own elaboration (Finstat, 2022)

Net cash flow is the amount of cash generated or lost over a specific period. In the pandemic year, 2020 the value of net cash flow surprisingly increased in 3 companies and only Samsung deteriorated by 93%. In terms of the net cash flow in 2021, 3 enterprises generated a lower volume of net cash flow and only Panasonic improved its level of net cash flow at a positive 361 371 €. At the same time, as the only company that generated positive net cash flow in 2021. There are times when a company can have negative cash flow while reporting positive net income.

4 Discussion

The electrical engineering industry produces and sells electronic equipment for industries and electronics products for consumers such as televisions, mobile devices, and printed circuit boards. The industry includes telecommunications, electronic components, appliances, industrial electronics, and consumer electronics. Electronics companies may produce electrical equipment, manufacture electrical components and sell items at retail to make their products available to consumers. Globalisation is a word that many companies use to describe their business. However, globalization includes different approaches to the market. For some, globalization means having several branches scattered around the world. For others, it means having their products and services available in major industrial centers around the world. For very few companies, globalisation means doing business to provide

services around the world as efficiently and easily as in a small village. Globalisation has significantly influenced the electrical engineering industry as we could see that in 2021, 39% of all sales in the sector were produced by only 4 transnational corporations which are more than 51% owned by investors from South Korea, Taiwan, Japan, and the USA. On the list of the TOP 25 electrical engineering enterprises in Slovakia with the highest operating revenue in 2021, all of them are foreign direct investments mostly from Europe and Asia (Finstat, 2022). The global approach of the 4 selected companies is to provide products and services in major industrial centers around the world and also an important role plays e-business.

We analyzed the ROA indicator, in 2021 Whirlpool performed best at 5,3%. Samsung produced 4,6 cents of net profit for every 1 euro of assets. These two companies achieved the best values of ROA in the reporting period. Panasonic produced the biggest increase in ROA indicator from -6,8% in 2019 up to 0,9% in 2021. There was a significant depression in the ROE indicator from 2019 to 2021 in Whirlpool but still reached the best position at 25,5%. There was an obvious difference from 2019 to 2021 when Panasonic produced at the level of 31,1% of net loss and moved to the level of 3,4% of net profit. In terms of the net profit margin indicator in 2021, Samsung performed best at 3,5% and Whirlpool performed very similarly at 3,4%. Panasonic produced 0,5 cents of net profit for every 1 euro of total revenue in 2021 and this company noticed the biggest improvement among selected enterprises. Net profit is the source of compensation to a company's shareholders. If a company can't generate enough profit to compensate owners, the value of shares will plummet. If a company is healthy and growing (with increased profits), higher stock prices should result. In terms of the net profit in 2021, all 4 enterprises generated a higher volume of net profit than in the previous year. In 2020 Samsung produced a decrease in net profit by 12% and in 2021 increased this value by 24%. For Panasonic, there was an obvious difference between 2020 when generating net loss and 2021 when already generated net profit with an improvement of 148%. Whirlpool generated net profit in the whole reporting period without large swings in values. In 2020 Whirlpool produced a decrease in net profit by 6% and in 2021 increased this value by 6%. The value of net cash flow surprisingly increased in 3 companies and only Samsung deteriorated by 93% in the pandemic year 2020. Samsung's net cash flow decreased in 2020 by 93% and then in 2021 by a significant 196%. Samsung's problem with liquidity was caused by an increase in current receivables. Samsung's financial management should negotiate a shorter period of current receivables with its key customers. Whirlpool's net cash flow surprisingly increased in 2020 by 18% and then in 2021 decreased by a significant 176%. Whirlpool's financial management is very stable with only small economic swings. Whirlpool's net cash flow increased in 2020 because of production depression and related production costs decline, which in 2021 rapidly increased. Panasonic had a significant liquidity problem in 2019, firstly in 2020 its net cash flow increased by 91%, and as the only company that generated positive net cash flow in 2021 with a huge increase of 623%. The successful growth of net cash flow was caused mainly by an increase in current payables and liabilities to employees. This attitude of the financial management of Panasonic improves in the short-term and affects the company's financial health, but they should not forget the reputation of the company. In this research, there are times when a company has negative cash flow while reporting positive net income.

This study aimed to analyze and describe financial management by using profitability indicators for key Slovak electrical engineering companies. Based on this study in the period of a pandemic the WHIRLPOOL SLOVAKIA spol. s r. o. and SAMSUNG Electronics Slovakia s.r.o. used its assets well above the ROA industry ratio median. WHIRLPOOL SLOVAKIA spol. s r. o. reached the best value of the ROE indicator in 2021 at 25,5%. The highest net profit margin generated in 2021 was produced by SAMSUNG Electronics Slovakia s.r.o. at 3,5% but WHIRLPOOL SLOVAKIA spol. s r. o. performed very similarly at 3,4%. SAMSUNG Electronics Slovakia s.r.o. showed the ability to create profit in the

reporting period but it had significant problems with liquidity. WHIRLPOOL SLOVAKIA spol. s.r.o. generated net profit in the whole reporting period without large swings and got smaller problems with cash flow management in the reporting period. Therefore, WHIRLPOOL SLOVAKIA spol. s.r.o. takes the best position in terms of financial management effectiveness in the Slovak electrical engineering sector.

Future research directions may also be highlighted in a problem of the financial health in the Slovak industrial sectors. The limitation of this study was an analysis in a short period of 3 years and a lack of access to management decisions.

Acknowledgments

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Prediction of the future oil price

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Abstract

Research background: Predicting the future price of oil is crucial for all participants in the commodity markets who trade oil. Moreover, the prediction of oil prices also has an important impact on the overall economy.
Purpose of the article: The aim of the paper is to analyse the time series of the oil price until 2022 and then to find out what impact the change in the oil price has on the evolution of the electricity price.
Methods: We use a technical analysis to predict the future oil price and a correlation analysis to determine the extent to which the oil price impacts the electricity price. The primary source of data to create the analyses is historical data from online databases from January 1, 2011 to October 1, 2021.
Findings & Value added: In view of all the constructive market fundamentals, we forecast the Brent spot price to average USD 67/BBL in 2022. Price risks that may arise will be skewed towards a higher oil price (up to USD 80/BBL). The correlation coefficient indicates a positive dependence between the oil price and the electricity price. This means that if the oil price changes by one unit, the electricity price will also change by one unit. We see the application benefits of the paper for participants in commodity markets, for analyses of economic variables on GDP, and the fundamental importance of oil futures prices for the future evolution of inflation and production.

Keywords: *prediction; oil price; electricity price; technical analysis; correlation analysis*

JEL Classification: *C32; E32; Q43*

1 Introduction

Oil is an important raw material and energy resource and plays a key role in the global industrial economy (Horák et al., 2020). It supports the development of the global economy

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and society (Timilsina, 2015). The price of oil, like of any other commodity, is shaped by the interaction of supply and demand in the market (Vochozka et al., 2020). The demand is shaped by consumption and is significantly influenced by the economic cycle (Baláž, 2006). In the long run, it evolves according to the global economic growth. A decline in the global economic growth reduces the demand for oil. The overall world demand for oil is increasing due to the economic growth in countries such as China, Brazil, India and Russia (Mareček and Machová, 2018). Therefore, what we find on the radar of investors in the oil market is the GDP growth figures mainly from the world's largest economies (Ropa.cz, 2021).

On the supply side, however, in addition to oil stocks, it is also necessary to take into account the impact of OPEC cartel regulation, natural disasters and the threat of military conflicts associated with embargoes on exports to a particular country (Gaspareniene et al., 2022). As oil is traded on commodity exchanges, speculative behaviour by investors can have both stabilising and not stabilising effects on prices. The effects of price changes are different for oil importing and oil exporting countries. For net importers, price increases will cause a deterioration in the balance of trade and negatively affect GDP. Exporters, on the other hand, benefit from oil price increases (Baláž, 2006).

The forecasts of demand, supply and prices are essential for all energy market participants (Sanders et al., 2008, 2009), but the oil price predictions are particularly important because of the impact of oil prices on all aspects of energy markets, on commodity markets and on overall economic activity, GDP growth and inflation (Mamatzakis and Koutsomanoli-Filippaki, 2014).

The aim of this paper is to analyse the time series of the oil price up to 2022 and then to find out what impact the change in oil price has had on the evolution of electricity prices up to 2022. We will use a technical and a correlation analysis to obtain the results.

To meet the objective, the following research questions are formulated:

RQ1: What is the prediction of the futures price of oil until 2022?

RQ2: What is the projected impact of a change in the price of oil on the price of electricity until 2022?

2 Literature research

Alquist et al. (2011) sought a reliable model for forecasting real and nominal oil prices that would benefit all oil importing and exporting countries. As the oil futures market plays an important role in information aggregation and price discovery, the prices of oil futures contracts traded on exchanges such as the New York Mercantile Exchange or the Intercontinental Exchange are commonly perceived to reflect market participants' expectations of future oil prices (Alquist and Arbatli, 2010). Moreover et al. (2013) show that over longer horizons, which are important for policymakers, the predicted performance of the oil futures curve is worse compared to a forecast without considered expectations of market participants. A possible explanation for this finding is that oil futures prices contain a time-varying risk premium. In fact, Hamilton and Wu (2014) find evidence of substantial changes in risk premia in oil futures prices after 2005.

Oil futures, as the most traded commodity futures in the world, play a key role in price fluctuations in the international financial market (Marousek et al., 2015). Therefore, many researchers have analysed the factors influencing the oil futures prices. Using the Markov-Switching Vector Autoregressions (MSVAR) model, Li (2017) concluded that the price of oil futures is directly affected by the positions of investors with the commodity index, and the positions of investors have a significant impact on the returns of oil futures. The price of oil futures as a financial derivative is affected by the behaviour on financial markets. The

investment strategy of commodity index investors is to control the direction of the oil futures market and then influence the fluctuation of oil prices. Guo (2018) concluded that the price of oil futures is affected by various factors such as supply and demand, exchange rates, political relations and international financing.

Zhao (2012) used the cointegration theory and the Granger causality test to conclude that there is a cointegrating relationship between energy and carbon futures prices and a causal relationship between the natural gas price, the electricity price and the carbon futures price. Using two dynamic correlation estimators, i.e., rolling correlation and dynamic conditional correlation multivariate GARCH, Lu et al. (2014) provided empirical evidence of time-varying information spillovers between global oil markets (Beckmann et al., 2014).

The authors point out that the adjustment of spot returns to the forward premium follows a nonlinear path consistent with smooth transition models. There is empirical evidence that investors commonly use futures contracts to hedge uncertain risks, to protect their portfolios and to avoid sudden price changes (Dergiades et al., 2012). Along these lines, Vacha and Barunik (2012) use wavelet coherence to uncover interesting dynamic correlations among energy commodities.

In communicating policy decisions, many central banks have emphasised the importance of oil futures prices for the future inflation development. Until recently, central banks and international organisations tended to rely solely on the oil futures curve to forecast the oil price (Rousek, 2020). However, recent research has shown that models incorporating economic determinants of the oil price, such as changes in oil inventories, oil production, and real global economic activity, can provide more accurate forecasts than oil futures prices (Alquist, Kilian, and Vigfusson, 2013; Baumeister and Kilian, 2014; Baumeister, Kilian, and Zhou, 2013).

This finding is also true in a real-time forecasting environment where oil price predictors are only available with a delay and are subsequently revised repeatedly (Baumeister and Kilian, 2012).

3 Data and methods

The data on the price of Brent oil were obtained from one of the largest Czech portals Kurzy.cz and from the financial portal Finex.cz, and covered the period from 1 January 2011 to 1 October 2021. The values were measured in USD per barrel/BBL (159 litres) in monthly terms over the last ten years. Graph 1 shows a line graph of the time series of the Brent oil price from 2011 to 2021. Since 2009, the oil price volatility has had a tendency to get higher. In this context, the long-term trend of oil prices is important to ensure future economic stability in many countries, as oil price changes and unstable oil supply can seriously affect their economies that depend on oil imports and exports (Singer, 2007; Olomola and Adejumo, 2006). The biggest drop in the price of oil was recorded in February 2020 due to the global pandemic, when Chinese authorities reported 19,461 newly confirmed cases of covid-19. From March 2020 onwards, the number of countries with infection began to increase exponentially, and these countries started to implement anti-pandemic measures, which had an impact on the economies of the countries. The prices shown in Graph 1 are the spot prices of Brent crude oil, which is one of the types of oil traded on the Exchange right next to WTI crude oil.
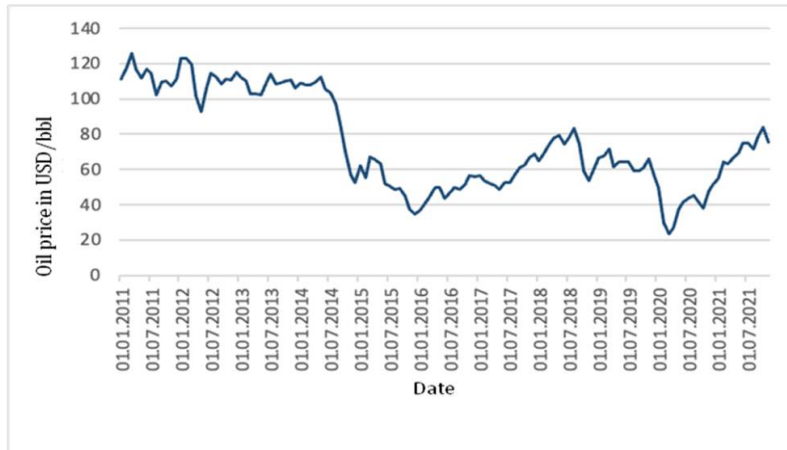
Graph 1. Brent crude oil price time series 2011 – 2021.

Source: Author

Most oil price forecasts are produced by commercial institutions (oil companies, banks, investment groups or large traders) and are intended only for the needs of those institutions or of a small circle of subscribers. For example, Moghaddam et al. (2018) compare the estimates of 13 institutions by evaluating the evolution of their oil price forecasts on three fixed dates. They use the criteria of the forecast efficiency and the forecast fairness to do so, and also examine possible sources of failure to meet these criteria.

In this paper, the methodology is based on estimating the future value for a short period of one year. To predict the oil price in the future year 2022, linear function Linertrend in Microsoft Excel was selected, which predicts the future development based on the historical data. The function finds the predicted value from the area of two cells whose relationship can be captured by a linear dependence. For the period from 1 October 2021 to 1 December 2022, 14 samples will be predicted (14 months). The variable y is a set of values derived from the relation y = mx + b and corresponds to the values obtained from the past period and the spot price of oil. The variable x is a set of values to which the values of the y field correspond. In this case, it is the individual period x. The new x between 1 October 2021 and 1 December 2022 is a set of values for which the function calculates the corresponding values for 2022. The logical value of b is a parameter and determines how we calculate the linear dependence. To find the prediction of the future electricity price, we applied an identical procedure as for the prediction of the oil price. Using a linear trend, the new x is predicted.

In order to predict future oil prices, it is necessary to consider factors that significantly affect the price of oil and cannot be predicted by the market, such as weather and natural disasters, or military conflicts and geopolitical reasons. The most important factor influencing the oil price increases is the supply/demand ratio. Factors can be long-term (economic expansion) or short-term (seasonal changes).

In order to determine the oil price and electricity price dependence, we created a correlation analysis from historically available data from 1 January 2011 to 1 October 2021. The correlation analysis is shown in the correlation (dot) diagram created in Microsoft Excel in Graph 4. To determine the existing relationship between the oil price and the electricity price, the correlation was calculated using the correlation coefficient through the Correl function, where the oil price was the cell area of matrix 1 and the electricity price was the cell area of matrix 2.

4 Results

Technical analysis was performed using previously collected historical data, extended by a linear trend followed by a forecast of the Brent crude oil spot price for 2022. Graph 2 shows the two rising lines of the linear trend, or the forecast for 2022, from a short period of two years from October 1, 2019 to October 1, 2021 and three years from October 1, 2018 to October 1, 2021. This technical analysis forms two outputs that are part of our future forecast. The final prediction is extended by various expert analyses. The forecast is primarily based on the upward trends from the outputs shown in Graph 2, which are mutually compared.
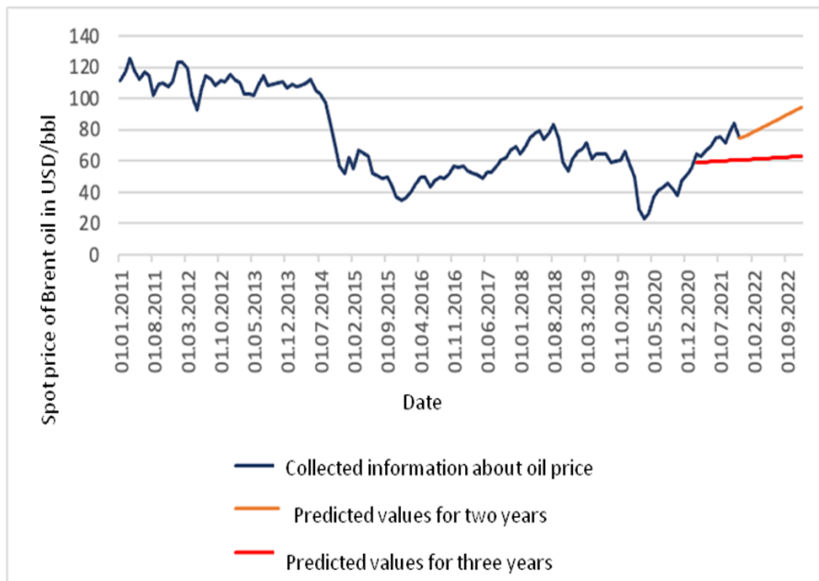
Graph 2. Oil price time series with subsequent prediction for 2022.

Source: Author

Graph 2 shows a line graph of the oil price time series, extended by a linear trend with a prediction of future developments until 2022. In June 2008, the world oil prices, which had had an upward trend since 2003, rose to $134/BBL. The oil prices declined after the global economic crisis in 2008 but started to rise again in early 2009 (Farzanegan and Markwardt, 2009). Buetzer et al. (2012) suggested possible explanations for such a projected slowdown in oil demand growth, such as structural changes in the global economy, consumer reaction and government policies. Since the crisis, the world economy has been recovering and growing continuously due to high demand. The years following the crisis were favourable for the OPEC cartel due to higher prices which brought them higher profits. It can be seen that from 2014 onwards the price of oil started to fall after OPEC decided to maintain oil production in 2014. The price of oil fell below $50/BBL and the biggest drop was in 2020. The sharp drop in the price of oil in 2020 was caused by the global pandemic of covid-19, with the price falling to almost $23/BBL in March.

Uncertainty grew steadily because of the newly rising confirmed covid cases, causing panic in the financial markets. The price at the end of 2020 rose above $50/BBL for the first time since March 2020 due to expectations that many countries would introduce vaccination against covid-19, which would accelerate the recovery in energy demand. Currently, aviation remains the weakest part of global oil demand. The price of oil per BBL surpassed $80 in

October 2021, the first time in more than three years, due to the recovery of the global economy and demand. Its value climbed to USD 81.5/BBL (O energetice.cz, 2021).

The diagram in Graph 3 shows a line graph of the electricity price followed by a prediction for 2022. To answer the second research question, the below graph was created using historical data identical to the spot oil price followed by a prediction from two time periods.
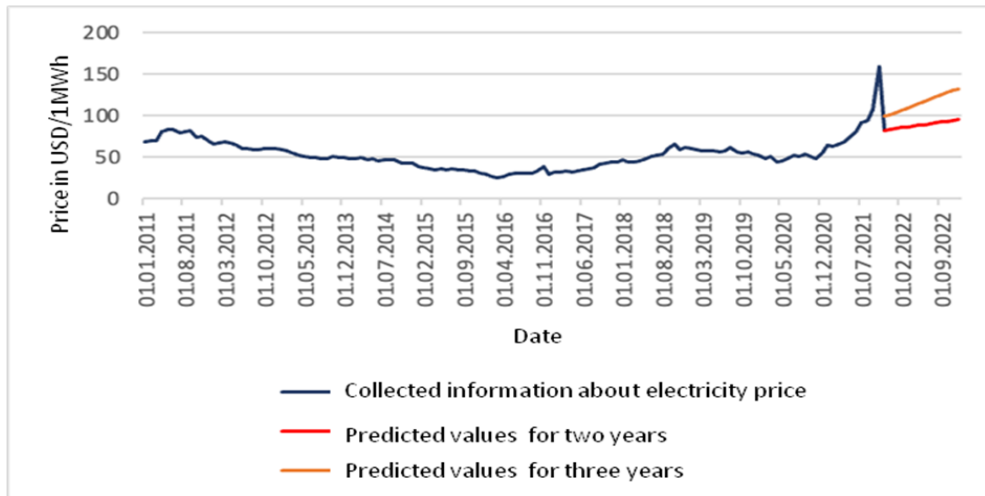
Graph 3. Electricity price time series with subsequent prediction for 2022.

Source: Author

Graph 4 shows a correlation diagram that illustrates the statistical dependence of the observed variables oil price and electricity price for the last ten years from 1 January 2011 to 1 October 2021. We have interleaved this Graph with a linear line whose equation is y = 0.3145x + 28.725.
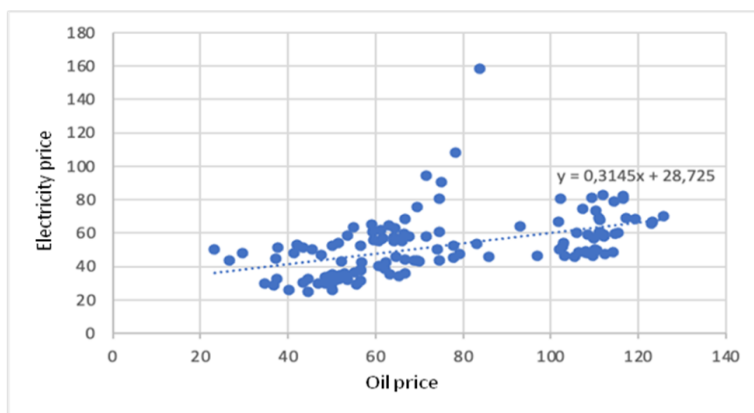
Graph 4. Correlation analysis - oil price and electricity price dependence 2011 – 2021.

Source: Author

To find out the existing relationship between these variables, we calculated its correlation using the correlation coefficient. The correlation coefficient of the oil price and the electricity price takes a positive value of 0.4721549, which indicates an average existing dependence of the relationship between the oil price and the electricity price. In this case, it means that if

the price of oil changes by one unit, the price of electricity changes by one unit at the same time.

5 Discussion

Based on the results obtained, we are able to answer the research questions that have been set.

RQ1: What is the prediction of the oil futures price until 2022

The historical data from 1 October 2018 on Graph 2 was used as the basis for creating a technical analysis that predicted future Brent crude oil prices until 2022. The linear trend method was used for two periods, 1 October 2018 – 1 October 2021, and 1 October 2019 – 1 October 2021. From this analysis, two outputs are obtained (see Graph 2) using two increasing linear trend lines. The outputs were then compared and extended them with further expert analyses. Based on these outputs, it was possible to make a prediction.

The oil futures price curve will rise slowly until 2022. Graph 2 shows a gradual rise in the Brent crude oil spot price in the future year 2022. However, the linear trend does not include certain factors affecting the oil price that should be taken into account. The relevant factor that cannot be avoided is primarily the political situation. Currently, the global pandemic of covid-19 has unfavourably affected the demand for oil, which has caused an unexpected shortfall in exporters' revenues. Due to the increasing number of infected people, countries have been implementing strict restrictive measures. However, the price of oil can also be affected by international demand for petroleum products (AIP, 2013).

In selecting the factors influencing international oil price fluctuations, some time series include daily data, such as the US dollar exchange rate. Cartels, such as the Organization of the Petroleum Exporting Countries (OPEC), can also influence the price of oil (finex.cz, 2021). However, their aim is to keep prices stable or only slightly fluctuating. Given the competition from WTI oil, it would be necessary to adjust the prices again.

The estimates for the year 2022 according to Platts Analytics predict an increase in the global demand for oil by 4,7 million barrels a day, thus reaching 103,2 million barrels a day, which is on annual average by 700 000 a day more than before the pandemic (Spgobal.com, 2021). In contrast, EIA (Environmental Impact Assessment) predicts that the price of Brent oil decreases from the average value of 84 USD/bbl in October 2021 to 66 USD/bbl in December 2022 and the price of WTI will decrease from the average value of 81 USD/bbl in October 2021 to 62 USD/bbl in December 2022. Expert estimates by EIA predicted that the global consumption of oil would exceed the production of oil for five consecutive quarters, starting from the third quarter of the year 2020. During this period, oil reserves in OECD (Organisation for Economic Co-operation and Development) decreased by 424 million barrels, which accounts for 13 %. The forecast is that the global demand for oil will exceed the global supply by the end of the year, thus contributing to further decreasing of oil reserves and keeping the price of Brent oil above 80 USD/bbl until December 2021. However, the global oil reserves will start to be created in 2022, thanks to rising production from OPEC+ countries and the USA due to the slowing growth of global oil demand. This shift is expected to decrease Brent oil, which is predicted to be 72 USD/bbl in 2022 (Independent Statistics Analysis, 2021).

In response to all constructive market fundaments, it could be assumed that the spot price of Brent oil in 2022 will be 67 USD/bbl on average. The price risks that may arise will be skewed towards a higher price of oil. In the case of tightening the market balance, the possibility of an increase in oil price up to 80 USD/bbl cannot be excluded. Based on the

comparison of outputs from technical analysis, the prediction from the period 1 October 2018 – 1 October 2021 will be prioritized.

RQ2: What is the projected impact of a change in the price of oil on the price of electricity until 2022?

The price of electricity in general shows a slight correlation of 0.4721549 with the development of oil prices. Since oil as fuel plays only a small role in the production of electricity, the prices of oil and oil products have only a small direct effect on electricity prices in Europe (Impact of the Oil Price on EU Energy Prices, 2014). The calculated correlation coefficient reaches a positive value of 0.4721549, which confirms the existence of the relationship between the monitored variables, oil price and electricity price for the last ten years. Various views of the impact of oil prices on the global economy have been formulated. Several studies found that higher oil prices have an adverse effect on economy (Akpan, 2009; Amano and Van Norden, 1998). Based on the obtained results, it can be predicted that if oil price decreases from 74,32 USD to 67 USD, electricity price will grow or decrease by a unit. The development of the price of these commodities is influenced also by environmental emission production from renewable resources.

6 Conclusion

The goal of the paper was to predict future spot prices of Brent oil and its effect on electricity prices until 2022. On the basis of performed technical analysis, future values of spot prices of Brent oil traded on the Stock Exchange were predicted. The obtained historical values were used as a basis for creating a linear trend from two different periods. The technical analysis had two outputs and the prediction was based primarily on the increasing trends of these two outputs. Correlation analysis was applied to determine the impact of oil prices on electricity prices. To confirm the existing relationship between these variables, correlation coefficient was calculated, which reached positive values, which could be seen as a confirmation of the existing relationship between oil price and electricity. It can thus be assumed that if the price of oil changes by one unit, the price of electricity will also change by a unit.

At present, it is not easy to predict the future oil prices. This prediction was thus made for a short period of fourteen months. The essential factor was that expert analyses were incorporated into the outputs of technical analysis. The accuracy of the prediction was also determined by fundamental factors that could be predicted to some extent; however, there are many non-market factors that cannot be predicted, such as political situation, changes in the strategy of the OPEC cartel, as well as the spread and the development of new mutations of COVID-19. In making resulting prediction, which included fundamental factors extended by other expert analyses, the prediction until the year 2022 from the period of three years, from 1 October 2018 to 1 October 2021.

The application benefits of the paper can be seen for the participants in commodity markets trading in oil and electricity, for the analysis of the impact of the economic variables on GDP, and the fundamental importance of oil futures prices on the future development of inflation and production. The output of the prediction of the curve of futures oil and electricity prices was information corresponding to the actual situation on these commodity markets.

Acknowledgement

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Corporate Debt Financing in the Building Project Development Sector (Characteristics of National Companies and Companies under Foreign Control)

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Abstract

Research background: Major corporate entities operating in the property development sector are companies that are part of corporate groups which create a network of affiliated entities associated with certain advantages and disadvantages. One of the benefits is being able to better utilise one's resources and achieve better performance. It can be stated that these companies show significant specific characteristics in the area of debt financing.

Purpose of the article: The aim of the paper is to assess the existing practice of utilizing debt financing in the sector. The object of interest was national companies, companies under foreign control, non-affiliated companies and affiliated companies. Those indicators that were assessed are: cost of debt, interest coverage and corporate indebtedness. Company payables to banks and controlling or controlled entities were observed.

Methods: Data were obtained from several sources. This was a combination of data from databases and from publicly accessible national registers. Companies were divided into categories according to ESA 2010 classification and according to the corporate group size level. The relevant quantitative data was acquired from financial statements such as data on interest expense and similar expenses, payables etc.

Findings & Value added: The results of the research indicate that companies which are part of corporate groups have significant representation in the sector. It was shown that companies under foreign control are part of bigger corporate groups as opposed to national companies. When assessing the cost of debt indicator no greater differences were found between national companies and companies under foreign control.

Keywords: *debt financing, cost of debt, interest coverage*

JEL Classification: *G10; G32; L74*

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1 Introduction

A company that becomes part of a corporate group brings significant competitive advantages. Affiliated companies as opposed to non-affiliated companies can pool the group's common resources (Aguilera et al., 2020; Lin & Yeh, 2020; Min et al., 2022), for example, use loans from affiliated entities or draw bank loans guaranteed by affiliated entities (Lin & Yeh, 2020). Pooling capital resources becomes more important with the limited options of obtaining external financing or with the high costs of debt financing (Cooper & Nguyen, 2020). Affiliated companies have easier access to external financing (Cainelli et al., 2019) and can obtain bank loans more easily (Cainelli et al., 2019). Pooling resources contributes to the financial independence of affiliated companies (Lin & Yeh, 2020) and improves their investment conditions, (Lin & Yeh, 2020). Møen et al. (2019) divides debts into external (to a third party) and internal (to any affiliated entity). Goldbach et. al. (2021) followed up the findings of Møen et al. (2019), while dividing debts into external (to a third party), parent (to a parent company) and internal (to other affiliated entities outside the parent company).

Among the benefits of companies becoming part of a group and pooling common resources are: i) independence of external financing: Pooling capital resources is a substitute for external financing (Cainelli et al., 2019). ii) easier entry into the sector: Pooling capital resources creates better conditions for entry into the sector (Aguilera et al., 2020). International corporate groups can pool their resources with local companies and make use of competitive advantages in the form of pooling cross-border capital resources (Fisch & Schmeisser, 2020). The disadvantages of companies becoming part of a group are: i) more complex management: Unlike non-affiliated companies, corporate groups have a more complex management structure (Li et al., 2022) and the difficulty of management increases with the size of the group (Min et al., 2022). ii) competition between companies: Although companies within a group cooperate, they also compete with each other (Li et al., 2022).

A group's resources can be redirected to a company as financial resources for strengthening its equity or as foreign capital (debts). Debt financing is more interesting for companies from a tax perspective (Cooper & Nguyen, 2020), the interest tax shield reduces the costs of debt. National companies can only make use of a standard interest tax shield whereas companies under foreign control can also use the international interest tax shield (Goldbach, 2021). Using debt financing while pooling resources is a means for tax optimisation (Cooper & Nguyen, 2020, Møen, 2019, Goldbach, 2021). However, this method of financing also brings tax risks as for example companies can face suspicion of abusing these transactions for profit shifting (Cooper & Nguyen 2020). OECD (2020) also assumes possible abuse. The aim of OECD (2020) is to set the rules for appraising fees for the use of debt financing among affiliated entities in the same way as if fees were to be set by non-affiliated entities.

Goldbach et al. (2021) urge further research in this area in order to understand the operational reasons for using debt financing between affiliated entities. The authors point out that tax savings are not the only goal of pooling a group's resources (Goldbach et al., 2021). Examining specific industries is also important since this way it is possible to gain more specific knowledge (Li et al., 2022).

The building project development sector in the construction industry was analysed through the conducted survey. The construction industry is a sector in which financial leverage is used and is strongly dependent on the availability of credit (Oh & Yoon, 2020). The principal production factor of companies operating in the sector is capital and the group's pooling of capital resources can be an important competitive advantage.

2 Aim and Methods

The conducted survey builds on the idea of the research of Joni et al. (2020), who examined the differences in capital expenses in one country (Indonesia) among the selected corporate groups in various sectors. The subject of this survey is also the situation in one country, which is the Czech Republic. The research focused specifically on the Building Project Development sector. It does not observe total capital expenses instead the research focuses specifically on debt financing expenses. The benefit is that the situation is assessed in one country and one specific sector. The selected sector is characterised by the small number of companies that operate in it, is challenging in terms of capital and socially significant.

The aim is to assess the use of debt financing and the cost of debt in selected categories of companies and expand the existing awareness of the use of debt financing by knowledge specific for one particular sector and one particular country. The observed quantity is the Cost of Debt in the period (hereinafter "t") of 2018. To achieve the goals the following variables were determined and assessed: i) affiliation to a corporate group (yes or no), ii) company size (measured size of assets and size of net turnover), iii) indebtedness. The survey was conducted for different company categories (non-affiliated companies, affiliated companies, national companies, companies under foreign control). As Aguilera et al. (2020) state, the definitions of a corporate group are entirely clear nevertheless the problem is to determine companies that are affiliated to a group (hereinafter "affiliated companies"). Information can be obtained from independent sources or from databases (Aguilera et al., 2020). In this survey data were obtained from databases and from several sources. A database was used to identify companies operating in the sector, determine the size of corporate groups and values of interest coverage and total assets (Bureau van Dijk, 2022). The National Administrative Register of Economic Entities was used to divide companies into categories (Ministry of Finance of the Czech Republic, 2022). The financial data of companies was drawn from the national register (Ministry of Justice of the Czech Republic, 2022) and from a database (Bureau van Dijk, 2022).

The basic set was established as of 8 September 2022 according to the following criteria: i) status: active companies; ii) NACE Rev. 2 (Primary Codes and Secondary Codes): 411 – Building Project Development; iii) World region/Country/Region in country: Czech Republic.

The basic set included 530 companies, of these 2 duplicate items. The total number of observed companies was 528 (Bureau van Dijk, 2022). A company was included in the non-affiliated company category if the number of companies in a corporate group was 0. In other cases a company was considered an affiliated company and the size of the corporate group was determined according to the number of companies. Information about the size of the corporate group was obtained from a database (Bureau van Dijk, 2022). The exchange rate of CZK 25.725/EUR was used to convert currency.

In the survey financial statement items were observed from a database (Ministry of Justice of the Czech Republic, 2022), specifically:

    i.   Profit/Loss statement: Interest expense and similar expenses (in subsidiaries/other), Profit/Loss Before Tax. Net Turnover for the period.

    ii.   Balance sheet: Payables, Payables to Banks (long-term liabilities), Payables to controlling or controlled entity (long-term liabilities), Payables to Banks (short-term liabilities), Payables to controlling or controlled entity (short-term liabilities).

The interest coverage and indebtedness indicators were assessed to gain information on the ability to pay interest from borrowed resources. The formulas for the calculations performed are given below.

$$Cost\ of\ debt\ =\ \frac{Interest\ expense\ and\ similar\ expenses}{\frac{(Payables\ (t)+Payables\ (t-1))}{2}} \qquad (1)$$

$$Interest\ cover\ =\ \frac{Operating\ profit}{Interest\ paid} \qquad (2)$$

$$Indebtedness = \frac{Payables}{Total\ assets} \qquad (3)$$

3 Results

Of the total number of 528 companies registered in the Bureau van Dijk database, 22 companies were no longer found in the national register (Ministry of Finance of the Czech Republic, 2022). It was possible to break down 506 companies out of 528 into the categories according to the ESA 2010 classification. In the Building Project Development sector in the Czech Republic private or national non-financial companies (389 out of 586) have the biggest representation, then self-employed person (56 out of 506) followed by private non-financial companies under foreign control (39 out of 506). In the private or national non-financial company category (hereinafter "national companies") affiliated companies (203 out of 389) prevail over non-affiliated companies (186 out of 389). In the private non-financial companies under foreign control category (hereinafter "companies under foreign control") affiliated companies (31 out of 39) also prevail over non-affiliated companies (8 out of 39). Small corporate groups with a maximum number of 10 companies have the biggest representation. Companies under foreign control are especially part of bigger corporate groups. Table 1. describes the incidence of corporate groups in the sector and their size. National companies that are part of corporate groups with up to 10 companies in size (190 out of 234) prevail in the observed categories. For companies under foreign control, corporate groups with more than 11 companies (17 out of 31) prevail over corporate groups with up to 10 companies (14 out of 31).

Table 1. Size of corporate groups in the sector (year 2018)

Companies	Corporate group size (number of companies)					
	1 – 10	11 - 100	101 - 200	201 - 500	501 - 800	Total
National	190	11	1	1	0	203
Under foreign control	14	6	3	4	4	31
Total	204	17	4	5	4	234

Source: own processing (Bureau van Dijk, 2022)

Data on total assets comes from a database (Bureau van Dijk, 2022) and can be seen in 265 companies ((national (237) and under foreign control (28)). In this group, 111 companies were non-affiliated and 154 part of the corporate group. Companies in the sector had total assets in a range of <0; 480,155> EUR 000. The median value of total assets of companies in the sector was EUR 271,000. Companies which are part of a corporate group work with higher total assets and therefore also higher total capital. The median value of total assets in companies under foreign control is several times higher than in national companies. The values measured in individual corporate groups are the following:

- National companies: range <0; 480,155> EUR 000; median EUR 249,000.

- Companies under foreign control: range <0; 156,393> EUR 000; median EUR 1,308,000.
- Non-affiliated companies: range <0; 31,050> EUR 000; median EUR 228,000.
- Affiliated companies: range <0; 480,155> EUR 000, median EUR 289,000.

3.1 Interest coverage of companies that are part of corporate groups

The interest coverage indicator can be found in the database in 94 companies (Bureau van Dijk, 2022). In this group there were 33 non-affiliated companies and 62 affiliated companies, 82 national companies and 12 companies under foreign control. As shown in Figure 1., the interest coverage value ranged in an interval from 1.01 to 10.00 (30 out of 94). Forty companies out of 94 showed a value of interest coverage of less than 1.00, which can infer that a big part of companies was unable to pay interest from operating profit in 2018. No more significant differences in the values of interest coverage were found among national companies and companies under foreign control.
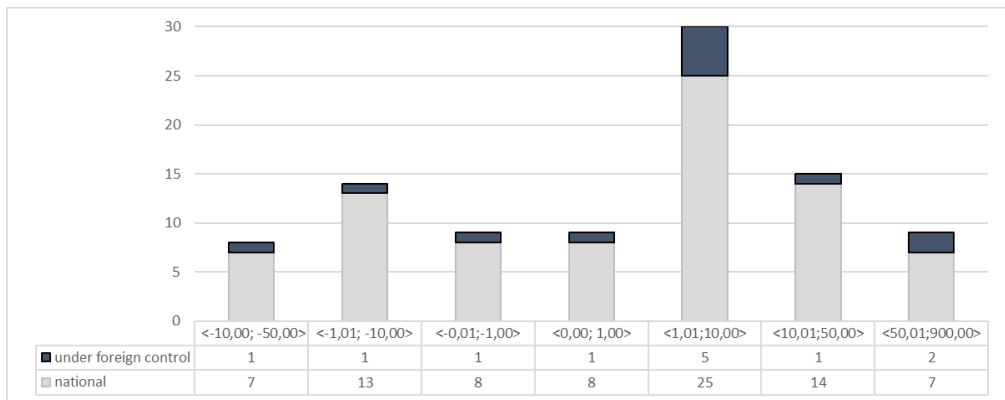
Figure 1. Interest coverage indicator in companies in the sector (year 2018)

Source: own processing (Bureau van Dijk, 2022)

Non-affiliated companies (15 out of 40) and affiliated companies which are part of corporate groups with up to 10 companies (20 out of 40) showed an interest coverage value of less than 1, see more in Table 2.

Table 2. Interest coverage indicator in non-affiliated and affiliated companies (year 2018)

Interest coverage	Non-affiliated companies	Corporate group size (number of companies)				
		1 – 10	11 - 100	101 - 200	201 - 500	501 - 800
less than 1.01	15	20	3	1	0	1
from 1.01 to 10.00	11	13	3	3	0	0
more than 10.00	7	10	4	0	1	2
Total	33	43	10	4	1	3

Source: own processing (Bureau van Dijk, 2022)

Table 3. shows the values of interest coverage for the category of national companies and companies under foreign control. In national companies the values of interest coverage of less than 1.01 (36 out of 82 companies) prevailed and in companies under foreign control most values occurred in an interval from 1.01 to 10.00 (5 out of 12).

Table 3. Interest coverage indicator in national companies and companies under foreign control (year 2018)

Interest coverage	Companies		Total
	National	Under foreign control	
less than 1.01	36	4	40
from 1.01 to 10.00	25	5	30
more than 10.00	21	3	24
Total	82	12	94

Source: own processing (Bureau van Dijk, 2022)

The values of Profit/Loss Before Tax, Cost of Debt and Net Turnover for the period could be found in 92 out of 94 companies (of these 80 national and 12 under foreign control, 32 non-affiliated and 60 affiliated companies). Companies in the sector showed Profit/Loss Before Tax values for the year in a range of <-915; 96,020> EUR 000. The median of all values was EUR 7,000. The median was significantly higher in affiliated companies as opposed to non-affiliated companies. The highest median was found in companies under foreign control. It was 75.8 times higher compared with national companies. The following Profit/Loss Before Tax values are characteristic for individual groups of companies:
- National companies: range < -915; 96,020> EUR 000; median EUR 5,000.
- Companies under foreign control: range < -448; 12,126> EUR 000; median EUR 379,000.
- Non-affiliated companies: range < -915; 943> EUR 000; median EUR 4,000.
- Affiliated companies: range < -448; 96,020> EUR 000; median EUR 9,000.

3.2 Cost of Debt

Cost of Debt includes interest expense and similar expenses made up of two components, which is: i) in subsidiaries and ii) other. The Cost of Debt for the sector in 2018 was in an interval of <0.0; 11.6> %. The median of values was 1.40%. Most companies in this period had a Cost of Debt of a range up to 3% (71 out of 92). No more significant differences were found among national companies and companies under foreign control, see more in Table 4. A maximum of 3% of Cost of Debt values was found in 88% of non-affiliated companies, 72% in affiliated companies, 75% in national companies and 92% in companies under foreign control. The Cost of Debt values in individual groups of companies are as follows:
- National companies: range <0.00;11.60> %; median 1.61%.
- Companies under foreign control: range <0.15;3.31> %; median 1.00%.
- Non-affiliated companies: range <0.10;7.59> %; median 0.99%.
- Affiliated companies: range <0.00;11.60> %; median 1.78%.

Table 4. Cost of Debt in % (year 2018)

Companies	Cost of Debt				Total
	<0.00;3.00>	<3.01;6.00>	<6.01;9.00>	<9.01;12.00>	
National	60	15	4	1	80

Under foreign control	11	1	0	0	12
Total	71	16	4	1	92

Source: own processing (Ministry of Justice of the Czech Republic, 2022)

A significant number of companies (58 out of 92) showed a Net Turnover for the period of up to EUR 1,000,000. The median of values for individual groups of companies are as follows: i) all the companies in the sector: EUR 281,000; ii) national companies: EUR 310,000, iii) companies under foreign control: EUR 57,000; iv) non-affiliated companies: EUR 46,000 and v) affiliated companies: EUR 411,000. Companies prevail with a Net Turnover value for the period of up to EUR 10,000,000 (79 out of 92). Companies in all categories in the Net Turnover range have Cost of Debts mostly up to 3%, see more in Table 5.

Table 5. Cost of Debt in % according to Net Turnover in EUR 000 (year 2018)

Net turnover	Cost of debt				Total
	<0.00;3.00>	<3.01;6.00>	<6.01;9.00>	<9.01;12.00>	
<0;10)	14	0	1	1	16
<10;100)	20	6	0	0	26
<100;1,000)	13	3	0	0	16
<1,000;10,000)	14	4	3	0	21
<10,000;100,000)	9	3	0	0	12
<100,000;1,000,000)	1	0	0	0	1
Total	71	16	4	1	92

Source: own processing (Ministry of Justice of the Czech Republic, 2022)

Most companies have indebtedness of up to 60% (52 out of 92), see more in Table 6. Twenty-nine companies have indebtedness that is higher than 80%, whereas 12 out of 29 reported negative equity (10 national companies and 2 companies under foreign control).

Table 6. Indebtedness of companies in the sector in % (year 2018)

Companies	Indebtedness					Total
	<0;20)	<20;40)	<40;60)	<60;80)	<80;∞);	
National	11	18	17	11	23	80
Under foreign control	2	3	1	1	5	12
Total	13	21	18	12	28	92

Source: own processing (Ministry of Justice of the Czech Republic, 2022)

3.3 Payables (to banks and controlling or controlled entity)

The next part of the survey focused on companies whose financial statements report the Interest Expense and Similar Expenses items, including their components (i) in subsidiaries and ii) other. These items were listed in 80 out of 92 companies (69 national companies and 11 companies under foreign control). A non-zero Interest Expense item and Similar Expenses

item in subsidiaries was reported by 38 out of 80 companies and non-zero Other Interest Expense item and Similar Expenses item was reported by 53 out of 80 companies. Both interest components were reported by 11 out of 80 companies. Most companies (27 out 38) that reported Interest Expense and Similar Expenses in subsidiaries in the financial statements did not report any Similar Expenses to non-affiliated entities. These were specifically 22 national companies and 5 companies under foreign control.

The next to be assessed were reports of Payables to Banks and to a controlling or controlled entity. Non-zero values, at least in one of the items, were reported by 47 companies (38 national companies and 9 companies under foreign control). Payables to Banks were reported by 33 companies, of these long-term and short-term by 12 companies). Payables to a Controlling or Controlled Entity were reported by 10 companies, of these long-term and short-term by 2 companies). Companies mostly reported long-term Payables to Banks, see more in Table 7.

Table 7. Payables to banks and controlling or controlled entity (year 2018)

Companies	Liabilities			
	Payables (Long-term)		Payables (Short-term)	
	to banks	to control (ling/led) entity	to banks	To control (ling/led) entity
National	24	7	14	5
Under foreign control	3	3	4	6
Total	27	10	18	11

Source: own processing (Ministry of Justice of the Czech Republic, 2022)

The median of values for companies which used intra-group financing were i) Net Turnover: EUR 757.5 000 EUR, ii) Profit/Loss Before Tax: 58.5 000 EUR; iii) Total Assets: EUR 3,772,000; iv) Indebtedness: 54%. The median values of Net Turnover, Profit/Loss Before Tax, Total Assets is significantly higher than the median of values of all companies in the sector. So it can be stated that the use of intra-group financing (pooling the group's common resources) presents an important competitive advantage. In specific terms, the pooling of common resources allows affiliated companies to work with higher capital, achieve higher earnings and higher profit.

4 Discussion and conclusions

The aim of the paper was to conduct an analysis of the sector and provide information on the use of debt financing. Research was focused on the assessment of companies operating in the Building Project Development sector in the Czech Republic. Specifically debt financing costs and the interest coverage indicator were assessed. Companies in the sector were divided into the following categories: national companies, companies under foreign control, non-affiliated companies and affiliated companies.

Most companies in the sector came under the category of private or national non-financial companies, which are part of a corporate group. Corporate groups of up to 10 companies mostly operated in the sector. In bigger corporate groups there was a bigger representation of companies under foreign control than of national companies. It can be assumed that companies which are part of a corporate group have significant representation in the sector. In terms of size, these are smaller corporate groupings.

Affiliated companies worked with greater total capital than non-affiliated companies. Companies under foreign control showed much higher total assets than national companies. The median of the Profit Before Tax item was many times higher in companies under foreign control than in national companies. It was also higher in affiliated companies as opposed to non-affiliated companies. The results show that pooling resources within a group and involving foreign capital contributes to higher performance.

The Cost of Debt values in most companies reached a value of up to 3%. Affiliated companies showed a higher median of Cost of Debt values as opposed to non-affiliated companies. No more significant differences were found between national companies and companies under foreign control. The size of companies was not significantly projected in the values of this indicator. To understand the reasons for the measured higher values in affiliated companies, it would be appropriate to focus the next research on determining the Cost of Debt to affiliated and non-affiliated entities.

A large number of companies had up to 60% indebtedness. Interest coverage in many companies was less than 1.00. These companies did not create sufficient operating profit to settle their interest. Interest coverage values have an impact on determining ratings and assessing the credit risk. In this respect, it can be assumed that pooling resources within a group when companies do not create sufficient operating profit, can mean that pooling resources is not just a competitive advantage but also an operational need. Given the long-term duration of development projects it would be appropriate to conduct research covering more periods. The period selected for the survey was not affected by the current problems such as the Covid-19 pandemic and the war in Ukraine. Many companies in the sector had a Net Turnover for the period of up to EUR 1,000,000. It can be assumed that there was a prevalence of smaller companies in the survey.

The conducted survey provides an overview of debt financing in individual categories of companies which were affected by the current problems. It will be possible to build on these findings in further research and determine the impact of the problems on debt financing of the Building Project Development sector.

Acknowledgements

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Phishing as an increasing threat in the digital environment

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Abstract

Research background: Social engineering in the context of organizational cyber security is a very widespread adverse phenomenon in the globalized world. Attackers are improving their abilities to lie, extort and cover up their activities. Their goal is to use psychological coercion and other technical skills to confuse the victim and force him to hand over personal data such as ATM card numbers, login data to information systems or other sensitive information. Then they exploit this information for their own enrichment by selling the information to a third party on the black market, or blackmail the victim with a software application called ransomware, which blocks access to the data and asks for money to be sent to a bank account. Healthcare facilities are a frequent target of phishing attacks around the world. The information contained in their information systems is sensitive data, the leakage of which has great negative consequences from the point of view of the law and the good name of the organization.

Purpose of the article: The main idea of this article is present a simple method of phishing attack within a medical facility and will point out the importance of a cyber security awareness development plan.

Methods: Before applying the method of phishing attack, it was necessary to collect relevant information about the organization's cyber security issues that can be affected by social engineering. Subsequently, a potential procedure was created by which the attacker could carry out the attack with minimal financial costs.

Findings & Value added: The main use is to spread knowledge about social engineering. The work describes social engineering in the context of cyber security organizations, as an agent that is used more and more every year for intrusions into the information systems of organizations. Based on the frequency and effectiveness of this type of social engineering, a test was created which it consisted in faking an attack and finding out how many employees of the organization will come across this attack.

Keywords: *company, cyber security, digital environment, phishing*

JEL Classification: *H10, G32, K10.*

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1 Introduction

Cybersecurity has come into people's awareness with the development of computer systems and the mass interest in these technical conveniences. Nowadays, almost every household has a computer, and not just one (Salloum et al., 2019), (Ristvej et al., 2017), (Lovecek, et al., 2017). Mobile phones now serve more as computers and not just a means of communicating, over long distances. All these devices are connected to the worldwide internet network.

The Internet is the fastest growing and expanding digital medium in a globalised society (Ristvej et al., 2017). With access to the Internet and the interconnection of all devices in cyberspace, there is a need to protect them (Kampova, 2019). When inspecting devices, detecting malfunctions and shortcomings, it is possible to come across the perpetration of illegal activities. Already in the manufacturing phase of products, software reliability checks must be carried out, most often with the use of hackers, which are persons engaged to penetrate the device's system, to detect its weaknesses and then remove them. Sometimes, updating the device's software or updating an antivirus program is sufficient to prevent penetration into the device's cyberspace (Fatima et al., 2019) These aspects are just a small start of a cybersecurity strategy for (Salloum et al., 2019), (Rehak,2019), (Frank et al., 2022).

The importance of cybersecurity lies in maintaining people's trust in the information and communication technologies that contain their sensitive information (Halaj et al., 2018), (Stojnic et al., 2021), (Rehak and Novotny, 2016). It encourages discussions about why an event happened, who caused it and how, with the aim of eliminating new threats. This issue is one of the most discussed topics by security professionals in 2022, and it has already come to the attention of ordinary people because of the large increase in incidents happening on the Internet, or on people's personal computers, or in the systems of multinational corporations and governments. To this day, various conferences are being held to develop measures against this anti-social activity. Each layer of society looks at cyber security differently, with its own perspective, its own interests.

Phishing is a social engineering technique that mainly aims to steal personal or confidential data and may harm the target individual or organization in many ways. In phishing, fraudsters hide their identity as legitimate people, banks, or institutions, whether governmental or private (Alattas et al., 2022). Phishing is an increasing threat that causes billions in losses and damage to productivity, trade secrets, and reputations each year. (Jensen et al., 2022). Phishing is a well-known cybersecurity attack that has rapidly increased in recent years. It poses risks to businesses, government agencies and all users due to sensitive data breaches and subsequent financial losses. Das et al., 2022).

2 Methods

For the investigation of the social engineering issue, an organization- a health care facility that provides diagnostic and health care services was selected. The health facility employs 30 specialist doctors, 50 nurses and 25 other service personnel. The content of the testing will be the resilience of the administrative staff of the selected healthcare facility to an email phishing attack. The test results will be anonymous to maintain appropriate respondent confidentiality and reputation. The test will be conducted in multiple phases to be gone through in a phased manner.

2.1 Test planning

Planning was the initial stage of the email phishing test, when it was agreed that some statistical analysis should be done on the number of respondents who were not attentive enough and fell into the trap. Given the relatively high technical skill and work focus of the administrative staff in the security sector, it was assessed that the phishing email created would be very plausible, both in terms of the sender and the content of the message sent. A real attacker would use the information obtained for extortion, misuse of sensitive data.... The main point already during the planning was that no information obtained should be leaked, therefore no names, titles or other personal characteristics will be mentioned further.

2.2 Establishing hypotheses

Prior to conducting the phishing test, the following hypotheses were established to serve as an estimate of the process and to anticipate a certain vision of the outcome.

Hypothesis 1: No one of the recipients of the phishing email will get caught and send any response.

Hypothesis 2: Less than 20% of the recipients of the phishing mail will succumb.

Hypothesis 3: More than 20% of the recipients of the phishing mail will succumb.

2.3 Test preparation

In the test preparation phase, the necessary technical and tactical steps were taken to create and run the test, creating a test that consisted of faking an attack and determining how many healthcare facility administrators would believe the attack to be true. It started with selecting a person who would be trustworthy enough for the interviewees to believe and respond.

Selecting the person the attacker would impersonate in the test was followed by identifying certain behavior patterns of that person, the message must look as convincing as possible. In order to create a phishing email, it is necessary to observe real messages from a genuine information system administrator and notice their details (Sarno et al., 2022).

The next step was to observe how the administrator expresses himself in the text, how he introduces himself and how he ends the message. It was found that generally in formal messages the administrator introduces himself with the greeting "Hello." This is followed by the content of the message, which tends to be short and to the point, and the message ends with a thank you (Thank you) together with the signature of the administrator's name and surname. From this information, it was possible to construct a fake phishing email message.

The next step was to create(purchase) an Internet domain through which the emails were sent. In the emails, the trusted person asked the administrative staff of the healthcare facility to send access data (password and login) to the system used in the healthcare facility.

2.4. Running the test

The official launch of the phishing test took place on June 22, 2022 in the premises of the medical facility. Using crafted login credentials, a fake attacker was able to access a trusted person's email account and begin crafting the content of a message that was sent out to administrative staff. The crafted message did not contain any grammatical errors or hyperlinks that would be suspicious to the user. The conclusion of all these measures is a message with almost no error, from a trusted person and therefore the administrative staff succumbed to a staged attack.

3 Results

26 out of 105 respondents responded to the phishing message, which is 25%. However, this number does not represent the number of unwanted intrusions into the system, only the response to the mail. It is not possible to clearly assess the security threat from it. The results are shown in Table 1.

Table 1. Responses to a phishing email.

	They responded without providing a password	**They responded with providing the password**	**They did not respond**	**Total**
Specialist doctors	4	6	20	**30**
Nurses	5	6	39	**50**
Other service personnel	2	3	20	**25**
Total	**11**	**15**	**79**	**105**

Source: authors (2022)

It follows from the conducted test that 26 employees involved in the testing responded to the phishing email:

- 11 employees employees who erred by replying to the message but not sending their password,
- 15 became a victim of phishing and provided their password,
- 79 without an answer, following the rules of information security in the field of social engineering, responded correctly.

Respondents can be divided into three categories based on their reaction to the phishing email.

1. The first category consists of respondents who were aware of the threat but for their own reasons decided to reply to the email. A message that is suspected to be inauthentic and may contain means to compromise data is never replied to. The main reason for this is to maintain anonymity, the attacker does not know if the email has been delivered and is therefore in a state of uncertainty, but when he gets a reply, even by foolishness, he gets confirmation of the existence of the email account and can start preparing for a targeted cyber attack in some modified form, for example social engineering- spear phishing.
2. Respondents who have provided a password - have fallen victim to phishing and need to be more vigilant
3. Respondents with no response - who knew it was phishing and responded correctly.

In addition to the basic differentials of responders and non-responders, respondents invented themselves in other ways. After receiving the phishing email, they directly contacted the person of the real information system administrator. This person was at the respondents' workplace at the faculty of security engineering mostly from 10:00 to 11:00 am. These respondents took advantage of this time. One went to see him personally and asked if the mail he received was genuine and to give him the data. The other respondent sent the name and password to the email of the real administrator. The first one did the right thing and contacted the person the attacker was claiming to be and got important additional information from him. Although the second respondent did not cause a security hole in the system, as the confidentiality of the true administrator is assumed to be maintained, he should not have sent

his login details to him either. Individuals have access to the information system in their own name; it is their calling card, as it were, their personal data.

4 Discussion

The obtained results are based on the established hypotheses and obtained statistical results. Hypothesis number 3 was confirmed by the phishing test - more than 20% of the respondents succumb to phishing emails. In this sample of respondents, more than a fifth of the respondents were compromised, which cannot remain like this in the future. It is too big an intrusion into the organization's information system, which could discredit the whole organization. A project containing the possibilities of increasing organizational and technical awareness in the field of social engineering will be devoted to preventing the repetition of such an unfavorable result.

The direct conclusions from the phishing test are:

- 26 respondents out of a total of 105 failed, which represents 25%.
- Of these 26, 11 responded with their name and password, allowing the attackers access to the system.
- 5 answered without providing a password.

5 Conclusion

This paper describes social engineering in the context of an organization's cybersecurity, as a factor that is increasingly being used to penetrate organizations' information systems. The most commonly used method of social engineering is the phishing attack, in which the perpetrator poses as a trusted person and steals information (Yeoh et al., 2022). Based on the frequency and effectiveness of this type of social engineering, a test was created that consisted of faking an attack and determining how many administrative staff at a healthcare facility would succumb to the attack. Specifically, the results revealed that 26 employees, out of the 105 surveyed, failed the test and succumbed to the attacker's intent, representing 25%. Of these, 11 provided the attacker with a password and therefore access to the information system. Such a intrusion could be catastrophic for the organisation. In terms of timing, most responses came in the first few hours, indicating the spread of information about the suspicious message among employees. The results of this test demonstrated the timeliness and scope of social engineering and the need to put measures in place to help the organization be more resilient to attacks of this type. These are primarily technical measures to help improve the overall security of the information system and educational measures to educate employees.

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Differences in stakeholder expectations of interest in service offerings during COVID-19 in electrical engineering companies

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Abstract

Research background: One of the options for maintaining a market position may be an emphasis on accompanying services, including smart services which, thanks to the limitations of COVID-19, could significantly alleviate the situation. However, in view of the evolving market situation, there is a general decline in the development of demand for standard products, as well as innovation and the cessation of investment in development projects. Nevertheless, there are companies that believe in renewal and increased interest in smart services from both management, customers and competitors.

Purpose of the article: The purpose of this paper is to find out the differences in stakeholders' expectations of interest in the service offering during COVID-19 in electrical engineering companies and whether these differences, if any, are significant in terms of size, market orientation, and industry focus.

Methods: This paper draws on a conjunctural research approach via a quantitative survey collected in electrical engineering companies during the coronavirus pandemic.

Findings and value added: The survey shows that expected results according to the CZ-NACE classification and size category does not prove the significance of the differences. Pessimism in the offering of complex solutions and smart services is generally lower compared to other categories. In terms of market orientation, there is no optimism about the increase in demand from final consumers, although it is different in the case of distributors. The company whose partners are intermediaries expect increased interest from customers, but they cannot determine the estimate of the steps taken by the competition, especially in the area of offering complex solutions. Increased interest in focusing on the B2B market is expected by companies, especially in the area of smart services on offer by competitors, but they do not expect a sharp increase from customers.

Keywords: *COVID-19; electrical engineering companies; service offering; smart services; Czechia*

JEL Classification: *O14; D22; L63; L25*

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1 Introduction

This paper focuses on the area of service offerings provided by manufacturers to their customers. Today, services provided by manufacturers are an integral part of their offering of tangible products as well. Their offerings can be very varied, from basic to advanced services and complex solutions. In addition, nowadays, thanks to smart technologies, companies can also provide services that use these smart technologies. However, how has the situation with the provision of services changed thanks to the pandemic? Is the interest in their offering and provision among customers, company management or competitors higher? The purpose of this paper is to find out the differences in stakeholder expectations of interest in the service offering during COVID-19 in electrical engineering companies. It could be assumed that the interest in providing services to manufacturers has increased, especially for smart services. The services provided remotely could be a suitable solution during the pandemic, when it was not possible to travel and resolve repairs directly with customers. Therefore, the contribution of this paper is to unveil the changes in expectations caused by a totally new situation, in this case, the COVID-19 pandemic in the field of service offering in manufacturing companies.

The paper is structured as follows. Chapter 1 describes the service offering provided by manufacturing companies, the importance of servitization and smart technologies in the time of the COVID-19 crisis and the stakeholder approach. Chapter 2 presents the methods used in the empirical study. Chapter 3 describes the main findings and discussion related to the aim of the paper. Chapter 4 summarises the conclusions of the paper.

1.1 Service offering provided by manufacturing companies

Most manufacturers today offer services alongside their products (accompanying services), from the basic to the advanced. Basic services care about product functionality, such as pre- and post-sale services). Advanced services try to avert product breakdowns by using e.g., preventive maintenance processes, training, and maintenance contracts. Moreover, advanced services help to create value with customers up to a service business model (Kindström, 2010). Based on Fischer et al. (2012), the expansion of accompanying service offerings includes three service categories: a) customer services, b) product-related services and c) services supporting business needs. Basic and advanced services can be included in the second category as product-related services. Also, a complex solution is a possibility of service offering, where end-users are not required to deal with technical issues related to the product, because everything is organised by the supplier, e.g. regular inspections, repairs, and ensured for the general trouble-free operation of the product. Smart technologies can be a part of accompanying services also. Services using smart technologies are commonly termed as smart services. They include remote monitoring, remote diagnostics, remote repair, predictive maintenance, etc. Smart technologies are a keystone for current manufacturers, which present a new service, but they are also a catalyst for product innovation (Blichfeldt and Faullant, 2021).

Based on Grubic and Peppard (2016) a main principle of smart services is a combination of software and hardware technologies. This combination ensures the collection of remote performance data and information about the use of the product to monitor and control its current and predictive status. Suppatvech et al. (2019) recapitulate many possibilities of using smart technologies in services based on the available literature, such as remote monitoring and reporting of information in real time, monitoring of customer behaviour in use, enabling responsive and proactive maintenance, support of optimisation and remote control of operations, as well as autonomous management.

1.2 Importance of servitization and smart technologies in time of COVID-19 crisis

Based on Brax and Visintin (2017) servitization is perceived as a process of change, where manufacturers intentionally or thanks to growing trends introduce elements of services into their business models. Servitization is seen as a possible transformation process in which a company moves from a product-centric system to a service-centric system (Kohtamäki et al., 2021). Servitization and smart technologies could represent the main drivers within the current turbulent period caused by the COVID-19 outbreak (Kowalkowski et al., 2022), in which manufacturers must innovate their products (Netz et al., 2022) to sustain their businesses (Ding and Li, 2021). Servitization connected to smart technologies is called smart servitization.

COVID-19 has dramatically affected the global economy and mostly SMEs. The most threatening for companies was the increased risk connected to market contraction and financial and resource constraints (Juergensen et al., 2020). Market uncertainty saw an upsurge in the adoption of advanced technologies in the short term (Prause, 2019). This adoption helps a company's innovation performance (Usai et al., 2021), which generates opportunities to quickly adapt to the changes that have appeared because of the coronavirus disease pandemic (Paiola and Gebauer, 2020).

Servitization and smart technologies are meant as a means of proactively speeding up and applying the response to the COVID-19 crisis (Rapuccini et al., 2020). Firms which proved most impermeable to the effects of the pandemic were those which got out in front with regard to servitization and smart technologies (Rapuccini et al., 2020). Less economic damage was endured by companies in the industrial sector which enhanced their digitally enabled service growth with parallel services based on software. (Rapaccini et al., 2020).

1.3 Stakeholder approach

A stakeholder is any individual, group or even organisation that has an influence or is influenced by the company's vision, mission and strategic results and performance of the company. We divided them into internal (owner, management, employees) and external (suppliers, customers, competitors, or government, media, and others). Significant stakeholders and their abilities have an influence and share in the competitiveness, profitability, and survival of the organisation (Hanson et al., 2017). Top management and company executives have a unique position among stakeholders. They have a responsibility for the direction and operation of the company and, as a result, also the greatest overview of events inside and outside the company. These stakeholders (top management and company executives) also decide what and whose priorities and needs the company will meet, and thus determine what the relationship with other stakeholders will be. Thanks to this unique position, they are one of the most influential stakeholders. However, mastering the correctness of relationships with all stakeholders is a source of long-term competitive advantage (Monkevičienė and Rybakovas, 2003).

Compliance of the expectations and goals of the most important stakeholders with the implementation of the strategy is a key success factor. Interest groups whose expectations, interests and goals are essential not to be overlooked include the owner, top management and managers, or creditors and business partners (Fotr et al., 2017). When selecting significant internal stakeholders for analysis (research), it is appropriate to know the corporate environment and culture. Based on this self-involvement, it is then possible to identify influential people. This influence may be based on their formal position, but it can also be trustworthy individuals who have been in the business for a long time, have experience and know how the business works (Hindle, 2010).

2 Research sample and methods

Sections CZ-NACE 26 (Manufacture of computer, electronic and optical products) and CZ-NACE 27 (Manufacture of electrical equipment) from the classification of economic activities designated by the European Commission were chosen in order to facilitate the processing of empirical research. CZ-NACE 26 firms, i.e., from electronics and electrical engineering, operate as subcontractors for, e.g. the car sector and mechanical engineering and numerous other fields of the economy. Labour-intensive production and the hugely efficient automated production sectors also form part of this group. Section CZ-NACE 27 relates to sectors within the manufacturing industry with more long-term significance, which hold a very powerful role in the economy and offer a vast selection of products. The competitiveness of other fields of the manufacturing industry and energy depends on the type of products from within the electrical engineering industry. This sector can be counted as one of the most significant manufacturing sector employers (MPO, 2017).

The web-based questionnaire was emailed to mainly directors and managers, who were asked to complete it. 55 responses were received which were deemed to be correctly and fully filled in. Table 1 shows the nature of respondents in relation to selected characteristics.

In terms of size, measured by number of employees, there are 40% micro and small enterprises, 21.8% medium sized enterprises and 18.2% large enterprises in the total sample. We had to exclude from the further analysis of mean differences a total of 20% of respondents in the number unknown category. The predominant customers in terms of profit share are: 21.8% focused on the B2C market, 54.5% on the B2B market and 23.6% focused on distributors (see Table 1).

Table 1. The structure of respondents according to CZ-NACE

	Frequency	Percent	Valid Percent	Cumulative Percent
CZ NACE 26	18	32.7	32.7	32.7
CZ NACE 27	37	67.3	67.3	100.0
Micro and small enterprises (0 – 49)	22	40.0	50.0	50.0
Medium sized enterprises (50 – 249)	12	21.8	27.3	77.3
Large enterprises (≥ 250)	10	18.2	22.7	100.0
Unknown category (re no. of employees)	11	20.0	-	-
The end-user B2C market	12	21.8	21.8	21.8
Manufactures or other firms, B2B market	30	54.5	54.5	76.4
Distributors (distribution channels)	13	23.6	23.6	100.0
Total	*55*	*100.0*	*100.0*	

Source: Kaňovská and Bumberová (2022)

2.1 Research strategy and methods

This paper draws on the data obtained from the quantitative survey. The survey was carried out in September 2020. The number of respondents was rather low due to the unfortunately timed launch of the research. When the research was commissioned in the summer months of 2020, the end of the pandemic was expected. However, when the questionnaire was implemented in September 2020, another wave of COVID-19 arrived. Manufacturers at that time did not have much time and desire to fill in the questionnaire, so the result of 55 respondents is certainly a success.

Originally, a 5-point scale was applied for gathering data from respondents about expectations of increased interest of their customers, management, and competitors in individual types of services (1-totally agree, 2 – partially agree, 3 – partially disagree, 4 –

totally disagree, -1 - without estimate/don't know). We excluded "no answer" due to the absence of business activity for further evaluation from respondents. Further, the analysis needed the recording of the original data into modification: agree and partially agree as "YES" (1), partially disagree or total disagree as "NO" (2), without estimate/don't know (-1) for better evaluation of result outputs. For a deeper analysis of differences according to size, field and orientation in the customer market, nonparametric tests were performed to compare the differences in mean (average score) of the results. Spider graphs were chosen to visually represent the results.

3 Results and discussion

The overall perception of interest within selected stakeholder categories and the offering of services and solutions is shown in the following Figure 1. As can be seen, about 25% of companies expect growth, 25% cannot estimate the situation, but 45% of companies don't expect growth. Pessimism in the offering of complex solutions and smart services is generally lower compared to other categories. Despite the difficult situation, manufacturers did not lose optimism to a great extent, but it must be acknowledged in the marginal answers of respondents that it is almost half and half, and that rather expectations of stagnation/decline and uncertainty from the development in basic services and the related decline in other related solutions prevail, especially for customers. At a time when the market situation cannot be read, business partners do not make very strategic decisions about new orders, projects, or new suppliers.
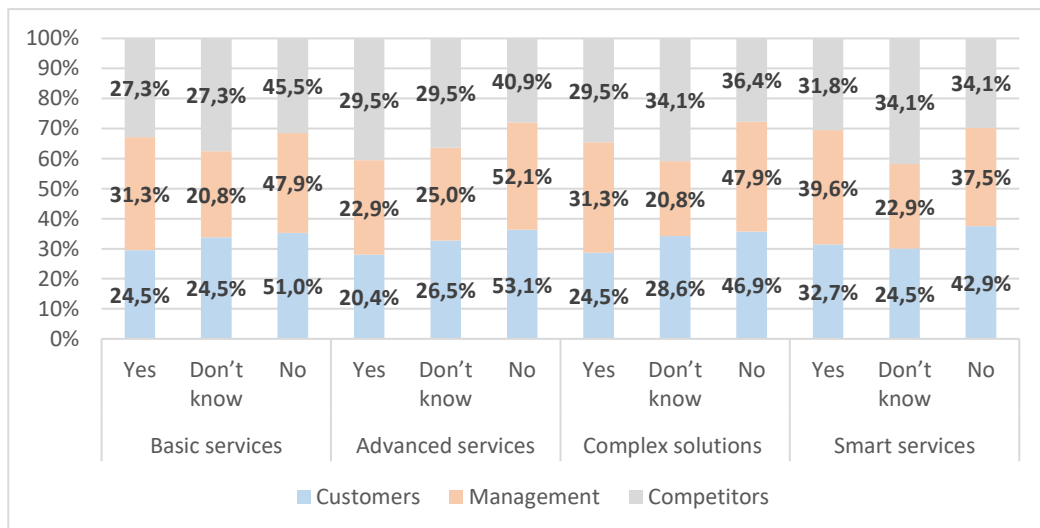
Figure 1. Overall expectations of growing interest according to selected stakeholders

Source: Kaňovská and Bumberová (2022)

The results in the area of testing are shown in the following Table 2, as expected according to the economic classification CZ-NACE, which does not prove the significance of the differences. Figure 2 shows a greater pessimism, which prevails in the production of electrical equipment in general (CZ-NACE 27). However, it is a specific sector, where these categories of companies are often not primarily oriented on the provision of services. Servitization is often not possible for these types of companies, and they do not even plan to develop activities in this direction. What little could be considered as servitization is not in

any way dependent on the crisis nor does it affect their results. The same situation is also for smart services. On the other hand, manufacturers from CZ-NACE 26 often offer additional services such as equipment repairs (service providers as intermediaries are their customers), and they are still seeing an increasing interest in smart services. They have information from intermediaries that end customers think more about investments and put more emphasis on maintaining and maximising the life of technology than in the period before COVID-19.

Table 2. Mann-Whitney U test[a]

Type of services	Grouping variable: CZ-NACE			
	Mann-Whitney U	Wilcoxon W	Z	Sig. a
Basic services	173.000	638.000	-1.015	0.310
Advanced services	253.500	389.500	-0.245	0.807
Complex services	240.000	376.000	-0.564	0.573
Smart services	249.500	385.500	-0.334	0.739

a Asymp. Sig. (2-tailed), * Sig.≤ 0.05, ** Sig.≤ 0.01.

Source: Kaňovská and Bumberová (2022)
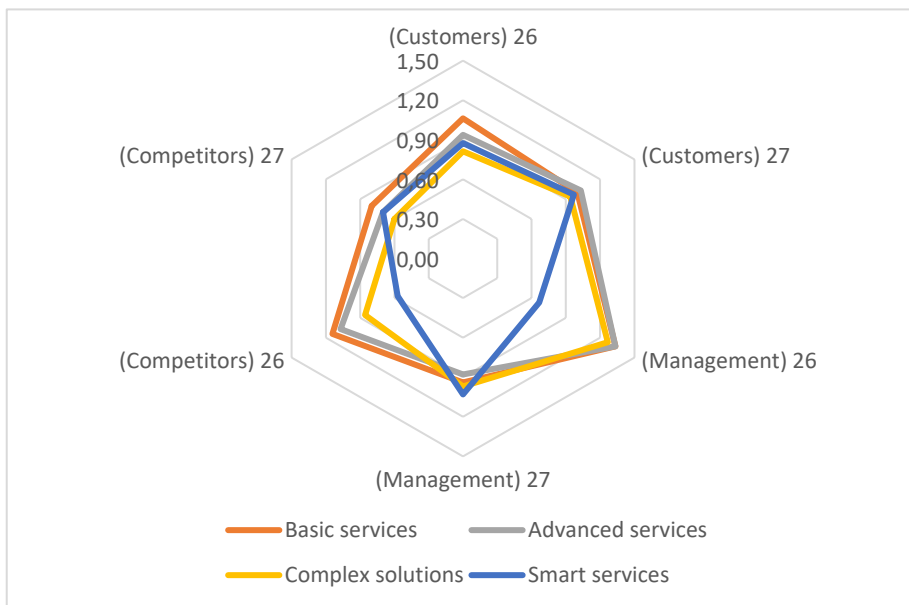
Figure 2. Average score expectations according to CZ-NACE

Source: Kaňovská and Bumberová (2022)

The results in the area of testing by expectations according to size specifics and market orientation are shown in Table 3. No significant dependence was demonstrated for the size category of enterprises, but Figure 3 shows that micro and small enterprises are more optimistic than medium-sized companies, which focus on the offer of advanced services, which recorded the highest level of basic services together with basic services, pessimism in terms of increased interest from customers. Micro and small companies have adapted to the

new conditions by far the most, thanks to their flexibility and having less capital tied up, or their focus on less complex contracts.

Table 3. Kruskal–Wallis Test[a]

Grouping variable: no. of employees			
Type of services	Customers	Management	Competitors
Basic services	0.810	0.872	0.888
Advanced services	0.860	0.867	0.198
Complex services	0.305	0.912	0.400
Smart services	0.184	0.191	0.386
Grouping variable: focus market			
Basic services	0.028*	0.014*	0.605
Advanced services	0.229	0.016*	0.256
Complex services	0.007**	0.043**	0.100
Smart services	0.050**	0.003**	0.228

a Asymp. Sig. (2-tailed), * Sig.$\leq$ 0.05, ** Sig.$\leq$ 0.01.

Source: Kaňovská and Bumberová (2022)
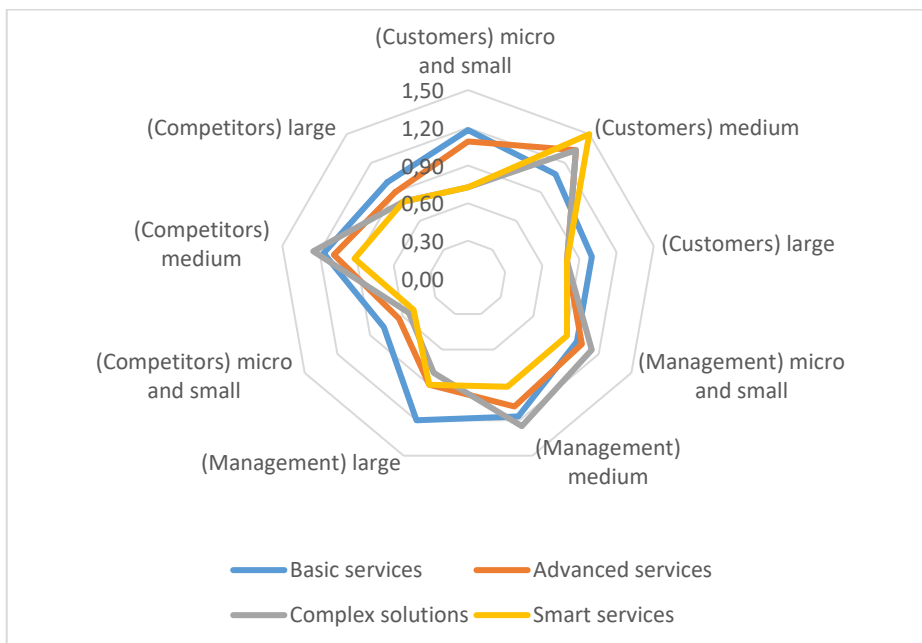
Figure 3. Average score expectations according to enterprise size

Source: Kaňovská and Bumberová (2022)

In terms of market orientation, there are already differences that are influenced by the specifics of the sales market of companies and final consumers. While there is no optimism about the increase in demand from final consumers (B2C market), it is different in the case of distributors. The companies whose partners are intermediaries expect increased interest from customers, but they cannot determine the estimate of the steps taken by the competition, especially in the area of offering complex solutions. This also applies in the case of management's awareness and positive expectations.

Due to increased interest in focusing on the B2B markets, companies expect higher expectations especially in the area of smart services by their competitors, However, they do not expect a sharp increase from customers or they are not even able to estimate the demand for services. The highest level of pessimism on the part of management is then confirmed by companies in the inter-company market and the purely manufacturing industry (with minimum of servitization). This confirms the fact that the rudder of change is the most difficult to turn there, also due to the search for new outlets for new products. On the other hand, this segment sometimes has the advantage of inertia (see the Figure 4).
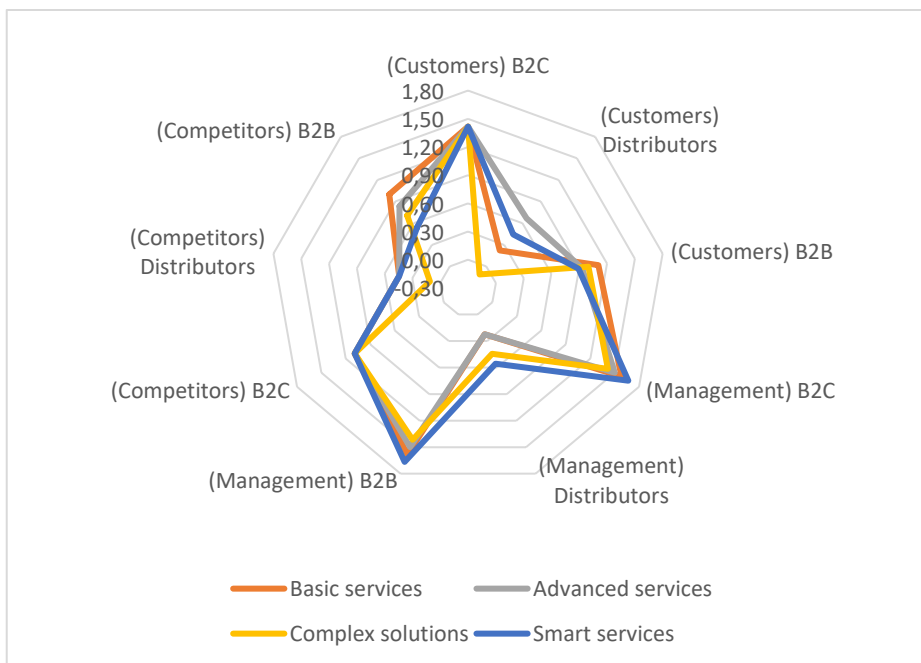
Figure 4. Average score expectations according to market orientation

Source: Kaňovská and Bumberová (2022)

4 Conclusion

For some manufacturers, covid has become destructive, but for some, on the contrary, it has become an attractive opportunity to move forward in some areas and gain a competitive advantage. During the pandemic, it was impossible to meet with customers and distributors, which could lead to an increase in stakeholders' interest in service offering, especially in the area of advanced services, such as smart services. Therefore, the aim of this paper was to find out the differences in stakeholders' expectations of interest in the service offering during COVID-19 in electrical engineering companies. The results of the paper did not prove the significance of the differences according to the CZ-NACE classification and size category. Pessimism in the offering of complex solutions and smart services is generally lower compared to other categories. In terms of market orientation, there is no optimism about the increase in demand from final consumers, it is different in the case of distributors.

The companies whose partners are intermediaries expect increased interest from customers, but they cannot determine the estimate of the steps taken by the competition, especially in the area of offering complex solutions. Increased interest in focusing on the B2B

market is expected by companies, especially in the area of smart services on offer by competitors, but they do not expect a sharp increase from customers. The contribution of this paper was to unveil the changes in expectations caused by a totally new situation, in this case, the COVID-19 pandemic in the field of service offering in manufacturing companies.

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Foreign trade and socio-economic environment

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Abstract

Research background: Economic inputs and outputs of the national economy are significantly influenced by foreign trade. Even globally important players in international trade are going through turbulent changes due to the influence of new factors affecting foreign trade relations.
Purpose of the article: The subject of analysis is the foreign trade of the selected countries in the Central European region. The aim of the article is to contribute to the discussion about the impact of countries' participation in international trade on the development of their socio-economic environment.
Methods: Data collection and analysis, comparative analysis, foreign trade indexes, deduction and induction.
Findings & Value added: The interdependence of the markets of the analysed countries is high, and even if the openness of their economies fluctuates, they do not avoid the rapid influence of factors that significantly affect global markets. Smaller monitored countries are significantly affected by them, but Poland has a higher strength of the internal market, which somewhat mitigates the speed and strength of the impact of global factors on its socio-economic environment. The reactions of national governments to the pandemic caused restrictions on the cross-border mobility of people (including labour mobility), affected the global supply chain (production and distribution capacities), and changed supply and demand patterns. It accelerated changes in the integration economic groups (especially the EU), but also the emergence of a new paradigm in global trade. The war conflict (and subsequent economic sanctions) comprehensively rewrite not only the foreign trade policy of countries but also geopolitics as such.

Keywords: *foreign trade; global markets; Central European countries; pandemics; sanctions*

JEL Classification: *F10; F40; F50; F60*

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1 Introduction

The economic situation of countries is influenced by a number of different factors. The importance of each factor varies from country to country, and what is important for one country may be completely irrelevant for another. Nevertheless, it is necessary to identify general trends and patterns that have a great impact on the economic development of individual countries. The economies of European countries have tended to develop up to 2020 (Aliukov and Buleca, 2022). The COVID-19 pandemic brought great uncertainty to markets in 2020, and both production and consumption were subject to rapid and extreme fluctuations. European Union was among the most affected economies, with a drop in GDP by 6.3% in 2020 (Kejžar et al., 2022). The COVID-19 pandemic has brought a huge recession to the EU, which could increase inequalities between regions. As a result of the decrease in demand and production, the global economy entered a recession in spring 2020. The year 2020 witnessed the biggest drop in global economic growth since the Great Depression of the 1930s (Li et al., 2022). Supply chains were disrupted, and millions of people lost their jobs as a result of the pandemic. Government interventions caused the closure of most businesses to reduce the risk of infection. Despite this, a number of negative impacts on the population have been observed. Many people became infected or had to be isolated in quarantine, and some countries suffered high mortality rates. The economic recession, high unemployment, serious income losses, liquidity problems, as well as the closure of hotels and restaurants and the cessation of air and bus transportation have led to an overall decline in demand in various sectors of the economy, but especially for tourism (Plzáková and Smeral, 2022; Martín-Domingo and Martín, 2022).

In 2020, the combined gross domestic product (GDP) of the European Union was just over €13.3 trillion. Europe's share of global GDP was just under 15 % that year, and this share is expected to fall to 13.99 % by 2026. Europe's declining share of the global economy is a long-term trend and is related to the fact that European economies are growing more slowly than those in other parts of the world, such as Asia and especially China. With a GDP of more than €3.3 trillion, Germany has the largest economy in Europe, while France and the United Kingdom have the second and third largest economies. However, none of these three countries grew at all in 2020, with almost all European nations experiencing negative growth rates in 2020 because of the coronavirus pandemic (Clark, 2022). At a time when it was thought that the pandemic was diminishing and that the market would recover from its influence, there was a conflict between Russia and Ukraine as well as sanctions as a result which greatly affected the global economy. The war conflict in Ukraine has significantly affected the EU economy, pushing the EU towards lower growth and higher inflation (Prohorovs, 2022). Global inflationary pressures, or erosion of household purchasing power, have been supported in particular by rapid increases in energy and food commodity prices (European Commission 2022). The war conflict in Ukraine as well as sanctions will have broad implications for the global business landscape as well. As a producer of 11% of global oil and home to 25% of the world's natural gas reserves, Russia will continue to impact energy markets (Markus, 2022). Overall, real GDP is forecast to grow by 2.7% in 2022 and 1.5% in 2023 in the EU and by 2.6% in 2022 and 1.4% in 2023 the Euro area. The projected annual growth rate for this year is propped up by the momentum gathered with the recovery of last year and a stronger first quarter than previously estimated (European Commission, 2022). Global economic growth is projected to slow from 6.1% in 2021 to 3.6% in 2022 and 2023. This is 0.8 and 0.2 percentage points lower than projected in January for 2022 and 2023 (Irtyshcheva et al., 2022).

International studies have shown relationships between the coronavirus crisis and feelings of job insecurity (Maleki et al., 2021; Karacsony et al., 2022). Feelings of insecurity were affected by fears of losing their jobs, as workers with higher levels of redundancy due to the

coronavirus crisis also had higher feelings of insecurity (Lippert et al., 2021; Giorgi et al., 2020). The financial shock caused by the pandemic weakened the financial security of households regardless of the income level of households (Szustak et al., 2021). Because of the uncertainty and fear of the virus, some studies (Karacsony et al., 2022) predicted less spending of households and consequently lower ability of the economies to reach the previous level of development. It did not happen in full. Szustak et al. (2021) studied the Consumer Confidence Index (CCI) of V4 countries within the years 2018-2021. The future was perceived as highly uncertain during the COVID pandemic. The CCI has fallen in three of the four analysed countries (except Hungary).

2 Methods

In addition to the traditional V4 comparative format (Slovakia, Czech Republic, Poland and Hungary), we also included Slovenia in the analyses, as a country with a smaller population than Slovakia (and at the same time all other analysed countries) but belonging to the Eurozone (since 2007 - even before the entry of Slovakia into it). We have thus expanded the analytical basis for evaluating the development in Slovakia.

The development of international trade over the last ten years, i.e. the period 2012-2021, was analysed. Data on international trade balance published by Eurostat and the national statistical offices of the monitored countries were used in the analyses. Specifically:
-    Czechia: Czech Statistical Office
-    Hungary: Hungarian Central Statistical Office
-    Poland: Statistics Poland
-    Slovakia: Statistical Office of the Slovak Republic
-    Slovenia: Statistical Office of the Republic of Slovenia

In the process of data collection, we notice significant differences in the data provided by institutions processing trade statistics (both international and national). The differences between values of international trade in accessed databases result from the application of a different methodology of data collection and calculation of indicators, as well as differences in terminology. Eurostat database consist of two systems: Intrastat and Extrastat. Intrastat as a data collection system is closely linked to VAT systems since single EU market removed customs formalities between EU Member States what resulted in a loss of information. On the other hand, Extrastat record flows of goods between the EU and third countries. This system uses Extra-EU statistics gathered by customs authorities. Regarding methodology: In the International trade in goods section of the Eurostat database, Eurostat presents data purely on cross-border movements of goods, which may not be consistent with the change of ownership data. CZSO (2022) discusses the topic of differences in the data of registered movement of goods in international trade in more detail. In order to be able to compare country data, we used the Eurostat methodology. Thus, in case of Czechia, data were retrieved as Cross-border movements of goods (CBmG).

3 Results

The development of the balance of the trade balance of the compared countries is evident from Graph 1. Table 1 provides an overview of specific values in the monitored period.

Table 1. International Trade Balance (in mil. Euro)..

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Czechia	12166	13564	15597	14883	17732	16793	14864	17963	18118	12259

Hungary	6655	6555	6274	8595	9725	8078	5520	4334	5618	1623
Poland	-10584	-1984	-2659	2345	3918	563	-4576	1172	10507	-1461
Slovenia	-1017	-565	355	635	859	659	152	-534	814	-2106
Slovakia	4000	4571	4773	3160	3367	3074	2310	1063	3317	1876

Source: Own elaboration based on Statistical Office of the Slovak Republic (2022), Hungarian Central Statistical Office (2022), Czech Statistical Office (2022), Statistics Poland (2022), and Statistical Office of the Republic of Slovenia (2022)
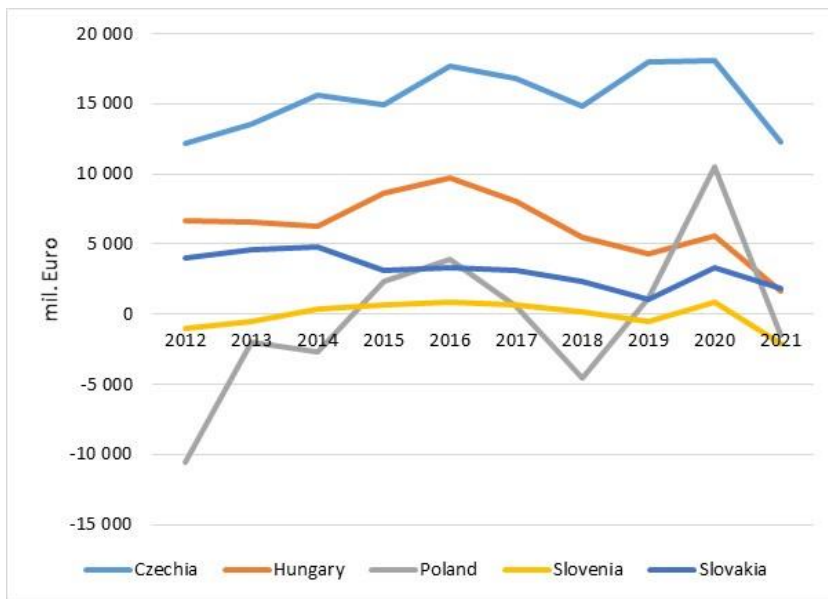
Figure 1. International Trade Balance (in mil. Euro).

Source: Own elaboration based on Statistical Office of the Slovak Republic (2022), Hungarian Central Statistical Office (2022), Czech Statistical Office (2022), Statistics Poland (2022), and Statistical Office of the Republic of Slovenia (2022).

Poland has a significant service sector, which accounts for over 55% of GDP (Statista, 2022). According to statistics (Statistics Poland, 2022), industry, mining and agriculture are also significant. Poland is the third largest agricultural region of the EU and Polish farmers have considerable bargaining power in the public debate on the use of agricultural land in Poland. Poland's largest trading partner in terms of imports and exports is Germany, followed by the UK, the Czech Republic, France, and the Netherlands. The engineering industry makes up the largest share (38%) of Polish exports. Import partners are Germany, China, Italy, the Netherlands, and the Czech Republic. It is followed by the chemical industry (mainly drugs and pharmaceuticals) and agriculture with the food industry (mainly the meat sector). The territorial structure of the international trade of Poland and Slovakia is similar - the largest exchange sessions are carried out with the same partners. The volume differences in trade are of course large. In addition, Poland has a very strongly developed domestic market. Its strength helps it better overcome sudden changes in world markets.

Slovenia is also an export-oriented economy due to its small domestic market. The openness of the economy makes it largely dependent on global trends and developments in partner markets, of which the markets of the EU states are important - up to 70% of Slovenian exports (Statistical Office of the Republic of Slovenia, 2022). The most important is

Germany, followed by Italy, Switzerland, Croatia, Austria, and also the V4 countries. The first three countries are also important for the import of goods. The Slovenian market is highly competitive and dynamically developing with a focus on industries with high added value. Medicines (packaged medicines), cars and their components and refined oil contribute the most in terms of value to the total export.

For the **Czechia**, as in the case of other countries, Germany is the most important trading partner. Among the Central European countries, Slovakia and Poland are also important for Czech exports. Import values are formed mainly in trade with Germany, China and Poland. The main traded commodities are machinery, electrical equipment and vehicles and their components. The significance of the EU's internal market is very significant for Czechia. According to Eurostat (2022), in 2021, the highest shares of intra-EU trade in goods (above 75 % of total trade) were recorded for Luxembourg (85.8 %), Slovakia (79.3 %) and Czechia (77.2 %) with this ratio falling to 52.2 % for Greece and 38.1 % for Ireland.

Hungary exported the most electrical equipment (year 2021). Germany was also the largest trading partner (export of electric accumulators), followed by Italy and Romania. As the only country from the V4 group, its exports are not territorially focused on any of the other countries of the Visegrad Four (in the first three highest export values). Goods are imported from Germany, China (mainly electronic devices for both) and Austria (mineral fuels and oils).

4 Conclusions

Economic inputs and outputs of the national economy are significantly influenced by foreign trade. Even globally important players in international trade are going through turbulent changes due to the influence of new factors affecting foreign trade relations. The impact of the Covid-19 pandemic was significantly negative in the subsequent economic development of the monitored countries. From the moment of its outbreak, it paralyzed the world economy with its consequences in the form of restrictive measures by the governments of the affected countries. The first major factor was the shutdown of the production of Chinese factories, which crippled the global supply chain with chain consequences on all connected markets. The fragility of the global supply chain was also demonstrated by the consequences of the 2021 Suez Canal collision, where a six-day blockade by the container ship Ever Given influenced global trade with long-lasting consequences.

In the last three years, Slovakia's GDP per capita in purchasing power parity is lower than in the Czech Republic, Slovenia and Poland (which even has a lower average annual wage during this period) (Trading Economics, 2022). In comparison with the largest (Poland) and the smallest (Slovenia) monitored economy, Slovakia achieves a worse ranking from the point of view of the Global Competitiveness Index (GCI) and Doing business (DB) (WEC, 2022; WorldBank, 2020) The industry had the greatest negative impact on the DB index starting a business and dealing with building permits. A high level of bureaucracy plays a role in both evaluated items. Among the analysed countries, only Slovakia and Slovenia are members of the Eurozone. The advantage of this is mainly simplified trading at the international level and currency stability (in terms of exchange rate risks). The disadvantage is frequent price increases or the growth of prices (not only of consumer prices but also of inputs for the corporate sector) and greater dependence of the national state on the policy of the European Central Bank.

Exclusively from an economic point of view, it can be stated that the analysed economies recorded progress in the monitored period. This can also be argued based on how quickly business recovered in the post-pandemic period. It is questionable whether economic progress does not paradoxically raise environmental questions, and to what extent it affects

the positive development of countries in the social field. The future development of the Central European region will be influenced mainly by factors that are difficult to predict: the global management of the pandemic, the ongoing war conflict in Ukraine (with all its consequences), political decisions at the level of national states and at the level of the European Union (including decisions regarding energy security).

Acknowledgements

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Increasing the prevention of financial crises in the enterprise using scenario analysis - a case study

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Abstract

Research background: External threats in the global environment and the resulting economic consequences, e.g. the COVID-19 pandemic, the war in Ukraine, the rise in energy prices, and rising inflation make corporates give more attention to the prevention of crises. Since some negative events are less predictable, the need for greater preparedness and associated risk assessment using various methods and techniques, e.g. scenario analysis, is in place.

Purpose of the article: Is to present the results of a case study focused on managing a service enterprise during a financial crisis using scenario analysis in order to prevent the bankruptcy. Part of the goal is to increase the awareness of business managers about prevention and preparedness for negative events using the method of scenario analysis.

Methods: To achieve the set goal, methods are used, e.g. analysis of relevant sources, studies, surveys, authors' own experiences, analysis of scenarios, investigation, comparison, and assessment of current knowledge and approaches of experts from practice and academia.

Findings & Value added: The results of this case study in a specific service enterprise point to the need to pay attention to scenario analysis, with the help of which the enterprise can think about the future development, possible economic consequences, and can take appropriate measures to avoid a crisis or bankruptcy. Processed results benefit board members, key process managers, risk experts, regulators, etc. not only in the business sector but also in the public sector in Slovakia and other countries in the world.

Keywords: *crisis, scenario analysis, prevention, consequences, enterprise*

JEL Classification: *L26, M21, G32, L52*

1 Introduction

In the current unpredictable and uncertain global environment, the consequences of the covid-19 pandemic are still fading and other threats are already coming, such as war in Ukraine, energy crisis, rising inflation, etc. The mentioned uncertainty emphasizes **the increase of resistance and the need for prevention in the enterprise** (Fraser and Simkins,

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2016; Gates at el., 2012). One option is the application of risk management, in an effort to be better prepared for crisis situations or prevent enterprise crises. The results of the Institute of Risk Management shows that every year the international interest in risk management in any governmental, public and business sphere is gradually growing. Their results show that it is very important to follow the framework, processes and standards for risk management so that enterprises can reliably manage risks and fulfill strategic objectives (IRM, 2022). These conclusions are also confirmed by the results of a study by the Federation of European Risk Management Associations (FERMA, 2022), which investigated the level of fulfillment of risk management tasks in strengthening the resilience of their enterprise. The study results show that three-quarters of risk managers expect a greater emphasis in the near future to more deeply integrate resilience efforts into the strategy process. Increasing resistance and prevention must become part of strategic considerations and strategic process in the enterprise (FERMA, 2022).

At the same time, negative threats, limitations, and various problems provide space and opportunities to reevaluate policies, strategies, measures, and priorities from a long-term perspective of enterprise management (Belas et al., 2021). It should be important for managers to set a strategy to strengthen resilience and pay much more attention to assessing risks, monitoring the symptoms of enterprise crises, proposing measures to reduce them (Makka and Kampova, 2021). According to the authors (Bsoul-Kopowska, 2020; Herghiligiu, 2014), the most common symptoms of a crisis can be e.g. declining market share, declining profitability, increasing dependence on external sources, incompetent management decisions leading to poor investment decisions, faulty planning, poor diversification and many others. Some of the mentioned symptoms have an immediate direct impact on the enterprise's financial situation, others will be reflected in the enterprise's performance and financial statements in the long term (Kliestik et al., 2021). Therefore, the issue of symptoms and their early identification is very crucial (Meng, 2007).

On the one hand, there are threats from the enterprise's external environment, on the other hand, threats arising from the internal environment, which can also be the cause of enterprise crises should not be underestimated (Vermeulen et al., 2015; Brzezinski, 2011). According to the research of the American Institute for Crisis Management (2022), the cause of more than half of crises in enterprises is incorrect and ineffective problem solving by managers. Their study shows that the cause of serious business problems is in many cases the human factor, namely executive employees with their behavior, as well as managers with their wrong decisions.

One of the risk management methods that managers can use to identify risks early is **scenario analysis** (Du and Xi, 2010). Using this method, enterprises can think about the future development of the enterprise from an optimistic, pessimistic and realistic point of view. Based on thorough analysis, they can predict risks, their consequences, and propose measures to minimize anticipated changes (Dvorský at el., 2021; Area et al., 2017). When applying the method, it is necessary to take into account the quality and quantity of changes in the internal and external environment of the enterprise's development. Identifying symptoms, indicators and reacting to them should be an important part of strategic business management (Farooq et al., 2018).

The aim of the paper is to present the results of a case study focused on enterprise management during the financial crisis using scenario analysis in an attempt to prevent the bankruptcy of a specific enterprise providing services in Slovakia. Part of the goal is to increase the awareness of business managers about prevention and preparedness for negative events using the method of scenario analysis.

2 Methodology

An important methodological starting point is the assumption that frequent unpredictable changes in the external and internal environment are a source of risks and cause a much increased need for resilience and prevention in the enterprise than before. Based on this, it is possible to make the assumption that despite the negative effects of the environment, it is possible to assess risks in time and reduce the consequences of adverse situations. This is possible mainly through the effective application of risk management using methods and techniques, e.g. by analyzing scenarios. The comparison of previous knowledge and approaches to the management of risks and enterprise crises confirms the high topicality of the issue being addressed. The key methodological source is a processed own study of business management during the financial crisis using scenario analysis in an attempt to prevent the bankruptcy of a service enterprise.

The following section presents the processed results of the conducted study.

To fulfill the set goal, following methods were used:
- analysis of relevant sources, studies, current knowledge and approaches,
- analysis of the authors' own experiences from practice and from the academic environment in the form of solving scientific projects,
- scenario analysis (optimistic, realistic and pessimistic),
- cash flow analysis,
- examination and assessment of the processed results,
- synthesis of proposed measures to prevent bankruptcy and prediction of cash flow after the adoption of corrective measures.

The conducted study was processed according to the procedure of business management in crisis Klučka (2021):
1. Identification of symptoms and causes of the crisis in the enterprise
2. Analysis of scenarios and taking measures with regard to the short-term survival of the enterprise (cash flow management to overcome the crisis)
3. Taking measures with regard to the long-term development of the enterprise (defining the strategy and adopting the action plan),
4. Implementation of measures with regard to the long-term development of the enterprise (obtaining the consent of the owners, managing changes).

3 Results

The service enterprise was founded in April 2021 and began to fully function in October 2021. The main activity of the service enterprise is the maintenance of the town and its property. Due to the provision of sensitive data, the name of the enterprise has been changed. The 100% owner of the enterprise is the town, which founded the service enterprise from the maintenance department of the municipal office. Due to incorrect financing and bad decisions by the owner, the enterprise got into a financial crisis in the first quarter of 2022, which may lead to bankruptcy.

The main goal of founding the service enterprise is to perform more efficient maintenance of the town and generate profit, which will be invested in new facilities and in the improvement of urban elements - public greenery, town buildings, roads, sidewalks etc.. The owner decided that the enterprise will be a registered social enterprise, which will be aimed at employing vulnerable and disadvantaged people, given that this type of people have already worked in the maintenance department of the municipal office. For vulnerable and disadvantaged people, registered social enterprise receives wage subsidies from the Office of Social Affairs and Family. This status was obtained before fully functioning of the enterprise.

At the fully functioning of the enterprise hired all employees of the municipal office maintenance department and new employees necessary for the operation of the enterprise. The condition for the enterprise to maintain registered social enterprise status is that it must employ 30% of vulnerable or disadvantaged people, which was achieved in March 2022. The owner also decided to use the project for registered social enterprise in the form of non-refundable financial assistance, in which they are reimbursed for 18 months wages for workers up to €200,000 from the Office of Social Affairs and Family. This project involves conditions, which the enterprise must fulfill, e.g. the participation of the bank in the form of a loan for the purchase of technology and the investment of own funds in the form chosen by the enterprise. The owner together with the CEO of the enterprise decided on the purchase of a telescopic lift from a loan and a flatbed truck as a investment of own funds.

A enterprise that is owned by the public administration and also has registered social enterprise status, brings many more conditions and obligations than normal enterprises. It has its advantages as a stable partner and various subsidies that can be drawn, but also disadvantages in the form of rules that must be followed and play an important role in the planning and management of the enterprise. The enterprise must perform 80% of its activities for the town and 20% of its activities for other customers. It is therefore necessary to plan and monitor the enterprise's activities thoroughly, which is also evidenced by the fact that it was the owner's decisions during the planning phase that led the enterprise to a financial crisis.

The following section presents the processed results of a study of enterprise management during the financial crisis using scenario analysis in an attempt to prevent the bankruptcy of the service enterprise.

3.1 Identification of symptoms and causes of the crisis in the enterprise

The owner decided to finance the enterprise in 2021 in the form of a subsidy from the town and not on the basis of invoices as in the case of ordinary enterprises, he switched to invoicing from 2022. This decision resulted in the enterprise having to return all subsidies for wages for vulnerable and disadvantaged workers and for workers assigned in non-refundable financial assistance project for the months of 2021 back to the town. The reason was that the workers' wages cannot be covered by a subsidy from the town and at the same time a subsidy from the Office of Social Affairs and Family, i.e. both from public sources.

Another decision of the owner was to make a non-monetary contribution in the form of land to the share capital and finance the start of the business with the amount from the budget for the maintenance department of municipal office for the year 2021, or its equivalent for the months of September to December 2021. No financial resources were planned for the start-up of the business. The necessary resources - offices, equipment, cars, tools, etc. in order to function, town gave to the enterprise if a form of loan, which later turned out to be insufficient, it was necessary to obtain additional resources for the necessary functioning, but they had to be obtained from the budget of maintenance department of municipal office.

At the beginning of 2022, financing in the form of a town subsidy ended and invoicing started, but it had to be switched to pre-invoicing in order to be able to cover all expenses on time. In addition, since January the service enterprise has been guided by the new budget for 2022, and after accounting for the town's subsidy from 2021, it came up that the obligations from 2021 had to be covered from the budget for 2022. Another obligation was to return the all subsidies for wages from the Office of Social Affairs and Family back to the town.

From the above analysis, the following symptoms were found:
- the impossibility of invoicing for services for the town after the service has been performed as in normal business relations,

- insufficient cash for investing in infrastructure,
- insufficient financial reserves for changes in the enterprise that would lead to improved conditions and increased sales of services,
- problems with the circulation of cash flow.

The main causes were identified:
- making a non-monetary contribution in the form of a land to the share capital.
- financing of the enterprise with the amount from the budget for the maintenance department for the year 2021.
- financing of the enterprise in 2021 in the form of a town subsidy, which led to the return of the subsidy from the Office of Social Affairs and Family back to the town.

Since it is a cash flow problem, it can be concluded that the enterprise is in an **acute financial crisis**, therefore it is necessary to perform an analysis of the enterprise's financial flows and take measures to prevent bankruptcy. It is necessary to take measures to rehabilitate the enterprise.

3.2 Analysis of scenarios and taking measures with regard to the short-term survival of the enterprise

The analysis of cash flow in the enterprise was carried out from the starting of business activities, that is, from September 2021 with a prediction for the years 2022 and 2023.
The following tables show the analysis of cash flow in the current situation without future measures:

Table 2. Analysis and prediction of service enterprise cash flow in 2021, 2022, 2023

Month		January	February	March	April	May	June	July	August	September	October	November	December	
Income - Expenses		0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	14 932,32	2 237,75	-3 452,71	45 652,14	59 369,50
	Status as of 31.12.2020													Status as of 31.12.2021
CASH FLOW	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	14 932,32	17 170,07	13 717,36	59 369,50	59 369,50

Month		January	February	March	April	May	June	July	August	September	October	November	December	
Income - Expenses		2 715,60	-48 478,34	-10 271,48	-700,00	12 800,00	2 800,00	2 000,00	2 000,00	2 100,00	-28 700,00	1 600,00	1 600,00	-60 534,22
	Status as of 31.12.2021													Status as of 31.12.2022
CASH FLOW	59 369,50	62 085,10	13 606,76	3 335,28	2 635,28	15 435,28	18 235,28	20 235,28	22 235,28	24 335,28	-4 364,72	-2 764,72	-1 164,72	-1 164,72

Month		January	February	March	April	May	June	July	August	September	October	November	December	
Income - Expenses		1 350,00	1 350,00	1 350,00	1 350,00	-8 650,00	-8 650,00	-8 650,00	-8 650,00	-8 650,00	-8 650,00	-8 650,00	-8 650,00	-63 800,00
	Status as of 31.12.2022													Status as of 31.12.2023
CASH FLOW	-1 164,72	185,28	1 535,28	2 885,28	4 235,28	-4 414,72	-13 064,72	-21 714,72	-30 364,72	-39 014,72	-47 664,72	-56 314,72	-64 964,72	-64 964,72

Source: author (2022)

The enterprise's income consists of:
- Incomes from the town – incomes for services provided to the town, which are controlled by the town budget. Incomes from the town are determined by the town budget, they are fixed income, changes to the budget must be approved by the town council.
- Income from other customers – income from services provided to customers other than the town. These incomes can be a maximum of 20%. Considering its capabilities, the management has set a objective of achieving income from other customers in the amount of 5% of the maximum amount for 2022.
- Subsidies for wages of disadvantaged and vulnerable workers, this amount is affected by the wage of a vulnerable or disadvantaged worker, if the worker is unable to work, his wage depends on the number of days worked, in the case of long-term sick leave it is zero wage, i.e. zero subsidy.
- Subsidies for the wages of workers assigned in non-refundable financial assistance project, this amount is also affected by the wage of the worker, but these workers are not disadvantaged or vulnerable.

- Loans – the loan for the telescopic lift.
- Owner's contributions – share capital, loans, owner's donation.
- Other monetary income - income from the sale of long-term assets, etc.

Enterprise expenses consist of:

- Wages - all costs associated with wages are included here - levies, taxes, food allowances, bonuses.
- Operating costs - costs associated with the operation of the business - gas, maintenance of equipment and vehicles, office supplies, various fees, etc.
- Repair and maintenance of town property costs – are costs associated with town maintenance, mostly with town buildings – revisions of technical equipment of buildings, repairs, building maintenance, etc., these costs are planned within the town budget.
- VAT – value added tax.
- Taxes - other taxes, e.g. road tax.
- Returns to the town - if the amount on the pre-invoice was greater than the amount for the services provided, it is necessary to return the difference in the form of a return.
- Investment costs.
- Loans.

All costs can be considered fixed. For the year 2022, investment costs were also planned for the purchase of a telescopic lift and a flatbed truck, which are mandatory conditions of the non-refundable financial assistance project.

From the analysis of the enterprise's cash flow in the current situation, it can be estimated that the enterprise will reach a negative cash balance in October (when it will be necessary to pay for the ordered flatbed truck), which will last until the end of the year. It indicates that the enterprise will not be able to repay its obligations on time. If no measures are taken, the enterprise will not be able to repay its obligations in the long term from May 2023 when the non-refundable financial assistance project will end and will be headed for **bankruptcy.**

The only way to avoid bankruptcy is to invest funds for the purchase of the flatbed truck and for a financial reserve so that changes can be made to improve the conditions for increasing the sale of services for other customers, i.e. to choose a strategy of income growth in any form. In the current situation, it is not possible to try to reduce costs, as all costs are considered to be fixed, in addition, enterprise must also think about current inflation and price increases. The only way would be to reduce wage costs, i.e. to dismiss several workers who are not fixed for subsidies, but this requires additional immediate costs associated with severance pay, with a reduction in the number of three workers, this would amount to approximately €6,000, which is a high cost considering the situation.

In the following part, the analysis of the scenarios from the optimistic, pessimistic and realistic point of view was processed. Subsequently, measures (strategies) were proposed for each scenario:

Optimistic scenario: In order for the enterprise to make a profit, it is necessary to increase the budget by minimum of 14% and income from the sale of services to other customers by minimum of 125% while maintaining the current costs. However, the development of prices on the market must be monitored and the costs for the next year analyzed accordingly. The analysis of the cash flow after the implementation of the measures shows that the enterprise will avoid bankruptcy in 2023 and achieve at least a minimal profit.

Proposed measures for an optimistic scenario:

- The owner will provide the amount that was returned together with the financial reserve for measures for changes that will improve the conditions for increasing the sale of services to other customers, a total of €57,000 - e.g. by increasing the share capital, providing a subsidy, donation, sale of land.

- The enterprise will take measures to increase the sale of services to other customers - e.g. purchase of new equipment, acquisition of qualified workers, improvement of marketing.
- For 2023, the enterprise will set a price list for town maintenance with higher prices and thus a higher budget.

Realistic scenario: The analysis of the cash flow after the implementation of the measures shows that the enterprise will avoid bankruptcy in 2023, but there is a risk that its economic result will be a loss, which would be the third loss in a row since the beginning of the enterprise's functioning. This would give a negative image of the enterprise in front municipal council and citizens of the town.

Suggested measures for a realistic scenario:

- The owner will provide the amount, which the flatbed truck will be paid with - as in the optimistic scenario, e.g. by increasing the share capital, providing a subsidy, donation, sale of land.
- The enterprise will take measures to optimize human resources after May 2023, when the non will non-refundable financial assistance project end - it will reduce wage costs by dismissing at least 3 employees whose contract ends in March 2023 in order to avoid paying severance pay. By doing so, however, enterprise will lose qualified administrative workers and truck operators, so it would have to take measures to cover these activities.
- The enterprise will take measures to increase income from the sale of services to other customers, but at minimal costs and without offering new services - e.g. constantly reaching out to potential customers.
- For the year 2023, the enterprise will set a price list for town maintenance with higher prices and thus a higher budget by minimum of 6%.
- The enterprise will look for additional subsidy projects for registered social enterprises.

Pessimistic scenario: The analysis of the cash flow after the introduction of the measures shows that the enterprise will avoid bankruptcy in 2023, but there is a risk that its economic result will be a significant loss, which would be the third loss in a row since the beginning of the enterprise's functioning, so the enterprise would have to consider taking measures to achieve profit in 2024.

Proposed measures for a pessimistic scenario:

- The owner will not provide any amount, the enterprise will have to take measures to pay for the flatbed truck - e.g. lease the flatbed truck, but this will require approval from the bank that provided the loan within the non-refundable financial assistance project, where one of the conditions was to invest own funds.
- The enterprise will optimize costs in 2023 – reduce wage costs by dismissing at least 3 employees whose contract ends in March 2023 in order to avoid paying severance pay. By doing so, however, enterprise will lose qualified administrative workers and truck operators, so it would have to take measures to cover these activities.
- The enterprise will set the same objective for income from the sale of services to other customers as in 2022, keeping its current customers and finding new ones at minimal costs.
- For the year 2023, the enterprise will set a price list for town maintenance with higher prices and thus a higher budget by minimum of 4%.

3.3 Taking measures with regard to the long-term development of the enterprise

The efficiency of providing the maintenance for town is not displayed in a reduced budget for the town maintenance, but in the improvement of services and the providing greater number of different services for the town. The financial performance of the enterprise depends on which scenario and which long-term strategy enterprise will choose.

In the current situation, it is possible to propose the following enterprise strategies for long-term development:

- An enterprise that will function as before and the main focus will be the maintenance of the town.
- An enterprise whose main focus will be the maintenance of the town, but with the new equipment so it will be able to offer these services to other customers at a profit.
- An enterprise that will implement a new type of services that will be profitable.

3.4 Implementation of measures with regard to the long-term development of the enterprise

The most difficult step will be obtaining the consent of the owner for the chosen scenario, because if the enterprise does not want to get into an unmanageable crisis, the consequence of which will be bankruptcy, it must invest additional funds, which come from public sources, and therefore the consent of the town council will also be necessary.

The management of the enterprise must plan individual measures and manage the risks associated with them. It is also important for the enterprise to monitor these measures together with own activities. The best way to monitor its activities and measures is to establish key performance indicators (KPI):

- KPIs for measures that can be used are:
- compliance with the deadlines of the individual tasks of the measures,
- effectiveness of individual measures, i.e. whether the measures fulfill their objectives,
- the degree of risks associated with the implementation of measures, or the identification of new risks,

KPIs for enterprise activities can be:

- monitoring cash flow and achieving its objectives,
- income from the sale of services for other customers,
- rate of fulfillment of weekly action plans,
- degree of equipment usability,
- efficiency of operating costs.

The enterprise is in an environment that is affected by a number of influences, where the situation cannot be predicted exactly, therefore it is necessary to regularly monitor the course of individual measures, a suitable tool is action plan. The status and course of measures to manage the crisis should be communicated with the owner (including the town council), the advisory committee for registered social enterprises and employee representatives, in order to know the current situation of the measures and, if necessary, propose new ones.

4 Conclusion

The service enterprise got into a financial crisis very quickly due to wrong management decisions and related cash flow problems. The main reasons were that the enterprise was not sufficiently financed when it started, the share capital was non-monetary, the costs of starting the enterprise were not taken into account, and the main reason was the setting of financing in the form of a subsidy from the town, which resulted in the return of the subsidy from the

Office of Social Affairs and Family back to town. As part of the processed study, scenarios and measures were proposed that would help prevent bankruptcy. The most advantageous solution is for managers to accept the measures of optimistic or realistic scenario that will bring a significant improvement in cash flow and profit in the future. In the case of a pessimistic scenario, the enterprise will turn away from bankruptcy, but will not fulfill its original strategy and will be in a significant economic loss. It is also possible to prepare a scenario by combining the mentioned measures. However, if the enterprise does not adopt any of the mentioned measures and continues to perform its activities with the current status, it is certain that it will be at risk of bankruptcy in 2023.

The results of a case study in a specific service enterprise point to the need to pay attention to the prevention in the form of risk management. Through risk management, the enterprise's management can identify the key risks that threaten the fulfillment of the main objectives and propose measures to reduce them. The attitude and approach of responsible managers to risks and overall prevention in the enterprise is also important. As the study shows, a suitable method is the analysis of scenarios, with the help of which the enterprise can think about its future development, the possible financial consequences and can take appropriate measures to prevent a enterprise crisis, or bankruptcy. The effective application of risk management can help to be better prepared for other strategic threats and negative events affecting the operation and management of enterprises. The authors of the paper believe that they will find understanding among responsible managers not only in Slovakia but also in other countries of the world, to deal with risk management in order to increase the prevention of enterprise crises. The processed results of the study are of benefit mainly to business managers, risk managers, academics, etc. not only in the business sector, but also in the public sector in Slovakia and the world.

Acknowledgements

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Enneagram as a motivation tool in a company in the process of globalization

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Abstract

Research background: In the process of globalization, one of the key prerequisites for the success of businesses is human resources. If the company wants to develop, assert itself on the market and gain a competitive advantage, it is necessary to create and constantly improve the conditions for acquiring high-quality labor and keeping them in the company. Human resources are considered the most valuable resource that a company has. It goes without saying that relationships in the workplace influence the motivation of employees to perform a given job. Currently, there are many "classic" motivational tools. Our goal is to point out non-standard tools for employee motivation and, based on their application in the selected company, point out their usefulness in business practice.

Purpose of the article: The purpose of the article is to point out the usefulness of the Enneagram in the field of employee motivation, to point out its advantages on a theoretical level; and, based on its application in a specific company, to point out its usefulness in practice.

Methods: The paper used methods of analysis and synthesis of theoretical knowledge. A survey was used to investigate interest in non-standard tools in businesses in the region of Trenčín. A structured interview was also used to obtain the opinion of the business owner, and a questionnaire survey with an evaluation of the answers was conducted.

Findings & Value added: The Enneagram was used in a company as a motivational tool in a specific company. On the basis of structured interviews with the company manager and questionnaire surveys with employees, we can conclude that the Enneagram has its application in corporate practice in the Slovak Republic and, from our point of view, is an effective tool for motivating employees in the company.

Keywords: *Enneagram, human resources, motivation*

JEL Classification: *G32, O15, O30*

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1 Introduction

In the process of globalization, it is necessary to pay increased attention to several areas of the economy and management. From our point of view, the issue of human resources is also important. It is often the basis for the success of businesses. From our point of view, motivation for extraordinary work is important, and we consider it important that companies pay attention to it and look for different ways to motivate their employees. That is why I focused on the use of a non-standard motivation tool—the Enneagram. Our goal is to briefly approach this issue and find out how to influence the motivation of the Enneagram application in a specific company.

2 The theoretic background of the problematical

Here are many definitions of the term "motivation" in the professional literature. Despite the large number of definitions from different authors who understand motivation differently, it can be clearly pointed out that mutual similarities are evident. In the current science of the development of human potential and in other behavioral sciences, motivation is one of the most complicated phenomena. Motivation is hidden in every area of the economy and social life of every society and country. Steriopoulos explains the term "motivation" as the sum of all driving intrapsychic motives or forces. They usually stimulate and organize experience and behavior (Steriopoulos, 2020). The aim of this is to change the unsatisfactory situation that currently exists or to achieve something positive. Motivation is related to the processes that maintain and stimulate activities that are aimed at achieving a goal. Motivational processes are internal personal influences that lead to results. (Ryan et al., 2018) Khan describes motivation as a process of maintaining, directing, and energizing behavior. Despite the fact that this process is based on biological sources, it is considered a psychological phenomenon. It is a type of regulation that is guided by the psyche (Abbasi, 2017). According to Bal et al. (2020) motivation combines the physical and mental activity of a person, which leads to a set concrete goal. Through desires, ideas, interests, and, above all, unsatisfied needs, psychological tension can be induced, which can become an incentive for certain human behaviors (Bal et al., 2020). The term "motivation" can be understood as driving energies of a psychological nature because they set human behavior and activity in motion. forces because they have direction and intensity. (Sajjad et al., 2019) Motivation is a driving force that is responsible for initiating, maintaining, and guiding targeted behavior. The effect of external and internal stimulation (and its cognitive interpretation) creates a motivational force. Stimulations can be psychological (e.g. desire to succeed) or physiological (e.g. hunger). (Fiľa et al., 2009)

According to Wu et al. employee performance and motivation are directly linked to the management style and principles of negative or positive reinforcement that are applied in the company (Wu et al., 2021). The lot of authors talks about motivating employees as a systematic process. As part of that, senior staff continuously stimulate and encourage the enthusiasm and internal motivation of subordinate colleagues. They do this by uncovering and applying tools, measures, and approaches that help satisfy the intrinsic goals, needs, and aspirations of these workers. And thus, they encourage their more efficient work performance and appropriate behavior. Barth et al. based on research that aimed to determine the effect of training on the performance of subordinates, states that this research concluded that there is a positive relationship between the performance of a worker and his motivation and training (Barth et al., 2014). "In connection with motivation, the concept of motive appears as a factor influencing human behavior in a certain direction, which is difficult to define precisely because: motive cannot be directly observed; it is usually the action of several motives at the same time; the manifestation of the motive's effect on behavior can be different for each

person; motives and their actions are subject to change." (Hitka et al., 2021) Motives determine the direction and targeting of an activity, and thus also the course of a certain behavior and the content of a given activity. They also determine the intensity of the activity and what effort the individual will make to achieve his goal. The motive determines the duration of the given activity, which is usually finished by satisfying the need that triggered the activity. (Huffman et al., 2022)

In general, we know several types of motivation. External motivation is the motivation that an individual obtains from an externally influenced need; that is, he is motivated by external desires and needs. (Popadinets et al., 2021) Buckley stated in his article: "Intrinsic motivation is a type of motivation in which an individual is motivated by internal desires." In the mentioned article, Buckley also talked about the following types: Motivation based on rewards, which is a type of motivation in which an individual is motivated by receiving a reward if a certain goal is achieved, is Fear can also be a very powerful motivator if the fear of failure is strong enough. We call this kind of motivation "fear-based motivation. He also spoke about the motivation based on the achieved results, which appears in people for whom the achievement of a title or a certain position in employment or in other areas of human life is very important. We also know material and non-material motivation. In the case of material motivation, employees are provided with tangible rewards, which include, for example, a salary increase. Intangible motivation, and therefore intangible factors, further strengthens the will of employees to provide the best possible work. Intangible factors include, for example, the opportunity for personal development. (Di et al., 2022) Some authors defined individual motivation and work group motivation. According to her, when motivating an individual, emphasis is placed on the manager, whose abilities and skills are very important in motivation. For the application of this type of motivation, it is essential that the manager thoroughly knows, understands, and addresses the value ranking of the employee ((Chen et al., 2020).

Nowadays, we know a lot of theories that deal with the motivation of individuals and entire groups. The causes of the emergence and development of these theories can be found on the side of workers (development of their skills, initiative, attitudes of employees at work), but also on the side of management (management style, etc.) (Brown et al., 2020). For the purposes of this paper, we divided motivational theories into "standard" and "non-standard" categories. The literature currently offers a large number of "standard" motivational theories. According to Bal et al. (2020), a large number of theories have been developed over the past decades that are based on basic human needs. These are, for example, Maslow's theory, Alderfer's motivational theory-ERG theory, Herzberg's two-factor theory, Adams', Vroom's, and many others.

Among the "non-standard" we will consider the Enneagram. The word Enneagram itself has its origin in Greek, consisting of the words "ennea", which means nine, and "grammos", which means shape or scheme. The Enneagram can be defined as a geometric representation of the nine primary personality types; it also depicts the complex interconnectedness of these types. It is important to realize that none of these nine types is worse or better than the others. Each type has its strengths and quirks. (Bayne et al., 2021) The exact history of the Enneagram is not known, but what we do know is that in the form we know it today, it was created by combining various religious and spiritual traditions. These traditions have been created by Christians, Muslims, Buddhists, and Jews over the millennia. (Di et al., 2022)

As stated by Bland (2010), the Enneagram symbol was brought to the modern world by Georgi Ivanovich Gurdjieff. He was interested in esoteric thinking from an early age. On his travels around the world, which he carried out in order to explore different thought systems and teachings, he encountered the Enneagram symbol in Afghanistan or Turkey. Then he created his own synthesis from his knowledge, which he later taught in St. Petersburg and Moscow. "With its focus on the development and identification of hidden potential, the

Enneagram typology can be a powerful tool for employee development and talent management." (Bal et al., 2020) The Enneagram is currently being applied in various fields and professions. It is used, for example, in the fields of education, business and sales, in psychotherapy, medicine, and others. Various companies, such as the Walt Disney Company and Silicon Graphics, use the Enneagram as a tool for conflict resolution, communication skills development, leadership development, coaching, strategic planning, and team effectiveness. (Di et al., 2022) Steriopoulos (2020), who uses Enneagram and currently works in venture capital, states in her article, "Like any personality assessment, it is not a science. However, it is a useful tool for understanding your own and other people's tendencies so that we can anticipate conflicts and harmonious relationships. " As she states, she encountered the Enneagram several years ago when she was working on a startup with her friend and co-worker, who introduced her to the Enneagram. She introduced the Enneagram. Since then, he has been using it in his work to find out how people can react to different events and to understand why people behave in certain ways (Ryan et al., 2020).

The Enneagram symbol itself consists of three parts that represent the three laws of God. They are as follows: 1. circle ("God is only one")-means harmony, unity, wholeness, 2. triangle-("Holy Trinity"-Father, Son, and Holy Spirit/Christianity/; "Three spheres"-Keter, Bina, and Chochma/Judaism/) -According to most world religions, the universe is not the result of duality but of trinity 3rd hexagon-("The Law of Seven"-describes development and process over time)-nothing is static and unchanging, everything is in motion and it transforms into something new. (Brown, 2020)

The Enneagram includes nine different personality types. However, the system is a bit more complicated. In addition to these nine types, it also includes three key centers. (Wu et al., 2021). According to Bland (2010), these are the following centers: • belly center - this personality type includes personality types 8, 9, and 1. These mentioned types react instinctively; they are mostly open and direct. Alternatively, they hide aggression. If they are not successful, they consider it their fault. • center of the head-this includes personality types 5, 6, and 7. As the name suggests, personality types of the center of the head think about everything a lot. They do not act without thinking everything through first. 20 • center of the heart-this includes personality types 2, 3, and 4. These types are very focused on interpersonal relationships. They want to be accepted. They let themselves be influenced by what others think of them, and many times they think they know what is best for others. These types often suppress their aggression. These centers shape the way individuals function in the world. Each person can control one of three instinctive subtypes. These subtypes are: self-preservation, individual (sexual), and social. (Bland, 2010) "Each type is characterized by a number of traits that dominate the individual's overall personality. The model also identifies the greatest anxieties of each type, as well as the coping mechanisms people use to deal with those anxieties. " (Ryan et al., 2020).

Figure 1. Enneagram

Source: Downey, 2017

Type 1-The Reformer (also called a perfectionistic, teacher, white knight, activist, reformer, moralist, or organizer) is a rational type, balanced, principled, and determined. As Cherry states in his article, "The imperfection of the self arouses anger in the unit, and this brings about a paradoxical situation. This anger is the root of the sin of unity. It is hard to recognize (compared to visible sins like immorality, etc.) because the unit is ashamed of its anger! She doesn't want to admit that she is driven by anger, and she doesn't even want to admit to herself that she is aggressive-after all, anger is a manifestation of imperfection (Bayne et al., 2021).

Type 2-The Helper (also known as lover, altruist, pleaser, nurturer, exceptional friend) is an open, generous, and possessive communicative and caring personality type. (Ball, 2009) According to Bland (2010), twos should realize that it is not selfish to be angry sometimes and should admit when someone hurts them. They need to understand that it's perfectly okay for them to need help sometimes. Above all, they should realize that they have the right to say "no" (Bland, 2010).

Type 3-The Achiever (also called an winner, actor, motivator, entrepreneur, role model, or social climber) is a pragmatic type whose goal is to succeed. This type is an excellent, adaptable, and motivated person. He bases himself on his image. (Abbasi, 2017) The winner charms people by using an image that impresses them so he can manipulate them. (Cherry, 2019) The troika strives to gain a good status in society. This type is very competitive and wants to succeed in any field in which he works.

Type 4-The Individualists (also known as romantics, artists, melancholics, tragic victims, esthetes, or the "strange") are highly sensitive and closed-minded personalities. It is characterized by high temperament, theatricality, and egocentrism. (Khan, 2012) Characteristics of this type include valuing creativity, aesthetics, dignity, humor, and compassion. He values authenticity and loves beauty. On the other hand, this type often experiences a feeling of depression, behaves too dramatically, and wants to be moralistic. (Bal et al., 2020).

Type 5-The Investigator (also called thinker, computer scientist, innovator, specialist, radical, exporter) is an intellectual type. He stands out for his intelligence, ingenuity, and sensitivity, and those around him often perceive him as mysterious and lonely. (Cherry, 2019) This type lives from a distance, avoids emotional involvement, and prefers to observe rather than engage. The observer is usually a closed person. He can feel exhausted and nervous if he does not have enough time for himself. (Fiľa et al., 2020)

Type 6-Loyalist (another name is, for example, traditionalist, soldier, devoted follower, devil's advocate, convinced supporter, problem solver) is a devoted type who relies on certainty. He is charming, anxious, responsible and suspicious. The Six identifies the sources of potential threats and imagines the worst possible scenarios. This can lead to procrastination and suspicion of other people's motives. They often question authority. Bayne also stated in her article that the six are a skeptical and cautious type. The goal of this type is to be ready for anything that might come their way in life (Bayne et al., 2021).

Type 7-Enthusiast (also called hedonist, optimist, entertainer, multitasker, storyteller, dilettante, energy rebel) is a cheerful, busy type. He is versatile, spontaneous, often unfocused and not temperate. He desires to live a pleasant and happy life. This leads to an escape from reality to exclude negative emotions and possible wounds that would prevent him from presenting himself as an effective and optimistic person. (Hitka et al., 2022).

Type 8-Challenger (also known as leader, protector, breadwinner, or entrepreneur) is a confident, aggressive, and stubborn type. Tanner stated, "As eights mature and learn to acknowledge their softer and more vulnerable sides, their relationships deepen and improve drastically" (Bland, 2010)).

Type 9-Peacemaker (or peacemaker, healer, comforter, optimist, utopian) is a modest, calm person. He is perceptive, he mostly agrees with the opinions of others, he is indifferent and reassuring (Downey, 2017). It is important for this type to discover and develop a sense of their own importance, life force, and human worth. He must discover his own inner impulse so that he can be independent of stimuli from the outside world. With the Enneagram, we also talk about the so-called wings of the Enneagram. They are shown in Figure 1. Wings help us individualize the nine (more general) types of the Enneagram. Wings are the two types that are on either side of our type (Bayne et al., 2021).

2 Methods

On the basis of a survey conducted among companies in the region of Trenčín, we tried to find out what HR professionals think is the level of motivation in companies and what tools are used within companies. We also tried to find out the interest in using non-standard tools as part of motivation. A total of 20 businesses in the Trenčín Region were approached. On the basis of the results, it can be concluded that the principles of "standard" motivation tools are primarily used in companies, while one company showed interest in the application of non-standard tools as well. It is a small business that employs 11 employees from the construction industry. First of all, we conducted a structured interview with the business owner in the company, while using the Riso-Hudson QUEST and the Riso-Hudson TOP tests, we determined what Enneagram type the business owner himself is. Subsequently, tests were carried out to determine individual personality types for all employees. Once we knew what Enneagram types were in the company, we provided the owner with descriptions of the individual types. In them, we summarized the basic character traits of the types, their strengths. In the descriptions, we have also indicated the ways in which it is appropriate to communicate with employees because the individual types are significantly different and different methods apply to them. We also worked with their emotional intelligence, so that they could understand themselves and other people. The goal was primarily to improve relations and communication within the company. The employer applied the principles of communication with employees for a period of 6 months. After that, we again conducted a structured interview with the owner of the business, and we also conducted a questionnaire with the employees to find out what changes in the fields of communication and motivation have occurred in the company.

3 Results and Discussions

When comparing the answers to the questions in both questionnaires, we noticed the following changes:

- *How do you perceive motivation from the employer?*

In the first questionnaire, most employees, specifically six, perceived the motivation from the employer as average. One of them felt that the employer was not interested in motivating his employees. Four employees rated the employer's positive motivation. In the second questionnaire, the number of employees who perceive motivation from their employer on average remained unchanged, i.e., six. The change occurred in the case of a negative perception of the motivation from the employer, where at the end of the period, not one of the workers perceived the motivation negatively. On the contrary, there was an increase of one employee in the case of a positive perception of motivation from the employer.

Conclusion: In terms of the perception of motivation from the employer, there were no significant changes in the company. But we have seen a small improvement.

- *Rate workplace relationships on a scale of 1 to 5.*

In Table 1, you can see how employees evaluated their relationships with colleagues in the first questionnaire. Table 2 shows the answers of the employees in the second questionnaire.

Table 1. Relationship with co-workers—first questionnaire

Relationship with co-workers	
1 – very bad	0 %
2 – bad	27 %
3 – good	45 %
4 – very good	18 %
5 – excellent	9 %

Source: own source

Table 2. Relationship with co-workers—second questionnaire

Relationship with co-workers	
1 – very bad	0 %
2 – bad	18 %
3 – good	38 %
4 – very good	39 %
5 – excellent	9 %

Source: own source

Conclusion: Regarding the issue of relations with the employer, even more significant changes can be seen after the application of the Enneagram than in the case of relations with co-workers. Initially, up to 27% of workers perceived this relationship badly. In the second questionnaire, this number dropped to 9%. That is two workers less than at the beginning. The same number of employees as at the beginning perceive their relationship as good. One more employee perceives their relationship as very good—from the original 18% to 27%. Even one of the employees rated his relationship with the employer as completely problem-free. Despite the fact that the relations with the employer are still not the best in all cases, after applying the Ennegram, we see an improvement in some cases.

- ***Are there conflicts with co-workers in your job?***

The answer to this question was identical in the first and second questionnaires. Ten workers, representing 91%, confirmed that there were conflicts between them and their co-workers. One employee, which is 9% of the total number of employees, does not enter into conflicts.

Conclusion: Conflicts between employees still occur in the company.

- ***If you answered yes to the previous question, how often?***

In response to the first questionnaire, seven employees stated that conflicts occur frequently (several times a week). According to two, conflicts occur occasionally (a few times a month). According to only one, conflicts occur rarely (about once a month). According to the second questionnaire, conflicts occur often (several times a week), according to four employees. The same number of employees gets into conflicts occasionally (a few times a month). Rarely (about once a month) do two employees come into conflict.

Conclusion: Although conflicts between employees still occur in the company, differences can be seen between how often they occurred before and now after 50 applications of the Enneagram. Previously, seven employees were conflicted several times a week; now there are four, which is a significant difference. From the original 9% of employees who rarely came into conflict with others, this number increased to 18%, which is a favorable phenomenon.

- ***Are there conflicts with your employer in your employment?***

According to the first questionnaire, all employees of the company came into conflict with the employer. According to the second questionnaire, ten employees have disagreements with their employer. One stated that such situations with a superior do not occur at all.

Conclusion: Despite the fact that there are still conflicts between the employer and employees, we have noticed a change in one worker, who has not come into conflict with the employer lately.

- ***If you answered yes to the previous question, how often?***

According to three employees, before the application of the Enneagram in the company, there were frequent conflicts between them and the employer (several times a week). In this first questionnaire, seven workers stated that arguments occur occasionally (a few times a month). Rarely did one employee come into conflict with a superior. According to two employees, disagreements often occur after applying the Enneagram. Five, conflict situations with the employer occasionally arise. The three employees rarely come into confrontation with their supervisor (approximately once a month).

Conclusion: Conflicts with the employer still occur in the company, but improvement can be seen. From the original 27% of workers, now a little less, specifically 18%, come into conflict several times a week. Also, the option "occasionally", which means a couple of times a month, is marked by two fewer employees—from the original 64% to 45%. More than two employees rarely come into conflict—from 9% to 27%. This is ultimately positive.

- ***Are you satisfied with the atmosphere at the workplace in the company?***

In the first questionnaire, only one employee stated that he was satisfied with the atmosphere at the workplace. The three were rather satisfied. Four were rather dissatisfied, and three were not satisfied at all. After applying the Enneagram, the results of the second questionnaire on this issue were as follows: Two employees were satisfied. Rather, the number of satisfied people remained unchanged, three. One of the employees could not comment. Rather, the number of dissatisfied people remained unchanged at four. One employee was not satisfied with the atmosphere at the workplace.

Conclusion: Certain changes occurred in workers' satisfaction with the workplace atmosphere after applying the Enneagram. From the original 36% of the company's employees who were satisfied and marked "yes" and "rather yes", their number increased to 45%. The number of employees who are rather dissatisfied remained the same. A positive change occurred in that from the original 27% of dissatisfied workers, this number dropped to 9%.

- ***How do you perceive communication with your superior?***

According to the first questionnaire, most of the workers in the company understood everything that their superior was saying, and they felt that he was also willing to listen to them. One employee perceived the communication as understanding, but the supervisor was not listening. The three employees did not understand everything their superior was saying. Of which, according to two, he tried to explain things to them, and according to one, he did not. According to the second questionnaire, three employees said that they understand everything, but the employer does not listen to them. Three said that they do not understand everything, but the superior tries to explain it to them.

Conclusion: In both cases, the situation was favorable when 64% of the company's employees evaluated the communication positively, saying that they understood everything. From the original 18%, the possibility that the employees do not understand everything, but the employer is willing to explain things to them, has increased to 27%. It is also positive that not a single employee identified with the option "you don't understand everything your superior tells you and he doesn't even try to explain it to you". It follows from this that there have been certain, albeit small, changes for the better in the area of communication between the employer and employees.

Following the implementation of the Enneagram, certain changes occurred in the company. This tool was used in the company for approximately three and a half months. All employees of the company stated that, according to them, the atmosphere at the workplace is their motivation to work. Although conflicts between employers and employees still occur in the workplace, those between employees and employers occur less frequently. Following on from that, the employees also expressed somewhat greater satisfaction with the atmosphere in the workplace, which supports their motivation to work. There were also other changes in the field of communication in the company. Small positive changes can be observed after applying the Enneagram. In cases with a longer time horizon, the results could be even more visible. Well, even for this short period, it can be evaluated that after applying the Enneagram as a motivation tool, relations in the company improved, and thus also the motivation in the company improved.

As already mentioned, we supplemented the survey with a structured interview with the business owner. Based on this, the following can be stated.

Conclusion of the first interview: According to the employer, employee motivation is important and uses various motivational tools to improve the level of motivation in the company. He considers the atmosphere at the workplace to be an important factor. In the company, there are conflicts between the employer and the employees, while the employer sees the main reason for these conflicts in different personalities and opinions. The employer rated his relationship with the employees on a scale from 1 to 5, with 1 being the worst and 5 being the best. 3. The employer tries to create an atmosphere of openness, friendliness, and trust in relation to the employees. He tries to stimulate the opinions and suggestions of his employees.

Conclusion of the second interview: The employer noticed changes in both his employees and himself after applying the Enneagram as a motivational tool. Over time, he noticed more open communication with some employees. He also noted a better atmosphere and fewer conflicts in the group in which he works. He noticed changes in himself in the form of fewer

conflicts in his personal and professional life. The employer began to show more interest in the needs and opinions of the employees. The employer continued to try to support the motivation of employees. In addition to the motivational tools that he had already mentioned during the previous interview, he began to attach more importance to providing employees with sufficient information. He also tried to be more interested in the opinions of employees and gave them more space to solve problems. According to the employer, even after applying the Enneagram, conflicts still occur in the company, but to a lesser extent than before. He rated his relationships with employees on a scale from 1 to 5, with 1 being understood as the worst and 5 as the best, at 3.5–4. The employer rated the effect of the Enneagram on the company positively.

4 Conclusion

In the process of globalization, it is necessary to pay attention to the motivation of employees and through it to influence the overall efficiency of the company. Surveys in the form of a poll have shown that companies mainly use "classic tools" of motivation, and their interest in non-standard tools is low. However, from our point of view, this could have been caused by the still dying pandemic.

On the basis of structured interviews with the employer before and after the application of the Enneagram, it can be concluded that, in his opinion, this tool influenced the atmosphere at the workplace, communication, and thus motivation in the company and also in the personal life of the business owner. Over time, he noticed more open communication in the case of some employees, an improvement in the atmosphere at the workplace, and also fewer conflicts in the work group, of which he is also a part. Despite the fact that even after the application of the Enneagram, conflicts have not completely disappeared from the company, it records them to a lesser extent than before. The business owner evaluated the Enneagram positively as a motivation tool in his company. As for the employees, they perceive that motivation is important for better performance. Most of them are of the opinion that the atmosphere that prevails at the workplace affects their motivation to work. After evaluating both questionnaire surveys and the changes between them, it can be concluded that certain positive changes occurred in the company after the application of the Enneagram. At the beginning of the period, the overwhelming majority were dissatisfied with the mood that prevailed in the workplace. This improved somewhat after applying the Enneagram. We are also aware that the results were evaluated after 6 months of Enneagram application, and from this point of view we evaluate them positively. In the end, overall communication, relationships and motivation improved, which was our goal.

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Renewable Energy Sources and Its Impact on Employment in the Globalized Environment

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Abstract

Research background: The energy transition offers significant employment opportunities across different countries and market segments. The trends in the educational requirements of the energy sector call for better co-ordination between the sector and educational institutions. An integrated approach to labour and educational policy and planning will be needed to address this challenge, and also to better integrate the educational requirements in the energy sector with those of other sectors.
Purpose of the article: The aim of the paper is to measure the impact of Renewable energy sources on development of employment in the globalized environment.
Methods: Our calculations are based on data from Eurostat and the Statistical Offices of the selected countries for last ten years. To answer the research questions, we chose regression analysis.
Findings & Value added: The estimates are done for employment in solar PV, liquid biofuels, wind and hydropower. Less information is available for other technologies such as solid biomass and biogas, solar heating and cooling, concentrated solar power (CSP), geothermal energy and ground-based heat pumps, waste-to-energy, and ocean or wave energy. At 4 million workers worldwide, the solar PV industry employs a third of the total renewable energy workforce. Decent jobs will not be created automatically in the energy transition; ambitious policy support and investments in a future-oriented, climate-safe and just energy transition will need to be sustained and expanded.

Keywords: *Employment; Globalization; Renewable energy sources;*

JEL Classification: *E24, E29, O13*

1 Introduction

The use of renewable energy provides many benefits on the global, regional and local scale. The improvement of the environment condition and the improvement of energy safety (Gradziuk and Gradziuk, 2018, Simas and Pacca, 2014) are the most frequently highlighted ones. Distributed power prevents major disturbances in the event of power grid or power

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providers' failure. Moreover, such strategy minimises costs of constructing and using transmission lines, as well as enhances provision of power, especially to areas with poor power infrastructure. The development of the use of renewable energy sources results in increased employment (Baranes, Jacqmin and Poudou, 2017, Moreno and Lopez, 2008; Afşar and Özarslan Doğan, 2021).

Germany has long known how to take advantage of the benefits of globalisation. Today, exports of goods and services account for around half of the country's value added. One in four jobs depends on exports; in industry, this is true for even more than every other job. Exports are not the only decisive factor here. As a manufacturing nation, Germany also heavily depends on inexpensive, high-quality imports.

Globalisation is a double-edged sword, especially for emerging market economies. Like other emerging market economies, China has responded with sound macroeconomic policy and structural reforms to create a good domestic environment for participating in globalisation. China is adapting to the new normal of economic development and deepening supply side structural reforms. The government have sought to encourage technological innovation, increase investment in education, and improve labour quality and total factor productivity (Praene et al., 2021, Selvanayagam, 2006). China aims to cut costs for enterprises, reduce real estate inventory through tax measures, land and resource price reforms, and to reform the administrative system by streamlining administration and delegating powers (Mu et al., 2018).

For decades Germany has been the global pioneer in applying renewable energy and environmental technologies (Lehr et al., 2008). In 2019, 46% of the country's electricity mix came from wind, solar, biomass and hydroelectric sources. That's up 5.6 percentage points over 2018. The bulk of the clean power came from onshore and offshore wind capacity (24.4%), followed by solar (9%) and biomass (8.7%), with the remainder stemming from hydropower. All in all, 238.37 terawatt hours of electricity were generated by all renewable technologies.

According to IRENA (2022) in Germany, wind energy sector creates the largest amount of jobs in RES employment (Figure 1).
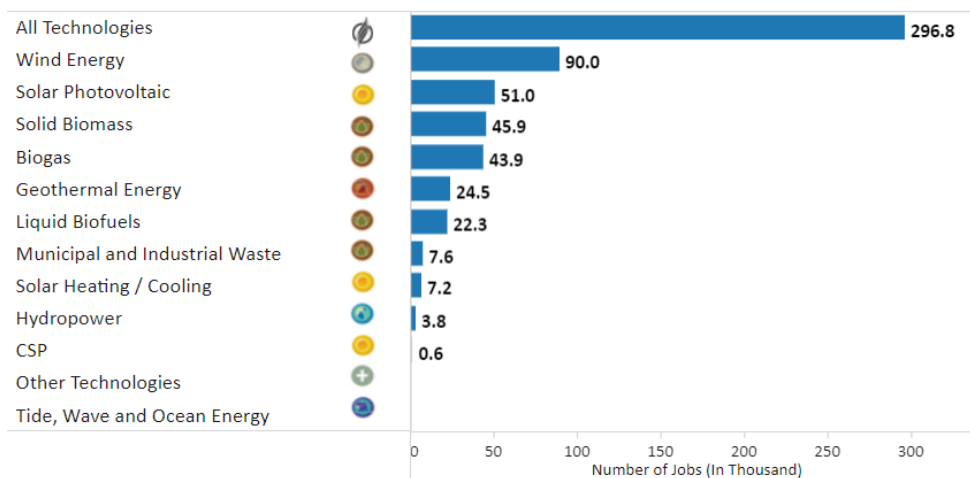
Figure 1. Structure of RES employment in Germany (2021)

Source: IRENA (2022)

In China, solar photovoltaic sector represents almost half of all RES jobs (Figure 2).

Nevertheless, the international community should be assured that China is genuinely interested in leading the world in one particular sector: deployment and investment in renewable energy (Kumar, 2020). China is already leading in renewable energy production figures. It is currently the world's largest producer of wind and solar energy, and the largest domestic and outbound investor in renewable energy. Four of the world's five biggest renewable energy deals were made by Chinese companies in 2016. As of early 2017, China owns five of the world's six largest solar-module manufacturing companies and the world's largest wind turbine manufacturer.
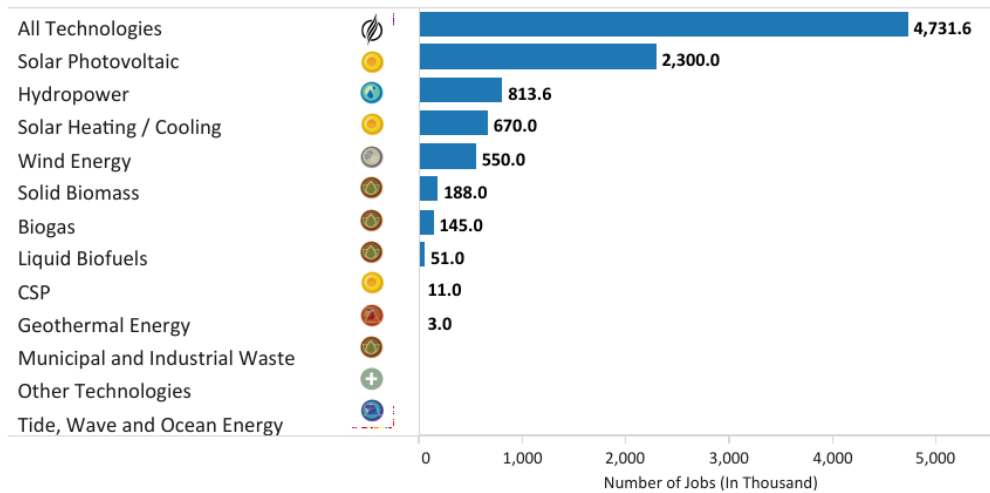
Figure 2. Structure of RES employment in China (2021)

Source: IRENA (2022)

2 Methodology and Methods

In this chapter, we described the purpose of the research paper and methodology used to fulfil the stated aim.

2.1 Research aim

The aim of the paper is to measure the impact of Renewable energy sources on development of employment in the globalized environment, especially in Germany and China. In the paper, we articulated the following research questions:

- Research question no. 1: What is the impact of the renewable energy sources on overall employment in globalized environment of China and Germany?
- Research question no. 2: What is the impact of the renewable energy sources on the economic development of China and Germany?

2.2 Methodology of the research

The KOF Index of Globalization aims to measure the rate of globalization in countries around the world. Data used to construct the 2020 edition of the index was from 2019. The index is based on three dimensions, or core sets of indicators: economic, social, and political. Via these three dimensions, the overall index of globalization tries to assess current economic flows, economical restrictions, data on information flows, data on personal contact, and data

on cultural proximity within surveyed countries. Globalization is defined for this index as the process of creating networks of connections among actors at multi-continental distances, mediated through a variety of flows including people, information and ideas, capital and goods. It is a process that erodes national boundaries, integrates national economies, cultures, technologies and governance and produces complex relations of mutual interdependence.

Figure 3 and Figure 4 declared the level of globalization in China and Germany.
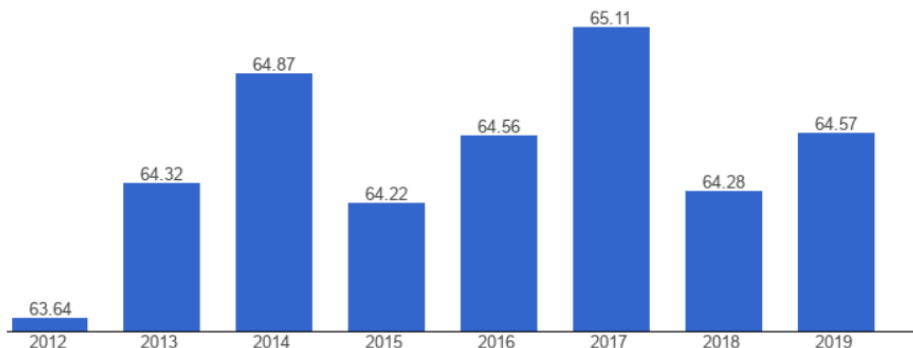
Figure 3. Index of Globalization - China

Source: KOF Swiss Economic Institute (2022)
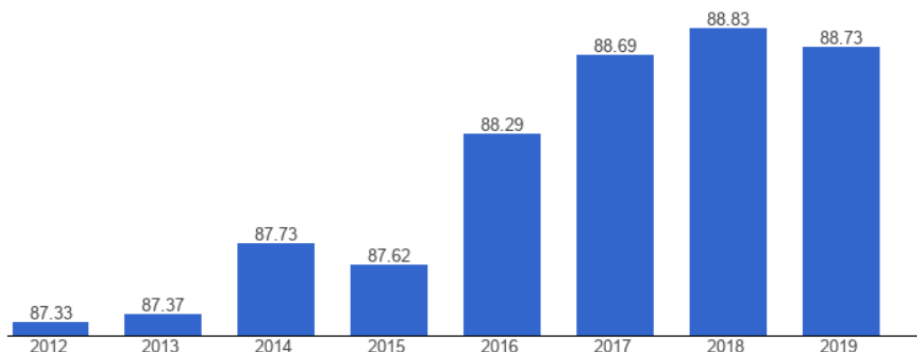
Figure 4. Index of Globalization - Germany

Source: KOF Swiss Economic Institute (2022)

3 Results and Discussion

Germany has historically been a global leader in renewable-energy research, thanks to its sustainable-energy agenda and high levels of public funding. The result has been a wealth of opportunities for scientists working in the private and public sector. The renewable-energy field employs nearly 340,000 people in Germany, and according to the Federal Ministry for Education and Research, there are now more than 180 universities and 120 research institutes involved in the country's energy-transition programme "*Energiewende*".

Figure below shows the increasing trend of renewable energy patents till 2020 in Germany.
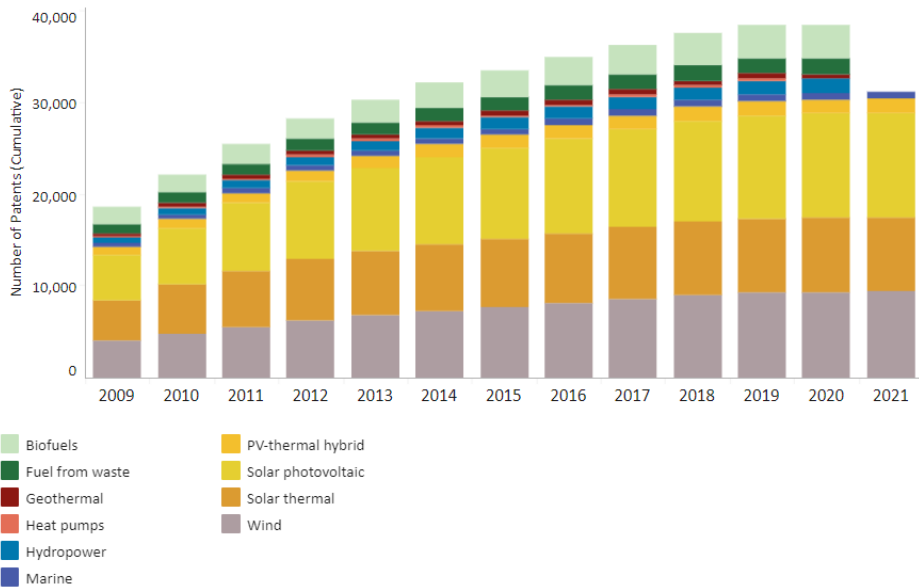
Figure 5. Renewable energy patents evolution in Germany

Source: IRENA (2022)

Figure 6 shows year-to-year increasing development of the renewable energy patents in China from 2009 till 2021.
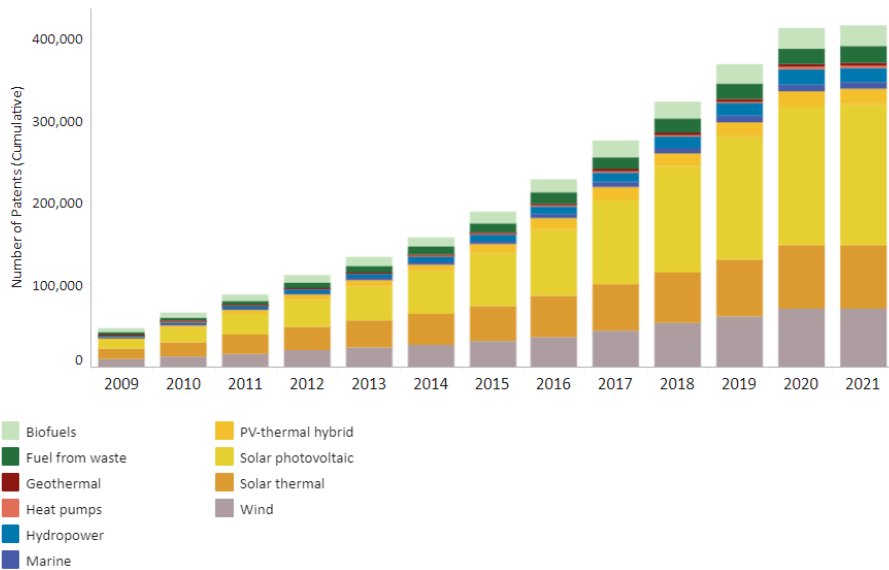
Figure 6. Renewable energy patents evolution in China

Source: IRENA (2022)

The second phase of the China Renewable Energy Scale-up Program, scheduled to run from 2014 to 2021, is of great importance to supporting policymaking, innovation and industrial layout optimization. The program, jointly developed by the National Energy Administration, the World Bank and the Global Environment Fund, was set to support the 13th Five-Year Renewable Energy Development Plan (2016-20) in China and promote the large-scale sustainable development of renewable energy by reducing costs and improving efficiency.

Table 1 shows the results of regression analysis in Germany. Only the strong positive relationship between the RES employment and GDP development was confirmed.

Table 1. Results of regression analysis – Germany

Model Fit Measures

Model	R	R²
1	0.826	0.682

Model Coefficients - Overall_Emp

Predictor	Estimate	SE	t	p
Intercept	52.1	4.46	11.68	0.001
Energy_Emp	−33.4	13.18	−2.54	0.085

Model Fit Measures

Model	R	R²
1	0.907	0.822

Model Coefficients - Energy_Emp

Predictor	Estimate	SE	t	p
Intercept	0.754	0.112	6.74	0.007
GDP_DE	−1.09e−5	2.92e−6	−3.73	0.034

Source: author's calculations according to Eurostat (2022)

Table 2 includes the results of the regression analysis for China. The results confirmed the strong correlation between total employment and the employment in RES sector (p-value 0.014 is lower than 0,05). P-value (0.002) is lower than 0.05

Table 2. Results of regression analysis – China

Model Fit Measures

Model	R	R²
1	0.996	0.992

Model Coefficients - Overall_Emp

Predictor	Estimate	SE	t	p
Intercept	−374750	36006.6	−10.41	0.009
RES_Emp	−166	20.0	−8.30	0.014
Year	225	17.9	12.56	0.006

Model Fit Measures

Model	R	R²
1	1.000	1.000

Model Coefficients - GDP

Predictor	Estimate	SE	t	p
Intercept	−614219	44182.8	−13.9	0.005
RES_Emp	510	24.6	20.8	0.002
Year	311	21.9	14.2	0.005

Source: author's calculations according to Statista (2022)

4 Conclusions

Owing to the instability and intermittency of power generation from new energy sources, the rapid growth of new energy not only has significant impacts on the generation side but also poses great challenges to the stability and security of the power grid. Therefore, additional equipment is required to maintain the balance of the power grid (Bali Swain, Karimu and Gråd, 2022, Bulavskaya and Reynès, 2018, Chen, 2019), such as peak-shaving power plants

and related equipment, which can also bring new job opportunities in the power sector and related industries.

Pumped-storage hydroelectricity is considered to be an excellent option for peak-shaving (Lindner, Legault and Guan, 2013, Chen, 2019, Zhao and Luo, 2017), and provided more than 40 000 jobs with a capacity of 40 GW in 2020, while the workers will increase to more than 100 000 in 2050. Moreover, electrochemical energy storage is another important solution to peak-shaving in China, and not only works in conjunction with power plants on the generating side but can also be arranged separately on the user side. In 2018, the total installed capacity of electrochemical energy storage reached 1.02 GW, and more than two-thirds of the market share is taken by lithium-ion batteries. The largescale application of energy storage batteries in the future will bring plenty of new job opportunities in battery production, lithium mining and the chemical industry.

The Chinese government places a priority on investing in renewable energy primarily because it enables the country to tackle problems of air and water pollution and mitigate risks of socio-economic instability.

As one can see, the p- values in case of China are lower than 0.05. In first case R coefficient is 0.996, which is close to one. This means that there is a very strong relationship between our variables (RES employment and Total employment). To answer the second research question, we have identified that there is a very strong positive relationship between RES employment and GDP (p value 0.002 and R coefficient is 1.0). The strong positive relationship between RES employment and GDP development was confirmed in Germany.

Acknowledgements

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Analysis of the innovation potential of business entities within the Slovak Republic and assessment of their performance from the international business point of view

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Abstract

Research background: The motivation behind the creation of presented article is evaluation of innovation potential of subjects under the conditions of Slovak republic and its business environment. This potential for innovations lies in the in the assessment of companies' degree of innovativeness because this is currently considered to be one of the main conditions for the competitiveness of companies. The article categorizes and integrates innovations into basic logical units. Innovative elements in these units have common innovative elements, the possibility of their legal protection because of their intellectual property status. At the same time, the article focuses on the analysis of the latest trends in the field of innovation that can be observed within the framework of Slovak companies.
Purpose of the article: To describe and analyse specifics of innovation potential under the specific conditions of Slovak economy and to assess its potential in comparison with other economics.
Methods: The paper is built mainly on the methods of formal logic like comparison, analysis, and synthesis along with deduction.
Findings & Value added: Comprehensive overview of the current state of innovation potential of companies in the Slovak republic and its state in the comparison with other countries in European Union and the world.

Keywords: *Innovation, patent, intellectual property, potential, competitiveness.*

JEL Classification: *G10; G20; O30*

1 Introduction

The motivation behind this paper is fact, that investments in research and innovation are investments in the future. These kinds of investments lead to new, innovative, more efficient

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products and services (Oliinyk et. al.,2018). Thanks to them, there can be increase in competitiveness and employment (Valaskova et. al., 2018). Innovations have also direct and indirect impact on areas, which are focal for future social development such as renewable energy, climate change, sustainable development, and modern waste management. Because of social areas mentioned above, it is very important to secure proper protection of innovations (Durana et. al., 2020). Cooperation and mutual scientific relations play one of the major roles in efficiency of investments. Unfortunately, global pandemic of covid and war in Ukraine caused some serious strains in these relations. There are ongoing strict covid protocols in China, with significant impact on global economy. War in Ukraine caused strong economic contraction across whole Europe and put energy markets in chaos. Science in general plays a critical role in many fields and with sufficient investments should provide solutions, which would prevent future contractions of global economy. Apart from the beforementioned problems, science has also impact on our daily live through digital technologies (Zhuravleva et. al., 2019). Thanks to them, the connection between science and innovation is becoming more collaborative, even at the international level despite those problems. (Meyers et. al., 2019). Although the support of such a creative and innovative environment is more than necessary for the attractiveness of the economic environment and its development not only in Slovakia, but also in the entire European Union.

To be able to continue, it is important to understand the definition of innovation from different point of views. This term is little different for sociologists, economists, historians, or journalists. From a managerial point of view, it can be defined as a combination of two key elements: invention and change (Kral et al. 2019). Innovation is a source for every organization because it can bring change and in most cases is also driven by the technological capabilities of the organization, the ideas it can work with and the knowledge it possesses (Gailly, B. 2011). Joseph Schumpeter's basic theory of innovation formed in the 1960s defines innovation as a business intention to overcome customary methods of production, distribution and service in new ways that better meet customer needs (Moravcikova et. al., 2017; Sommerlatte, 2020). Another definition is offered by Oslo Manual, which defines innovation as the implementation of a new or significantly improved product (goods or service), or process, new marketing method or new organizational method in business practices, workplace organization or external relations (Jakimowicz and Rzeczkowski, 2019). At the same time, it also states that innovation can be introduced in any sector of the economy including government services such as health or education (OECD, 2022). In the 20s of the 21st century, the European Union considers research and innovation to be an essential part of the EU's coordinated response to the outbreak of the pandemic and energy crisis caused by Ukrainian war. It also considers innovation to be essential for supporting Europe's sustainable and inclusive recovery from both events (Hollanders, 2020). Considering current social changes, ecological requirements, and the intensification of global competition between regions with very different political and economic systems, there is the opportunity to observe how the development of society creates a new culture of innovation and society as such, including all its entities. From a macroeconomic point of view, innovations are important for the competitiveness of individual economies or regions on the international market (Frias et. al., 2020). From a microeconomic point of view, we monitor the competitiveness of individual entities within one region.

The scope of intellectual property is constantly expanding in its means to include new topics. However, this is not surprising given the constant changes in socio-economic conditions, technologies, and market opportunities (Kral and Janoskova, 2015). In the past, patents and copyrights represented privileges granted by monarchs to merchants, manufacturers, and artisans (Kachuriner and Hrushko, 2019). Over time, they became a form of personal property of inventors or authors. Currently, we can define them more precisely

as a class of intangible business assets of companies that perform the role of investor, employer, distributor, and trader (Zygmunt, 2019; Dutfield and Sustharsanen, 2008).

2 Methods

We decided to use WIPO's foreign databases for the purpose of this paper. These WIPO's foreign databases, thanks to its deep datasets helped us to evaluate the innovation potential of foreign entities. Major source of information and the basis for the research part of this paper was the database of the Industrial Property Office of the Slovak Republic (UPV SR) and also their annual reports published on the offices official website. The annual reports were a valuable source of information about developments in the Slovak Republic during the years 2009-2021. The database of the office enabled us to process, evaluate and compare the data necessary for the assessment of all entities applying for a patent.

The latest figures from the World Intellectual Property Organization (WIPO) on intellectual property activity worldwide indicate that 277 500 275,900 PCT international applications were filed in 2021, a 0,9% increase compared to 2020 despite the global pandemic (WIPO, 2022). On the other side, the growth of filled applications slowed down from 4% in 2020. The only positive remains that according to WIPO PCT applications have still an upward trend since 2010. The most PCT applications were filed by applicants from China, the USA, Japan, the Republic of Korea and Germany. The first 10 countries accounted for 88.1% of the total number of applications in 2021. This is depicted in Figure 1 bellow.
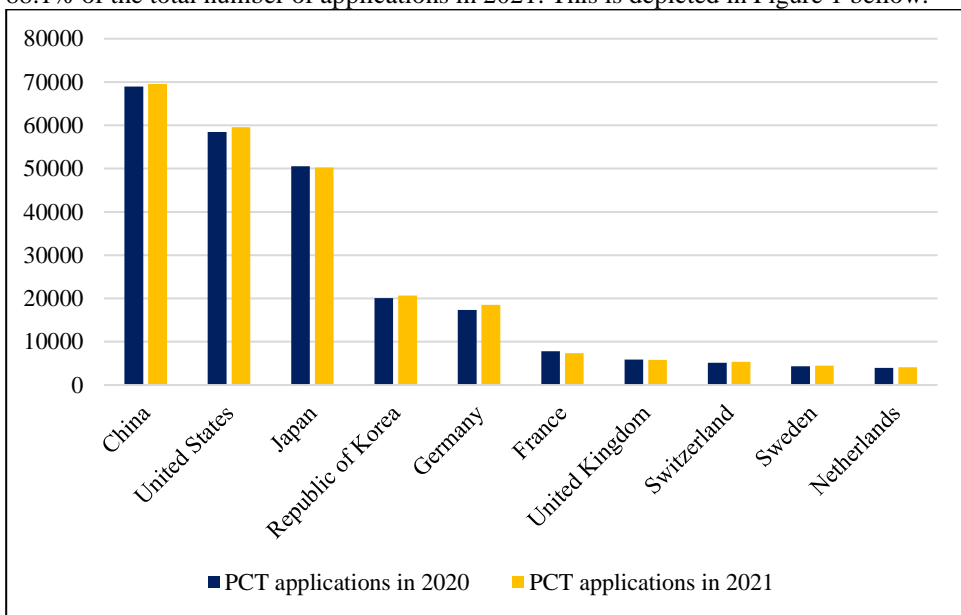
Figure 1. The biggest users of the PCT System applications.

Source: https://wbr.indprop.gov.sk/WebRegistre/

If we look at the kind of patents, then, we can state, that patent applicants from China and the Republic of Korea applied heavily for patents related to digital communications, while those from the US filed the most patent applications in the field of computing. Japan is mainly focused on electrical equipment and German applicants focus on the patents in transport.

Among the top innovators, we can find technological companies like the Chinese conglomerate Huawei Technologies, which filed the most PCT applications for 2021. It is

followed by Qualcomm Incorporated from United States, Samsung Electronics from the Republic of Korea and Mitsubishi Electric Corporation from Japan. Eight of the ten most significant innovators come from Northeast Asia. This is not a good sign for companies in European Union and their innovation potential hit by the pandemic and Ukrainian war, which will along with economic contraction have further negative impact on them.

3 Results and Discussion

In the following section, we evaluate the innovation potential of Slovak entities. The input was gained from The Industrial Property Office of the Slovak Republic and its annual reports along with WIPO datasets.

In order to better compare the innovation potential of countries, we have expressed the number of patent applications per million inhabitants in countries that WIPO designates as innovation leaders based on the total number of filed patent applications. We also drew data on the number of inhabitants from the World Bank database. It is important to note that newest information available were for 2020. These data are processed in the figure 2. To make overview more testifying, we decided to include applications from 2010. Figure 2, then depicts the number of patent applications filed by residents, divided by the total population of the country and multiplied by a million.
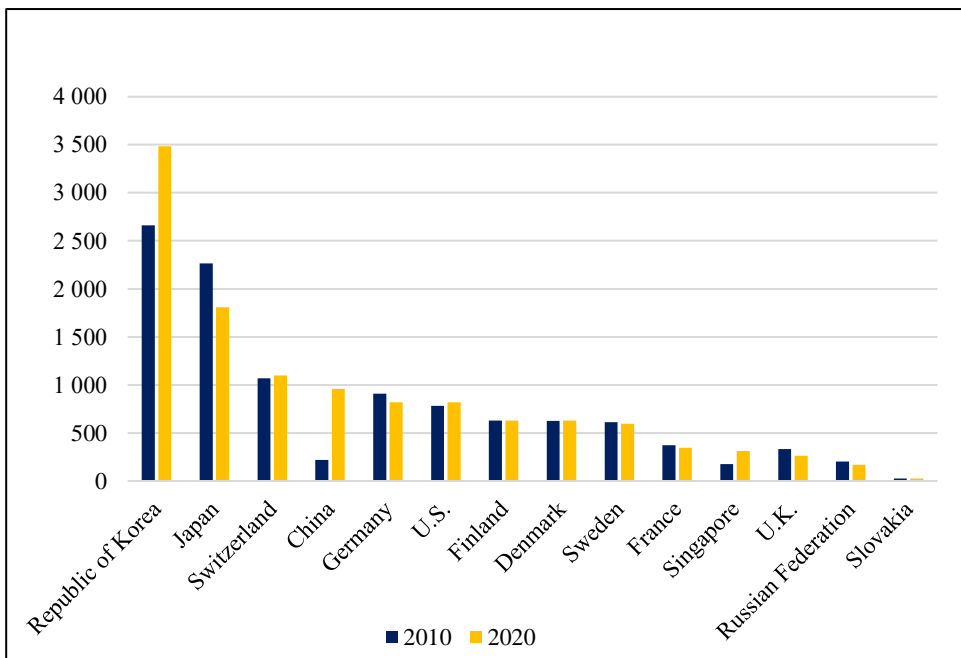
Figure 2. Resident patent applications per million population.

Source: World intellectual property indicators 2021

Republic of Korea is the unequivocal leader in the number of patent applications per million inhabitants. It is followed by Japan by a significant margin. Switzerland is in the third place. This depicts the country's high demands for technological sector of their economy. In the contrast to their first place in overall number of patents, China finished in the fourth place. The number of patent applications per million inhabitants in the case of other countries gradually decreases until they reach the value of 168 patents per million inhabitants in

Russian Federation. At the last, we can see the results of Slovak republic. The number of filled applications remained relatively unchanged through the last 10 years at 27 and 25 applications per million inhabitants during the year. This number is low in comparison to developed economies. There are many reasons behind this fact. Low investments in science and education, exodus of the most skilful young people to neighbouring countries and universities. Lack of motivation of these people to come back, because of high corruption and untransparent behaviour of state authorities or lack of modern, progressive, technological companies etc.
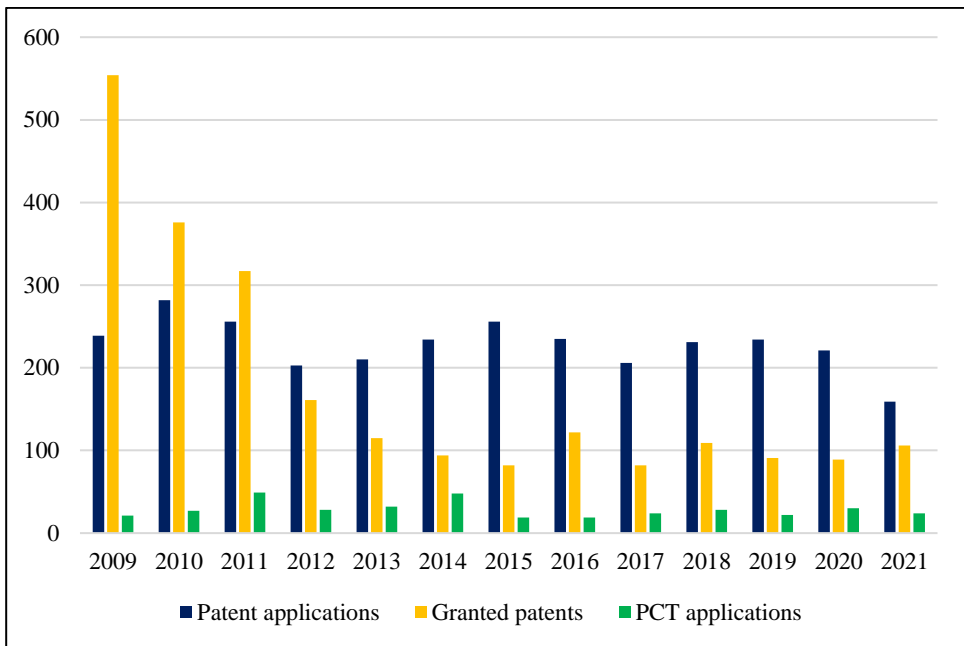
Figure 3. Number of patent applications, granted patents and PCT applications in Slovak republic

Source: https://wbr.indprop.gov.sk/WebRegistre/

Figure 3 shows a significant downward trend in the innovation activities of Slovak entities, but also of foreign entities on the Slovak market, especially on the curve of granted patents in the last twelve years. This happened despite the various marketing and PR activities of the UPV SR. If we look at the country of origin of the entities to which the patent was granted, these are mainly Slovak entities. Small part of them comes also from Japan, Czech Republic, United States and Austria. It is interesting that not all patents granted in the Slovak Republic in 2021 still had a valid legal status in 2022. The valid legal status expires if the patent applicant does not pay the annual fee, or if the approval committee evaluates it again and found out that the patent is not original and rejects such patent.

4 Conclusion

The period after 2009 defined the world economy, which tried to recover from the global financial crisis. Investments and productivity growth around the world, this was partially driven by innovations. In many cases innovations enjoyed faster growth than GDP itself. For example in 2020, this growth was mainly supported by the growth of key emerging markets, such as China, India, Korea, Germany, USA and Japan. The global innovation environment

is currently concentrated mainly in the eastern part of the world, in countries such as China, India, but also Vietnam and the Philippines, which are constantly on the rise. However, if we take into account number of inhabitants, then the clear leader is Republic of Korea. As many statistics further show, both developed and developing countries are increasingly monitoring their innovation performance and are working to improve it through spending and a persistent willingness to confront obstacles to national innovation systems. However, the world is currently facing unprecedented conditions of a pandemic and the threat of war global conflicts. These obstacles have an economic and social impact on all countries of the world at the same time. It should be emphasized that now more than ever, countries and communities are aware that innovation, especially in the search for medicines and vaccines, alternative energy sources and energy efficiency are the key for economic growth and safety. However, just like it was in the case of world economic crisis after 2009 and the following years, it will be important for economic growth to focus on the development of innovation beyond the field of health and energy by building sustainable and inclusive overall economic environment.

During the beforementioned period from 2009, the UPV SR consistently urged the need to increase investments in science and research. However, investments in Slovakia mostly did not even reach the value of one percent of GDP (approximately 0.88% of GDP). Despite some partial improvements in several years during the followed period, the situation remained bad. The Slovak government in the last two years decreased the financing of the science and research. This happened despite its already low state and despite the high cost of covid 19 pandemic for universities. Energy crisis caused by war in Ukraine put their financing in existence trouble and forced their executives to savings and announcement of education cancelation in the late 2022.
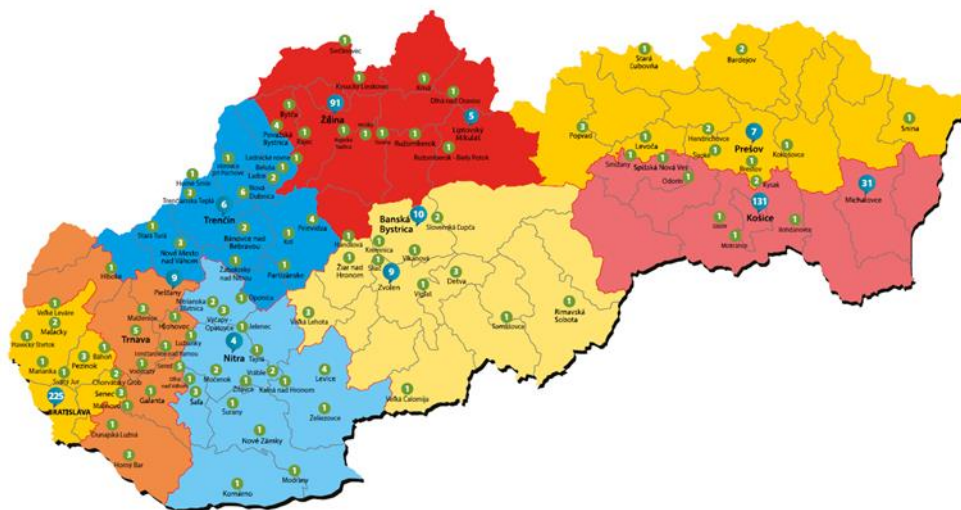
Figure 4. Number of patent applications in regions of Slovak Republic.

Source: UPV SR 2021 annual report

As we can see from the figure 4 above, patents applications are not distributed evenly around the whole Slovak republic. The most patent ideas come from the three cities with technical universities. Namely Bratislava, Kosice and Zilina. These cities are also regional centres for several well-known technological companies. This fact also depicts the importance of investments into science and research, because they are the main source of

innovation. Every crisis brings opportunities and space for its creative solution. One of the side effects of the current crisis is the stimulation of interest in innovative solutions not only in the field of health and energy, but also in areas such as remote work, distance learning, e-commerce, mobility solutions or carbon neutral economies (Zauskova et. al., 2020). These impacts have the potential to positively support the solution of societal goals such as reducing or reversing long-term negative climate change. For Slovakia, as for all countries coping with the pandemic and energy crisis, this period is a challenge to demonstrate the ability to increase its resistance to their effects and to overcome the crisis through fiscal incentives and fight against inflation.

Acknowledgements

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A new interpretation of Isenberg's entrepreneurship ecosystem model - based on interviews with Hungarian SME leaders

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Abstract

Research background: Isenberg created a broader, conceptual model and comprehensive framework for analyzing this system which he calls the self-sustainable entrepreneurial ecosystem. His well-known model covers six domains (namely policy, finance, market, culture, human capital and the supports) and a dynamism among them that represents a novel and cost-effective strategy for stimulating economic development. This strategy combines entrepreneurial vitality with a sustainable milieu.

Purpose of the article: This study aims to observe sustainability (CSR) and responsibility in the Hungarian SME sector based on Isenberg's entrepreneurial ecosystem model. We investigated the sustainability and responsibility orientation of actors to identify domains and connections and recognise collaborative innovation of sustainability opportunities in the Hungarian SME sector. Besides subjects' opinions were asked directly about the Isenberg model.

Methods: In the May and June of 2022, three focus group interviews were carried out with prominent professionals who represented the target population. Transcriptions were studied through broader content analysis using NVivo12 software.

Findings & Value added: As a result, this study provides an extension of Isenberg's model of entrepreneurial ecosystem tailored to the national SME sector. Our samples also emphasized that the model helps them to have a structured view that supports their work.

Keywords: *sustainability and responsibility; entrepreneurship ecosystem model; SME; qualitative analysis*

JEL Classification: *M12; M5; Q01; Q56*

> *"If you believe as I do that an entire ecosystem must exist in order for entrepreneurship to be sustainable – sustainability that ultimately exists without much central control is inherent in the concept of ecosystem—and*

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have the positive impacts that it can have, then it logically follows that somebody should be responsible for seeing that the ecosystem evolves, and then exits." (Isenberg, 2011)

1 Introduction

The integration of entrepreneurship and sustainability plays a crucial role in national economies and is strongly related to globalization. Sustainability refers to the use of business practices in the internal and external, natural, economic and business environment. (Simatupang et al, 2016) Entrepreneurship is profit-oriented, and it can support both the economy and society only if it is successful (Isenberg, 2008). Unfortunately, companies may have a widespread negative impact on the entrepreneurship ecosystem. On the other hand, the success of entrepreneurship greatly depends on the ecosystem, which is created by a virtuous cycle of it. Several theories investigated the domains (factors) and mechanisms of this field. Therefore, entrepreneurial activities and entrepreneurs are integrated into a complex system with multiple actors. As Isenberg (2010) suggested, these elements are among others leadership, culture, capital markets, and open-minded customers—that combine in complex ways. He structured them into six domains that interact in very complex ways with the self-stunning entrepreneurship in the middle. However, each combination is unique but "in order for there to be self-sustaining entrepreneurship, you need conducive policy, markets, capital, human skills, culture, and supports." (Isenberg, 2011, p. 6) The whole system interconnects components that determine opportunities and pace for creating and scaling new sustainable businesses by entrepreneurs as Isenberg and Onyemah (2016) underlined.

Kansheba and Wald (2020) refreshed this study and suggested a research agenda. According to them, most papers about entrepreneurial ecosystems deployed a case study approach or conceptual work (without real empirical data). Only a few applied quantitative, qualitative or mixed-methods. In this view, our paper is gap-filling because our results rely on extended focus group analysis. Moreover, most of the articles have a too general focus. We targeted specific sectors, focusing on small and medium enterprises. This research aims to investigate the unique combination of the Hungarian entrepreneurial ecosystem in the SME sector in order to learn how sustainability and responsibility can be enhanced. The managerial and practical implications of our results may be useful for policymakers, managers and each actor who are responsible for sustainable development and want to change the dynamics of an ecosystem to progress sustainability and achieve innovation.

1.1 Environment based on the stakeholders' theory

The sustainable activities of companies are unthinkable without looking at the organisations, institutions, and people they are dealing with. The range of stakeholders has been examined in some academic works, and attempts have been made to group them according to different criteria. When looking at stakeholders, it is essential to distinguish between stakeholders with influence (and thus power) and those who are merely interested. Differences in the strategic environment of organisations also significantly impact who the stakeholders are. Consideration must be given to the industry, political, social, and technological context when looking at the range of public and private actors.

According to Malecki (2018), an entrepreneurial ecosystem also includes numerous stakeholders, and various models and theories describe differently these ingredients. In our paper, we relied on one of the allocation options which was formulated by Freeman in 2002 (Freeman, 2002) when he suggested that firms redistribute benefits and necessary decision-making powers among all stakeholders based on their contributions. This would redefine the

impact of stakeholder scope on organisations. In further research, he and his co-author concluded that all stakeholders could be divided into two groups. They named these two groups cooperation and collaboration. Cooperation is the group of people who are affected by or have a stake in the business; collaboration is the group of people whom the industry needs support, such as employees, suppliers, and customers (Dunham et al., 2006)

Another approach divides the stakeholders of a company by looking at three characteristics. The presence or absence of the attributes of power, legitimacy and urgency among the stakeholders assigns stakeholders with the same traits to a group (Mitchell et al. 1997).

The third theory we applied is that stakeholders can be divided into two broad groups according to whether they are involved in the company's internal operational processes or external contributors. Organisational learning and collaboration play an essential role in this division. The corporate learning process facilitates the flow of implicit and explicit knowledge that improves the effective functioning of the organisation. On this basis, we can distinguish the following types of learning:

- internal stakeholders: owners, managers, employees
- external stakeholders: suppliers, customers, competitors, strategic partners, public institutions, local communities, and creditors (Jones, 1995)

Our study aims to map the mindset and actions of the leading actors in the SME sector in this field, whether consciously or unconsciously mentioned by our subjects.

The concept and understanding of CSR have been evolving since its appearance in academic works in the 1930s, in the wake of the Great Depression. Today, its scope has broadened and ranges from compliance with corporate laws to aligning internal business objectives with externally determined societal aspirations (Győri et al., 2021). Unfortunately, the relevance of this multidimensional concept within the SME sector remains weak and is overshadowed by its application in large and multinational organisations. SME actors are under increasing pressure to participate in social activities as if they were no different from their larger counterparts.

Some theorists argue that economic interests take precedence over social values. At the same time, other researchers believe that CSR is the firms' response to issues beyond the firm's narrow economic, technical and legal boundaries (Davis 1973).

Table 1. Stakeholders and codes

stakeholders	internal	owners	
		entrepreneur, manager and his family	
		employees	current
			future
	external	direct market environment	consumer, buyer, customer
			supplier
			strategic partner
			competitors
		wider market environment	non-governmental organisations
			local environment
			state, legal environment
			International environment
		natural environment	
	future generation		

Source: own elaboration based on the literature

Further exploration of the field and its relationship with sustainability and the ecosystem led us to conclude that the scope of stakeholders should be further broadened and disaggregated for the sake of this research. As we believe that current and future impact are

essential aspects of sustainability, we have further disaggregated some elements and identified future generations as stakeholders to complement this feature.

1.2 Isenberg's model

In 2002, Hedstrom and Michael Isenberg, at that time the two consultants began their paper with the following sentence "Massive shifts are underway in how business relates to society." (p. 13) They identified the five main forces that "will spur an unprecedented degree of innovation and define the successful businesses of the next 20 years." (p.13.) Listing several big companies as examples, the redline of sustainable and conscious entrepreneurship was drawn in that article. Later, Daniel Isenberg who was a professor for 11 years at the Harvard Business School and has been an entrepreneur and venture capitalist (active angel investor) in Israel, became famous for the concept and development of entrepreneurship ecosystems. However, Daniel Isenberg identified entrepreneurial ecosystems at the national scale; nearly all his examples are small countries because this is the most appropriate for studying entrepreneurial ecosystems but some network links, participants (domains) and resources (specific technologies) are global.
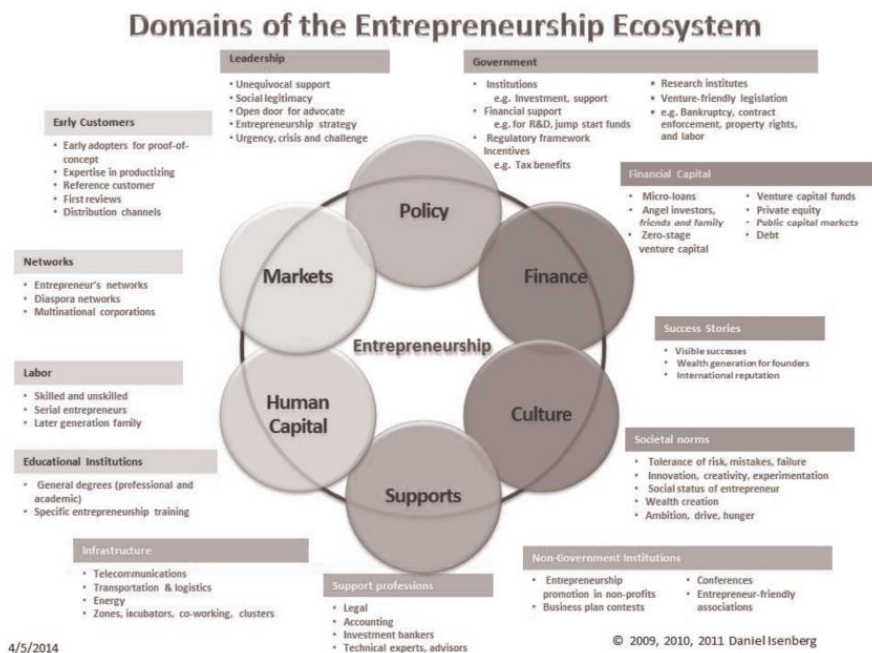
Figure 1. Domains of the Entrepreneurship Ecosystem

Source: Isenberg and Onyemah (2016, p. 74)

Daniel Isenberg published his findings and theory about the entrepreneurial ecosystem in the 2010s when created (as he says for convenience's sake) his model (see. Figure 1). The author has taken the ecosystem metaphor directly from the natural sciences (Isenberg, 2016) and calls it idiosyncratic because elements are interacting in highly complex and idiosyncratic ways that cannot be transferred among or copied by various regions. What makes the ecosystem unique? Firstly, the regional available resources, secondly culture, then the actors and the dynamics among them. (Baron & Freiling, 2019) That is why the diagram lacks causal paths as Isenberg (2010) said there are no arrows indicating what causes what. An

ecosystem is a dynamic, self-regulating network of many different types of actors. In every entrepreneurship hotspot, there are important connectors and influencers who may not be entrepreneurs themselves. Isenberg organised them into six main domain fields, which are Culture, Markets, Human Capital, Finance, Supports, and Policy.

Actors of the Entrepreneurship Ecosystem

Market access
- Corporate executives
- Distributors
- Export agencies
- Trading company executives

Government
- Elected: Mayor, governor
- Elected: Legislators
- Regulators
- Gov't research directors
- Innovation agency managers
- Bankruptcy officials
- Economic dev't directors

Policymakers and public leaders

Corporations

Financial actors

Financial actors
- Bankers
- Family offices
- Venture capitalists
- Leasing managers
- Non-bank lenders
- Grant-givers

Growth Entrepreneurship

Educators, human capital
- University heads
- Entrepreneurship dept, heads
- Leaders of training centers
- Service professionals

Educators and developers of human capital

Culture impacters

Support organizations, event organizers

Entrepreneurship supporters
- Event organizers
- Incubator directors
- Mentors
- Foundation managers
- NGO managers

Culture impactors
- Journalists
- Popular cultural "icons" (e.g. athletes)
- Popular bloggers, social media
- Informal opinion leaders

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Figure 2. Actors of the Entrepreneurship Ecosystem

Source: Isenberg and Onyemah (2016, p. 75)

As Malecki said, "Although empirical research by economic geographers historically has focused on large firms as employers and as agents of globalization, large firms typically start small and attract interest only after they become large." (2018, p. 1) Isenberg and Onyemah also underlined this development, "The common denominator among entrepreneurship ecosystem elements is their essentialness for increasing numbers of companies growing more and more rapidly. (2016, p. 73)" It means a so-called "spillover effect" will lead to the globalization of entrepreneurship.

The ecosystem model makes it possible to establish an environment, securing implementation for the principles of sustainable development (those are expressed for example in the SDG 17 goals, United Nations, 2015) and shows how increasing self-interest could develop better solutions in the future (Hauber & Csongrádi, 2015). Tolstykh et al. (2021) underlined that regional sustainable development is focused on achieving firstly ensuring a sufficient level of quality of life for the regional population. Afterwards, it should relate to sustainable development goals at the supra-regional (national and global) level.

2 Methods

2.1 Focus group

Our research is in its exploratory and hypothesis definitions phase, so the observed focus groups are prior research to develop a structured and systematic survey based on a more detailed and sensitive understanding of the topic. (Wilkinson, 1998) Therefore, we designed and used guidelines based on previous literature studies. Isenberg's model was directly implemented into the guideline (see Fig. 1). In this paper, we only investigated (1) codes related to SME sectors' stakeholders mentioned in the text and (2) subjects' direct responses and opinions about Isenberg's model.

Three focus group meetings were organized where the same moderator asked the same questions based on a preprepared guideline. The guideline was validated in a pilot round. Each meeting was recorded, and conversations have been transferred to three transcriptions. In this study, we focused on (1) codes about the SME's stakeholders whereby codes were directly generated from the state of the arts. Two independent researchers coded the entire text. Finally, (2) the selected sections from the transcriptions were studied to align with the 5th topic when subjects were directly asked about Isenberg's model. Transcriptions were investigated through broader content analysis using NVivo12 software.

Table 2. Samples

Date of each FG	Participants	Represented company
2022/05/10	1. János, Male, 62 yrs, owner, CEO 2. Czafi, Male, 68 yrs, owner, 3. István, Male, 62 yrs, CEO 4. Lasek, Male, 53 yrs, owner	1. Engineering, Hungarian, Small 2. Coaching, training, Hungarian, Small 3. Trailer sales, International, Medium 4. Construction, building, Hungarian, Medium
2022/05/26	5. Évi, Female, 51 yrs, founder 6. Evedor, Female, 45 yrs, owner 7. Oglu, Male, 63 yrs, owner 8. Gábor, Male, 38 yrs, owner 9. Autosave, Male, 45 yrs, owner, CEO	5. Recycling, fashion, Hungarian, Small 6. Decoration, event, Hungarian, Small 7. Book publisher, Hungarian, Small 8. Consultancy, Hungarian, Small 9. HR software and IT, Hungarian, Medium
2022/06/01	10. H-S P, Male, 58 yrs, owner 11. Edu, Male, 58 yrs, owner, CEO 12. CTP, Male, 49 yrs, owner	10. Consultancy, Hungarian, Small 11. Education, Hungarian, Small 12. Constructions

Source: Own elaboration

As for our target population (i.e. the Hungarian leaders from the SME sector) and regarding the research aim (sustainability and responsibility), three focus group interviews were performed with prominent professionals who represented the target population.

2.2 Evaluation methods

Onwuegbuzie et al. (2009) summarized various methods of how focus group transcriptions can be analysed. Following their suggestions, we used classical content analysis when after we created codes based on the literature, data was separated into smaller chunks and each chunk was placed in the codes. Finally, these codes are grouped, counted and quantified by NVivo12 Software. So-called quasi-statistics refer to the use of descriptive statistics that can be extracted from qualitative data. Additionally, semi-discourse analysis was also carried out, in order to understand social interaction and cognition, when the representative or unique lines and segments of transcription were selected to examine how versions of the elements (here opinions, best practices, and attitudes) emerge in conversations. Semi-discourse or

thematic analysis means that basically major themes were organised and evaluated. Separately two researchers did the coding and content analysis, its reliability was tested with the Kappa index and agreement percentage and both showed strong agreements and matching (the "stakeholders" codes covered 95.62 % of both codings).

In both cases, the so-called keywords in context method were also carried out in order to determine how prominent leaders from the Hungarian SME sector use expressions and words regarding sustainability and responsibility. It is essential to study how our target population communicates on a daily business basis. Therefore, a better survey may be created knowing the culture of the use of keywords.

3 Results

3.1 Classical content analysis

In our focus groups, we wanted to find out how the managers and owners of SMEs perceive responsibility, what motivations accompany their activities, and how personal values influence how they operate. Do they integrate responsibility and sustainability into their daily activities, or do they deal with this issue on an ad-hoc basis?

By comparing the appearance of each code, we can observe that among the internal environmental elements, the personal values of the entrepreneur, manager, family, and owner strongly influence the approach. The natural environment was emphasised during the interviews among the external environmental factors. In addition, the impact on future generations and the responsibility of the business in this regard were frequently mentioned. The figure includes the views of each focus group member, where they talk about the area of the respective code. Darker colours indicate an increase in the number of mentions.
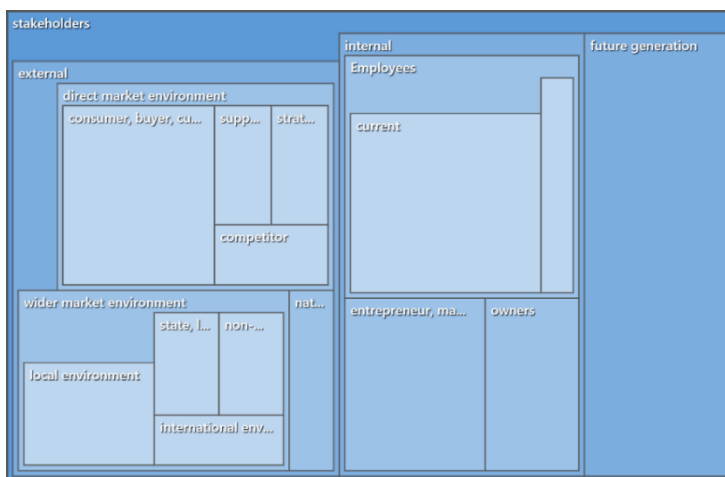
Figure 3. Code frequency

Source: Own elaboration

We have analysed the relationship between the codes based on the opinions of the surveyed entrepreneurs. The relevant parts of the interview extracts were assigned to the corresponding regulations. This coding was done in parallel, and the results were then cumulated into a single file, thus minimising the potential bias of our individual researcher's opinion. We based our measurements on the Jaccard index, which measures the similarity of set samples. We found that the codes can be sorted into four major clusters. The first cluster

is distinct from the others by one element, i.e. we can conclude that family values and traditions strongly influence leaders and that where sustainability values are also present in the leader's family, they are more strongly current in the company's operations. The elements in this code are distinct from other areas. A separate cluster of strategic partners appears for the future and the natural environment, which were mentioned in a similar context and felt interrelated by the interviewees. The primary market, the employee, the customer and the future generation, who also appear in these two groups, were placed in the third cluster. This shows that these codes appeared in the same texts and similar contexts, i.e. the managers perceive these elements and stakeholders as belonging. According to the literature, all other elements were placed in the fourth cluster, whether internal or external stakeholders. This may be because members of the SME sector are often vulnerable in their role as suppliers and have substantial market exposure in Hungary. Thus, these elements are perceived not to influence them. However, it is interesting to note that the local environment is also included in this cluster. Further research is needed to investigate this.
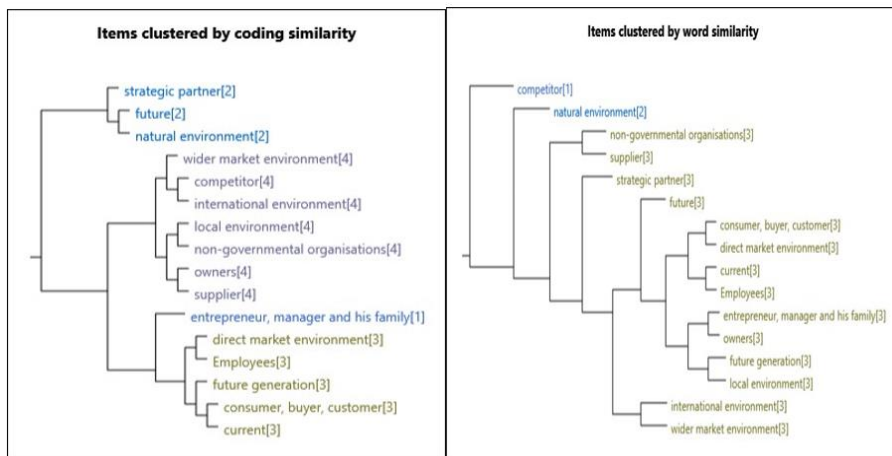
Figure 4. Dendrograms of the codes

Source: Own elaboration

The same co-occurrences were examined using a similar analysis technique for word similarities. In this result, we observed differences from the code tree. Interestingly, the word similarities show complete separation of competitors, presumably because one of the most significant pressures comes from this area. After all, there is massive competition in the SME sector. The natural environment is a separate cluster. It was clear to all participants that this was an important issue. Due to the aim of the research, the discussions also revealed that sustainability and responsibility obviously was the first and most common area that came to the minds of the interviewees. As a result of our analysis based on word similarity, we identified 3 clusters. The remaining items showed strong co-occurrence, described by similar words in the same context.

3.2 Thematic analysis

When the moderator directly asked for participants' opinions about the Isenberg model (Figure 1 was shared). It can be concluded that most of the interviewed SME managers are not familiar with the model. They found challenging to identify the schematic model at first glance. *"I got problems with this chart." (János), "My problem is that there are very different effects and counter-effects within each point, so I know how to balance, but every domain*

has different components and obviously this cannot be separated"(Edu) "I am struggling with this figure, could you please repeat your question?" (AutoSave) However, Isenberg published this model also for managers, the first reactions, acceptance and understanding of the model were ambiguous.

After a wider clarification, it turns out that discussions can be clearly associated with the main aim of the ecosystem theory, even if they call domains differently. Their frequently used expressions show how actors perceive the Hungarian ecosystem and which domains are emphasized in their communication. In the section the following frequently used expressions occurred:

- Nationality (*Hungarian*) was mentioned 21 times in the section,
- *Culture* appeared 18 times,
- *Sustainability* 17 times
- *Politics* 18 times
- *Family, kids, parents, home, flat,* also regularly mentioned

The dynamics among the actors are intense and not just static, thus the time element (future and past) seems to be also important. Heritage from the past, how the subjects are educated or where they were raised (e.g. "*What motivates you? - I think I brought this from home." AutoSave*) and the next generation ("*This is not the case with our children, they were born into an environment that is not bad in Hungarian terms. However, moving on from there is not so easy. Obviously, they experience it in tiny steps" István*) or possible new actors and future projections and expectations are also regularly mentioned in the text. *"Only the consumer society produces that the needs have changed, so, unfortunately, I look at the development process of my own children. Due to the fact that I want it to be as good as possible for my own children" Lasek*

Dynamics within and between the domains (i.e. the way how ecosystem actors behave and interact) are imbued with emotions and feelings. *"That is typical Hungarian." Lasek* For example, the sentiment of Hungarian always contains some stereotypes and prejudice (see Fig. 5). "*The Hungarians like to cry, they always say this, and say that, if they were serious, we would not be an entrepreneur so we would have failed a long time ago*." *János*

Additionally, institutional settings like tax environment or grants or complex capital structures as part of the Hungarian business culture appear in the conversations.
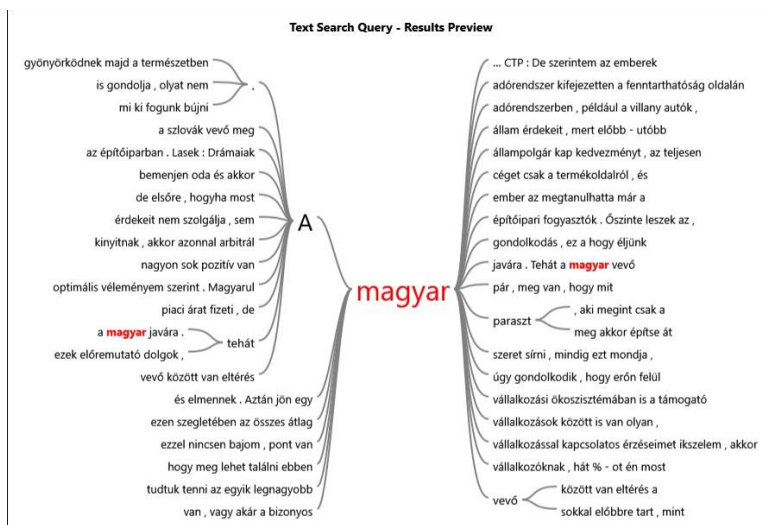
Figure 5. Text tree around the word *Hungarian*

Source: Own elaboration

The impact and importance of the personal inner circle like family and relatives are underlined, as well. *"We also have family roots, they say, because the goodwill clearly comes from there."* Gábor or *"If I didn't have a supportive family environment, I wouldn't be able to get from one to two, because I'm tiny and I'll stay tiny."* Evedor

Finally, best practices and examples show how routines are going and how SMEs are doing for a sustainable future like in this final quote as a beautiful example of local patriarchy. *"Also about taking responsibility: the flower store is in my village, right? So that's how we get into everyone's lives and since I'm an economist, I'm not from a family with such a history of flower arranging for a thousand years, so I took what I liked and what I liked from all of this. And this is how we educate the village from this point of view. I mean we teach what is appropriate, what is not appropriate, what is sustainable, for example why flowers are not wrapped in cellophane. .... we also have special selections, from the local ceramicist, the local artist, or from the local I don't know what... and I tell everyone who made the product and I'm sure everyone will figure it out... then it considers as a small community building.... it takes half a year for the new tenants to learn that we say hello and greet each other, not because we know each other, but because we live here together. ... it turns into such a small community, ..., I am happy to take responsibility so that is how we can think together, and how this can really be done, starting with the selective collection. We have a very large institution with hundreds of people, a home for the mentally disabled people, and in the village, it is a common sight for the children to see all kinds of people with limps and all kinds of people in wheelchairs, people who can't speak, can't count, but we'll solve it together. For example, a deaf-mute people lives there who always comes into the store. When he gives his wallet, then I'll do the math. Usually, I don't understand what he's saying, so he shows and mimics everything to me. There are some other disabled people, the children know them, the village likes them too… There is another man. We give him work so that he can collect the selective trash, and he comes over and picks out ours, like he takes the plastic bottle away, then gets a bunch of flowers for it, which he gives to his beloved. …"* Evedor

4 Discussions

The novelty of this study arises from the integration of theory and managerial implications, where policymakers, stakeholders, entrepreneurs, and the whole socioeconomic environment for sustainable entrepreneurship activities may achieve a successful and long-term committed sustainable future. An important result of this research is the understanding of how Hungarian SME leaders are thinking about sustainability and which components and domains can influence their sustainable activities in order to promote innovative sustainable development. A nation with fewer environmental restrictions can force some companies to manufacture offshore, in this term sustainability and globalization may be used to describe competitive advantage, not the environment. Higher degrees of legislation and collaboration, and information exchange are likely to facilitate more favourable entrepreneurship environments worldwide. Clear regulations, open communications, and cultural values (like trust) may help stakeholders to collaborate effectively within the system and to work with external domains and progress sustainable development practices more actively in the SME sector.

Maroufkhani et al. (2018) provide a systematic review and a possible extension of Isenberg's model of entrepreneurial ecosystems. Based on an extensive literature study, they added domains of crowdsourcing and industrial dynamics to Isenberg's conceptual model. Based on our findings, family and personal backgrounds (like education, where and how people are raised and parental behaviour and values) are highly important parts of this model and may be implemented into the Supports domain.

Acknowledgements

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Web-Based Geographic Information Systems as a Part of Digital Environment in the Age of Globalization – a Case Study

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Abstract

Research background: Globalisation and governance are linked concepts. Globalisation influences quality of governance. Good governance can increase interest of global companies in particular regions or countries. Good governance is pre-condition for sustainable development. Many decisions made by public administration are spatially oriented. Web-based GIS solutions have been increasingly preferred to allow easy and intuitive access to spatial information and to involve citizens in the decision-making process.
Purpose of the article: The case study provides an overview of progress in the utilisation of web-based GIS by chosen municipalities in the Czech Republic to inform or include citizens into public activities and affairs, e.g. fault reporting.
Methods: Case study based on spatial analyses. Visualization of results using cartographic methods. The diffusion of innovations theory, as proposed by Everett Rogers, serves as a background.
Findings & Value added: Case study demonstrates the diffusion of innovations in practice. Two former districts in the Pardubicky region are chosen for the case study. Municipalities of various size are covered. Contemporary diffusion of web-based GIS solutions is compared to the diffusion in the year 2018. Some results are visualised by maps. Discussion of success factors is the key added value.

Keywords: *diffusion of innovations; eParticipation; Web-based GIS; good governance; digital environment*

JEL Classification: *R59; H83; D83*

1 Introduction

The age of globalization has introduced many new approaches and technologies to improve our lives. Citizen participation can be given as an example. It supports participation of citizens in decision-making and planning processes at various levels of government. It is possible to actively participate in decision-making processes, which does not refute

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representative democracy and its principles, but on the contrary promotes the interconnection of local government and citizen (Tomor, 2019; Irvin & Stansbury, 2004). Participation can be divided into several levels, depending on how actively local government and citizens are involved in the system. The level of citizen involvement can be described by the term *participation ladder*, which represents the progression from the lowest participation of the citizen to the highest. The foundations were laid by Sherry Arnstein (1969). One of the lowest forms of the participation ladder is information, which is only a one-sided communication of the local government to the citizens. Information can be done in several ways. For example, in the form of a public hearing or a panel discussion. The opposite pole, that is, the highest form of citizen participation, is the delegation of decisions into his hands. This form is often not used in the Czech Republic. The only exceptions are local referendums. Over the years, the participatory ladder has been modified by many authors (Rocha, 1997).

For citizen participation, it is important to choose the right technologies to help meet the desired goals. According to Chmelařová et al. (2020), the devices that public administration and citizens can use include smartphones, tablets, laptops, desktop computers. Their suitability of use depends on criteria such as variability and device characteristics between a smartphone for simpler tasks and a desktop computer for more complex tasks. It is also important to choose the right form of communication between the devices of citizens and the public administration. This choice depends on many factors, such as the type of device, the form of participation, the type of application, and so on. Examples of participatory technologies, according to Csáki (2020), include online petitions, public opinion polls and others. Based on these factors, it is selected whether the application on the device will require a permanent connection to the Internet and thus to public administration, or whether the application is allowed to operate offline and data from it is synchronized occasionally (Szarek-Iwaniuk and Senetra, 2020).

One of the newly explored areas for promoting participation is blockchain. According to Shrier (2020), blockchain can be thought as a database that is distributed among users and contains all records since its inception. Jafar et al. (2021) states that each blockchain network has its own characteristics and attributes that determine its usability for different projects. Muth et al. (2019) gives an example of the interconnection of blockchain and public administration in the form of a cadastre of real estate. According to the authors, this system would reduce real estate fraud or embezzlement of money. According to Jafar et al. (2021) e-voting is a potential use of this technology This system could reduce the cost of printing ballots and could increase voter turnout, as it would be possible to vote from anywhere. However, these solutions bring new threats such as digital cybersecurity and it would be necessary to introduce regulations and standards for the solutions (Jafar et al., 2021). Bagloee et al. (2021) devotes other potential uses of blockchain in their work.

One of technologies already in use are Geographic Information Systems (GIS). GIS combines spatial data, tools and geoinformation technologies to help citizens participate in the functioning of the city (Kotus and Rzeszewski, 2020). They are crucial in some areas of local government functioning, such as spatial planning (Kahila-Tani et al., 2019). Nowadays, web GIS is used in most cases – these versions are most often referred to as WebGIS (web geographic information system), which includes well-known geoportals (such as public administration geoportals). Geoportals allow access to and handling of geographic information via the Internet (Lafrance et al., 2019). Often these services are provided by public authorities. This information is mainly public and provided free of charge. Geoportals allow data to be viewed, analyzed, and edited through a web browser that the user is familiar with. Geoportals offer features that the user needs for their work, so they cannot make a mistake based on unfamiliarity of GIS (Komárková and Kupková, 2018).

The main aim of the paper is to evaluate how GIS are used by municipalities to inform or include inhabitants in citizen participation.

2 Methods

Form of a case study is used. The case study deals with municipalities of the second and third type in the Pardubice region. Municipalities are the basic self-governing units in the Czech Republic and are divided into several types according to the law. These are:

- municipalities with a regular municipal office (municipalities of the first type),
- municipalities with an authorized municipal authority – (municipalities of the second type),
- municipalities with extended competence – (municipalities of the third type).

In total, there are 26 municipalities, including the regional capital Pardubice. As part of the study, it was examined whether the municipality operates a map portal (geoportal) and allows citizens to view spatial information about their municipality.

Another monitored area of participation is the methods of fault reporting. It was ascertained whether the municipality operates a platform where a citizen can report defects and suggestions in the territory of the municipality. Fault reporting can take many forms. These include, for example a form solution, which represents the most basic option, where a citizen fills in a form via a web browser, which may contain various specifications (e-mail, place of reporting, description, or possible insertion of a photo). Such a form is accessible through the website of the municipality or through the website of technical services of a particular municipality. WebGIS solution. An application that allows you to enter and locate fault reports on a map. The solution can be a standalone application or as a module part of a WebGIS application (geoportal). Another option is a mobile application in a smart device that can use the geolocation of the device, allow you to take a picture of the fault and then upload it. The application can work independently or be a complement to the WebGIS solution. Municipalities can combine these different implementation methods and possibly use more solutions. For example, technical services may have a form solution where crowded trash cans are reported, but the municipality also has a WebGIS solution where people can write suggestions for potential changes in public space.

3 Results and discussion

The survey found that out of a total of 26 municipalities, 19 (73%) are using some form of web GIS as of 28 February 2022. Among these solutions are Marushka (https://www.geovap.com/cs/marushka), GePRO (https://www.gepro.cz/produkty/geoportal/), GObec (https://www.gobec.cz/mapovy-server/), ArcGIS (https://www.esri.com/en-us/ArcGIS/products/geoportal-server/overvie), GIS4U (https://www.tmapy.cz/gis4u), Cleerio (https://www.cleerio.com/cs/mapova-aplikace) and custom solutions. Almost half of the municipalities of the second type do not use any geoportal. A more precise overview between municipalities of the second and the third type is shown in Table 1.

Table 1. Overview of geoportals in municipalities of the second and third type in Pardubice region

Geoportal	Second type		Third type		All municipalities	
	Count	[%]	Count	[%]	Count	[%]
Marushka	1	9,09	6	40,00	7	26,92
Gobec	3	27,27	3	20,00	6	23,08
GePRO	1	9,09	1	6,67	2	7,69
ArcGIS	0	0,00	1	6,67	1	3,85
GIS4U	1	9,09	0	0	1	3,85
Cleerio	0	0	1	6,67	1	3,85
Custom	0	0	1	6,67	1	3,85
None	5	45,45	2	13,33	7	26,92

Source: authors

The geographical distribution of municipalities is shown in Figure 1.
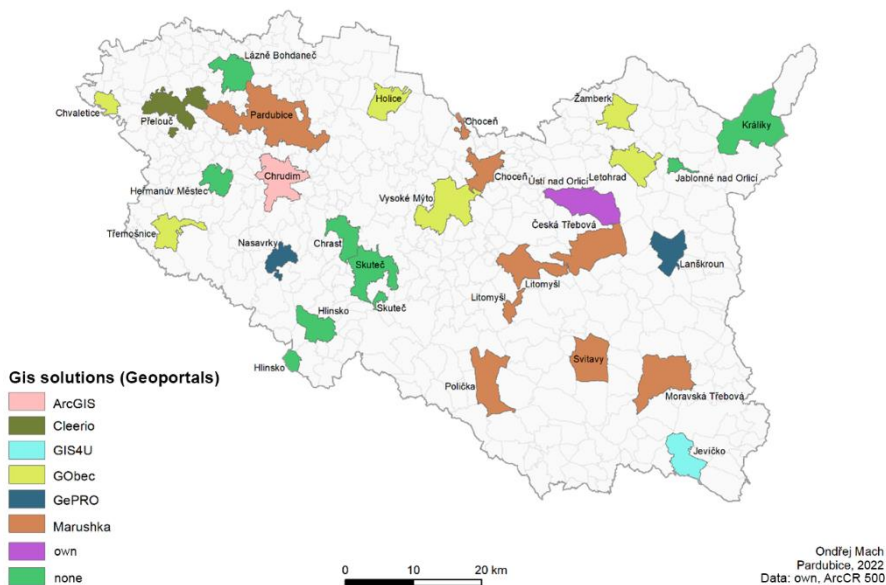
Figure 1. Web GIS solutions (Geoprotals) in municipalities of the second and third type in the Pardubice region.

Source: authors

Out of a total of 26 municipalities, each (100%) used at least one method of faults reporting. The used solutions include form solutions (the municipality's own solution), Marushka, ZmapujTo (https://www.zmapujto.cz/), Mobilní rozhlas (https://www.zlepsemecesko.cz/), GObec, DejTIP (https://dejtip.eu/) and T-mapy (https://www.tmapy.cz/hlaseni-zavad). ZmapujTo (web solution) and Mobilní rozhlas

(mobile application) work together (except for the city of Pardubice – they do not use Mobilní rozhlas). Marushka, GObec, T-mapy and DejTIP are WebGIS solutions, but they also have their own application that municipalities may or may not use.

The most widely used solution ZmapujTo is used by 16 municipalities (62%). The second Mobilní rozhlas (with active fault reporting) in 15 municipalities (58%). The third most used solution is the form used by 11 municipalities (42%).

Figure 2. Overview of fault reports (and their combinations) in municipalities of the second and third type in the Pardubice region.

Source: authors

The newly obtained data from February 28, 2022, was compared with the work of Komárková and Kupkova (2018). In this work, a similar issue was being solved, in which was then possible to observe the development after four years.

After comparing the current data of municipalities with the authorized municipal authority with data from 2018, it is found that 9 municipalities still operate a geoportal, one municipality stopped operating the geoportal (probably caused by a change in the geoportal operator). 3 municipalities began to operate the geoportal (improvement of 20%) and 2 municipalities do not have and did not have a geoportal.

As part of the participation in the area of fault reporting, it was found that 9 municipalities still operate fault reporting, no municipality has cancelled fault reporting, 6 municipalities have started to use fault reports since 2018 (improvement by 40%).

All investigated municipalities support a system for fault reporting.

4 Conclusion

Digital environments play an increasingly important role in the age of globalization. For example, a suitable environment can significantly support and fasten cooperation of remotely located teams or citizens participation.

The paper aimed to evaluate changes in utilization of digital platforms used to support citizens participation since 2018. It revealed that some services are not in use but on the other hand some new services have been deployed.

The study focuses only on the Pardubicky region, the Czech Republic which can be understood as its limitation.

For the future, authors plan to observe next development to identify changes and new trends in utilization of participation technologies.

Acknowledgement

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Specification of methods for public passenger transport performance and efficiency evaluation

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Abstract

Research background: The public passenger transport sector has its own specifics, due to which traditional methods and approaches cannot be used for performance evaluation. The choice of metrics for performance and efficiency evaluation can therefore be problematic and ambiguous.

Purpose of the article: The purpose of the research is to perform, based on a systematic literature review, description of the methods and metrics used for performance evaluation in the public passenger transport sector.

Methods: Systematic literature review was performed based on the selection of the articles provided by Web of Science database which relevant issue was performance and efficiency in the public passenger transport. Articles were categorized according to criteria and a description of the thematic focus of the articles was made. Subsequently, an evaluation of the methods and tools used for performance and efficiency evaluation was carried out. Within the framework of the methods used, the measures and criteria for the efficiency evaluation were structured.

Findings & Value added: The findings were summarized in the conclusion. Based on these findings was confirmed that there are no uniform metrics and models for public transport efficiency evaluation. In this area was identified a large number of criteria that influence the efficiency of public passenger transport.

Keywords: *public passenger transport; performance; efficiency*

JEL Classification: *L91; O18; O57*

1 Introduction

In its most general form, the concept of business performance is used in connection with the definition of the very essence of the existence of the business and its success and ability to survive in the future (Fibírová & Šoljaková, 2005). Performance can also be defined as "the ability of the company to evaluate the investments made in its business activities in the best possible way" (Faltejsková et al., 2016).

In a market economy, the financial position and performance of the company have to be constantly evaluated. Various performance benchmarks serve as feedback for companies that

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evaluate their decisions and allow them to adjust direction or eventually reverse the identified situation (Tousek et al., 2021).

Properly designed performance measurement system provides the basis for effective management system and can be used as a management tool for strategic, tactical and operational business management (Knápková et al., 2011).

Each performance measurement model is different and uses different indicators. However, these models also have some common features. Most authors try to strengthen the predictive capabilities of the original models as a response to changes in the economic environment (Hyranek et al., 2018).

Performance measurement contains these separate questions: How to measure the inputs and outputs of the business process? How to compare them, for which user is the performance measured? Who is requesting this information and why? (Fibírová & Šoljaková, 2005)

Among the traditional indicators of financial performance are primarily included classic indicators of financial analysis based on accounting data - i.e., primarily absolute profit indicators and profit rate indicators (profitability). The fundamental problem is above all the fact that these indicators cannot exist without additional information relating in particular to the development of liquidity, indebtedness, the relationship between the property and financial structure or the use of the company's assets, or other indicators focused on the level of productivity, added value, cost effectiveness and capital market indicators (Knápková et al., 2011). Another obvious, problematic and questionable fact of financial analysis indicators is the issue of the explanatory power of input data (i.e., accounting statements).

The development of modern methods of business performance evaluation responds to the described deficiencies of traditional methods and takes into account also non-financial indicators. Modern methods include, for example, the EVA indicator (Economic Added Value), which works with the concept of economic profit, as well as the Balance Scorecard (BSC) model, which works with incorporating business processes and their successful management, and the Excellence Model (EFQM), based on the logic that excellent results can only be achieved by the organization under conditions of maximum customer satisfaction. Furthermore, there belongs, for example, the Perofmance prism model (PPM), which evaluates the company's performance using five perspectives: strategy, options, processes, satisfaction and contribution of interested groups. On the contrary, the purpose of another model (Performance evaluation pyramid) is to link organizational strategy with its activities (Narkuniene & Ulbinaitė, 2018).

The public passenger transport sector has its own specifics in relation to performance, due to which it is not possible to use commonly used methods and approaches for performance evaluation. A transport system that allows people to satisfy their needs at the lowest social cost can be considered efficient.

In order to assess the efficiency of the transport system, it is necessary to include all persons travelling or being affected by transport, as well as all social and external costs associated with transport (called externalities). Benefits and costs are usually understood on a broader scale than revenues and costs from an accounting perspective (Marešová, 2012).

In connection with the efficiency of public passenger transport, it is also necessary to mention the basic principle of 3E (economy, efficiency and effectiveness). The 3E principle is often associated with performance in public administration.

Žižka (2017) within the evaluation of the efficiency of public transport in the Czech Republic distinguishes three levels of efficiency and states that efficiency is understood as the ability of society to achieve set goals. On the other hand, efficiency (effectiveness) is understood as the relationship between the input used and the output achieved, and economy then means avoiding waste in business process implementation, which means procuring input at the lowest possible cost. The overall performance is then determined by the combination of all three components mentioned above.

2 Methods

The systematic literature search was carried out based on the results of the search in the Web of Science database. Total of 323 articles was found using the research based on the keywords: public transport, efficiency and performance. (Articles published in the years 2008–2021, where the main relevant topic was performance and efficiency in public personal transport.) The articles were sorted and categorized, and then evaluation of the methods used for performance evaluation was carried out. The measures and criteria for the efficiency evaluation were structured, and a description of the thematic focus of the articles was carried out.

Table 1. Analyzed research sources by the period

Year of publication	Share of articles in %
2020-2021	19 %
2018-2019	33 %
2016-2017	18 %
2010-2015	24 %
2008-2009	6 %

Source: own processing

An overview of the analyzed articles according to the period in which they were published is shown in table 1. The largest share of articles falls in the period of 2018–2019. On the contrary, the fewest of the analyzed sources were published in the period of 2008–2009.

3 Results

With regard to the focus of the articles having something to do with the area of transport systems (tab. 2), most articles were focused on research on public passenger transport in general (42 % of sources), followed by the area of public bus transport (30 % of sources). 22 % of the resources were focused on city public transport research and only 6 % of resources were dedicated to railway transport research.

Table 2. Researched transport systems

Type of the transport system	Share of articles in %
Public bus transport	30 %
City public transport, metro	22 %
Public passenger transport in general	42 %
Railway transport	6 %

Source: own processing

Taking into account selected sources, it can be stated that most of the articles were focused on research of transport system in the Europe (42 % of articles). This was followed by the research in China and India, 18 % of articles were focused on another non specified

regions and 9 % of the articles were focused on the analysis of the transport systems in greater number of countries.

Table 3. Region in which was researched the transport system

Region of researched transport system	Share of articles in %
Europe	42 %
China	13 %
India	12 %
global view	9 %
America	6 %
other	18 %

Source: own processing

3.1 Thematic focus of the articles, research methods overview

In the table number 4 is the overview of thematic focus of analyzed articles. 39 % of the articles were generally focused directly on analysis of efficiency in public passenger transport. In this area was then some topics defined in more narrow context. There were articles focused on technical, operational or environmental efficiency or articles focused on the efficiency of the services provided. In the analytical part, there was also a variance in approach. In some cases it was directly about the construction of an efficiency model, other articles focused on the compilation of a matrix or an overview of criteria/indicators. In 33 % of the articles, the authors focused on investigating the influence of a certain factor on efficiency. This factor was, for example, the ownership factor, the environmental factor, or the network morphology factor, the transport integration factor, managerial attitude, etc. Another 9 % of the articles were focused on the analysis of the transport network, its morphology and integrity. Other analytical studies were focused, for example, on the influence of factors on CO_2 emissions in transport, analysis of passenger satisfaction, etc.

Table 4. Thematic focus of the articles

Thematic focus of the articles	Share of articles in %	More detailed aspects of the topic
Efficiency analysis	39 %	Technical efficiency, operational, environmental, efficiency of services, optimization, criteria matrix model
Effect of a certain factor on efficiency	33 %	ownership factor, environmental factor, network morphology factor, transport integration, managerial attitude, PPP factor, form of contractual relations
Analysis of the transport network, integrated transport system	9 %	
Other analytical studies	13 %	Influence of factors on CO_2 emissions, passenger satisfaction analysis, bus battery operation analysis, public transport balance analysis
Overview and methodological articles	6 %	

Source: own processing

In the following table (tab. 5) is summarized list of used research methods. It is visible for the first sight that in the selected articles is predominant quantitative research which used statistic analysis of secondary or primary data. When assessing qualitative research, it can be stated that some articles were focused on analysis of interviews done mainly with the employees of the transport companies.

Table 5. Used research methods overview

Research methods	Share of articles in %
Quantitative research (statistic analysis of secondary, primary sources)	70 %
Qualitative research (interview)	15 %
Overview	6 %
Case studies	9 %

Source: own processing

3.2 Analysis of tools/methods for efficiency/performance evaluation

In the following table (tab. 6) is introduced the overview of analytical tools that were mentioned in analyzed articles and that were used for data processing and further evaluation of efficiency and performance of public passenger transport.

Table 6. Analytical tools used for data processing

Analytical tools	Share of articles in %
DEA (Data Envelopment Analysis)	35 %
Tobit regression analysis, regresssion analysis, correlation analysis	22 %
AHP – criteria matrix model	14 %
Reports, indicators overviews	13 %
Multimodal graph – network morfology, network analysis	12 %
SFA (Stochastic Frontier Analysis)	4 %

Source: own processing

• **DEA – Data Envelopment Analysis**

The most often used method in analyzed articles was DEA - Data Envelopment Analysis (incidence 35 %).

Data Envelopment Analysis (DEA) represents specialized model tool for efficiency evaluation of decision-making units. The input and output weights are unknown in the model. The input-oriented model assumes that output is constant and that inputs have to be adjusted to maximize technical efficiency. The DEA method represents application of linear programming to analyzed data with the intention to create a production frontier against which the efficiency of each observed country or firm is measured. Based on the analyzed data, the DEA creates an efficiency frontier that is reached by the most efficient firm in the observed sample and against which the level of inefficiency of the others is measured (Tomeš, 2014).

According to the definition of efficiency, when the comparison of real performance with that which can be ideally reached using the same level of inputs consumption is done, then inputs and outputs are in fact compared.

In the analyzed articles using the DEA method can be met various approaches and combinations of input and output parameters.

Authors Costa et al. (2021) use in the analysis input parameters: operating costs, assets and liabilities and define as output parameters: revenues and earnings before interest and tax (EBITDA).

On the contrary, the authors Li et al. (2020) define as input parameters to the model: number of employees, number of vehicles and number of vehicle kilometers and define as output parameters: passenger kilometers and number of passengers. The authors of the article also define so-called exogenous variables that can affect efficiency. These variables are: population density of the researched area, GDP per inhabitant, presence of taxi service, presence of alternative public transport (e.g., urban railway), car ownership.

Analogous parameters are also used in another author's analysis (Saxena, 2019), which examines the efficiency of state-owned transport companies in India. The input parameters were defined as: fleet size, total number of employees and total costs. On the contrary, the output parameters were: passenger kilometers and total revenues.

The authors (Han et al., 2018) investigating the efficiency of bus transport in China assess separately the operational efficiency and separately the efficiency of the services provided. As part of operational efficiency, they then choose the input parameters: number of stations, PHM consumption and number of employees, and the output parameter here is the value of sales. For the efficiency of services, the input parameters were defined as: waiting time, travel time and accuracy rate, on the other hand, the output parameter was the number of passengers.

The study (Agarwal et al., 2010) evaluates the technical efficiency of the public transport sector in India and defines as input these parameters: fleet size, number of employees, PHM consumption and accident rate per kilometer, on the other hand, the output parameters were bus usage, passenger kilometers and load factor.

- **Tobit regression analysis, regression analysis, correlation analysis**

In the analyzed articles, methods of regression analysis and correlation analysis were noticed in connection with the DEA analysis.

For example the authors (Costa et al., 2021) analyse the impact of the model of urban rail networks ownership in Portugal and use the methodology in the calculation of DEA scores and the subsequent use of regression analysis to identify the main determinants.

Also the following article (Saxena, 2019) describing the efficiency of State Transport Corporations of India uses DEA technics and subsequently, a regression analysis tool.

For example, Tobit regression analysis, is used by the authors (Li et al., 2020) who construct a three-stage DEA model to eliminate the effects of exogenous environmental factors on the operation of public bus transport to obtain real efficiency results. The Tobit model was used for the subsequent analysis of the results.

Regression analysis is also used in the article (Boitani et al., 2010) investigating how ownership and institutional regime affects productivity in the public transport sector.

The article (Xylia & Silveira, 2017) working with the indicators so-called environmental performance indicators (proportions of renewable fuels, CO_2 emissions and energy efficiency) are analyzed based on interviews with employees, fuel preferences and best practices. Correlation analysis is then used to examine the dependence between population density or the volume of bus traffic and the achieved share of renewable resources.

- **AHP – criteria matrix model**

The authors (Lin et al., 2021) create an AHP public transport criteria matrix model, which includes the following criteria: basic level of infrastructure, level of public transport services, level of economic benefit and level of sustainable development.

Further article (Cyril et al., 2019) focusing on improving efficiency through optimization of available resources. These authors identify twelve decision variables within the AHP model. To these variables belong: controllable costs, uncontrollable costs, taxes, staff-to-bus ratio, safety, availability, regularity, load factor, fleet utilization, percentage of dead kilometers to effective kilometers, travel speed, percent of canceled kilometers, planned kilometers.

- **Reports, indicators overviews**

In the article (Alonso et al., 2017) focusing on the city public transport systems in Spain is efficiency analysis based on several indicators used to measuring supply, demand and efficiency.

The article (Hirschhorn et al., 2018) is focused on compilation of the overview of system metrics usable for public transport efficiency evaluation. To these metrics belong user satisfaction, cost recovery, modal split and level of system integration. The metrics were created based on a questionnaire survey with experts, which was evaluated using the Delphi method.

Also the article (Komorousová & Hinke, 2021), comparing the efficiency of the city public transpor in selected cities of the Czech Republic, works with the set of defined sub-indicators.

- **Multimodal graph – network morfology, network analysis**

In the article (Vrabková et al., 2016) is evaluated availability of public transport in municipalities in the Czech Republic by means of network analysis. The article examines the hypothesis that deconcentration practices of public administration lead to higher security costs and thus inefficiency.

The article (Wang et al., 2020) examines, how significantly contributes the morphology of China's public transport network to its performance. The research is carried out on the basis of the multimodal multigraph of the public transport.

The article (Cats, 2017) analyzes topological development of the multimodal railway network in Sweden. On the basis of this analysis are further analyzed changes in global efficiency and directness.

• **Method (SFA) Stochastic Frontier Analysis**

The article (Jarboui et al., 2013) measures the technical efficiency of public road transport providers in 18 countries and analyzes the extent to which various factors influence the level of technical efficiency. The research was conducted using the stochastic frontier analysis (SFA) method.

3.3 Limitations of research methods for efficiency evaluation

The limitation of the research methods is primarily the problematic availability of some sub-indicators, or possibly the inconsistency of the methodology for their quantification (e.g., number of passengers, passenger kilometres). In a number of cases, it is necessary to rely on a certain subjectivity of partial criteria (e.g., passenger satisfaction).

Limitation of the research is also given by the large number of criteria that can influence the efficiency of public transport. This also results in a non-uniform approach to the efficiency evaluation and in certain cases to impossibility of partial results comparison. It is also necessary to mention the considerable fragmentation in the understanding of the concept of efficiency. Some authors perceive it as efficiency in more technical form, others focus on efficiency with regard to the availability of public transport and the quality of services provided, other authors examine rather the efficiency of the transport network in relation to the level of infrastructure.

The number of criteria affecting the efficiency of public transport evaluation also leads to the necessity to use more complex statistical tools. Their construction can be quite complicated for some authors.

4 Discussions

Systematic literary research was conducted on the basis of Web of Science articles selection, where the main relevant issue was performance and efficiency in public passenger transport. With regard to the thematic focus of the articles, it is necessary to state that only 39 % of the articles from described selection were fully focused on more complex model of efficiency assessment, or more comprehensive structure of public transport efficiency indicators. Although the efficiency evaluation was a key concept in all selected articles, number of articles were limited only to evaluation of a certain partial factor or several partial factors influencing efficiency. Some articles were focused more on technical parameters and analyzed, for example, the performance of transport networks, their morphology and typology. Therefore, it can be concluded that compiling comprehensive model for efficiency evaluation can be quite complicated considering the large number of criteria that affect the efficiency of public transport.

With regard to the used research methods, it is possible to state that most of the articles used quantitative research and analyzed secondary or primary data.

When focusing on analytical tools used for the efficiency of public transport evaluation, it is necessary to write that large number of the articles was based on the DEA model – Data Envelopment Analysis. In the framework of this model, input and output criteria, or limiting variables, are proposed. In the model, efficiency is determined based on the linear programming task. On the basis of the comparison of individual articles, it was found that

the selection of input and output criteria is comparable for some models, but for some models it shows significant differences. The articles also used significantly often regression and correlation analysis tools. These tools were mostly used by the authors in connection with the DEA model (e.g., Costa et al., 2021, Lia et al, 2020, Saxena, 2020). Some authors used the AHP criteria matrix model to organize an overview of criteria for efficiency evaluation (Lin et al., 2021 or Cyril et al, 2019). Other authors limited themselves to a kind of overview or a set of metrics (e.g., Alonso et al., 2017, Hirschhorn et al., 2018, Komorousová & Hinke, 2021). In the articles focused on infrastructure performance, a network analysis tool was used (Vrabková et al., 2016), in some cases the authors worked with a multimodal graph and network topology (Wang et al., 2020). Only a small percentage of authors used the SFA (Stochastic Frontier Analysis) method (e.g., Jarboui et al., 2013).

Acknowledgement

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Analysis of the state and development of Corporate Income Tax harmonization as a risk factor for corporate bankruptcy in Slovakia and the EU

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Abstract

Research background: The amount of tax burden in the national economy is one of the factors that largely influence plans, decisions, and the existence of business entities. Corporate income tax in Slovakia has undergone many reform changes since the establishment of the independent republic. Reforms and changes are natural because different subjects of the national economy perceive the setting of the tax burden differently. It is also natural that the level and structure of corporate tax vary between the member countries of the European Union.

Purpose of the article: The essence of tax harmonization is the convergence of autonomous tax systems in individual stages and levels. The analysis will show what phase the harmonization process is currently in, which member countries have the most significant differences, and how individual countries perceive the Union's efforts to bring tax systems closer together.

Methods: The paper aims to examine the state and development of corporate income tax in Slovakia, compare it with the development in the European Union, and look for similarities in development within the Union through cluster analysis.

Findings & Value added: Tax competition and harmonization are topics that constantly divide the Union. The arguments of both the countries and the integration grouping are understandable, so it is necessary to find a point where both sides can find satisfaction. Setting the amount of taxation of income and profits of enterprises is a fundamental tool in supporting the business sector. However, it turns out that it is not a decisive factor in the case of survival, or bankruptcy of companies currently.

Keywords: *corporate income tax; tax harmonization; tax competition; bankruptcy*

JEL Classification: *F62; H21; H25*

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1 Introduction

The diverse fiscal, political, and social development in various parts of Europe has also been reflected in specific tax characteristics, as in entire tax systems. Significant contrasts, in corporate income tax (CIT), can be followed especially between taxes of Western or Northern Europe and the taxes of Eastern European countries. There are substantial differences in the volume of tax collection, and the rates as well. The creation of a common market in Europe, the growing influence of multinational corporations, and the financing of joint activities within integration clusters have highlighted the need for tax coordination, respectively harmonization. Appropriate tax harmonization of EU Member States' tax policies is a severe economic and political issue that governments must seriously address to maintain economic progress and economic stability. Following the partial failure to implement harmonization measures, the notion of tax harmonization has begun to be closely linked with the single internal market. Still, there are clashing opinions whether it is better to preserve tax competition (i.e., a situation where there are different tax systems and different tax rates via which states seek to attract investors) or seek tax harmonization from two points of view – within the European Communities and the individual Member States. The harmonization process means gradual reform steps, which require constant effort from individual governments, as well as European institutions and offices in search of compromise solutions.

The paper aims to explore to what extent the harmonization process has progressed in the case of corporate income tax. To find groups of member countries where the state and development of corporate income tax are similar and to propose further steps for convergence of tax systems. Corporate income tax is one of the substantial factors that influence business decisions. It can even affect the existence of individual businesses.

2 Literature review

In the 1990s, partly against the backdrop of the impact of globalization on tax revenues, unfair tax competition rose the policy agenda. EU and OECD initiatives led to the amendment of various tax measures sometimes, paradoxically, enhancing their attractiveness. In parallel, the European Commission pursued an increasingly hard approach to disciplining regional aid, even in the most disadvantaged regions. Meanwhile, the European courts addressed the longstanding question of whether corporate tax rates set by regional authorities involve state aid. The consequence of these policy outcomes is that national governments and autonomous regional authorities may operate more generous tax measures than those authorized under the state aid rules in the most severely disadvantaged regions. This raises imperative issues for EU cohesion policy, small island economies, and the relationship between EU competition policy and taxation. (Wishlade, 2012) When a dozen new countries joined the European Union in the mid-2000s, political tensions spiked over disparities in corporate income tax rates. Since the time of enlargement, leaders have tried repeatedly to enhance corporate tax coordination within the EU, because of fears of downward pressure on corporate tax rates and states' weakening ability to collect revenues. At the same time, leaders from new member states in Eastern Europe with low corporate tax rates have contended that regional efforts to coordinate tax policies are not worthwhile, given that corporate tax competition is a global phenomenon. (Tudor and Appel, 2016)

The correct functioning of the European Union Single Market requires the elimination of discriminatory or protective internal taxation of goods. With partial harmonization of indirect taxes, the EU has reached a considerable degree of fiscal neutrality. (Tyc, 2008). However, the attitudes of Member States suggest that closer harmonization in the case of direct taxes may not be considered. Taxes and their collection are seen as one of the essential attributes of state sovereignty. To set tax legislation is although, the discretion of each state, this

discretion should always be based on the current political and economic situation. (Vondrackova, 2014)

The tax competition of countries causes both positive and negative effects on macroeconomic processes such as the effectiveness of government spending, the rationality of supply of externalities, and the length and amplitudes of business cycles. A considerable reduction of corporate tax in the EU is related to increased tax competition after new members entered the EU. (Podviezko et al., 2019)

The study of Tavares and Bogenschneider (2015) says about the existence of multiple instances of seemingly abusive or artificial structures, or functionally thin interposed entities, that could be deemed valid under the terms of the amended directive by one state and trigger disproportionate tax relief in other states irrespective of their national tax policies, thus fostering tax competition and bast erosion within Europe, particularly in fact patterns wherein third-country capital is invested in the EU.

Based on general statistical analysis, the authors identified and described three strategies of tax competition: aggressive, moderate, and conservative. Furthermore, rankings of the countries were created based on two elements, namely: changes to FDI and the share of CIT revenues in GDP. The authors have also estimated the parameters of the dynamic panel model to find relations between the corporate income tax and the ratio of FDI to GDP and have found differences between the crisis period and stable period and differences in results for two groups of countries (new members of the EU and old ones). (Guziejewska et al., 2014)

In the corporate environment, globalization supports possibilities of mobile bases transfers among states and therefore changes in the taxable income. Differences in tax systems as well as in the level of corporate income tax revenues deserve attention in the context of tax competition. Experts on tax competition in the field of corporate taxation can be divided into those who perceive it positively, particularly because of its influences on the economic growth of the state, and those who consider it harmful, especially because of the possibility of tax base transfers among states along with the impossibility of ensuring effective allocation of tax resources. Tax competitiveness among states is perceived based on the level of corporate income tax revenues in relation to GDP. Based on the examination of determinants of corporate income tax revenues, a draft of the econometric model of panel regression has been specified (fixed model with individual effects) and is compiled from the main tax and macroeconomic determinants that influence tax competitiveness in the field of corporate taxation. The conclusion confirms that there is tax competition in the field of corporate tax between EU states, and there is a statistically significant relationship between the development of corporate income tax revenues and the determinants of tax competitiveness that are influenced in the context of corporate taxation. (Banociova and Tahlova, 2019)

Redoano (2014) provided a simple theoretical model of capital tax competition between countries that differ in spatial location, and where cross-border investment costs are proportional to distance - a gravity model. She modeled EU membership as a reduction in the distance between countries. Precise predictions about reaction functions' intercepts and slopes are derived. In particular, she finds that joining the Union lowers the intercept and that all countries react more to member countries than they do to non-members. These predictions are largely confirmed using a panel data set of statutory corporate tax rates in Western European countries.

Corporate tax avoidance has been shown to raise the cost of bank debt and lower credit and bond ratings. However, it is unclear whether tax avoidance increases a firm's bankruptcy risk or whether it is just viewed negatively by banks and rating agencies. Dhawan et al. (2020) find that firms engaging in tax avoidance and firms that are thinly capitalized face higher bankruptcy risk. The findings are consistent with the view that tax avoidance is a risk-enhancing activity.

On one hand, governments engage in tax competition and are tempted to lower tax rates. On the other hand, they are unable to commit to future policies and, once capital has been installed, have incentives to increase taxes. In this setting, there exists a tax that optimally trades off the two distortions. Finally, there are three possible tax harmonization scenarios: no tax harmonization (all countries set taxes unilaterally), global tax harmonization (all countries coordinate their capital taxes), and partial tax harmonization (only a subset of all countries coordinate capital taxes). (Conconi et al., 2008)

3 Material and methods

We obtained the input data for the analysis of corporate income tax from Eurostat databases and reports. For research and comparison, we chose the tax expressed in relative units, in the percentage of GDP, and percentage of total taxes.

To calculate the average indicator in Slovakia we used the Average Annual Growth Rate (AAGR). It is determined by taking the numerical mean of specified or calculated year-on-year growth rates. The formula is following:

$$\text{AAGR} = \frac{[(Growth\ Rate)y + (Growth\ Rate)y + 1 + \cdots (Growth\ Rate)y + n]}{N(1)} \tag{1}$$

Where:
Growth Rate (y) – Growth rate in year 1
Growth Rate (y + 1) – Growth rate in the next year
Growth Rate (y + n) – Growth rate in the year "n"
N – Total number of periods

Since practical data mining problems high-dimensional data are clustered, the resulting clusters are high-dimensional geometrical objects which are difficult to analyze and interpret. A low-dimensional graphical representation of the clusters could be much more informative than such a single value of the cluster validity one can cluster by eye and qualitatively validate conclusions drawn from clustering algorithms. (Abonyi and Balázs, 2007)

We have used two clustering methods, the hierarchical Ward's method, and the non-hierarchical K-means method. A significant part of these degrees of similarity is based on the calculation of the distance of objects. The Euclidean distance we used is defined by the formula:

$$d_{ij} = \sqrt{\sum_{k=1}^{K} \left(x_{ik} - x_{jk} \right)^2} \tag{2}$$

Where x_{ik} is the value of k variable for *i-th* object and x_{jk} is the value of k variable for *j-th* object. For calculated distance is than determined the rule of linking statistical units into clusters.

In 2010 the average revenue from corporate income tax was 2,4 % GDP in the EU-27. In 2020, this average indicator grew up to 2,5 % GDP. The median reached the level of 2,3% of GDP in both compared years. In 2020 (compared to reference year 2010), increased CIT collection in eighteen Member States, most in Netherlands, Ireland, and Belgium (+ 0,8 percentage point). On the other hand, Greece recorded the sharpest decline in comparison to the reference year (-1,4 percentage point). Highest incomes from corporate income tax in

2020 were recorded by Cyprus (5,9 % GDP), followed by Luxembourg (4,8 % GDP), and Malta (4,1 % GDP). The lowest amount was levied by Estonia (0,3 % GDP). Most of Member States are above the zero axis. Over the past decade, tax collection has increased in most member countries, albeit only slightly. (Figure 1.)
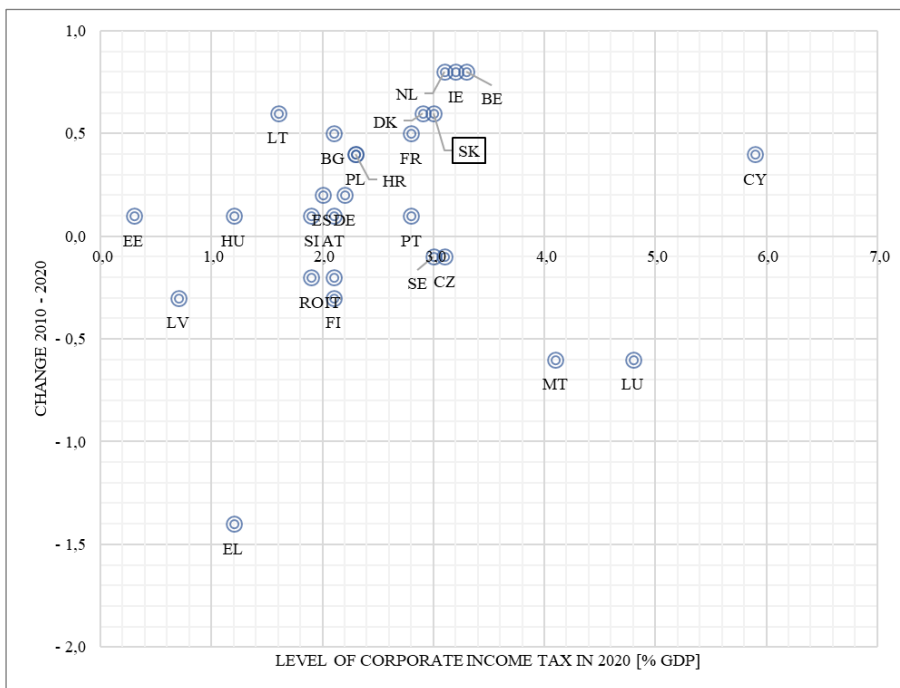
Figure 1. Corporate income tax as percentage of GDP in the EU

Source: authors according to Eurostat (2022)

Table 1 shows the examined indicators in the observed period for Slovakia. The data show that income from corporate tax grew mainly in the period after the economic crisis, which receded in 2012. The tax rate, the level of collected revenues, and the share of corporate tax in total taxation increased. However, other data and a trend graph show a gradual decline in indicators in recent years. The AAGR shows that tax revenues as a % of GDP for 2010-2021 grew by approximately 2,1% annually. On the other hand, the share of CIT in total taxes decreased on average during the monitored period, but not significantly.

Table 1. Selected indicators of corporate income tax in Slovakia

Slovakia	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Average	Trend	AAGR
CIT - % of GDP	2,4	2,4	2,3	2,9	3,3	3,7	3,5	3,5	3,3	3,1	3,0	3,0	3,0		1,0205
CIT - % of total taxes	8,6	8,2	8,1	9,2	10,3	11,2	10,5	10,2	9,6	8,8	8,6	8,4	9,3		0,9979
CIT - rate	19	19	19	23	22	22	22	21	21	21	21	21	---		---

Source: authors according to Eurostat (2022)

The amendment to the Income Tax Act (effective from January 1, 2021) regulates the reduction of the income tax rate to 15% only for legal entities whose taxable income for the tax period does not exceed €49,790. A legal entity applies the rates of income tax based on the tax reduced by the tax loss shown in Table 2.

Table 2. CIT tax rates in Slovakia since 2021

15%	21%
if the taxable income for the tax period does not exceed the amount of €49,790	if taxable income for the tax period exceeds the amount of €49,790

Source: authors

Measured as percentage of total taxes, the average revenue by corporate income tax was in 2010 6,8 % in the EU-27. In 2020, this average indicator grew up to 6,9 %. The median reached the level of 5,5 % in 2010, and 6,1 % in 2020. Compared to reference year 2010, increased CIT ratio in fifteen Member States, especially in Ireland (+ 7,1 percentage point). At the opposite end of the scale, Greece recorded the sharpest decline in comparison to the reference year (-4,5 percentage point). The highest share in total taxation in 2020 were recorded by Cyprus (16,9 %), followed by Malta (13,4 %), and Luxembourg (12,0 %). The lowest ratio recorded Estonia (0,9 %). In most surveyed countries, the share of corporate income tax in total taxation has not changed significantly over the last decade. The approach to corporate taxation has been relatively stable in recent years and does not show significant fluctuations. (Figure 2.)
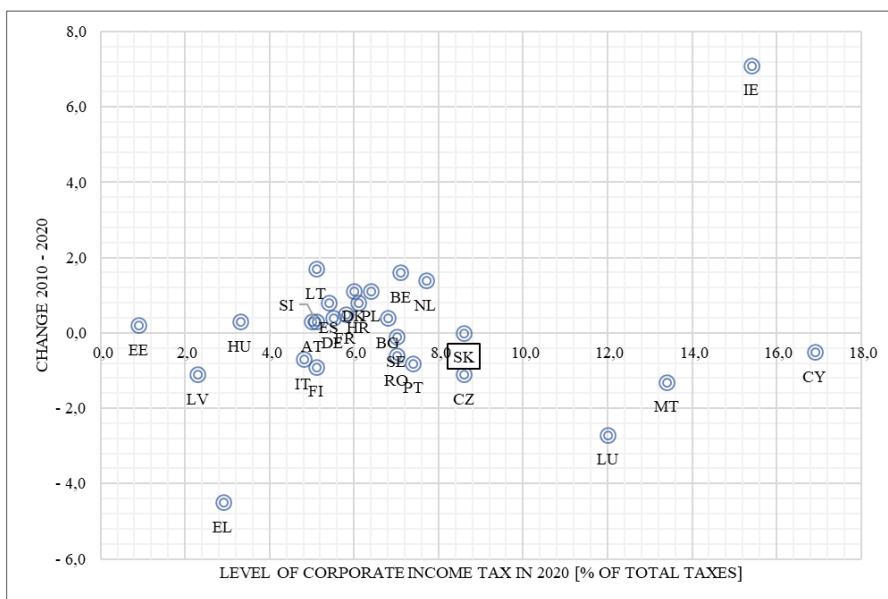
Figure 2. Corporate income tax as percentage of total taxes in the EU

Source: authors according to Eurostat (2022) and Kesner-Škreb and Kuliš (2010)

Figure 3 shows the top statutory rates on corporate incomes in EU-27. Compared to 2010, the highest decrease in the tax rate occurred in Hungary (-11,6 percentage points). On the contrary, the most significant increase in the rate was recorded in Latvia and Portugal (+ 5,0 percentage points). Among the Member States, Malta has long been applying the highest tax rate (35,0%). The lowest rate is in Hungary, which has significantly reduced corporate income taxation in recent years.
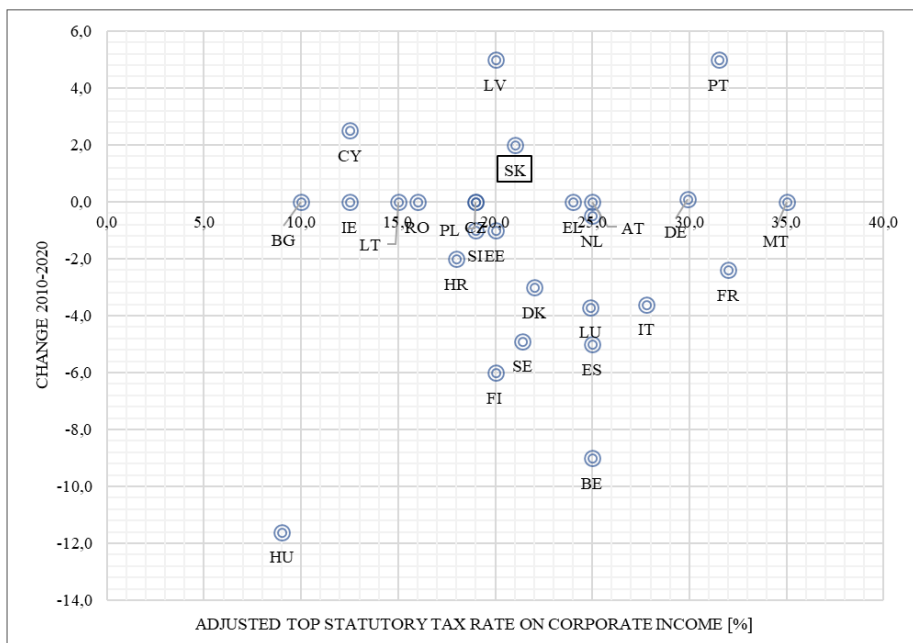
Figure 3. Corporate income tax rates in the EU

Source: authors according to Eurostat (2022) and Asen (2020)

4 Results and discussion

Cluster analysis aims to reveal mutual similarities between 27 Member States based on further analysis of previous research data (CIT). Preceding quantitative and graphical analyzes indicate differences in the development of three selected indicators. Therefore, we decided to use that statistical tool to analyze multidimensional data. Inputted data were calculated according to data obtained from statistical reports published in the Eurostat database.

Three imputed variables for the Member States were CIT as percentage of GDP, CIT as percentage of total taxes, and CIT rate in 2020 analyzed in previous material. The objective of cluster analysis was to achieve such groups of states, which would be characterized by certain homogeneity in case of selected tax indicators. Cluster analysis sorted data into sets with the greatest possible similarity within the group and the largest difference between groups. (Fraley and Raftery, 1999)

Hierarchical clustering methods are sequentially joining clusters, which decrease them continuously into one. The result of clustering is a tree diagram (Cluster Dendrogram). Ward's method involves an agglomerative clustering algorithm, which looks for groups of leaves and forms branches, and limbs. It uses the Euclidean distance when calculating the intra-group sum of squares of deviations from the gravity center of clusters. In the Dendrogram, we can identify three groups of countries with similar characteristics. There are two similar groups in terms of cluster size, and one smaller cluster including Luxembourg, Cyprus, Ireland, and Malta. (Figure 4.)

To draw conclusions that consider the exact distances, we have also used a non-hierarchical clustering K-means method, which involves two main clustering components (variables). The output of that kind of clustering is a scatterplot. (Figure 5.)
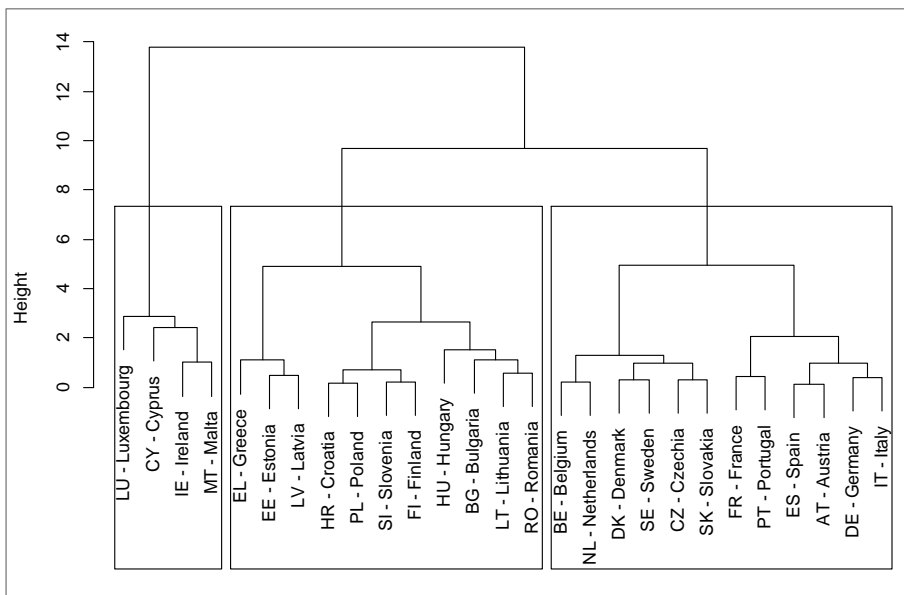
Figure 4. Cluster Dendrogram according to Ward's method

Source: authors
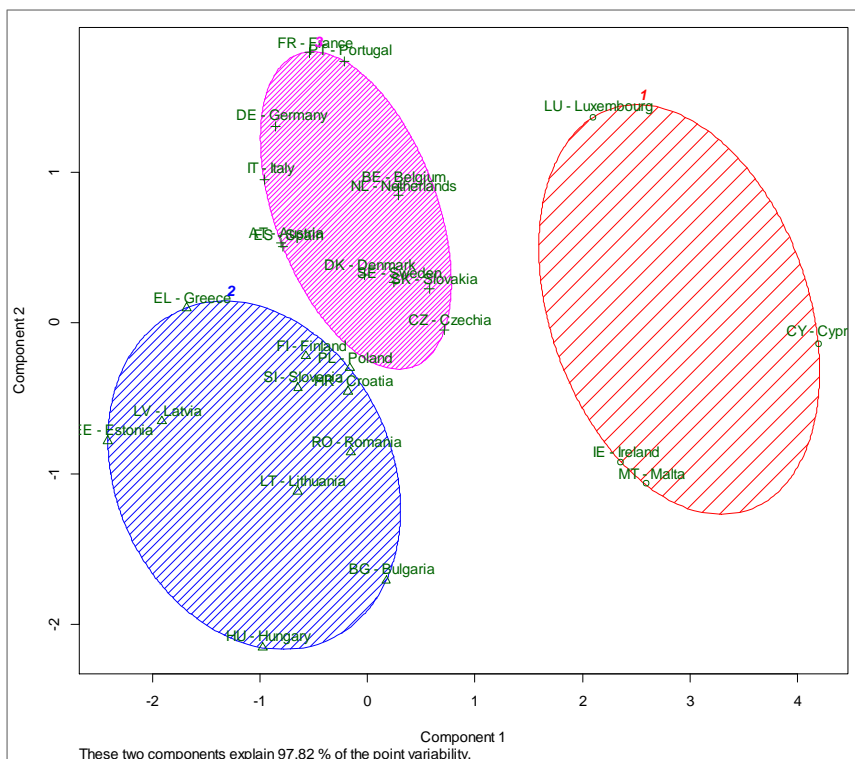
Figure 5. Scatterplot according to K-means method

Source: authors

If we consider two variables, clusters are visualized by using the non-hierarchical method. Based on the previous hierarchical clustering, we used the same number of clusters. K-means clustering is the most popular partitioning method. It requires the analyst to specify the number of groups to extract. There are two components, which explain 97,82 % of the point variability. Due to testing, we have chosen 3 clusters as an imputed command for a new clustering. We consider the data set, which contains n=27 objects. The essence of ellipses is the average and the covariance matrix of each cluster. Their size is such that they include all the points of their group. The ellipses sizes of all clusters are similar. Group of countries no. 1 displays greater variability for Component 2 because of an object on the boundaries of the ellipse (Luxembourg). The denser shading intensity indicates the greater density of divided countries in ellipses. The most tightly arranged countries are in cluster no. 3.

5 Conclusion

The harmonization of corporate income tax still runs into requirements for maintaining tax competition in the EU. The demands come primarily from the "youngest" member countries. Despite the Union's efforts to balance regional differences, these are also the "poorest" countries. The inflow of new foreign investments depends, among other things, on the applied tax policy. The effective setting of income tax is individual. Its task is to ensure sufficient tax revenue, while not discouraging businesses from paying taxes. Over the past decade, corporate taxation has not changed significantly in most Member States. The development indicates a stable and relatively optimal setting of individual tax attributes that meet the requirements of countries and entrepreneurs. Bankruptcy or the cessation of the existence of enterprises is more influenced by other factors than the applied level of taxation of their incomes and profits (primarily increasing input prices, such as wages, taxes, energy costs; decreasing purchasing power of the population; anti-pandemic measures, or difficult-to-predict developments in the field of strategic raw materials).

The level of participation on tax harmonization and the willingness to cooperate on the further development of this process varies considerably from one Member State to another. Despite many years of efforts to redress economic and other differences between Europe's regions, differences still exist. The support of domestic and foreign entrepreneurs through tax policy is a valuable tool in every country for influencing the business environment, economic development, and mood of the entire society. Many states see the preservation of tax competition as the only opportunity to compete with other member countries in the inflow of foreign investments. Economic, social, and other differences between the regions of Europe will always reflect in the different willingness to further tax harmonization. Nevertheless, cluster analysis offers a way forward in this process. Cooperation in the convergence of tax systems and their specific attributes is desirable, first within individual clusters, and then in all member countries. Unanimous agreement of individual members on various tax issues is very unlikely in most cases.

Acknowledgement

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Perspective on Sustainable Food Security: Food Waste Across the Supply Chain in Slovakia

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Abstract

Research background: Food waste is a major global problem that contributes to financial losses, adversely affects our planet's sustainability, and impacts food security. National studies on food waste measurement in EU countries present very different results due to the different methods used.
Purpose of the article: The study quantifies the amount of food waste within the food supply chain in Slovakia as well as offers to review empirical studies on food waste practices at all stages of the food supply chain.
Methods: Food waste was estimated using a model approach of assigning food waste to individual phases of the food supply chain based on a delegated act published by the European Commission establishing a common methodology for the uniform measurement of food waste.
Findings & Value added: A total of 353 million kilograms of food is eliminated annually in the Slovak food chain in 2019. Food waste generated each year is 65 kilograms per capita per year. In the household sector, food waste is 43 kilograms per capita per year. It has been estimated that the entire food industry produces about 14 kilograms per capita per year. In the primary production sector, food waste is estimated at 7 kilograms per capita per year. Increased awareness of food waste in individual phases of the supply chain can reduce its production. Minimizing food waste is a key element in increasing food security and developing a sustainable food system, and last but not least an important part of responsibility in the food chain.

Keywords: *food waste; food chain; food security; waste statistics; sustainability*.

JEL Classification: *Q18; Q53; Q56*

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1 Introduction

Flexibility in everyday life is becoming a trend where people buy too many foods that end up in the trash uneaten. Society's development can be measured very well through food waste production. Especially in developed parts of the world is the problem of food waste. Food waste leads to the loss of valuable resources, such as land, water, and energy, which are needed for the production, processing, and distribution of food (Jeswani et al., 2021). Food waste also burdens waste management systems, exacerbates food insecurity, and has a major impact on the environment.

The United Nations (UN) Sustainable Development Goal (SDG) Target 12.3 is to halve food waste and reduce food losses by 2030 (UNEP, 2021). To ensure adequate food for a rapidly growing population and streamline the sustainability of the food system, interest in reducing food losses and food waste has grown (Steur et al., 2016).

Food waste is a global problem that has raised social and government awareness in recent years. Food waste from the industry, retail, and household sectors is 931 million tonnes each year. Of this, the household sector accounts for almost 570 million tonnes. The world average of food waste disposed of is 74 kilograms of waste per capita each year (UNEP, 2021).

2 Literature review

The definition of food waste is often contradictory. Therefore, several terms and definitions are often used in the literature (Schneider, 2013). The terms food loss and food waste are often confused but are very different in terms of origin and scope. Food waste is defined as food produced for human consumption but then diverted for non-food purposes or waste disposal. To estimate the potential for food waste reduction by waste prevention, a distinction needs to be made between avoidable and unavoidable food waste. According to the FAO (2021) definition, food waste is related to food and related inedible parts removed from the food supply chain (retail, food services, households). Food means any substance intended for human consumption. According to the study FUSIONS, food waste is any food and inedible parts of food removed from the food supply chain that is to be recovered or disposed of, incineration, disposal, sewage, or landfill (Stenmarck et al., 2016).

In this study, the definition of food waste by FUSIONS unlike the definition by FAO is used, where, in addition to the household, retail, and food services are included primary production and processing. One-third of the food produced for human consumption is lost worldwide, equivalent to about 1.3 billion tonnes per year. This means that food waste amounts to approximately 1.4 billion hectares of land, which means that 30% of the planet's agricultural land and 250 million m^3 of water will be lost (Gustavsson et al., 2011; FAO, 2021). If only a quarter of the discarded food was saved, it would be possible to feed all malnourished people in the world. These discarded foods, which are still suitable for human consumption safety, could contribute to enhancing food security (Quested et al., 2011). However, the real causes of hunger cannot be reduced to the existence of food waste and food availability. Therefore, we should be cautious in linking food waste with food insecurity.

The problem of food waste is considerable and multifaceted. If food is lost for some reason, the impact is both financial and environmental, as well as the impact it can have on an individual's health (Gustavsson et al., 2011). Food degradation is most common in countries where food is relatively cheap. In the EU, 143 billion euros of food is thrown away each year, representing two-thirds of the cost associated with food waste from households (Stenmarck et al., 2016). In the United States, $165 billion worth of food is wasted each year, with food being wasted especially in households (Wharton et al., 2021). The annual economic value of food waste in Finnish households is about 70 euros per person (Katajajuuri et al.,

2014). Due to the availability of data, techniques and methods used, or definitions of food waste, the results vary from country to country.

These economic losses occur in parallel with the environmental impact. A huge number of resources are used to grow, produce, store, and distribute food that is not consumed. All these resources, such as soil, fertilizers, fuel, materials, transport, water, and electricity, lead to many environmental impacts (Kataajajuuri et al., 2014). Because most discarded foods end up in landfills, the resulting breakdown of discarded foods contributes to greenhouse gas emissions. Food waste in the European Union is estimated at 88 million tonnes per year, resulting in the equivalent of 186 metric tonnes (Mt) of carbon dioxide (CO_2 equivalent) (Scherhaufer et al., 2018). According to Monier et al. (2010), food waste simulates the impact on global warming potential (GWP) of 170 Mt CO_2 equivalent emitted in Europe. The impact of food waste on the entire the food supply chain represents approximately 15.7% of the environmental impact (Scherhaufer et al., 2018). In particular, preventing food waste in the US results in 113 million metric tons of CO_2 (carbon dioxide equivalent). In terms of greenhouse gases, the annual food consumed by Finnish households equals approximately the annual carbon dioxide emissions of 100 thousand cars (Katajajuuri et al., 2014).

Many studies have estimated food waste throughout the supply chain for different regions. For example, food waste has been disposed of as part of the supply chain in the EU (Stenmarck et al., 2016), in Finland Katajajuri et al. (2014), and the UK Jeswani (2021). So far, no studies have assessed the amount of food waste in Slovakia within the entire the food supply chain. The availability of food waste data is currently low, and approaches to measurements vary widely. The article aims to quantify food waste in Slovakia within the entire supply chain using the model approach set out by the European Commission in a delegated act to measure the food waste at the supply chain.

3 Data and methods

This study quantifies the amount of food waste through data from the Ministry of Environment of the Slovak Republic, which draws data from the Regional Waste Information System and the Statistical Office over the period 2014-2019.

Food waste is thus allocated at different stages of the supply chain for specific NACE activities. Primary production corresponds to NACE activity A and relates with division 01 – crop and animal production, hunting and related service activities, and division 03 – fishing and aquaculture. Processing and manufacturing correspond to NACE activity C and relate to division 10 – manufacture of food products and division 11 – manufacture of beverages. Due to data collection, stages of the food supply chain retail and other distribution of food and restaurants and food services are cumulated into stage distribution of food and food services. Retail and other distribution of food correspond to NACE activity G and relate to division 46 – wholesale and retail trade and division 47 – retail trade, except motor vehicles and motorcycles. Restaurants and food services correspond to NACE activity I, which relate to division 55 – accommodation, and division 56 – food and beverage service activities. Also, this stage relates to divisions covering activities in which food services are provided (N, O, P, Q, R, S). In the case data obtained for Slovakia, for restaurants and food services all types of waste used only one type of NACE code 84110 – general public administration activities (section O, division 84). So, it is possible to make only the sum of these wastes for individual years without breaking them down into NACE codes. Food waste produced by households is without relevant NACE activity. Biodegradable waste which does not include food waste is not included in the database.

While the European List of Wastes does not provide accurate identification of food and bio-waste, the allocation of food waste to the different stages of the food supply chain can provide recommendations to national authorities on the measurement of food waste.

Measurement of food waste is performed using the waste codes (OJEU, 2019) includes in the European list of waste or old waste codes that contain food waste. The amount of food waste in individual stages of the food supply chain is obtained by calculation of the following equations:

$$FW_{primary\ production} = \sum_i FW\ 02\ 01_{02,03} \tag{1}$$

i = NACE activity A01, A03; 02 01 02 – animal-tissue waste; 02 01 03 – plant-tissue waste

$$FW_{processing\ and\ manufacturing}$$
$$= \sum_i FW\ 02\ 02_{01,02,03,04} + \sum_i FW\ 02\ 03_{01,04}$$
$$+ \sum_i FW\ 02\ 05_{01,02}$$
$$+ \sum_i FW\ 02\ 06_{01,03} + \sum_i FW\ 02\ 07_{01,02,04,05} \tag{2}$$

i = NACE activity C10, C11; 02 02 01– sludges from washing and cleaning; 02 02 02 – animal-tissue waste; 02 02 03 – materials unsuitable for consumption or processing; 02 02 04 – sludges from on-site effluent treatment; 02 03 01 – sludges from washing, cleaning, peeling, centrifuging and separation; 02 03 04 – materials unsuitable for consumption or processing; 02 05 01 – materials unsuitable for consumption or processing; 02 05 02 – sludges from on-site effluent treatment; 02 06 01 – materials unsuitable for consumption or processing; 02 06 03 – sludges from on-site effluent treatment; 02 07 01 – wastes from washing, cleaning and mechanical reduction of raw materials; 02 07 02 – wastes from spirits distillation; 02 07 04 – materials unsuitable for consumption or processing; 02 07 05 – sludges from on-site effluent treatment

$$FW_{distribution\ of\ food\ and\ food\ services}$$
$$= \sum_i FW\ 20\ 01_{08,25} + \sum_i FW\ 20\ 03_{02} + \sum_j FW\ 20\ 01_{08,25} \tag{3}$$

i = NACE activity O84; j = NACE activity G46, G47; 20 01 08 – biodegradable kitchen and canteen waste; 20 01 25 – edible oil and fat; 20 03 02 – waste from markets

$$FW_{households} = \sum_i FW\ 20\ 03_{01} * ceof\ 0.2_{INCIEN} \tag{4}$$

i = household as referred to in Annex I Section 8 point 1.2 to Regulation (EC) No 2150/2002 on waste statistics; 20 03 01 – mixed municipal waste.

According to an analysis of the composition of mixed municipal waste carried out by the Institute for Circular Economy in Slovakia, a coefficient of 0.20 was used in the food waste of household model as the default coefficient expressing the share of food waste in household waste code 20 03 01 for households. The total amount of food waste in Slovakia is calculated as the sum of food waste in all stages of the food supply chain.

4 Results and discussion

This section presents calculated amounts of food waste, reported under waste codes, for all types of food chains which typically includes food waste. Data are from the Ministry of Environment of the Slovak Republic and the Statistical Office. The amount of food waste according to the food supply chain is determined by measuring food waste generated by a sample of food business operators or households according to specified methods. Together at all stages of the food supply chain, 64.7 kilograms of food waste per capita is produced

per year, which corresponds to 353 million kilograms of food waste in Slovakia per year (Table 1). When comparing our results with other studies, our results are consistent with some international studies. In Finland, for example, food waste produces 335-460 million kilograms per year, which represents 62-86 kilograms per person per year (Katajajuuri et al., 2014). Other international studies report large percentages of food waste. The total amount of food waste in Germany per year ranges from 9.5 to 12.3 million tons, which corresponds to 134 kg of food waste per capita (Hafner et al., 2012). According to a European study FUSIONS, the estimate of food waste in the EU-28 was 173 kilograms of food waste per person in 2012 (Stenmarck et al., 2016). Our results are comparable to the study FUSION, based on the proportions of food waste at different levels of the supply chain (Figure 1; Figure 2). According to an earlier study by Monier et al. (2010) averages 179 kilograms of food per person per year in the European Union, while in Slovakia it was 109 kilograms per capita per year (reference year 2006). Of this, food waste at the household level in Slovakia was estimated at 70 kilograms per capita per year (Figure 3). These significant differences are difficult to explain based on individual aspects, such as the fact that primary production is not included in the study, different measurement techniques have been used or that primary data do not distinguish between food waste and other bio-waste data.

Table 1. Total food waste estimated at the different stages of the food supply chain in the Slovak Republic (in tonnes)

Stage	2014	2015	2016	2017	2018	2019
Primary production	85 846	91 199	100 818	39 924	47 141	39 323
Processing and manufacturing	68 752	33 008	70 571	96 031	48 264	75 131
Distribution of food and food services	3 737	5 912	27 839	25 682	20 257	5 566
Households	236 611	238 738	236 946	235 316	234 813	233 284
Total Food waste	394 946	368 857	436 174	396 953	350 474	353 305

Source: own calculation
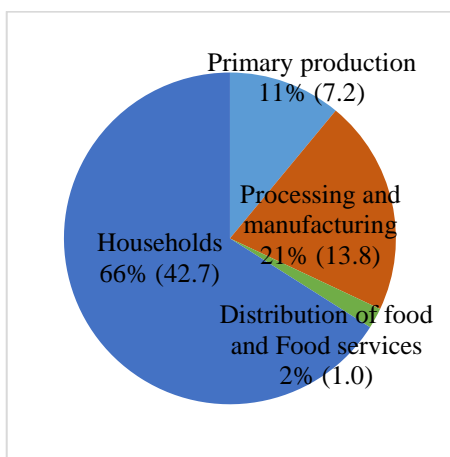
Figure 1. Estimates of food waste in Slovakia in 2019 (kg per person)

Source: own estimation
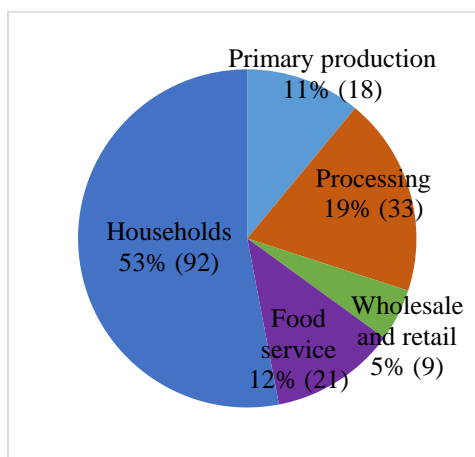
Figure 2. Estimates of food waste in EU-28 in 2012 (kg per person), based on FUSION report

Source: Stenmarck et al. (2016)

In 2019, the average daily household waste was 117 grams per person. This means that Slovak households produce approximately 42.7 kilograms of food waste per year (Table 2).

Our results show a lower amount of food waste per capita per year at the household level than the EU average, 92 kilograms per capita per year (Stenmarck et al., 2016).

Table 2. Food waste estimated at the different stages of the food supply chain in the Slovakia (in kilograms per capita)

Stage	2014	2015	2016	2017	2018	2019
Primary production	15.8	16.8	18.5	7.3	8.6	7.2
	(21.7%)	(24.7%)	(23.1%)	(10.1%)	(13.5%)	(11.1%)
Processing and manufacturing	12.7	6.1	13.0	17.6	8.9	13.8
	(17.4%)	(8.9%)	(16.2%)	(24.2%)	(13.8%)	(21.3%)
Distribution of food and food services	0.7	1.1	5.1	4.7	3.7	1.0
	(0.9%)	(1.6%)	(6.4%)	(6.5%)	(5.8%)	(1.6%)
Households	43.6	44.0	43.6	43.2	43.1	42.7
	(59.9%)	(64.7%)	(54.3%)	(59.9%)	(67%)	(66%)
Total Food waste	72.9	68.0	80.2	72.9	64.3	64.7

Source: own calculation. Share of food waste at individual sectors in parenthesis

The amount of edible food waste per capita in Norway was estimated at about 46.3 kilograms per year (Hanssen et al., 2016). In Croatia, the amount of food waste estimated based on the kitchen diary method is 75 kilograms per year per capita (Ilakovac et al., 2020). Also, using the kitchen diary approach, the amount of 72.6 kilograms of food waste was estimated in the UK household (Langley et al., 2010). Fruits and vegetables make up the largest share of thrown food in homes (Silvennoinen et al., 2014; Langley et al., 2010; Wang et al., 2017).
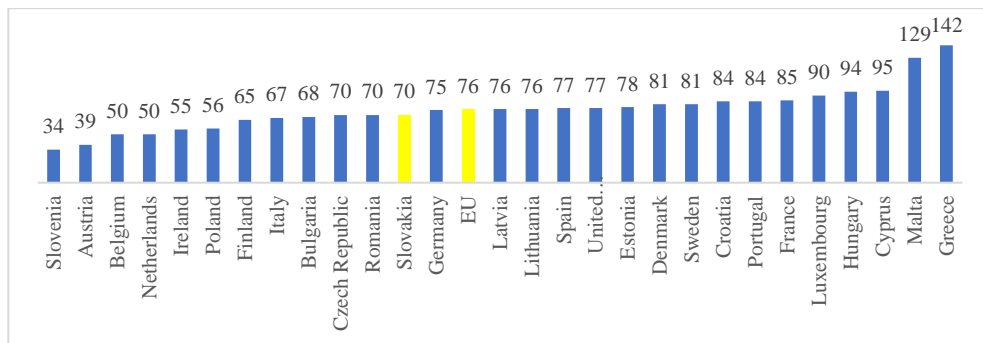
Figure 3. Household food waste estimates based on Eurostat data

Source: Monier et al. (2010)
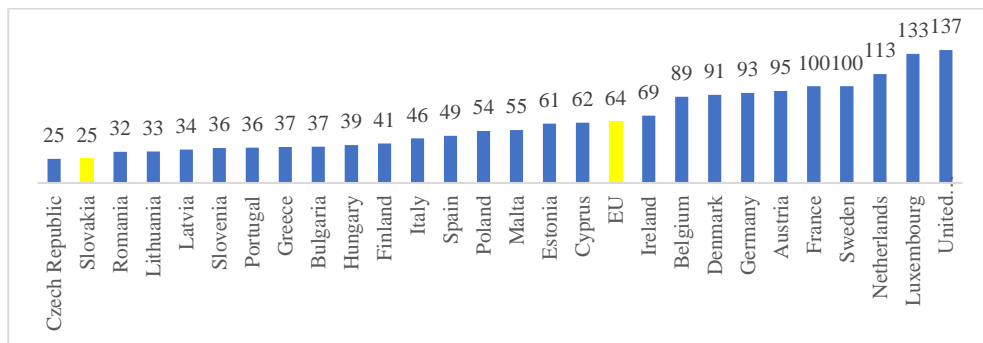
Figure 4. Household food waste estimates based on UNEP Food Waste Index Report

Source: UNEP (2021)

European comparison of the estimated amount of food waste at the household level is shown in Figures 3 and Figure 4, in the different monitored years of measurement. According to these studies, Slovakia households produced 25-70 kilograms of food waste per person per year (Monier et al., 2010; UNEP, 2021).

At distribution of food and food services levels there was a reduction of food waste at the end of the reference period. It is due to the reduction in the amount of biodegradable kitchen and restaurant waste, which is probably caused by the transfer of its collection and processing from municipalities to business entities, which, however, are missing in the records of the Statistical Office. There is no record of waste from natural persons, except for municipal waste and internal records of collection companies. However, these data are not in the Waste Management Report, which enters the Regional Waste Information System. Therefore, for the combined supply chain distribution of food and food services, there are reported lower amounts of waste than it really was. Wastes that should belong to this sector are not reported. So far, detailed statistics on food waste have not been kept, so the data in 2019 were the most representative in terms of the division of waste into individual sectors. Here we see an example of how food waste data is missing for some industries. Therefore, the differences compared to other countries are significant not only in the level of distribution of food level and food services level. This gap should be solved by a common EU methodology to quantify food waste.

The food waste generated processing and manufacturing stage for Slovakia was estimated to be 75 thousand tonnes in 2019. This corresponds to 13.8 kg per person per year. The share of processing and manufacturing is estimated at 21.3% of the total estimated food waste. Approximately 7.42% of the total amount of food produced and processed in Slovakia is discarded. Our estimates are in line with the FUSIONS study (Stenmarck et al., 2016), in which the amount of food waste for the processing sector is estimated at about 33 kilograms per person per year. For example, Hafner et al. (2012) state that in the food waste processing sector, they account for 17% of total food waste in Germany.

In the primary production sector, food waste is estimated at 11.1%, which corresponds to 7.2 kilograms per person per year. If we look at European estimates of food waste in the EU-28, the average value of food waste in this sector is 18 kilograms per person per year (Stenmarck et al., 2016). In general, the largest amount of waste is generated in the cereals (31%) and vegetables and roots (28%) sectors (Jeswani, 2021). Food waste generated at the primary productions for individual food groups is shown in Table 3.

Table 3. Food waste estimates at primary production in Slovakia (in tonnes)

Primary production	2014	2015	2016	2017	2018	2019
cereals	28127	28113	42465	11982	14131	13224
vegetables, root crops	1098	164	127	127	118	117
fruit	251	262	244	83	83	86
meat	3588	2626	1072	956	605	883
dairy	33892	33404	37498	25538	28009	22680
fish	13	24	40	44	53	78
others	18876	26605	19371	1195	4141	2256
Total	85846	91199	100818	39924	47141	39323

Source: own calculation

It is interesting that in Slovakia the largest food waste in primary production consists of the dairy industry, followed by cereals, and others. According to a study by Caldeira et al. (2021), in primary production the largest amount of food waste in Denmark is meat, In Germany is vegetables and in Italy is fruit. This is due to the different mass flows used in the studies. A sensitive issue in measuring food waste is the inclusion of the portion of liquid food waste, such as milk, that is generally disposed of to the sewer. These estimates are often debatable due to data quality issues as well as the definition of what belongs and what does not belong in food waste.

To achieve better environmental quality and a sustainable circular economy, Slovakia has committed itself to halve food waste by 2030 in line with the Farm-to-Fork Strategy and the EC Circular Economy Action Plan and UN SDG Target 12.3. In addition, the Slovakia has taken a number of measures to prevent food waste, which are in line with the relevant EU measures. The Ministry of the Environment of the Slovakia has prepared a new modern Envirostrategy 2030 (ME SR, 2019), the aim of which is, among other things, to prevent the generation of biodegradable and food waste. Furthermore, this strategy addresses the removal of the food label "best before" and introduces a uniform "use by". Thus, these foods may still be suitable for consumption when stored well.

The Food Waste Prevention Plan (MoARD SR, 2016) is a long-term plan for the prevention and reduction of food waste and food loss in Slovakia. The main strategic goal is to quantify the amount of food losses and wasted food in individual links in the food chain, to identify the causes of its occurrence and the possibilities of their elimination. The Slovakia has a regulatory framework in place to address food waste, reduce the share of biodegradable municipal waste, increase bio-waste collection and municipal waste recycling, and prevent waste management according to the Waste Management Plan 2021-2025 (ME SR, 2021).

Another strategic document is the Waste Prevention Program 2019-2025 (ME SR, 2018), which aims to support the reduction of food waste generated by retail and consumers and to reduce food losses throughout the food production and distribution chain. The measure concerns the provision of a ban on the landfill of food waste from wholesale, retail, and distribution with effect from 2023, the development of a methodology for the thorough quantification of the amount of food waste generated, and the methods of food waste management. Another goal is to reduce the amount of biodegradable waste in mixed municipal waste by 60% by 2025 compared to 2016. The measure concerns the development of a strategy for biodegradable and municipal waste and legislative, financial, and information support for domestic and community composting. Since 2021, cities and municipalities in Slovakia have been obliged to ensure the sorting of kitchen waste and bio-waste and to limit the landfilling of such wastes. Since two-thirds of total food waste is produced by households, it is important to start with them.

4 Conclusions

The article aimed to quantify food waste in Slovakia within the supply chains and compare it with other studies. Food waste was estimated using a model approach of assigning food waste to individual phases of the food supply chain. The data from the Regional Waste Information System and the Statistical Office was obtained.

The Slovakia has in place a regulatory framework to address food waste, reduce the share of biodegradable municipal waste, increase the collection of bio-waste and recycling of municipal waste, and prevent waste following the waste hierarchy. Food waste prevention measures should focus on improving the methodology for measuring food waste, reassessment of food donation and sale after minimum durability date, the extension of existing Pay-as-you-throw (PAYT) systems. Due to the lack of interest of farmers in compost, the measures should also focus on investments in composting facilities for biowaste treatment. Finally, prevention measures should focus on supportive marketing, education campaigns, and stakeholder cooperation.

The Slovak government does not have unique extensive food waste data to take immediate action to prevent food waste. Therefore, the main limitations regard data collection and representativeness of the data related food waste. These results may help to develop a national food waste prevention strategy, food waste estimates that are sensitive enough to capture changes in food waste. Increased awareness of food waste in individual phases of the supply chain can reduce its production. For future research, it will examine the economic and environmental impacts of food waste in the food supply chain in Slovakia. The economic understanding of the impact of food waste in society could act as an incentive to prevent or at least minimize it.

Acknowledgements

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Regional tax incentives as an option for implementing anti-crisis industrial policy: on the example of Russian regional tax policy during the COVID-19 pandemic

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Abstract

Background of Research: During the COVID-19 pandemic, various globalization trends were observed towards the universalization of anti-crisis response. In particular, the states actively used the common set of anti-crisis industrial policy tools. One of the most popular ways to do business during a period of forced downtime, reduced demand, has become variable combinations of expanding tax incentives.

Purpose of the article: The article is devoted to the regional factor in the implementation of tax benefits. The object of the research is the regional tax policy of the Russian Federation. The choice of the country was determined by a high degree of differentiation of regional development and a pronounced sectoral specialization of individual subjects. The subject of the study is the mechanism of tax incentives for the main tax payments of legal entities.

Methods: This article uses economic and statistical methods. The empirical material of the study is statistical data, tax analytics and legislative acts of the Russian Federation.

Findings & Value added: The anti-crisis tax policy can be considered as a natural part of the interaction between the federal center and the regions in the context of the anti-crisis industrial response and the existing relations of budgetary federalism. But in order to realize a full-fledged cumulative positive effect, it is necessary to solve a number of tasks: to stimulate the tax activity of the regions by reducing direct financing (subsidized support); expansion of regional instruments for granting tax incentives; to build an anti-crisis industrial policy, in combination with investment, monetary, fiscal components.

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JEL Classification: *E63; L52; R58*

1 Introduction

Research devoted to understanding the administrative experience of anti-crisis response to the challenges of the COVID-19 pandemic has acquired particular relevance today. This pandemic has not become an unprecedented disease. Mankind has also faced far more deadly and widespread diseases in its history. However, for the first time in its history, humanity met a pandemic at the level of a full-fledged global crisis fully armed with its developed medical and administrative resources. For the first time, mankind fought so meaningfully from the point of view of theories of anti-crisis response, and for the first time with such a detailed fixation of all empirical data. And one of the most important tasks of post-COVID modernity is the theoretical understanding of the experience gained.

This article is devoted to the analysis of tax incentives at the level of regional legislatures as an element of anti-crisis industrial policy, as well as the regional factor in their implementation. The object of the research is the regional tax policy of the Russian Federation. The choice of the country was determined by a high degree of differentiation of regional development and a pronounced sectoral specialization of individual subjects of the federation. The subject of the study is the mechanism of tax incentives for the main tax payments of legal entities.

The purpose of the study is to review the anti-crisis tax policy of the regional governments of individual subjects of the Russian Federation and the results it has led to in these regions. As will be demonstrated in the main part of the article, the strategies of the regional governments were quite different. Considering their different budget sufficiency, as well as the multiple difference in the gross regional product, the empirical material seems to be very interesting.

An important part of this study is an assessment of the existing mechanisms for granting tax incentives at the disposal of regional legislatures and governments. The anti-crisis tax policy can be considered as a natural part of the interaction between the federal center and the regions in the context of the anti-crisis industrial response and the existing relations of budgetary federalism. But, as the study will show, in order to realize a full-fledged cumulative positive effect, it is necessary to solve a number of tasks: to stimulate the tax activity of the regions by reducing direct financing (subsidized support); expansion of regional instruments for granting tax incentives; to build an anti-crisis industrial policy, in combination with investment, monetary, fiscal components.

2 Methods

The methodological foundations of this work are, first of all, the works of the founder of the St. Petersburg School of Industrial Policy F.F. Rybakov. The very interpretation of the concept of "industrial policy", which is ambiguous in the framework of modern economic theory, by the authors of this article is based precisely on the thoughts set forth in Professor Rybakov's monograph: "Industrial policy is an activity to create framework conditions for economic entities in industry. The specifics of such a policy is related to the specifics of the industry itself as a type of economic activity and a complex industry. Industrial policy instruments (tariffs, public procurement, sectoral proportions, norms and regulations, etc.) should not be identified with its content. The content of industrial policy is a kind of

technology for applying its tools, i.e. leverage that has been established in practice" (Rybakov, 2011).

In the context of regional imbalance, regional sustainable development and the study of interbudgetary transfers in the economies of federal states, the authors of this article are guided by the developments in the work of Russian researchers (Koltsova and Starobinskaya, 2021) and (Aliaskarova et al, 2020), as well as by our Chinese colleagues (Wang et al, 2021) and (Jia et al, 2021). And, finally, as part of the study of the anti-crisis response of regional authorities in the framework of fiscal policy, the authors of this work relied on articles by other Russian authors (Galyukshova, 2010), (Nakiden, 2021), and (Lysenko and Mechikova, 2020)

In applied terms, such a methodological base leads the authors of this article to a well-established model of scoring the situations that have developed in the regions of the Russian Federation. Considering that 85 regions coexist in the Russian Federation within 8 federal districts, it was necessary to draw up a sample of subjects of the federation. To do this, it was necessary to analyze the gross regional product for the constituent entities of the Russian Federation, as well as their growth rates in 2019-2020. Further, for work already within the framework of the point system, a table was compiled with the characteristics of the selected regions for the provision of subsidies for budget equalization in 2020 from the federal budget and various tax incentives administered specifically by regional governments and legislatures.

The empirical material for the study was statistical data, tax analytics and legislative acts of the Russian Federation.

3 Research progress

At the first stage of the study, we will identify the regions that were minimally / maximally affected in the first year of significant restrictions associated with the pandemic.

The general statistical databases of Rosstat provide, at the moment, the opportunity to analyze the dynamics of the indicator Gross regional product per capita until 2021. That is, the latest data available to us in 2020. Let's calculate the heat of growth and the growth rate for this indicator for the period from 2019 to 2020. The slowdown in business activity associated with forced downtime during the pandemic has already had its consequences in the period under review. For reference, we note that restrictions on movement and declared non-working days (with options for reducing social contacts), bans on mass events were introduced both at the regional levels and for the country as a whole. The nationwide "suspension" of the economy in 2020 was implemented from the end of March to May, in the following intervals of 30.03-3.04, 4.04-30.04 and 6.05 to 8.05. The majority of enterprises, retail outlets (other than those selling essential goods) did not work. Further, until the end of 2020, many enterprises switched to the remote mode of work of employees. All this clearly affected the total volume of output. Rosstat data show a reduction in GRP per capita (average for the Russian Federation) from 2019 to 2020. from 647,708 to 640,519 rubles (by 1.11%).

At the same time, for the periods 2017-2018 and 2018-2019. there was an increase in the indicator: by 11.3 and 5.4%, respectively. Let us trace the regional differentiation in terms of the rate of change in GRP per capita. From the total number of federal districts, we will choose the North-Western, Volga, Siberian, Far Eastern. They do not have a distorting effect on the leading region, which is typical for the Central Federal District, are not as small in composition as the Ural and Southern Federal Districts, and do not have special specific characteristics, like the North Caucasian Federal District. For each of the selected federal districts, we will determine 2 leading regions (maximum GRP growth or minimum decrease in the indicator for the group) and 2 outsider regions, characterized by the minimum growth

rate or the maximum rate of GRP decline per capita. It is worth noting. In general, the picture varies greatly across the federal districts. Thus, in the Volga Federal District, over the period under review, the average GRP per capita decreased by 2.54%, in the Siberian Federal District by 0.2%, in the North-Western Federal District it increased by 0.74%, and in the Far Eastern Federal District, the increase was 1.54%. 63%. The total sample of regions, with baseline indicators, is presented in Table 1.

Table 1. Dynamics of the gross regional product of some regions of Russia

	2019г.	2020г.	Growth rate	Rate of increase
Gross regional product by constituent entities of the Russian Federation (gross value added at current basic prices) - total, in rubles	**647 708,10**	**640 519,00**	**98,89**	**-1,11**
Northwestern Federal District	**756 785,90**	**762 356,70**	100,74	**0,74**
Murmansk region	827 822,30	1 072 337,10	129,54	29,54
Pskov region	313 156,00	325 659,60	103,99	3,99
Vologodskaya Oblast	543 570,90	544 379,20	100,15	0,15
Komi Republic	870 097,80	749 219,30	86,11	-13,89
Volga Federal District	**480 660,10**	**468 462,30**	97,46	**-2,54**
Penza region	341 904,10	379 820,40	111,09	11,09
Kirov region	292 342,60	315 153,90	107,80	7,80
Udmurt republic	480 560,70	451 490,90	93,95	-6,05
Republic of Tatarstan	720 053,20	675 621,40	93,83	-6,17
Siberian Federal District	**530 177,00**	**529 091,00**	99,80	**-0,20**
Altai Republic	259 944,10	283 451,40	109,04	9,04
Altai region	270 172,30	291 156,90	107,77	7,77
Kemerovo region-Kuzbass	416 418,60	392 374,90	94,23	-5,77
Tomsk region	573 005,20	518 179,50	90,43	-9,57
Far Eastern Federal District	**730 003,20**	**741 938,30**	101,63	**1,63**
Magadan Region	1 524 002,30	2 035 007,00	133,53	33,53
Chukotka Autonomous Okrug	1 900 850,80	2 404 271,20	126,48	26,48
Sakhalin region	2 397 445,20	2 059 206,50	85,89	-14,11
The Republic of Sakha (Yakutia)	1 266 298,60	1 168 152,50	92,25	-7,75

Source: Data from the Federal State Statistics Service of Russia

Next, we will analyze the regional fiscal policy implemented by these entities. Let's compare the economic situation in the region with the general option of using tax incentives and receiving subsidies for budget equalization. As the main parameters of preferential taxation, we will consider: reduced rates under the simplified taxation system (STS), reduced

corporate income tax rates and the use of a regional investment tax deduction for this tax, as well as additional benefits for organizations on property tax introduced for 2020. Let us briefly characterize the options for preferential taxation for these tax payments. The USN, as a special tax regime, is focused on small and medium-sized businesses, under normal conditions, the rate for the tax base "income minus expenses" is 15%, for the tax base "income" 6%. Regions can set differentiated rates: lower 6% to 1%, and 15% to 5%. Corporate income tax (NGO) is a federal one, levied at a general rate of 20%, while 17% of revenues form the budget revenues of the regions. The subjects of the federation can reduce the rate from 17% to 13.5%, on special conditions, for residents of the SEZ or participants in regional investment projects, the rate can be reduced to 0. Also, the regional authorities decide to approve an investment tax deduction for NGOs, which reduces the tax base when payment calculation. Since 2020, large-scale events have been held in the Russian Federation to support enterprises in those industries that have suffered the most due to the restrictions associated with the pandemic. Among the set of measures being implemented are additional benefits for corporate property tax, which are accepted by the regions. Table 2 reflects the main parameters of regional preferential taxation for 2020, and also provides information on the dependence of regions on intergovernmental transfers-subsidies. If a region is subsidized, this greatly undermines its ability to reduce tax revenues due to the expansion of tax incentives.

Table 2. Main parameters of regional preferential taxation for 2020

Region	Providing subsidies for budget equalization in 2020.	Reduced rates on the simplified tax system from base income 6%	Reduced rates on the simplified tax system from the base expense15%	Reduced NGO rate 0-17%	Approved investment tax deduction for NGOs	Additional R&D Benefits Due to COVID-19 in 2020
Vologodskaya Oblast	yes	1%, 5%	5%	0%, 10%, 13,5%	yes	yes
Murmansk region	yes	1%, 3%	5%, 10%	5%, 10%, 12,5%, 16%	yes	yes
Komi Republic	Yes	1%, 3%	5%, 7,5%	0%, 5%, 10%	yes	no
Pskov region	Yes	3,5%	5%, 10%, 15%	0%, 5%, 13,5%	yes	yes
Tatarstan	no	1%	5%, 10%	0%, 5%, 13,5%	no	no
Penza region	yes	1%	5%	4%, 4.5%, 5%, 10%, 13,5%	no	yes
Udmurt republic	yes	1%, 2%, 3% ,6%	5%, 10%, 15%	5%, 10%, 13,5%	yes	no
Kirov region	yes	1%, 3%	5%, 7.5%	13,5%	yes	yes
Tomsk region	Yes	3%	5%, 10%, 15%	5%, 10%, 13,5%	no	no
Kuzbass	Yes	1%, 4,5%, 3%, 4%, 6%	5%, 7,5%, 10%, 12%, 15%	13,5%	yes	no
Altai region	Yes	3%	7,5%	5%, 10%	No	no
Altai Republic	Yes	2%	5%, 8%	13,5%	yes	no
Chukotka Autonomous Okrug	Yes	1%, 4%	5%, 10%	0%, 10%, 13,5%	No	no
Sakhalin region	no	2%, 4%	8%, 10%	0%, 10%, 13,5%	yes	no

| Magadan Region | Yes | 1%, 3% | 5%, 7,5% | 0%, 10%, 13,5%, 15% | No | no |
| Yakutia | Yes | 1%, 2%, 4%, 6% | 5%, 10%, 15% | 0%, 10%, 13,5% | No | yes |

Source: Data of the Federal Tax Service of Russia

Let's introduce a scoring of the regions based on the information presented in Table 2. As the main criteria, we will take the following criteria: receiving subsidies, varying the simplified tax system, changing the rate and tax base for NGO, introducing additional benefits for R&D. The maximum score will be 4 points. In table 3 we will reflect the total amount according to the presented estimates of the selected regions.

Table 3. Total amount according to the presented estimates of the selected regions

Region	Getting grants	STS	NGOs	NIO	Total
Vologodskaya Oblast	0	0,5	1	1	2,5
Murmansk region	0	0,5	1	1	2,5
Komi Republic	0	0,5	1	0	1,5
Pskov region	0	0,5	1	1	2,5
Tatarstan	1	0,5	0,5	0	2
Penza region	0	0,5	0,5	1	2
Udmurt republic	0	1	1	0	2
Kirov region	0	0,5	0,5	1	2
Tomsk region	0	0,5	1	0	1,5
Kuzbass	0	1	1	0	2
Altai region	0	0	0,5	0	0,5
Altai Republic	0	0	0,5	0	0,5
Chukotka Autonomous Okrug	0	0,5	0,5	0	1
Sakhalin region	1	0,5	1	0	2,5
Magadan Region	0	1	0,5	0	1,5
Yakutia	0	1	0,5	1	2

Source: authors

Thus, three groups can be distinguished among the analyzed regions: leaders (2.5 points), prosperous (2 points) and outsiders (1.5 points or less). Leading regions: Vologodskaya Oblast, Murmansk region, Pskov region and Sakhalin region. Prosperous regions: Tatarstan, Penza region, Udmurt Republic, Kirov region, Kuzbass and Yakutia. Outsider regions: Komi Republic, Tomsk Region, Altai Territory, Altai Republic, Chukotka Autonomous Okrug and Magadan Region.

If we focus on the analysis of the data obtained, it can be noted that in the final data, which compares the leadership of the region in terms of GRP and as part of our assessment of certain aspects of the regional fiscal policy, the Far Eastern Federal District stands out in particular. All four regions chosen for the study fall out of the indicated correspondence. This anomaly in the form of the absence of an observed connection between GRP and anti-crisis measures within the framework of the region's fiscal policy allows us to confidently state the prospects for continuing research in this direction. In the rest of the selected federal districts, there is a correspondence with varying degrees of stability, but it is present. Thus, in the Northwestern and Siberian Federal Districts, compliance is observed in 3 out of 4 cases. Moreover, if in the Siberian Federal District the correspondence is ensured at the level of connection "leader" - "successful" (as in the example with the Kemerovo region), then in the

North-Western Federal District the connection is denser in the form of "leader" - "leader" and "outsider "-"outsider".

For a better understanding of the relationship between the identified indicators and the crisis situation of the COVID-19 pandemic, it is possible, by analogy with the works from the Methods section, to build a diagram with the average incidence of COVID-19 in Russia in relation to regional indicators. The data are presented in Figure 1. The average incidence of COVID-19 in Russia in 2020 was 33.9 people per 1,000 people. Green color in the diagram indicates regions with values less than the national indicator, and red - with indicators higher than the national one.

Figure 1. The position of the region in terms of GRP growth per capita and comprehensive assessment of tax benefits

Source: authors

Within the framework of the presented array, especially anomalous Magadan Region and Chukotka Autonomous Okrug are visible. Surprisingly successful is the Murmansk region, even though the incidence rate is above the national average. Additionally, the Republic of Altai and the Altai Territory stand out, for which the Accounts Chamber of the Russian Federation often has questions regarding the budgetary security of these regions. Thus, the Altai Territory in 2022 receives more than 32 billion rubles as subsidies for budget equalization from the federal treasury, while the budget of the entire Altai Territory is 151 billion rubles for the same year. In turn, the Republic of Altai receives 10.3 billion rubles from the federal budget as designated subsidies, while the budget of the entire region is just over 27 billion rubles.

4 Discussion

The methodology presented in the article makes it possible to assess the adequacy of the implemented regional fiscal policy to the challenges that the COVID-19 pandemic has

generated. At the same time, this study has certain limitations, overcoming which will allow us to implement a larger study of the implementation of anti-crisis industrial policy.

Firstly, it is not entirely clear what kind of industrial policy model is being considered, while the orientation of modern industrial policy towards protectionism and import substitution is not taken into account (this phenomenon, as noted by various authors (Fajgelbaum et all, 2020) and (Aliaskarova et al, 2020), is inherent not only in Russia, but also in the United States). But depending on the basic priorities, the focus and priority of tax incentives and subsidies may change.

Secondly, as Dani Rodrik (Rodrik, 2018) and Bård Harstad (Harstad, 2020) note, as a rule, in difficult times, the share of populist decisions increases, with the help of which politicians try to lobby the interests of certain groups and earn "points" from voters, many of these decisions are untimely and inconsistent in time. Therefore, to improve the analysis, this aspect of the study is also of interest.

Thirdly, as practice shows, for a number of regions not only tax incentives and subsidies are important, but also their impact on the brand of the territory. As noted by numerous studies (for example, (Kavaratzis and Hatch, 2013), (Pashkus et al, 2018), (Foroudi et al, 2016) and (Caselli and Reynaud, 2020), the presence of a strong brand of the region allows significantly improve the situation, especially if the anti-crisis industrial policy is carried out in the same direction with it.

Fourthly, it is worth noting that the purely fiscal tools do not work as effectively as we would like. It is important to take into account the long internal lag in the elements of regulation, the initially different positions of the subjects in terms of socio-economic parameters, and disproportions in industry specialization. In June 2020, the Government of the Russian Federation approved a list of industries most affected by the worsening economic situation due to the pandemic. And if the region has the maximum share in the cultural and recreational sphere or transport services in the GRP per capita, even with tax adjustments, significant reductions in the total volume of the regional product are possible. This is in good agreement with the results of similar studies (Victorova et al, 2020) and (Hendriyetty et al, 2022).

In turn, if we set ourselves the goal of explaining the emerging anomalous zones of discrepancy between the leadership of the region in terms of GRP per capita and within the framework of our assessment of certain aspects of the regional fiscal policy, as well as separately taken Magadan Region, Chukotka Autonomous Okrug, Altai Territory, Altai Republic and Murmansk Region, then one can, following the example of research in the field of political economy (Koshkin, and Mokretsov, 2022), concentrate on industry specialization. In this particular case, on the industry specialization of anomalous regions. According to the Atlas of economic specialization of Russian regions (Abashkin et al, 2021), the following list can be built:

- Murmansk region - Shipbuilding and water transport, fishing and fish production, metal ore mining, power generation and transmission
- Chukotka Autonomous Okrug - Mining, production and transmission of electricity, transport and logistics
- Altai Krai - Medical services, food, livestock and mixed agriculture, crop production
- Altai Republic - Medical services, timber industry, tourism
- Magadan Region - Mining of metal ores, production and transmission of electricity, construction and building materials, transport and logistics.

The extraordinary abundance of highly profitable industry specializations (and quite far from the services sector that was particularly affected during the pandemic) of the Murmansk and Magadan regions, as well as the Chukotka Autonomous Okrug, explain the insensitivity of these regions to the manifestations of the crisis, as well as the reduced sensitivity of their economic systems to anti-crisis response measures in the form additional tax incentives.

Much more questions are raised by the behavior of the authorities of the Altai Territory and the Altai Republic, which are outsiders both in terms of GRP per capita and in our assessment of certain aspects of the regional fiscal policy. Their industry specializations were much more seriously affected by the pandemic (with the exception of the agricultural industry of the Altai Territory). The more difficult it is to understand the lack of anti-crisis response measures in the form of additional tax incentives at the regional level.

5 Conclusion

As part of the conclusion, it seems reasonable to summarize the amount of work done. The authors of this article analyzed the existing mechanisms for granting tax benefits at the disposal of the regional legislatures and governments of the Russian Federation. A sample of leading regions and outsider regions was compiled by federal districts. Further, for work already within the framework of the point system, a table was compiled with the characteristics of the selected regions for the provision of subsidies for budget equalization in 2020 from the federal budget and various tax incentives administered specifically by regional governments and legislatures. To do this, it was necessary to draw up a list of taxes that are subject to regulation by these regional legislatures and governments. Attention was focused on the variation of the rate under the Simplified Taxation System, the variation of the corporate income tax rate, the fact that there is an investment deduction for this type of tax, as well as the availability of regional tax incentives for corporate property tax during the COVID-19 pandemic.

These data were useful for the formation of a score rating of regions and the compilation of a list of leading regions, prosperous regions and outsider regions. Comparison of the leadership of the region in terms of GRP per capita and as part of our assessment of certain aspects of the regional fiscal policy, especially in the context of comparing the incidence rate for 2020 in selected regions with the average Russian level. In the resulting arrays, the following stand out especially: Magadan Region, Chukotka Autonomous Okrug, Altai Territory, Altai Republic, and Murmansk Region. Also, the entire Far Eastern Federal District should be singled out as a separate anomaly. As part of the comparison table of regional leadership in terms of GRP per capita and as part of our assessment of certain aspects of the regional fiscal policy, the regions from the FEFU sample did not find a single match.

Based on the industry specialization of anomalous regions, assumptions were made regarding the reasons for the insensitivity of these regions to the manifestations of the crisis, as well as the reduced sensitivity of their economic systems to anti-crisis response measures in the form of additional tax benefits. In the course of the analysis, the lack of anti-crisis response measures in the form of additional tax incentives at the regional level in the Altai Territory and the Altai Republic caused special questions, given the outsider positions of these regions in terms of GRP and GRP per capita.

Summarizing the results of the study, we can conclude that the use of anti-crisis response measures in the form of tax incentives already at the very first stage demonstrates a mitigating effect. Nevertheless, it can be suggested that the regional authorities have insufficient opportunities to introduce such measures. Some regions, having exhausted their arsenal of anti-crisis response measures, were unable to sufficiently mitigate the crisis factors. It is important to note that this assumption needs additional verification when we see the medium-term effect of the introduced anti-crisis measures over a five-year period.

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Online reputation management of a selected tourism facility

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Abstract

Research background: Reputation management means of checking the company's reputation and now it is represented mainly on online platforms, where companies and customers use review portals. Often these reviews decide whether customers will visit the hotel or not.

Purpose of the article: The aim of the work is to analyze the reputation management of BoHo hotel Prague on booking.com, which is related to finding out the key factors for choosing a hotel, its popularity among customers and whether the hotel rating has changed during the Covid-19 pandemic. For comparison of data period between March 2020 and March 2022 will be used as pandemic years and compared to year 2019 as a source year.

Methods: content analysis and analysis of variance is used in this article as a research method

Findings & Value added: Using content analysis and analysis of variance, the reviews of the BoHo Prague hotel were categorized and key factors were identified, such as the location. The popularity of the hotel was analyzed according to the number of stars, and at the same time the hypothesis of rating before and during the Covid-19 pandemic was refuted. However, for more accurate research, it is necessary to analyze reviews from all review portals.

Keywords: *reputation management; covid-19; online ratings; reviews; hotel*

JEL Classification: *M14; M21; M30*

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1 Introduction

Therefore, in order for businesses to function properly and offer products or services of the best quality and thus satisfy customer needs, it is necessary to know the opinion of buyers. Positive evaluations of products and services help the company create the best possible reputation and secure new customers (Hojdík and Majtan, 2017). On the contrary, a negative evaluation damages the company's reputation, and regaining customer trust is a time-consuming process. It is therefore essential that businesses respond to all customer reviews and try to improve their services or products.

There are countless ways to get an overview of a company's reputation, but nowadays the online form is the most widespread. Thanks to the internet environment, almost everyone has the opportunity to write a review and thus become part of the reputation management of the given company (van Heerden and Rensburg, 2018). Not only company websites are used for this purpose, but also social networks such as Facebook or Instagram. These platforms are currently very popular and serve as a favorite source of information for many people. Therefore, it is essential that businesses present themselves here as well as possible.

Tourism facilities, such as hotels and restaurants, are also connected with reputation management. It is reviews and recommendations that often decide whether customers will visit a hotel or other business and use its services (Perez-Aranda et al., 2019). These reviews contain the necessary information about what customers consider to be key factors for choosing a hotel, and whether the chosen destination meets these requirements (Proserpio and Zervas, 2017). For this purpose, booking portals such as Agoida.com, Hotels.com or booking.com are often used, where it is possible to book a hotel and then rate it.

The aim of the work is the analysis of online reputation management on a selected example, which is the BoHo Hotel Prague, located near Wenceslas Square in Prague, a popular tourist destination and, for example, has more than 1500 reviews on the booking portal booking.com.

2 Literature review

Online reputation management is characterized by the level of customer familiarity, the belief of what visitors can expect from the business in the future and the attractiveness for customers. Together, these aspects represent the company's reputation (Perez-Aranda, et al., 2019). The company's reputation can further be described as an abstract, but nevertheless valuable component of online management, which creates the company's identity (van Heerden and Rensburg, 2018). Reputational risk is also associated with a company's reputation, especially on social networks, which are a popular source of information for customers (Eckert, 2017). This risk is related to the damage to the good reputation of the company, and it is the damage to the reputation that is most perceived by customers or business partners. Professional literature mentions the emergence of reputational risk as a state where a company loses direct influence on the active management of its profile and the authenticity of the presented content, thereby exposing itself to an increased risk of competition (Pollak et al., 2016).

So, it is basically a duty for businesses to deal with the use of e-marketing tools. This assumption was confirmed by econometric research by Dovleac, et al. (2020) who find that online reputation management is no longer an optional option for maintaining reputation, but has become a strategic tool for sustainable business. Inversini (2019) describes advances in technology and the use of smart devices as the main drivers of online reputation management.

And it is precisely for hotels or restaurants that positive reviews are key and reputation management is essential. Since positive reviews serve as a key factor in customer decision-making, it is clear that popular and well-known hotels with positive reviews will attract more

customers than unknown and unreviewed ones. For this reason, it happens that many businesses with a lower reputation create reviews themselves or hire users of review portals to create fake reviews for them (Luca and Zervas, 2015).

So consumers don't just trust one review, they study more, it means consumers don't trust one review, but if 9 out of 10 reviews agree, the hotel is probably worth visiting. Customers can thus perceive that a large number of reviews reflects the quality of the hotel and has a great influence on customer decisions (Dowling, 2016).

Hotels should therefore respond to all reviews to maintain a good reputation and customers. If they do not, they may appear to be unresponsive to their customers' demands and their reputation may decrease (Castro and Ferreira, 2018). Ma et al. (2020) looked at this issue and found that, in general, all hotels tend to respond more frequently and in a timely manner once a larger audience notices a fluctuation in ratings.

To write a review, not only social networks are used, but also review portals such as Booking.com or Tripadvisor. These review portals open a channel of communication to consumers, encourage hotels to engage in communication with their guests, inform future guests of steps they have taken to correct issues raised in previous reviews, and create a richer information environment that should help consumers make better choices (Proserpio and Zervas, 2017).

In order to analyze the reviews or ratings, it is necessary to divide the reviews according to different variables. According to Rabadán et al. (2020), reviews can be divided into two categories, according to general criteria, for example, according to the number of stars or the location of the hotel, or more precise criteria that capture the company's reputation, its quality, advantages or vice versa. With this method, it is possible to find out the necessary information about hotels, such as its popularity compared to other businesses.

Furthermore, it is possible to examine hotel ratings only according to the number of stars. The number of stars is awarded to hotels according to the services they offer. For example, hotels that only offer free WI-FI and a pool are awarded only 1,5-2 stars (Soifer et al., 2020). Further research shows that reviews can also be analyzed in terms of the key factors they offer. In this analysis, the number of stars is irrelevant, but the aspects that differentiate the hotel from the competition are crucial. Small businesses thus have the opportunity to differentiate themselves from other hotels and not rely on high ratings (Xia et al., 2018).

Reviews can also be differentiated into ratings from foreign customers who have different social habits and therefore may expect different services from the hotel, for example, Japanese tourists base their opinion on the cleanliness of the hotel, while Russian tourists rate more on the staff (Kozlenkova, 2017).

From the methods described above, it follows that in order to achieve the goal, it is necessary to use content analysis, which deals with the verbal description of reviews and thus focuses on identifying key factors. The number of stars is also examined to determine the popularity of the hotel.

3 Material and methods

The data that will be processed comes from the internet portal booking.com. This portal contains reviews from Czech and foreign users. To fulfill the goal of the work, it is not necessary to divide these data, but all of them can be used. The analyzed reviews were added by visitors in the time period from March 2020 to March 2022. The number of data that will be used is 187. The obtained results will be processed into graphs in the MS Excel program.

The aim of the thesis is to use online reputation management on a selected example, together with the identification of key factors that lead customers to visit BoHo Hotel Prague. Furthermore, to analyze the position and popularity of the hotel on the Czech market and to

find out how the pandemic affected the evaluation of hotel visitors from 2020. To fulfill the goal, the following research questions were set:

RQ1: Which key factors lead customers to visit BoHo Hotel Prague?

RQ2: What is the position and popularity of BoHo Hotel Prague on the Czech market?

RQ3: Has the pandemic affected the ratings of BoHo Hotel Prague visitors since 2020?

In order to answer the first research question regarding the identification of the key factors that lead customers to visit BoHo Hotel Prague, a content analysis of reviews is applied in order to determine the key factors for choosing a hotel. Using content analysis, it will be possible to divide reviews into categories. Finding out the key factors for choosing a hotel will relate to the data with the highest frequency.

To answer the second research question regarding the position and popularity of BoHo Hotel Prague on the market, content analysis will be used for data processing, and then the total number of stars of the hotel will be examined, for the entire period of its operation on the market, and this data will be compared with other Prague hotels, which results in the overall popularity of the hotel. In order to answer the third research question regarding whether the COVID-19 pandemic affected the evaluation of visitors to BoHo Hotel Prague from 2020, it will be necessary to analyze the company's reputation management from March 2020 to March 2022 and the period before the pandemic, and based on the comparison of key factors, it will be possible to confirm whether disprove the hypothesis whether the COVID-19 pandemic had an effect on the hotel's rating.

An analysis of variance will be processed for this purpose. This analysis will be created in MS Excel using the data analysis function and the Anova option. To confirm or refute the hypothesis, it is necessary to know the p-value. To refute or confirm the hypothesis, this value must be compared with the level of significance, which is 0,05%. If the p-value will be less than 0,05%. it means that the visitor's rating and the hotel's key factors have not changed during the pandemic. If the value will be higher than 0,05%, it means that the assessment has changed, and the hypothesis can be confirmed.

4 Results and discussion

In the first part of the research, a content analysis of reviews that were added between March 2020 and March 2022 was carried out, these reviews come from the booking.com internet portal. In this period, 183 reviews from Czech and foreign tourists were added to the website. Of these, 76 reviews did not contain a verbal comment (rating) of the hotel, and therefore the analysis could not be performed from all reviews.

The remaining 107 reviews contained verbal ratings, and based on this, it was possible to divide the reviews into categories that were most mentioned by hotel visitors and could be identified as key factors of the hotel. The selected categories are described in Figure 1 together with the percentage representation of the given category.
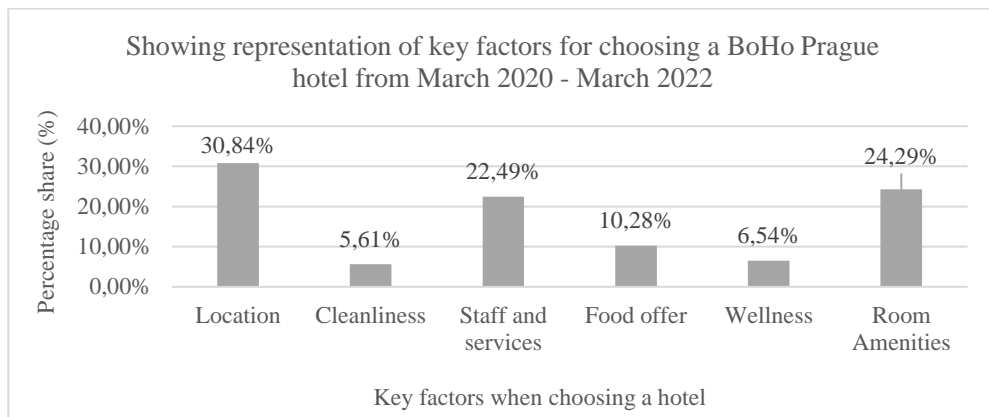
Figure 1. Key factors 2020-2022.

Source: Own processing according to data from booking.com

The reviews were divided into the following categories: hotel location, hotel cleanliness, hotel staff and personal services, food offer in the hotel restaurant (breakfast, lunch and dinner) and hotel equipment (e.g. furniture or bathroom equipment). The lowest representation in the reviews was the hotel cleanliness category, which was mentioned by 6 visitors in their reviews, i.e. 6% of the reviews. With the second smallest representation was the wellness category, which the hotel offers and was mentioned in the reviews by 7 visitors, its percentage representation is 7%.

Another key factor was the menu offered in the hotel restaurant, which offers breakfast, lunch and dinner. In internet reviews, this factor was mentioned by 11 visitors to the hotel, and this category accounts for 10% of the total number of reviews. The staff and personal services of the hotel are then mentioned in the reviews by 24 visitors, and the percentage of this is 23%. The room equipment is only just missed by the hotel's personal services and was identified as a key factor by 26 visitors, this category makes up 24% of the total number of reviews.

The location of the hotel was determined by visitors as the first key factor for choosing this particular hotel. The hotel is located near Wenceslas Square and Old Town Square, making it accessible both to tourists and, for example, to employees on a business trip. Location was a key factor for 33 hotel visitors who then mention this factor on booking.com, the percentage representation of this category from the total number of reviews is then 30%

The second part of the research dealt with the popularity of BoHo Hotel Prague on the Czech market. As the key factor in the first part of the research was the location of the hotel, 12 other Prague hotels in the vicinity of Wenceslas Square and Old Town Square were selected for comparison. The comparison was based on the number of stars that the hotel has collected since it has been on the market. In this case, it was not necessary to do a content analysis of the reviews, but it was possible to focus only on the number of stars. The BoHo hotel comparison is summarized in Figure. 2, where the names of the hotels and the number of their stars are entered.
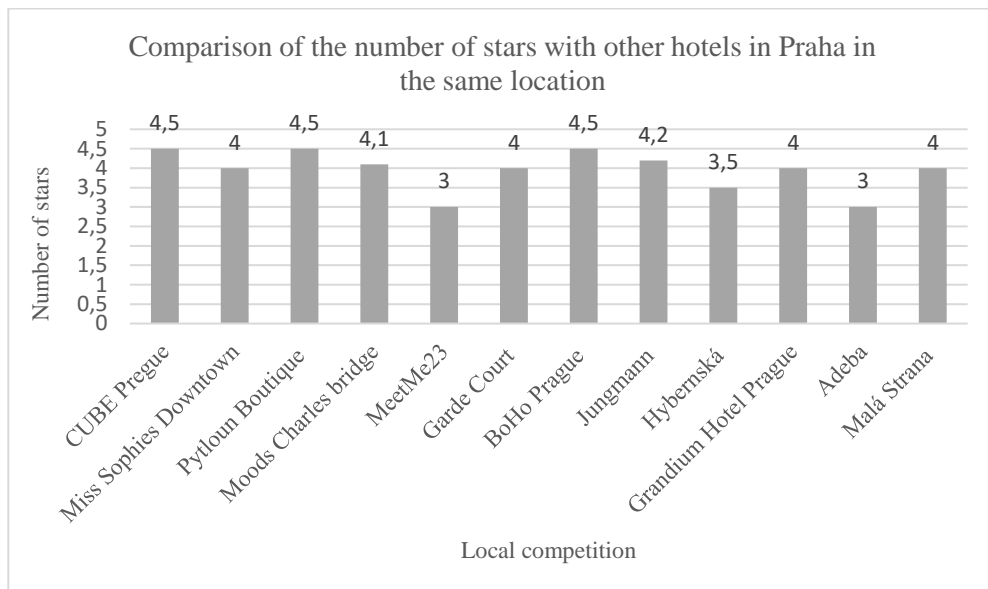
Figure 2. Hotel popularity on the Czech market.

Source: Own processing according to data from booking.com

Hotels in this location have similarly high ratings. However, the hotels with the least number of stars are MeetMe23 and Adeba Hotel. These hotels have 3 stars. Other hotels with the same number of stars are Hotel Malá Strana, Grandium hotel Prague, Garde Court and Miss Sophies Downtown. These tourism establishments have 4 stars on the booking.com internet portal. The Moods Charles Bridge hotel is rated 4.1 stars. The Jungmann hotel has 4,2 stars. The hotels BoHo hotel Prague, Pytloun Boutique and hotel CUBE Prague are in the first place together. It can therefore be concluded that BoHo Hotel Prague is one of the most popular hotels in the given location on the Czech market.

In the last part of the research, the key factors for choosing a BoHo hotel were compared, namely before the Covid-19 pandemic and during the pandemic. Analyzed reviews were added to booking.com in 2019 by Czech and foreign visitors, and the key factors for choosing a hotel this year were determined using content analysis.

These factors were sorted into Figure 3. compared to 2020-2022, more reviews were added to the booking. The total number of reviews for 2019 amounted to 348 reviews, with 161 reviews containing verbal ratings and therefore content analysis could be performed, the remaining 187 reviews from visitors only contained the number of stars.
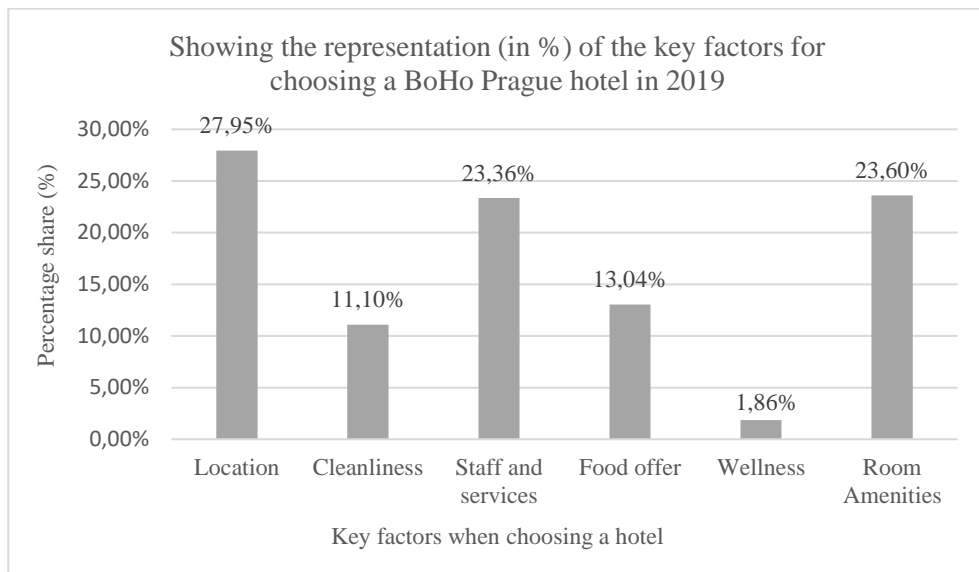
Figure 3. Key factors 2019.

Source: Own processing according to data from booking.com

Location was once again determined by visitors as the first key factor. 45 visitors mentioned this factor in their reviews, which is 28% of the total number of visitors. Another important factor for visitors was the equipment of the rooms, which was mentioned by 38 visitors, i.e. 24%, in their reviews. In third place is the staff and personnel services offered by the hotel. 36 visitors, i.e. 22% of the total, mentioned this in their reviews. The food on offer at the hotel (breakfast, lunch and dinner) became a key factor for 21 visitors, their percentage being 13%. The penultimate factor was cleanliness, which was mentioned by 18 visitors, i.e. 11%. The last place was taken by the wellness category, which was mentioned by only 3 customers in their reviews, i.e. 2% of visitors.

From this graph, it can be seen that despite the higher number of reviews, the first key factor remained the same, but the remaining factors changed. Figure 4 is used to compare these changes, which contains data from the period March 2020 – March 2022 and the entire year 2019.
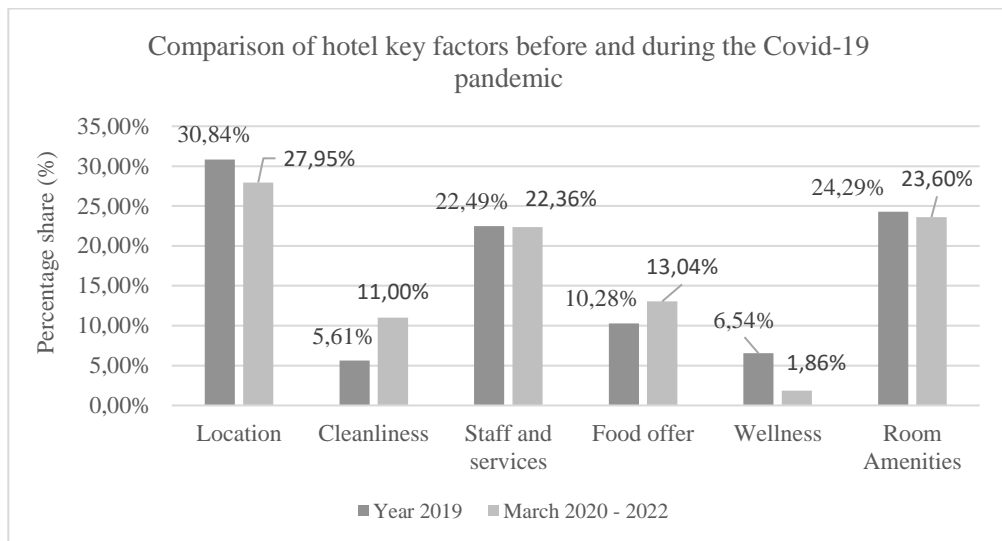
Figure 4. Key factors comparison 2019-2022.

Source: Own processing according to data from booking

From the comparison of key factors before and after the Covid-19 pandemic, it can be seen that the order of some categories has changed. Location remains the first factor for choosing a hotel, and in both cases this category was mentioned by approximately 30% of visitors. Room equipment is an important factor for around 24% of visitors before and during the pandemic. Staff and their services are important to 22% of hotel customers, and their number is also the same before and during the pandemic.

The first change occurs in the catering of the visitor. In 2019, the food menu category was mentioned by 13% percent of visitors. However, during the pandemic, this factor was only mentioned by 10%. The cleanliness of the hotel and facilities were mentioned in their reviews by 11% of visitors in 2019, in 2020-2022 only 6% of visitors. In last place was the wellness category, which was mentioned in reviews by 7% of visitors in March 2020-2022 and only 2% in 2019.

In addition to the comparison of individual factors before and during the Covid19 pandemic, an analysis of variance was processed, whereby if the p-value is lower than 0.05, the individual key factors and with them the rating of the hotel did not change. If this value is higher than 0.05 customer opinion and key factors of the hotel have changed. Table 1 contains these changes.

Table 1. Analysis of variance of ratings (ANOVA).

Source of Variation	SS	df	MS	F	p-value	F crit
Between Groups	0,09954373	5	0,01990875	34,8473935	0,00023309	4,387374
Within Groups	0,00342787	6	0,00057131			
Total	0,1029716	11				

Source: Own processing according to data from booking.com

The p -value – i.e. the probability of the certainty of the statement, disproves the hypothesis that the assessment or key factors would change during the Covid-19 pandemic. The P value is only 0.023309, which means it is less than the significance level of 0.05.

Based on the results of the work, it is possible to determine the answers to the research questions. Using content analysis, the key factors for choosing BoHo hotel Prague were identified. These factors are as follows: hotel location, cleanliness, staff and staff services, food, wellness and room amenities. Chu & Huang (2017) claims that the key factors for visiting a hotel may be different for foreign tourists (be it hotel cleanliness or food) than for domestic tourists. The results of the work show that in this case the opinions of Czech and foreign visitors were very similar and the main key factor for choosing this hotel was determined. Even so, I think it would be interesting to divide the reviews of Czech and foreign visitors and use content analysis to examine individual key factors based on the nationality of the visitors.

The main key factor is the location of the hotel, this factor was identified by 30% of visitors in their reviews. The hotel is located in the center of Prague, near Wenceslas Square and Old Town Square. It is therefore close to the center but also to tourist attractions, which means that it can be used both by tourists and, for example, by employees on their way to work.

Another important factor for choosing a BoHo hotel is the room amenities for visitors. In this case, visitors particularly mentioned the comfort of the bed or mattress and the bathroom amenities. Conversely, Wellness (hot tubs, saunas, swimming pool) are mentioned here by a minimal number of customers. Soifer et al. (2020) note that hotels that only offer wellness and wi-fi receive lower ratings from customers, sometimes only in the range of 1.5-2 stars. In this case, customers mention the wellness category absolutely minimally, and yet the hotel has a high rating.

From the results of the work, it is also possible to determine the popularity of the hotel on the market. As the main key factor was determined by location, 12 Prague hotels in the same or similar location as BoHo were selected for the comparison of the number of stars. This research shows that the BoHo hotel is one of the most popular, together with the CUBE and Pytloun hotels it shares the first place in the given location. For the comparison of these hotels, aspects other than location were not taken into account, so it is possible that if the hotels were classified according to capacity or size and the services offered, the results would be different. For the overall popularity of this hotel on the Czech market, it would be necessary to compare the number of stars with all hotels in the Czech Republic.

It was also possible to find out whether the Covid-19 pandemic affected the hotel's rating from 2020 and at the same time confirm or refute this hypothesis. The first was a comparison of the individual key factors, where it turned out that the main key factor did not change, but other factors did.

For more valid results, analysis of variance was processed, with a significance level of 5%. A P value greater than 0,05 was required to confirm the hypothesis. The research results showed that this value is 0.023309%, which means that the individual key factors have not changed during the Covid -19 pandemic. This means that the hypothesis of whether the assessment changed during the pandemic can be rejected.

In this case, it is better to use variance analysis to compare individual factors in a given time period. A simple comparison of averages from a given category showed skewed and false results that can lead to confusion.

The main limitation of this research is the fact that the data used is from only one internet portal. If reviews from all review portals where it is possible to rate the BoHo hotel were used, it would be possible to obtain more accurate results about the overall reputation management of the company.

Processing the reviews from the booking.com reputation management portal in this hotel has a major benefit for the hotel itself, its staff and managers. The work shows the main key factors of the hotel, its popularity, and accordingly it is possible for the hotel to improve or expand certain services and thus improve its rating.

Mapping of reputation management on the booking.com internet portal shows the evaluation of visitors to the BoHo Hotel before and during the Covid-19 pandemic. An overview is created from the reviews, which will serve customers, the hotel itself, staff and managers.

Thanks to this overview, which contains the key factors of the hotel and its popularity among Prague hotels, it is easier for customers to decide whether to visit the hotel, whether they will be satisfied with all the services offered, or whether they will choose another hotel option.

For the hotel itself and its staff, this work is an example of how the hotel stands on the market, due to which factors people choose it and in which categories the services need to be improved or expanded. For hotel owners, these reviews are, for example, feedback on the work of their employees.

The overall popularity of the hotel then shows their position among competing tourism facilities. All these facts can be used by hotel managers to take care of the development of the hotel and its maintenance on the market.

5 Conclusion

The aim of the research was the analysis of reputation management at a selected tourism facility. The reputation management analysis was created from reviews on booking.com for the BoHo hotel Prague.

The reviews were sorted into categories and then compared and it was possible to find out the key factors for choosing this hotel. A total of 6 factors were identified according to which visitors choose this hotel. The main one is the location of the hotel, as well as the hotel's equipment and staff. The knowledge gained was also used for another part of the research, which dealt with the overall popularity of the hotel on the Czech market.

Furthermore, the overall popularity of the hotel among other Prague hotels in the same location was determined. The results of the work show that this hotel is one of the most popular hotels near Wenceslas Square and has received a rating of 4,5 stars from customers since its operation on the market

The last part of the research was devoted to the evaluation of hotel visitors before and during the Covid-19 pandemic. The results of the work show that customer ratings and, together with them, key factors remain the same before and during the pandemic.

The main limitation of the research is the fact that the analysis of reputation management was processed only on a single internet portal. In order to provide more accurate results or other key factors, it would be necessary to perform an analysis on all review portals where visitors left a review.

Even so, the work found answers to all research questions and disproved the hypothesis that reviews differed before and after the pandemic. The research objective was met.

Acknowledgments

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The evaluation and assessment of scattered field research in African countries

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Abstract

Research background: Data processing and understanding of the socio-economic development of African countries is often impossible due to the incompleteness, inaccuracy, and/or outdated of available public data provided by the local government. Primary data collection and cooperation with the country's locals are crucial if the researcher wants to evaluate and subsequently find a solution to improve the environment. The quality examination can only be carried out in these countries with primary data gathering.

Purpose of the article: The article focuses on evaluating and assessing scattered field research in African countries. The paper estimates the most effective methodology, but it is also concentrated on its insufficiencies. In addition to estimating the data collection methodology, the article also includes an evaluation and comparison of the ethical principles and their challenges.

Methods: Analysis, comparison, and deduction. To fulfill the selected goals, the existing books focusing on field research are reviewed to provide the answers. Secondly, the publications of the researchers who conducted primary data collection in African countries were used to analyze the value of the methodology in the field and to collect the ethical challenges.

Findings & value added: In the question of the most effective methodology, the article shows that the best way is to establish yourself in the community. Researchers struggle most with data ambiguity and moral dilemmas. Secondly, the most significant finding in the question of ethical principles is that researchers struggle the most with the question of compensation.

Keywords: *field research; methodology; ethical challenges; Africa*

JEL Classification: *B40; B41; B55; C82*

1 Introduction

Data processing and understanding of the socio-economic development of African countries is often impossible due to the incompleteness, inaccuracy, and/or outdated of available public data provided by the local government. Primary data collection and cooperation with the

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country's locals are crucial if the researcher wants to evaluate and subsequently find a solution to improve the environment. The quality examination can only be carried out in these countries with primary data gathering. Another advantage is that field research helps with an exceeding understanding of the situation by integrating assorted perspectives. (Maestrini et al., 2016)

Advanced researchers focusing on African countries (and other low-income countries around the world) need always to go the extra mile to work with trustworthy and reliable information. The best possible way to do so is to collect data by themselves. However, collecting data in different cultural zones needs deep preparation, stable strategy, skills, good knowledge of used methodologies, challenges, and vital emotional intelligence.

This paper aims to evaluate the most effective methodology of scattered field research in African countries and concentrates on its insufficiencies. In addition to estimating the data collection methodology, the paper also includes evaluating and comparing ethical principles challenges, which almost every researcher reconsidered after entering the field.

Every researcher whose work is considered in this article focused on qualitative methods. It was not intentional. The reason is that locals, most of the time, cannot give exact data about a more extended period or exact data in general. The exception can be if the research focuses on working with official departments, but such research was not found for the article.

2 Methodologies and their insufficiencies

Initially, it is essential to mention that social sciences are not objective. The scientist's work (by interviewing) always includes subjective meanings, the personal experiences of the participants, and their explanations. To get access to the content, understand it, and verify the information that participant assign, the most critical and time-consuming element of the field research is to establish yourself in the group or the organization and observe. The observers gather data by being part of the daily life of the study community. They should also enter some participants' conversations and discover their observed interpretations. The value lies in the opportunity to collect rich, detailed, and feasible data based on participants' natural settings. Therefore, it is achievable to build new ideas and schemes for the research or possible future research and generate questions they would not have come up with (Burgess, 1984; Becker, 1961). However, many researchers focus on rural areas, and in these cases, it is crucial to cooperate with local guides, organizations, or institutions in the question of safety (Mutisya & Yarime, 2011).

As mentioned, interviewing and verifying data by observing the studied community can be significantly impeded. On one side, there is an interviewer who needs to make quiet time, plus each respondent can have a different schedule, which does not have to be connected to others. However, more importantly, it is about the participants' time and scheduling of meetings. Observing does not mean participating (cooking meals, teaching classes, or robbing coffee beans), but it is very effective to help them with their tasks and daily activities (Seale et al., 2004). Besides that, it can be beneficial to schedule the meeting. Respondents are likely to open more in informal settings, and psychologically, it can create more friendly-oriented conversations, which can be crucial for the research (as some researchers reported) (Clark 2006). As a behavioral economy says, each person is different, and it will not be possible with each participant. Some will prefer formal meetings and conversations to feel equal with the interviewer (Thomson et al., 2013).

On the other hand, with great opportunities, significant problems come along. The risk of modifying gathered information is prevalent to be part of the context. There is a thin line where the untouched and outside point of view becomes influenced by the situations, and atmosphere researchers are in (Schwartz, 1975). Also, researchers who spent much time in the field reported in methodology that their work is influenced by connections they have

made while collecting data (Clark, 2006; Gokah, 2006). Even though observation has insufficiencies, gaining reliable and quality data is only possible with built trust between the interviewer and the respondent. Researchers cannot expect honest and open discussions with people they have just met (Thomson et al., 2013; Green et al., 1995).

When it comes to in-depth interviews, structured interviews are frequently adopted to generate quantitative data. For researchers, who study outside their cultural zones with a focus on qualitative methods, semi-structured interviews are recommended and mainly used (Clark, 2006; Polit et al., 2006). Each researcher, whose goal was to understand and explain the relations, processes, decision-making, or livelihood, used semi-structured in-depth interviews combined with observation as the primary methodology (Clark, 2006; Thomson et al., 2013; Gokah, 2006); Ansoms et al., 2016). They are predetermined to go further than what can be learned through firmly scripted structures. It is needed to prepare the areas and topics the interviewer wants to cover, and they should explain what interests them to know and talk about. It is crucial to know that research questions should not be interview questions, only related matters. Trust can be built through interview sessions as well. The process should be divided into more days. The first meeting should be about introducing yourself, the interest and concept of the research, and answering possible questions from the respondents. Lastly, it is about signing an informed consent to be part of the research. In the next session, the research-oriented conversation can start. The process is primarily about building trust, understanding the participant (especially if the focus is on underrepresented and marginalized people, groups, or organizations), and preparing the relationship for more sensitive topics and answers. With open questions and semi-structured interviews, there is no certainty about where the conversation will lead. The researcher always has to stay focused and notice the possible sign of exploring new areas (Arthur et al., 2021; Mišovič, 2019).

With this concept, insufficiencies come along. Only on rare occasions did the participants let the interviewers record the sessions (Clark, 2006). Also, walking with notebooks and other expensive belongings in many African areas is not recommended because of safety. Only shorthand notes and often only keywords (because of the slow writing process) can be very tricky to interpret. Reading after each session as soon as possible is essential, and rewrite them into more structured field notes. Later, the field notes are again rewritten into the final research and articles. At this point, data are more time modified, and there is no objective option for verifying the information, and obtained data cannot be tested. The best way how to prevent not reliable obtained data is to self-reflect and contemplate daily reports. However, few researchers were able in rural African areas to make video-recorded walking and audio interviews (Adams et al., 2022). Another imperfection with interviewing and working with people is the unpredictability element. Many times, sessions may not go as planned. Respondents can lie, do not have needed information, or change their minds and decide not to cooperate during the process (Mohajan, 2018). In African countries, there is also a strong possibility that logistical issues come up, though not up-to-date maps and therefore navigations, or low quality of infrastructure and therefore a considerable delay. Lastly, after data collection, their processing can be overwhelming because researchers have to go through thousands of pages when interviews are unfocused or concentrated on quantity (Polkinghorne, 2005).

Another standard and one of the most used methods is focus groups. Organized discussions such as focus groups are excellent for gathering many opinions on one topic. The most significant added value is that their opinions can influence each other and come up with new conclusions and ideas. Secondly, it is a more time (and money) effective way to simultaneously achieve a reasonable number of opinions about specific topics (Arthur et al., 2021). The quality of focus groups mostly depends on the dynamic of the group. Building them is essential to think about symmetric power relations between participants and connect people with similar characteristics (such as gender, age, ethnicity, standard of living). In the

case of asymmetric power within the group, reliable data and openness are not likely (Michell, 1999). In reality, researchers indicate that such a selection process was impossible to build. They were able to do just a tiny portion of the symmetry power. However, they still considered focus groups helpful for achieving a quality discussion with fulfilling information. Nevertheless, focus groups were always just a complementary method (Clark, 2006). The biggest challenge and insufficiency is the promised confidentiality to all participants as a basic ethic rule during every field research. The only way to succeed is to be a highly skilled moderator with knowledge of potential conflicts (Halcomb et al., 2007).

The second most used and valuable complementary method is the life history. Specifically, in African countries, it is oral history (Burgess, 1984). There are mostly only complementary because of the practical difficulties of obtaining a sufficient number of such stories to cover the studied topic (Simmons & Syvertsen, 2022). However, some researchers used them as a primary method and succeeded with 12 000 adult respondents from rural areas (Sender & Cramer, 2022). The constructive part of collecting them is the possible better understanding of the present life of the participants, their decisions, and future plans. They can be used as a good substitute for observation, and it is also a good starting point for the interview. They can build trust, friendly relationships, and rich data for understanding the area. From a psychological point of view, African people need to see the interest (of the studied community) in the interview, which is a very effective way to achieve this goal (Thomson et al., 2013).

Lastly, not recommended methods are written statements, questionnaires, and other online methods. Written statements were asked of each potential respondent with a given notebook. They were asked to share their thoughts, experiences, and hopes for a more extended period. However, the researcher had no success. Most adults used the notebooks for other purposes; others did not pay attention to the given task. When it comes to children, there are different problems. Young people can be from non-written cultures or have poor written communication skills (Clark, 2006). Questionnaires were not used in any research used for this article. For such a method, there is a need to connect with the participants online, and with African people and their communities, it is hardly achievable. The article's author is also working with the African population, and during preparation, there was zero response to written e-mails (which were addressed to the primary private schools).

The hierarchical methodologies described in chapter 1 are graphically illustrated in Figure 1.
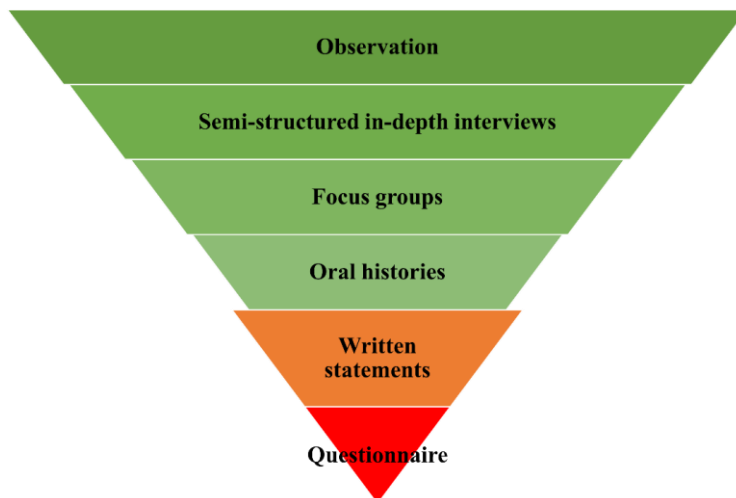
Figure 1. Hierarchy of the used methods in qualitative field research

Source: Author's own contribution based on information in Chapter 2 (2022)

3 Ethical principles and their challenges

Each researcher has to design a strategy in the question of ethical principles. This chapter will not be about the basic ethical rules that each researcher has to keep, such as anonymity, confidentiality, the principle of voluntariness, do not harm, informing the participants about studied interests, and informing them about the results - if possible (Mišovič, 2019). The article focuses on the challenges the researchers have to overcome and make decisions.

Firstly, there is a decision about using resources to achieve access to influential people. While it can look like a logical move, it can create unrealistic expectations and discredit the data. If the respondents saw or knew about influential connections, they might represent their stories in ways to gain possible aid, benefits, or assistance. The solution is to highlight the limited role of a researcher (Clark, 2006).

The most significant decision is about compensation. Different associations around the world, which circulate and set the rules of ethical principles, cannot finalize the verdict. The freedom to research and publish and the importance of independence, validity, and integrity are not negotiable (Clark, 2006). Regarding reality, almost every researcher opened the question again because they cooperated with people who struggled daily with basic living standards. Some researchers hired local assistants and informants and paid them. They argue that they helped them with safe transportation and finding the respondents. Also, the critical fact is that participants know the researchers always gain something from the information (such as a degree or academic carrier). They also openly discuss the possibility of a relationship based only on financial transactions. However, they argue that in the same cases, it was inevitable - field research in war zones (Jourdan, 2013). Another situation where researchers had to pay was inevitable cooperation with the officials or commanders (Thomson et al., 2013). While there is an undeniable need for reciprocity, some researchers came up with another way to give back to the community. Few researchers communicated with the locals and devised different types of workshops. Primarily, they focused on financial literacy and potential financial opportunities (Clark, 2006).

Lastly, many researchers have more than one experience in the field. Each of them came to the same conclusion: small teams and being as less visible as possible are much more effective than large groups. The reason is that a single person connected differently, more intensely, and trust was built on a higher level. When researchers came to the studied area with security, large cars, and expensive clothes, it was sometimes impossible to connect with the locals and potential participants (Thomson et al., 2013).

4 Conclusion

The article about evaluating and assessing scattered field research in African countries mainly focused on the methodologies used during field research and their practical issues. Secondly, the ethical challenges and different decisions of similar problems were evaluated.

The preferable method was the combination of in-depth semi-structured interviews and observation. The observation ended up in the first position because hand-written notes during the interviews are examined at considerable risk. Another reason is that, during observation, researchers can use the recorder (which was most of the time refused during the interviews). Recorded data can be repeatedly used after collecting data, while hand-written notes are modified more times and can not be verified. Lastly, observation is the easiest way to build trust (crucial for every research) because of the potential informal conversations that do not relate to the studied interest. The most significant insufficient is that researchers can be more attached, influencing the possible outcomes. Secondly, this method is the most time-consuming one.

In the third position stands focus groups. They are a great way to save money and time. It is also very likely to get interactive and more exciting data because open-minded discussions can bring new ideas. However, there is also a considerable risk of getting no reliable data in case of inappropriately chosen people in one group. Along with this, the moderator has to be skilled and have a good knowledge of potential conflicts.

This paper evaluated that written statements and questionnaires are not recommended in African countries. Chosen participants of written statements decided not to do it, and no researcher used questionnaires. Even though there is no obvious success story, this methods does not take much time, and researchers can try them.

The most questionable ethical principles were estimated as well. The most significant findings are that researchers should try to look as less different as possible regarding living standards. Otherwise, there is a risk of missing connection and reliable data. Also, the smaller group of researchers, the more extensive connections were built. The most questionable principle was, and still is, the compensation. Even though there are different points of view, each researcher should think not only about the current situation but also about the future of research in similar areas. Lastly, researchers should know that they build cooperation standards with similar areas and people.

Acknowledgments

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Implementation of Industry 4.0: A Systematic literature review

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Abstract

Research background: Many manufacturing industries are anticipated to adopt and implement the fourth industrial revolution in the era of industry 4.0. Additionally, industry 4.0 has a significant impact on the economy and ecology, two contemporary trends. Industry 4.0 is a big change in countries, communities and the world. It transforms small firms into medium or large firms. It develops a huge transformation that all firms can benefit from the new technologies. Industry 4.0 has many benefits that affects the companies in a big way. However, there are many challenges that industry 4.0 technologies might face.
Purpose of the article: Rapid development of communication and information technologies with their orientation on big data have significantly changed the character and the needs of national economies. The onset of the 4th Industrial Revolution significantly affects the structural changes of individual economies (companies) as well as their requirements for workforce. The main goal of the paper is to point out the implementation of Industry 4.0 throughout the deep literature review.
Methods: The paper presents the implementation of Industry 4.0. This is based on the bibliometric analysis and deep literature review.
Findings & Value added: The paper presents results, connections and impact of implementation of Industry 4.0.

Keywords: *Industry 4.0; bibliometric analysis; Fourth Industrial Revolution; Technologies*

JEL Classification: *F63; O31; O14*

1 Introduction

Every element of human life has been impacted by the ongoing advancement of our time. The biggest modification is that we are initiating the new technologies, and the economic climate is changing dramatically, as well as system and social organization. The meaning of the fourth industrial revolution is that how they are responding to these changes (Ahmed et al., 2019).

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The first revolution in the industry was the era when steam engines are introduced. The second revolution was the catalysts by the electricity capacities. In the third revolution era, the semiconductor was introduced in computer development, and there was the automation of the production from the internet. Now the time is of the fourth digital revolution, which is also known as industry 4.0. (Alaref, Khan, 2021; Zvarikova et al., 2021)

The world and its nations are changing significantly as a result of Industry 4.0. It changes tiny businesses into medium-sized or huge businesses. It creates a significant transition whereby all businesses can gain from the new technologies. The collaboration of systems, such as machine to machine and human to machine interaction, is the focus of industry 4.0 (Lawrence, Durana, 2021).

Agility, decision-making, efficiency, cost-cutting, and flexibility are encouraged by Industry 4.0. By adding technology that will aid in controlling industrial processes and in employing real-time systems to control and run, Industry 4.0 seeks to develop processes and services (Alcacer, Cruz-Machado, 2019; Rogers, Kalinova, 2021).

When a company is prepared to utilize industry 4.0 technology, it is said to be "industry 4.0 ready." Therefore, this occurs when businesses integrate and adopt industry 4.0 technologies using both digital and physical resources. In order to increase productivity, the lifespan of products, and the efficiency of operations, many firms are prepared to accept and use new technologies (Alcayaga et al., 2019).

Understanding the topic in depth and recognizing the issues encountered are made easier by the literature review concept. When performing a literature review, there are numerous processes that can be taken. Therefore, the main goal of the presented paper is to provide a systematic literature review of Industry 4.0 implementation, with the use of bibliometric analysis.

The paper is structured as follows. Firstly, the literature review part provides the theoretical background and recent incentives on Industry 4.0. Then, the results and discussion part present the results of provided bibliometric analysis followed by the summary of main ideas. Conclusions sum up the results of the study as well as their practical implications, the limitations of the research and potential areas of further research.

2 Literature review

As suggested by the Industry 4.0 project, Europe needs new ideas and ways to increase its competitiveness. The economy and society stand to be greatly impacted by Industry 4.0 technologies. Various researchers have devoted their study into the phenomenon Industry 4.0 and many studies have been dedicated to this issue since 2011, when Industry 4.0 has entered the scene.

A systematic literature review was provided by Alaref and Khan (2021) to identify the concept of industry 4.0. Qualitative data was used in this research to understand the literature of Industry 4.0 in all aspects. It was found that Industry 4.0 is a big change in countries, communities and the world. It transforms small firms into medium or large firms. It creates a significant transition where all businesses can gain from the new technologies. The benefits of Industry 4.0 are numerous and have a significant impact on businesses. However, industry 4.0 technology may confront a number of difficulties (Bettiol et al., 2020).

Suleiman et al. (2022) also conducted the systematic literature review of the Industry 4.0 related concepts, characteristics, and enabling technologies. According to these they formed five distinct clusters, namely Customer Orientation (CR1), Sustainability (CR2), Knowledge management (CR3), Global value chain (CR4), and Smart factory (CR5).

Similarly, Da Silva et al. (2022) provided analysis and literature review of Industry 4.0 and micro and small enterprises. The objective of their study was to identify the relationships between Industry 4.0 technologies and Micro and Small Enterprises. To achieve this, a

systematic literature review and content analysis were conducted. A total of 60 articles from the sample were coded, using selection criteria designed to find relevant studies in the domains of Industry 4.0 and Micro and Small Enterprises. Thus, 16 Industry 4.0 technologies were identified, as well as nine possible barriers to implementing them, and eight performance outcomes after adoption in such enterprises (Hopkins, Siekelova, 2021).

The connection between employee adaptability skills for Industry 4.0 success was studied by Sony and Mekoth (2022). The main purpose of their study was to successfully develop an employee adaptability road map for the successful implementation of Industry 4.0, by critically analyses the previous studies to develop a roadmap of employee adaptability skills for the successful implementation of Industry 4.0. The study used deductive methodology using a systematic literature review to group and thematically analyse 52 articles to develop the conceptual model. Besides, this study also ranks these dimensions using an empirical study and finds the most critical employee adaptability dimensions.

On the other side the impact of Industry 4.0 initiative on society changes was studied by Masarova et al. (2019). Through the theoretical general methods, they analysed the impact of Industry 4.0 on work life balance. This can be followed by the study of Hyzova et al. (2020), who conquer the study on the requirements for education and qualification of people in industry 4.0. They focused on theoretical concepts of qualification requirements within the industry 4.0 and conditions that citizens of the Slovak Republic will meet. Through the analysis of curricula at primary, secondary and also higher education institutions and subsequent comparison with the requirements of this industry it will be possible to show to what extent the development and growth of industry 4.0 in the conditions of the Slovak Republic is a prerequisite. Equally, Berkovic et al. (2020) outlined the changes that are made in the production process, but also across the community, and what impact these changes will have on organizations and people. It illustrates the speed of the changes that are made in this way and is directly dependent on the technological capabilities that Industry 4.0 brings. Similarly, Simanaviciene et al. (2018) analysed the impact of Industry 4.0 on economic security in Lithuania. So, they showed that economic security works as a guarantor of the country's competitiveness and the Fourth Industrial Revolution. An analysis of threats to economic security in Lithuania has shown that the object of economic security is its economic system and economic indicators, competitiveness, which determines the general rise of Lithuania in the EU and in the global context.

Another look on this issue was presented by Grencikova et al. (2018). They focused on the impact of Industry 4.0 on tourism services, on sales and service in this area. The authors pointed to the current state and consequences of changes brought about by the use of modern technologies and the personalization of the products sold. Grencikova and Krajco (2020) also studied the reasons for introducing the Industry 4.0 concept in Slovak companies. Selected results presented in the study were found out by questionnaire survey in Slovak companies.

Based on the provided literature review the main goal of the presented study is to focus on the systematic review of the literature provided by bibliometric analysis.

3 Results and discussion

Based on the provided literature review, we analysed studies devoted to the issue of Industry 4.0 and its implementation. The analysis was conducted through the bibliographic map provided by the application VOSviewer to present visually the connections.

The analysis was based on the articles listed in the Web of Science database and the selection criteria was the occurrence of the words *Industry 4.0* and *implementation*. Based on these we have selected 3 623 articles. Firstly, the overview of this articles through the years of publication was provides. Figure 1 shows the rapid development and focus of researchers

on the are of Industry 4.0. implementation since 2015, while the first studies devoted to the issue were published in 1996 and 1997.
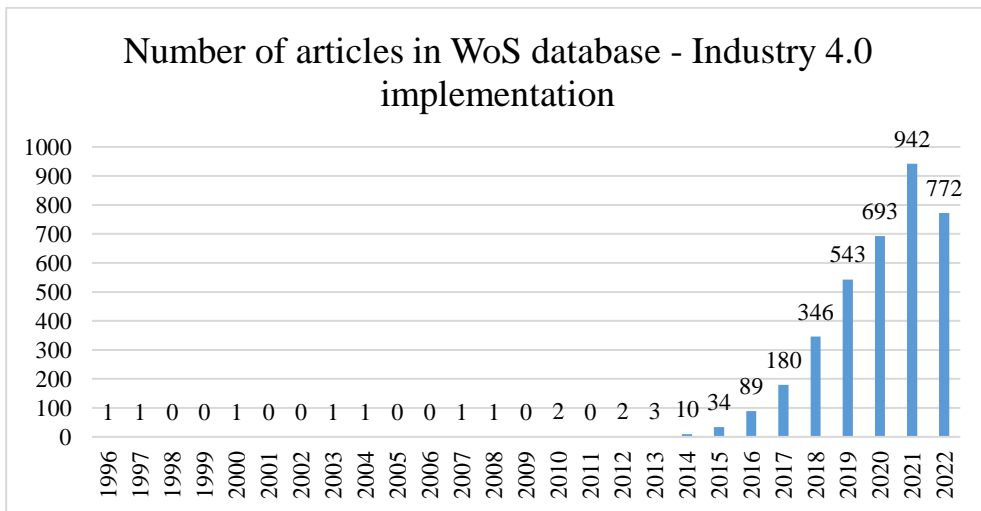
Figure 1. Number of articles in WoS database – key words Industry 4.0 and Implementation.

Source: own processing

So, the rapid development of articles can be seen also on the provided bibliographic maps. If we look on the bibliographic map based on keywords for years 1996 – 2014 we can see only 1 cluster (Figure 2). During this period only 24 articles were published, 40 key words were selected, but only 10 key words meet the threshold and are connected together.
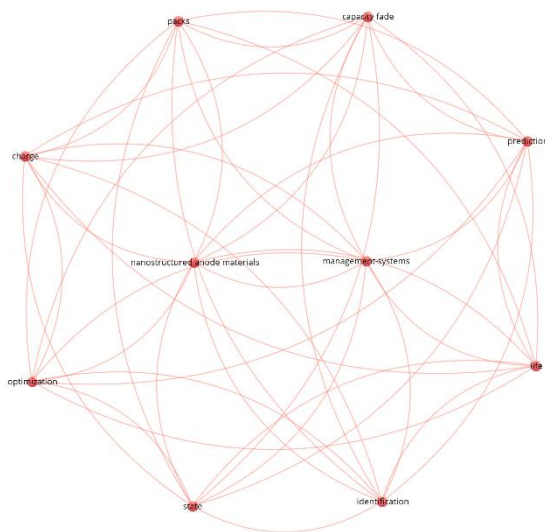
Figure 2. Bibliographic map – keywords analysis for years 1996-2014.

Source: own processing

The second period, which can be studied is from 2015 to 2019. In this period 1 192 articles were published. The bibliographic map for this period is shown in Figure 3. 899 keywords

were detected, but only 78 meet the threshold, thus minimum number of occurrences of a keyword was set as 5.
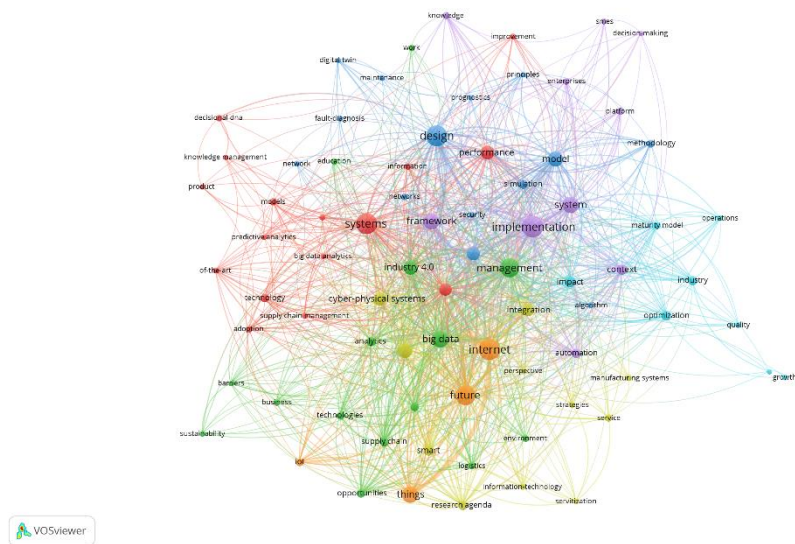
Figure 3. Bibliographic map – keywords analysis for years 2015-2019.

Source: own processing

According to the Figure 3, seven clusters were constructed and we can conclude that there is a strong intercorrelation between investigated words. So, the main connections may be found among systems, design, implementation, management, internet, industry 4.0 and big data. It is interesting to see the difference from a previous map. Now the connections are stronger and more complicated, which is given mainly by the growing number of studies in this period.

The last studied period is last three years from 2020 until 2022. In this period 2 407 articles. We can see that there is a huge interest from the researchers on the issue of Industry 4.0 implementation, so also the bibliographic map is much more complicated. 2 367 keywords were selected, while 292 of them meet the threshold, thus minimum number of occurrences of a keyword was set as 5.

According to the Figure 4, nine clusters were constructed. Therefore, we can conclude the main interconnections are between keywords implementation, management, systems, future, internet, performance, big data, industry 4.0 and sustainability. So, the map confirms the strong interest of various areas connected to the selected issue.

Another problematic area, which could be studied through the bibliometric analysis is the construction according to countries of author´s origin. Authors of articles are from 115 countries, from which 78 meet the threshold, thus minimum number of documents of a country was set as 5. The most articles were published by authors from Italy, Spain, Germany, Poland, India, USA, England, Russia, Slovakia and France. Figure 5 shows the bibliometric map according to countries.
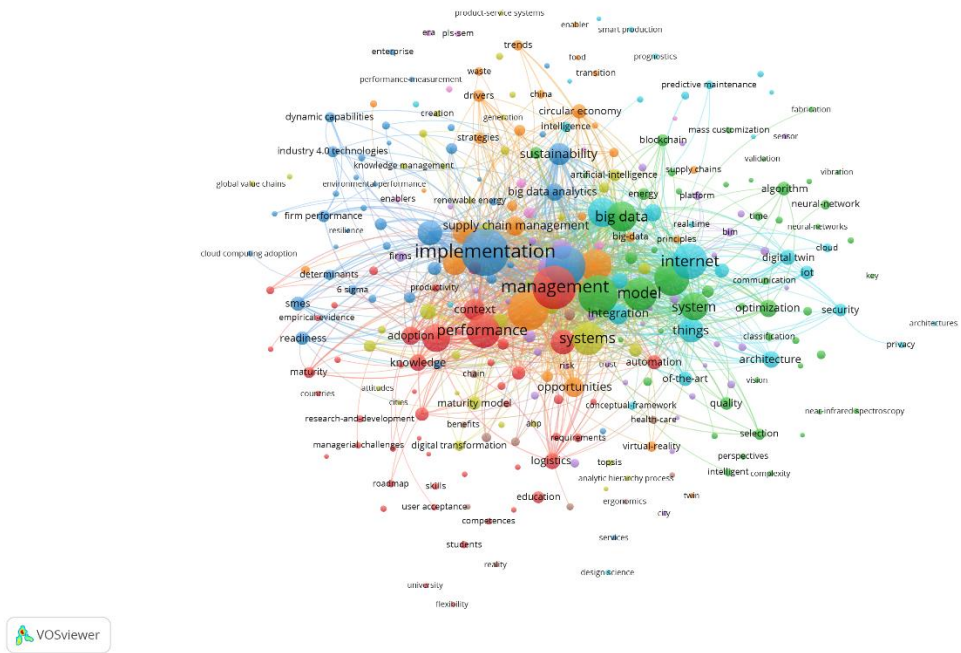
Figure 4. Bibliographic map – keywords analysis for years 2020-2022.

Source: own processing
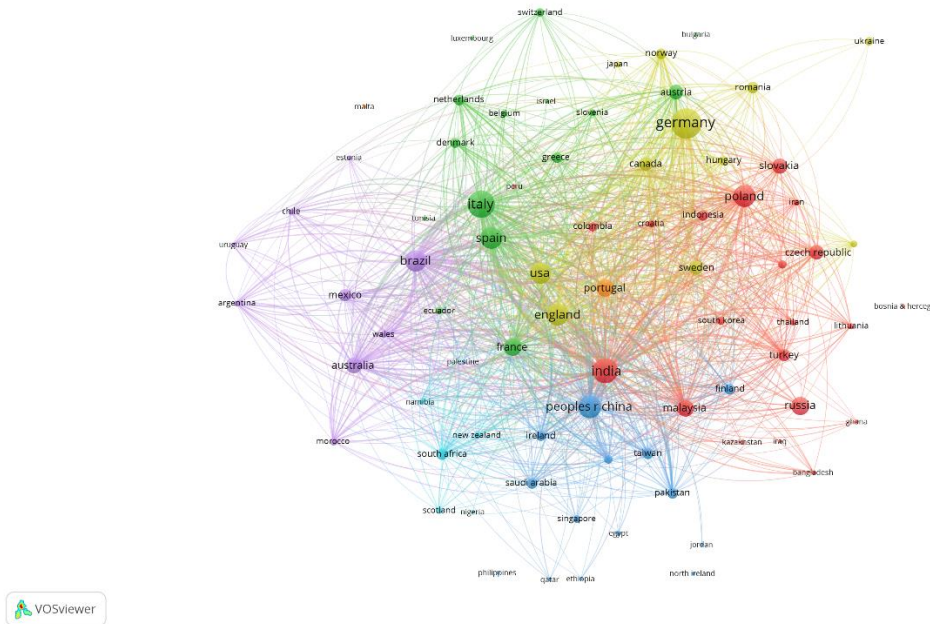
Figure 5. Bibliographic map – countries analysis.

Source: own processing

4 Conclusion

An emerging trend in the world is "Industry 4.0" It provides access to the newest and most innovative industry strategies. It aids in employing cutting-edge technologies to assist enterprises in achieving their goals. In all fields and industries today, Industry 4.0 is crucial. From the provided literature review above, we have drawn the conclusion that industry 4.0's long-term goal is to boost process productivity and efficiency, which can promote worker security by lowering the workload on the workplace. Decision-making could be improved with the aid of the Fourth Industrial Revolution 4.0 and the use of the tools that will be supplied by it that are data-based.

In the presented study we provided deep literature and bibliographic review of selected issue of Industry 4.0. implementation. Based on these we can conclude that this area is in huge interest of researchers in the last few years from various countries. Future researchers should focus on the possibilities to construct various business models including these technologies.

Acknowledgements

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Measurement of the innovations impact on transnational company performance

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Abstract

Research background: In today's world, which is shaped by global competition and oversupply demand, innovations cease to be only competitive advantages, but are created necessary to ensure the existence of the company and the jobs associated with it. Broadly the concept of competitiveness is concretized into the strengths and weaknesses of the company in the area of innovation, which is one of the most important conditions for competitiveness. Competitiveness has a close relationship with the company's performance. in modern theories of economic growth, competitiveness is more and more linked with the creation and transfer of innovations, as a decisive prerequisite for obtaining emergency competitive advantages.

Purpose of the article: The aim of this paper is to bring readers fundamental theoretical knowledge regarding innovation strategies of the company. An innovation strategy is an incremental, functional and predetermined plan management and allocation of resources to different types of innovations, with the aim of achieving overall strategic goals of the company, and also when and how he should selectively leave the past or change the strategy and goals of the business in order to focus on the business in the future.. The fact that the innovation strategy was successful will show if the company achieves two basic goals, namely customer satisfaction and competitive advantage fight. Considering that many companies invests more or less without having it pre-planned, the main aim of the paper will be to specify the impact of the innovation on the company performance.

Methods: Analysis method, Synthesis method, Deduction.

Findings & Value added: The result of this paper is the overall analysis of the impacts of introducing innovation into the company.

Keywords: *innovation; performance; measurement*

JEL Classification: *O32; L25*; *M11*

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1 Introduction

For companies to survive in today's global market economy and achieve long-term success, it is important to be able to adapt and continuously innovate in order to overcome intense competition and adapt to changing market demands. Innovations mean for companies the resources of their future functioning. Companies that innovate do not disappear. For most companies, true innovation is still something that usually happens by accident, if at all. Few of them have overcome obstacles and created sustainable processes (Valmohammadi, 2012). Proven innovation practices help to increase a company's competitive advantage. Various researches have revealed a range of benefits for companies that have been able to successfully use innovation strategies to achieve higher profits and market share (Prajogo and Ahmed, 2006). However, being a successful innovative company requires creative skills and the ability to commercialize the created ideas. With the increasing necessity of global forces, many experts predict that workforce creativity and innovation will be the most important factors in creating and sustaining competitive advantage (Valmohammadi, 2012).

However, in the field of innovation, companies encounter a lack of initial ideas important for the creation of innovation or also a lack of financial resources. Innovation activities are costly and use a significant part of the company's resources for a long time. Both the innovation process and the actual implementation of the output of the innovation process in the form of a certain type of innovation require the expenditure of funds and the use of various resources. Especially radical innovation is also accompanied by high levels of risk and uncertainty, volatile and delayed financial returns, and longer development times. These factors can prevent many companies that do not have sufficient resources to undertake radical innovation. Instead, they were encouraged to favour incremental innovations characterized by lower risks and faster rewards (Troilo et al., 2014).

In order to reduce the risk of innovation projects and minimize the waste of resources, it is necessary to engage only in innovation projects that have the potential to lead to success and to ensure the effective implementation of innovation projects. Companies should therefore implement innovation control aimed at increasing the level of successful innovations. By using innovation control, it should be possible to allocate resources to the most promising projects and stop projects that do not match the corporate strategy, market needs, or are unfeasible or unprofitable (Schentler et al., 2010). As part of the control, factors that have an impact on the innovation performance of the company should be recognized, which can be defined as the performance of outputs directly connected to a specific innovation measured by the number of innovation projects, the increase in sales as a result of the innovation or the frequency of implemented innovations. Prajogo and Ahmed (2006) also state, the criteria for comprehensive capture of different aspects of innovation performance are the number of innovations, speed of innovation, level of innovativeness and market leadership. The importance of organizational innovation for competitiveness has been demonstrated by several studies that analysed the impact of organizational innovation on company performance in terms of productivity, delivery times, creativity, quality, originality and flexibility. Since innovation performance has a direct impact on business performance (Madhoushi and Mehdivand, 2011), companies are forced to innovate to increase performance and thereby achieve higher competitiveness.

2 Methods

Performance measurement is a sub-process of performance management that focuses on identifying, tracking and communicating performance results using performance indicators. Performance measurement deals with the evaluation of results, while performance management deals with adopting indicators based on the results of the evaluation and

ensuring that the target results are achieved (Brudan, 2010). Performance measurement can be characterized as a process of creating indicators for evaluating the progress of meeting set goals and comparing the achieved performance values with these indicators. Also, performance measurement can be understood as a complex of interconnected elements including the goals and object of measurement, the entity performing the measurement, measurement tools and methods, and a set of monitored indicators. This definition is based on a systems approach. Individual performance measurement elements can also represent certain phases of the measurement process (Vodáková, 2016).

Performance monitoring is essential for the management of the company and its employees due to the existence of a link between the performance monitoring system and the use of its outputs to guide the desired behaviour of people (Kaplan and Norton, 2005). There are many reasons for performance measurement, but they can be summarized in three main categories (Marr, 2006):

1. reporting on compliance with goals - measurements are used to communicate with the company's stakeholders, either voluntarily or compulsorily due to compliance with set goals;
2. control of people's behaviour - measurements are used to motivate people and change their behaviour. They are also used to quantify the value of compensation for compliance with objectively verifiable labour standards.
3. strategic decision-making and organizational learning - measurements are used to inform managerial decisions, to challenge strategic assumptions and to continuously learn and improve.

Businesses collect performance measurement data from different sources (e.g. board members, middle managers and front-line workers), use different methodologies (e.g. questionnaire survey and interview) or use different external workers to collect data. This can reduce bias and increase the reliability of the data obtained (Marr, 2006). When collecting data, it all too often happens that a company chooses traditional methods that may not be able to provide the necessary information. Instead, it is important to consider the strengths and weaknesses or suitability of other data collection methods. In this case, the indicator proposal should include a brief description of the data collection method, specify the data source, how often the data will be collected, what scale will be used to measure it, and who is responsible for data collection and updating (Marr, 2006).

Performance measurement is influenced by various factors. Vodáková (2016) states three factors that influence it:

1. from what point of view the company's performance will be assessed (based on the theory of value management, performance is assessed from the perspective of the business owner).
2. according to what criteria will the company's performance be assessed (the criteria for evaluating the owner's investment is the net present value).
3. what strategy to choose and then implement to achieve the selected goal or criteria.

The future functioning of the company and its success depends on the meaningfulness of the measurements, on the connection with the company's goals and the company's strategy. The development of performance measurement systems is influenced by adapting to a dynamic and competitive environment. System design requires rigorous preparation that respects the characteristics of production systems and their management criteria (Adams et al., 2006).

Many studies have confirmed the positive relationship between innovativeness and business performance. Innovations have a significant impact on the financial success of the company. Innovation and innovativeness are important determinants of company performance and sales productivity (measured sales/employee). A study by Saunila and Ukko

(2012) found a strong link between collaboration and financial performance - companies using external resources achieve higher revenuee growth than others. While innovation is represented by innovative design solutions, innovative project procedures and advanced use of technology, business performance represents project and business performance (Tajuddin et al., 2015).

Innovation brings new knowledge that is not available to competitors at least for a certain period of time. Companies that adopt an innovation first can create "insulating mechanisms" because competitors do not have knowledge of the innovation (Dulinova, et al., 2011). This enables the company to maintain a competitive advantage, protect profit margins and gain higher performance (Tajuddin et al., 2015). Different types of innovation have an impact on different areas of performance. Company innovations improve coordination and cooperation in the company, which is also confirmed by better results of efficiency indicators. Company innovations themselves have an impact on business performance in terms of productivity, delivery times, quality and flexibility. Technical innovations increase the competitiveness of the enterprise and have been shown to have a positive effect on the results of performance indicators (Saunila and Ukko, 2012). In an industry where design is one of the critical elements, sustained success in developing and implementing innovations has resulted in a positive perception of the company by both clients and competitors. These numerous studies in innovation research support the importance of innovation in enhancing performance because it offers a better response to a changing environment, gains more market share, introduces new knowledge, and establishes an isolation mechanism for innovative firms. This highlights the fact that companies that focus on improving innovation are more likely to achieve higher performance (Tajuddin et al., 2015).

Despite much research in this area providing evidence that the relationship between innovation and performance is positive in nature, there is also evidence of a negative impact of innovation on performance. The nature of innovation requires risky and costly activities leading to increased exposure to market risk, increased costs, employee dissatisfaction or unauthorized changes, which in turn provide a negative impact on the overall performance of the enterprise. Another study conducted by Wright, Palmer and Perkins (2005) reported that innovation has a positive effect on performance only in hostile environments but not in favourable environments for SMEs. A hostile environment is characterized by intense competition between companies and a decreasing number of competitive opportunities. Companies operating in highly competitive markets are likely to be more successful innovators by increasing the number of new product launches through incremental innovation to meet customer needs, thereby contributing to a positive impact on performance (Tajuddin et.al., 2015).

Innovative companies are still looking for relevant metrics that quantify the benefits of innovation. Indirect effects include a reduction in competitive market share. These criteria are mainly used to determine whether the innovation leads to a reduction in costs through an increase in quality. Other criteria include, for example, the impact on the environment, as well as increasing safety at work, as well as eliminating physically demanding jobs. After the introduction of the innovation, there are positive or negative impacts. The positive impacts of introducing innovations (not only) in transnational companies are (Rammer et al., 2016):
- Retention of existing customers
- Better response to changing customer needs
- Acquisition of new customers
- Increase in sales
- Increase in market shares
- Reduction of costs
- Development of more ecological products.

Because innovation is currently a generally recognized critical requirement for almost all companies in all industries, it is necessary to define certain indicators on the basis of which innovation can be evaluated. To measure the success/failure of an innovation, it is necessary to create a complex of indicators, including input and output metrics that control the allocation of resources as well as the return on investment (Adams, et al., 2006). Measurement of direct and indirect effects, or the impact of the innovation, examined using different performance indicators, can be devoted to different areas in the company. It is the choice of these indicators that affects the decision-making of executives between different dilemmas (Brattström et al., 2018). The problem in measuring the impact of an innovation is "metric overload", i.e. defining a large number of indicators. Many businesses try to measure everything with different criteria. This overload leads to excessive activities that provide little value and often cause conflicting behaviour (Dulinova and Bodon, 2011). Brattström et al. (2018) also agree with this statement who state that setting the wrong set of indicators by managers leads to focusing executives' attention on the wrong set of problems.

Švejda et al. (2007) present financial indicators that register the changes caused by innovations. Innovations can mainly affect the amount of turnover, profit, market share, costs and profitability. They also hold the opinion of Saunila (2017) that the action of innovation activities is a complex system that is reflected in many areas of the company. Financial statements therefore provide a rough idea of the impact of the innovation process on economic results. Despite the need to measure the effects of innovation, measuring innovation presents a problem in itself because innovation involves stepping into the unknown. When measuring the impact of innovations, the company should also take into account the lifespan of the innovations (Baron and Tang, 2011) Sustaining innovation is continuous in nature and therefore there is no beginning or end to the innovation process. Different kinds of innovations have different lifespans. Some innovations last a very long time, while others may have a short lifespan (Sethibe and Steyn, 2016), which means that the impact on the company's performance has a different character in a certain period. Dvořák (2006) deals with the time aspect when evaluating innovations. Assessing the impact of the introduction of an innovation can be carried out only after its implementation in practice. However, it is not clear how long after the introduction of the innovation it is appropriate to assess these impacts. The later the impact of the innovation will be monitored after its implementation, the more financial indicators can be used. On the other hand, with a longer time difference, the degree of assignability of costs decreases, or revenues, to individual innovations. According to Dvořák (2006), it is possible to compare the established current states with the initial states, when it is possible to evaluate the rate of growth of economic variables, technologies, etc. It is therefore necessary to compare the achieved results with the planned state. According to Kislingerova (2008) the concept of stages is suitable for evaluating investments. The basis of the concept is a certain number of stages, or the gates through which the innovation passes. At each stage, the innovation is evaluated as to whether it makes sense to continue in this way, whether it fulfils the set goal or whether something needs to be changed. However, measuring the effectiveness of innovations in the form of ascertaining the effectiveness of investments, it is possible to monitor the results only after a certain period of time from the expenditure of costs (Kislingerová, 2008). According to Brattström et al. (2018) measuring the impact of innovation leads to prioritizing strategic innovation over creativity and exploring new opportunities, which is another problem of measuring the impact of innovation. Rammer et al. (2016) state that the decisive importance of the impact of innovations on performance and competitiveness has the so-called novelty and innovation.

3 Results and discussion

Innovations that represent a significant change compared to the existing product range or the technology used so far offer significant competitive advantages that are associated with higher business growth. The development and introduction of such innovations carries a higher technological and market risk (Rammer et al., 2016). Most companies do not measure the benefits that result from their innovation projects, despite the fact that it is innovations that bring value to the company and cause many times the growth of the company. Many of them do not have internal structures for measuring innovation, therefore they do not pay attention to the innovation management process (Gama and Da Silva, 2007). Tidd (2001) divides indicators that are used to demonstrate the relationship between innovation and business performance into two categories. The first group concerns accounting and financial performance. These metrics include profitability, return on investment (ROI), return on assets (ROA), return on sales (ROS), return on equity (ROE), sales growth, and stock price. The second group refers to market performance, for example share or growth (Tidd, 2001; Sethibe and Steyn, 2016). However, most researchers prefer the combination of ROS, ROA, ROE and ROI because they complement each other (Sethibe and Steyn, 2016). Non-financial indicators should also be evaluated in order to evaluate overall performance for two main reasons. First, there are several types of stakeholders involved in business, and they all have specific goals and expectations related to the business. Second, strategic business areas do not necessarily have a financial nature (Sethibe and Steyn, 2016). After reviewing the literature on new product performance measurement, Alam (2003) proposes three performance dimensions to determine the success of new products, namely financial criteria, customer criteria and opportunity criteria. Financial criteria include financial indicators of new products such as profitability, sales, costs, ROI and market share. The second dimension concerns customer satisfaction and how new products attract new customers and create new market opportunities. The third dimension has a much wider scope because it refers to the overall opportunity that new products can create. These opportunities include, for example, providing a platform for further new product development and gaining skills and experience as a result of new product development projects (Sethibe and Steyn, 2016).

Innovative businesses are still looking for relevant metrics that quantify the benefits of innovation. Also in "what is not measured is not managed" applies to this issue, therefore it is important to measure the benefits of innovation using certain rules (Chromjaková and Rajnoha, 2009). Hauschildt and Salomo (2007) list three types of innovation effect criteria: Technical criteria assess the success of innovation according to technical parameters (fuel consumption, knowledge of weak points, transfer of know-how, etc.). Economic criteria evaluate the success of the innovation, for example, based on the amount of profit or turnover. Indirect effects include a reduction in competitive market share. These the criteria are mainly used to determine whether the innovation leads to a reduction in costs through quality improvement. Other criteria include, for example, the impact on the environment, as well as increasing safety at work, as well as eliminating physically demanding jobs (Spacek, 2015).

After the introduction of the innovation, there are positive or negative impacts. Positive impacts the introduction of innovations (not only) in transnational companies are for example (Rammer et al.,2016):

- Retention of existing customers
- Better response to changing customer needs
- Acquisition of new customers
- Increase in sales
- Increasing market shares
- Cost reduction
- Development of more ecological products

Because innovation is now a universally recognized critical requirement for almost everyone businesses in all sectors, it is necessary to define certain indicators, to on the basis of which the innovation can be evaluated. (Saunila, 2017) To measure the success/failure of innovation is it is necessary to create a complex of indicators, including input and output metrics that they control resource allocation as well as return on investment (Saunila, 2017). Measurement of direct and indirect effects, or impacts of innovation, investigated using different performance indicators, can be devoted to different areas in the company. Just a selection of these indicators influence the decision-making of executives between different dilemmas (Brattström et al., 2018). The problem with measuring the impact of an innovation is "metric overload", i.e. defining big number of indicators. Many businesses try to measure everything with different criteria. This overload leads to excessive activities that provide little value and often cause conflict behaviour (Adams, et al., 2006). Brattström et al. (2018) also agree with this statement, who state that the setting of an illegal complex of indicators by managers leads to focus executives' attention on the wrong set of problems.

4 Conclusion

Innovation is really important for businesses, because the needs of the market require that businesses constantly were improving their products and services so they could remain competitive in their industry. With innovation, it is possible to extend the life phase of the enterprise. thanks to innovation, a business can achieve higher performance, including these terms there is a relationship. Although there are a few authors who argue otherwise, most of the literature describes the positive impact of innovations on business performance.

If companies find out, or they measure the results of their training in at least the following areas, this measurement can serve them to obtain relevant information suitable for implementation future innovations. Through analyses of the impact of innovations (either in the form of innovative performance or impacts on business performance, the business learns about its strengths and weaknesses and can prepare in advance for new market opportunities or take advantage of them his previous experiences to know how to react in certain situations, what it can help him in how best to avoid certain threats.

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Updates on Ethical Attitudes in Slovak Companies

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Abstract

Research background: Businesses formalize their ethical attitudes through Codes of Ethics/Conduct. These become a core for further processes and problem solving. There is a need to update these codes and disclose them to employees and other stakeholders. Study analyzes the forms of disclosure and frequency of using various informational channels.

Purpose of the article: Study examines the set of 179 Slovak subsidiaries of foreign multinationals with the aim to determine factors of updating on their ethical attitudes (frequency of using Website; Social networks; Intranet/BIS; Annual report; Specialized document; Collective agreement for enclosing ethical attitudes by variables: Autonomy in Ethics; Ethics in the organizational structure; Ethical organizational climate; Reason for adopting the Code; Ethical scandal).

Methods: Study based on the use of Kruskal–Walli's test was applied with the assumption of no difference between companies of various general ethical characteristics (V1-V5) in frequency of publication on their ethical attitudes (F1-F6). Found significant differences were analysed by Bonferroni post hoc test to identify exact differences. The IBM SPSS Statistics Subscription software was used.

Findings & Value added: Study shows that 33.5 % of entities publish ethical attitudes regularly on their website, 15.1 % on social networks and 46.9 % on company's intranet. 48.6% regularly update their ethical attitudes in annual reports, 27.9% in specialized documents and 27.4% in collective agreement. The differences in frequency were found between companies who solve ethics under the Compliance Department and under PR /Marketing Department. There is also difference between companies who build strong and medium ethical organizational climate.

Keywords: *Business Ethics; Code of Ethics; multinational enterprises; Slovakia, ethical attitudes*

JEL Classification: *F23; J81; M14*

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1 Introduction

The study of business ethics increasing its importance. Global economic face unprecedented challenges of COVID-19 pandemic, global environmental crisis and nowadays also increasing risk of war conflicts. Individuals and businesses must deal with these situations, take a position on them and act. Society has elevated expectations on actions of business sector, multinational corporations especially. They are expected to be helpful at least locally and as a good corporate citizen they must contribute to mitigating the impacts. Thus, companies are required to maintain themselves ethically in the first place and to assist in stitching beyond what is required by law. Even if companies do not engage in corporate social responsibility (CSR) beyond what is ethical and required, maintaining at least ethically is a necessity for keeping their face and reputation in the eyes of customers and other stakeholders.

Business ethics is defined as the study of business situations, activities, and decisions where issues of right and wrong are addressed. This general definition does not set out the characteristics of good or bad organizational behavior which confuses business ethics with the law, which also sets the rules of right and wrong (Crane and Matten, 2010). But ethics is a wider construct which from its descriptive perspective (Ferrell et al., 2019) includes not just what is required by law but also what is required by society in the form of accepted rules of conduct and preservation in certain contentious situations in a way that is decent and for the benefit of the parties involved. In business, the overlap of ethics and law is observed in the way in which organizations operationalize these rules (for example through ethical tools, i.e., written documents, practices and procedures designed to guide employee behavior towards what the firm considers ethical (Weaver et al., 1999; Kaptein, 2015)). These sets the normative perspective of business ethics (Laczniak and Kennedy, 2011) and serve three major purposes in organizations: they include demonstrating a concern for ethics by the organization, transmitting ethical values of the organization to its members, and impacting the ethical behavior of those members (Wotruba et al., 2001). Therefore, business ethics is not just the conceptual idea but also the control system (McCrudden, 2008) which can be formally incorporated in the company's rules in the form separate document (Code of Ethics, Code of Conduct) or it can be a part of the other corporate documentation (Annual report, employee's contracts, operating principles) (Kozáková et al., 2021). These documents confess the company's attitudes towards ethics and they are usually considered to be static. But, in the turbulent situations, as we have nowadays, the need for updates is increasing.

Introducing the ethical principles in business practices and formal incorporating of ethical codes in the company's core documentation creates the prerequisite of strong ethical organizational climate. It is a type of organizational work climate understood as a group of prescriptive climates reflecting the organizational procedures, polices, and practices with moral consequences. Theory of the ethical work climate was developed by Victor and Cullen (1988) who identify the normative systems guiding organizational decision-making and the systematic responses to ethical dilemmas. According to this, ethical climate can be defined (Cullen et al., 1989) as the prevailing perceptions of typical organizational practices and procedures that have ethical content and can be seen as a component of the organizational culture.

2 Methodology

The aim of this study is to determine factors of updating ethical attitudes in Slovak companies.

Design of study

The study was conducted in the form of an interview (Gillham 2000) provided by the group of trained interviewers. The survey contains multiple topics connected to management of multinationals. However, this paper presents just the fragment aimed at business ethics, updates on ethical attitudes, respectively. Precondition for participation in the study was registration in Slovak Commercial Register, connection with the foreign mother company as Slovak subsidiary (no matter the type of this connection or investment) and formal existence of Ethical Code/Code of Conduct in the company. For this research, a stratified randomization (Kim and Shin, 2014) was used. After data adjustment (Wapstra, et al., 2003), the sample was narrowed to 179 examined companies.

Since the total number of Slovak companies connected with the foreign multinationals is unknown, it was not possible to identify the representativeness of sample. In addition, the total number of companies who formalize their ethical attitudes thorough Codes of Ethics is unknown too. These can be identified as limitations of the study. But we believe that given the structure of sample and number of examined companies this study thoughtfully describes the situation in Slovakia.

Factors and variables

To describe the situation on updating ethical attitudes in Slovak companies' questions connected to frequency of publication of ethical attitudes were included in the questionnaire. All these questions were closed type with the five possible answers designed as Likert scale (Nemoto and Beglar, 2014): (1) Never; (2) Exceptionally; (3) Occasionally; (4) Irregular; (5) Regular. As a result, the set of five factors describing the form of updating on ethical attitudes of monitored companies was set: F1 - Website; F2 - Social networks; F3 - Intranet / Business Information System; F4 - Annual report; F5 - Specialized document; F6 - Collective agreement or other document supplementing the employment agreement.

General attitudes and characteristics of monitored companies on business ethics were included in the five questions later used as variables V1-V5. These were designed as closed questions with the following answers and their frequencies:

- V1 Autonomy in Ethics: 1- Decisions are made exclusively by parent company (30), 2 -Decisions are made usually by mother company (48), 3 - There is consensus on decisions with mother company and daughter (59), 4 - Decisions are made usually autonomy by daughter company (32), 5 - Decisions are made autonomy by daughter company (10);
- V2 Ethics in the organizational structure: 1 - Separate Ethics Department (15); 2 - Under the CSR department (17); 3 - Under the Compliance Department (30); 4 - Under PR or Marketing Department (20); 5 - Under Human Resources Department (79); 6- Another department (18);
- V3 Ethical organizational climate: 1- Strong (49), 2 – Moderate (61), 3 - Medium (50), 4 – Weak (18), 5 – None (1);
- V4 Main reason for adopting the Code of ethics: 1 - Striving to build the good name of the company (101); 2 - The need to adopt the ethical principles of the parent company (56); 3 - Trying to copy current trends (4); 4 - Public pressure due to an ethical issue that society had (5); 5 - Pressure from owners (13);
- V5 Ethical scandal: 1 - No ethical issue yet (93); 2 - A unique problem with ethics (65); 3 - They have solved them more (19); 4 - They face them regularly (2).

Hypothesis

For determining factors of updating ethical attitudes in Slovak companies the analysis of statistically significant differences between companies of various ethical characteristics in

updates on their ethical attitudes was realized. Therefore, the general hypothesis of this study was set:

- • H0: There is no difference between companies of various general ethical characteristics (V1-V5) in frequency of publication on their ethical attitudes (F1-F6).
- • Ha: There is a difference between companies of various general ethical characteristics (V1-V5) in frequency of publication on their ethical attitudes (F1-F6).

For this study, alternative hypotheses were extended to the set of specific hypotheses derived from Ha (Ha1-Ha5). Computed p-value lower than the significance level alpha=0.05, indicates to reject the null hypothesis H0, and accept the alternative hypothesis Ha and vice versa.

Procedure

Identification of statistically significant differences was preceded by the Shapiro Wilk test of normality (Shapiro and Francia, 1972) which verified that used data significantly deviate from a normal distribution. Also, the Durbin – Watson test (Watson and Durbin, 1951) confirmed no autocorrelation between set variables. Subsequently, a nonparametric statistical test (Kruskal and Wallis, 1952) was applied with the assumption of no difference between companies of various general ethical characteristics (V1-V5) in frequency of publication on their ethical attitudes (F1-F6). Later, significant differences found by Kruskal - Walli's test were analyzed by Bonferroni post hoc test to study the relationship between variables (Lee and Lee, 2018) closely with the assumption that the data are a random sample from a normal population. This post hoc analysis is based on estimated marginal means with the mean difference significant at the 0.05 level, using P value adjusted for Bonferroni correction.

Statistical analysis and computing of data frequencies were provided by the Software IBM SPSS Statistics Subscription 1.0.0.1447 software.

3 Results and discussion

The set of monitored business entities is characterized by the fact that they all have a formally adopted Code of Ethics and thus publish their ethical positions in the form of a formally adopted document. This is not necessarily a separate document, sometimes it is a part of an Annual Report or another summary document. What is characteristic, however, is that the company defines its ethical considerations and attitudes towards the basic ethical principles required towards employees, customers, partners, and other stakeholders. Once this document has been received, it is important to change and adapt it to the current situation if necessary, or periodically. Nowadays, it is customary for business documents to be published online for a wider public on corporate websites, social networks or in the corporate information system.
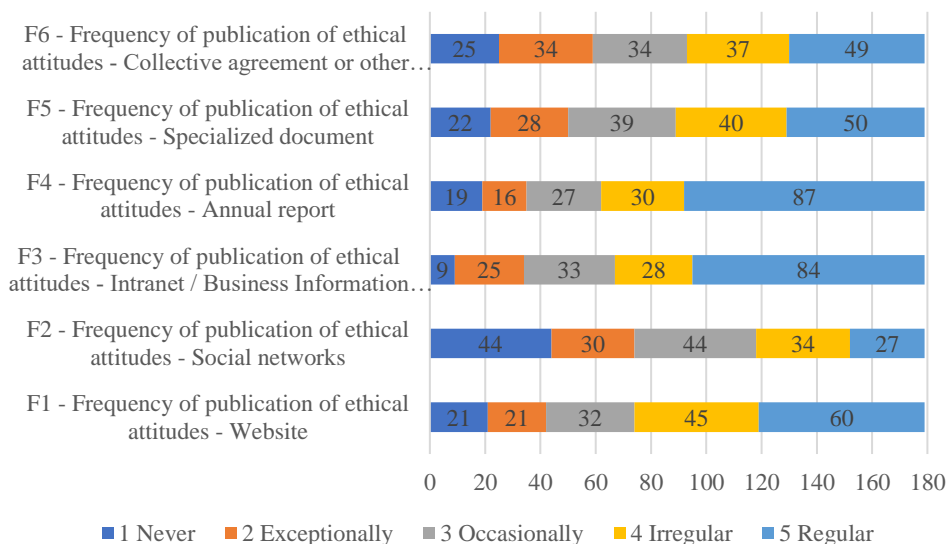
Figure 1. Frequencies of factors F1-F6

Source: own processing

The frequency of publication companies' ethical attitudes was investigated thorough the set of questions designed to Likert scale answers. In this study they were used as Factors F1-F6 (Figure 1). Out of 179 monitored entities, 60 publish ethical attitudes regularly on their website, 45 of them irregularly. On social networks companies are not that regular. The 44 of them publish on them just occasionally and the same number never. The most used form of publishing Code of Conduct for companies is their online Information system or so-called Managerial information System (MIS), which is usually accessible exclusively for their employees. In addition, these systems are usually very advanced, and they work under module platforms which allow them to access various content for various users according to their authorization. When using MIS, companies usually use modular Codes of Conduct and users are allowed to access just the parts conducted for them. For example, employees have access only to general parts of the document and parts dedicated to desired behaviour of employees, they cannot see parts for managers or owners. MIS is used regularly for publication of ethical attitudes in the 84 monitored companies. Similar number of them (87) regularly use the form of Annual Report. This is understandable, since there is no rules or obligations for publication of ethical attitudes in European union, nor in Slovakia. Despite this, 50 monitored companies use separate document regularly, 40 irregularly and 39 occasionally which indicates the move in the direction of to the use of separate documents. Still, similar numbers of monitored companies use also Collective agreement or other document supplementing the employment agreement. This is used in 49 companies regularly and in 37 companies irregularly which also indicates the afford of this companies to connect their internal documents and ethical attitudes confessed in Code of Conduct they are transfer formally and directly to employment contracts.

For determining factors of updating ethical attitudes in monitored companies the analysis of statistically significant differences between entities of various ethical characteristics in updates on their ethical attitudes was realized. Therefore, we verified the general hypothesis H0 of no difference between companies of various general ethical characteristics (V1-V5) in frequency of publication on their ethical attitudes (F1-F6). For this verification, the Kruskal-

Wallis nonparametric test was used (Table 1). Computed p-values were lower than the significance level alpha=0.05 only in case two cases (F3/V2 and F5/V3) which indicates acceptance of null hypothesis alternative hypothesis in case of Ha2 and Ha3. In case of Ha1, Ha4 and Ha5 we are rejecting the alterative hypothesis and accept H0.

Table 1 Significant differences between variables (V1-V5) and factors (F1-F6)

Alternative hypothesis	Grouping Variable	F1	F2	F3	F4	F5	F6
Ha1	V1 - Autonomy in Ethics	6,774	0,374	2,551	2,081	2,204	3,386
	df	4	4	4	4	4	4
	Asymp. Sig.	0,148	0,985	0,635	0,721	0,698	0,495
Ha2	V2 - Ethics in the organizational structure	8,425	4,969	14,181	2,261	3,816	5,019
	df	5	5	5	5	5	5
	Asymp. Sig.	0,134	0,420	**0,014**	0,812	0,576	0,414
Ha3	V3 - Ethical organizational climate	7,644	4,152	6,115	4,831	11,764	6,215
	df	4	4	4	4	4	4
	Asymp. Sig.	0,106	0,386	0,191	0,305	**0,019**	0,184
Ha4	V4 - Main reason for adopting the CoE	6,390	4,287	6,611	0,506	1,707	2,073
	df	4	4	4	4	4	4
	Asymp. Sig.	0,172	0,369	0,158	0,973	0,789	0,722
Ha5	V5 - Ethical scandal	1,383	1,002	2,234	0,975	4,004	2,171
	df	3	3	3	3	3	3
	Asymp. Sig.	0,710	0,801	0,525	0,807	0,261	0,538

Source: own processing

Results of Kruskal-Walli's test indicates statistically significant differences between (Ha2) companies of differ incorporation of ethics in the organizational structure (V2) and (Ha3) companies of differ ethical organizational climate (V3) in frequency of publication on their ethical attitudes (F1-F6). For searching exact differences, the Bonferroni post hoc test was used with the general assumption of no statistical difference between two data sets being compared.

Table 2 Pairwise comparison F3 - Frequency of publication of ethical attitudes - Intranet / Business Information System and V2 - Ethics in the organizational structure

(I) V2 - Ethics in the organizational structure		Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	-0,039	0,444	1,000	-1,361	1,283
	3	-0,833	0,397	0,556	-2,014	0,347
	4	0,367	0,428	1,000	-0,908	1,641
	5	-0,080	0,353	1,000	-1,131	0,971
	6	-0,500	0,438	1,000	-1,805	0,805
2	1	0,039	0,444	1,000	-1,283	1,361
	3	-0,794	0,381	0,576	-1,927	0,339
	4	0,406	0,414	1,000	-0,825	1,637
	5	-0,041	0,335	1,000	-1,039	0,957
	6	-0,461	0,424	1,000	-1,723	0,801
3	1	0,833	0,397	0,556	-0,347	2,014
	2	0,794	0,381	0,576	-0,339	1,927
	4	1,200[*]	0,362	0,017	0,123	2,277
	5	0,753	0,269	0,085	-0,047	1,554
	6	0,333	0,374	1,000	-0,779	1,446
4	1	-0,367	0,428	1,000	-1,641	0,908
	2	-0,406	0,414	1,000	-1,637	0,825
	3	-1,200[*]	0,362	0,017	-2,277	-0,123
	5	-0,447	0,314	1,000	-1,381	0,487
	6	-0,867	0,407	0,522	-2,079	0,346
5	1	0,080	0,353	1,000	-0,971	1,131
	2	0,041	0,335	1,000	-0,957	1,039
	3	-0,753	0,269	0,085	-1,554	0,047
	4	0,447	0,314	1,000	-0,487	1,381
	6	-0,420	0,327	1,000	-1,395	0,555
6	1	0,500	0,438	1,000	-0,805	1,805
	2	0,461	0,424	1,000	-0,801	1,723
	3	-0,333	0,374	1,000	-1,446	0,779
	4	0,867	0,407	0,522	-0,346	2,079
	5	0,420	0,327	1,000	-0,555	1,395
Based on estimated marginal means *. The mean difference is significant at the 0,05 level. b. Adjustment for multiple comparisons: Bonferroni.						

Source: own processing

Post hoc pairwise comparison of factor F3 - Frequency of publication of ethical attitudes - Intranet / Business Information System and variable V2 - Ethics in the organizational structure (Table 2) enclosed statistically significant differences between companies who ethical issues solve under (3) under the Compliance Department (30 out of 179) and companies who solve them (4) under Public Relations or Marketing Department (20 out of 179). This difference may be due to the different approaches to ethical issues in monitored companies. It can be assumed that the group of companies that managerially integrate the area of ethics under the compliance department approaches this problem more from the point of view of legal and legislative. The area of compliance focused on compliance of corporate processes with legislative and legal regulations. Compliance with ethical principles can be said by voluntary extension of compliance with socially generally accepted rules beyond what is required by law. On the other hand, there is an understanding of the disclosure of attitudes towards business ethics as part of promoting a business and building its reputation, which can be assumed to be done by companies that manage to integrate the area of ethics under the PR or Marketing department. Thus, we see the difference between enterprises in the organizational integration of ethics into the company in their different approach to business ethics, which is manifested in the focus on the legal aspect of ethics and in the focus on the marketing potential of compliance.

Table 3 Pairwise comparison - Dependent Variable: F5 - Frequency of publication of ethical attitudes - Specialized document and V3 - Ethical organizational climate

(I) V3 - Ethical organizational climate		Mean Difference (I-J)	Std. Error	Sig.b	95% Confidence Interval for Differenceb	
					Lower Bound	**Upper Bound**
1	2	0.587	0,256	0,230	-0,141	1,314
	3	,796*	0,268	0,034	0,034	1,558
	4	0,205	0,368	1,000	-0,840	1,250
	5	-1,184	1,347	1,000	-5,014	2,646
2	1	-0,587	0,256	0,230	-1,314	0,141
	3	0,210	0,254	1,000	-0,514	0,933
	4	-0,382	0,358	1,000	-1,399	0,635
	5	-1,770	1,344	1,000	-5,593	2,052
3	1	-,796*	0,268	0,034	-1,558	-0,034
	2	-0,210	0,254	1,000	-0,933	0,514
	4	-0,591	0,367	1,000	-1,633	0,451
	5	-1,980	1,347	1,000	-5,809	1,849
4	1	-0,205	0,368	1,000	-1,250	0,840
	2	0,382	0,358	1,000	-0,635	1,399
	3	0,591	0,367	1,000	-0,451	1,633
	5	-1,389	1,370	1,000	-5,284	2,506
5	1	1,184	1,347	1,000	-2,646	5,014
	2	1,770	1,344	1,000	-2,052	5,593
	3	1,980	1,347	1,000	-1,849	5,809
	4	1,389	1,370	1,000	-2,506	5,284
Based on estimated marginal means *. The mean difference is significant at the 0,05 level. b. Adjustment for multiple comparisons: Bonferroni.						

Source: own processing

Post hoc pairwise comparison of factor F5 - Frequency of publication of ethical attitudes - Specialized document and V3 - Ethical organizational climate (Table 3) enclosed statistically significant differences between companies who build (1) strong ethical climate (49 out of 179) and (3) medium ethical organizational climate (50 out of 179). This difference can be simply explained by the different importance that companies attach to the building of the ethical organisational climate. On the one hand, there are businesses that know the benefits of a strong ethical organisational climate and focus on building it in a targeted way through various tools. On the other hand, there are enterprises that are equally aware of the importance of an ethical organisational climate, but do not pay enough attention to its building. Of the group of businesses that are aware of the importance of creating an ethical organisational climate, these are entities on the other side of the spectrum. In addition to them, there are still businesses that will not be at all or minimal in the ethical climate and remain only with the formal adoption of the Code of Ethics. In their case, the targeted effort to build an ethical organisational climate cannot be talked about, which in our opinion is the

reason for finding differences precisely between groups with a strong and medium organizational climate.

4 Conclusion

Formal incorporating of Codes of Ethics or Codes of Conduct and building of ethical organizational climate become core of business practice also in Slovakia. These tools are slowly incorporating by Slovak businesses and leaders are primarily daughter companies of foreign multinationals. Study examines the 179 of these companies with the aim to determine factors of updating on their ethical attitudes which describing the frequency of using website; social networks; intranet or Business Information System; Annual report or other specialized document; Collective agreement or other document supplementing the employment agreement for enclosing ethical attitudes. According to our findings we can conclude that 33.5 % of monitored entities publish ethical attitudes regularly on their website, 15.1 % on social networks and 46.9 % on company's intranet or its internal Managerial Information System. Also, 48.6% of companies make their ethical attitudes public in the form of Annual report, 27.9% in the form of specialized ethical document and 27.4% regularly update also Collective agreement or other document supplementing the employment agreement.

The differences in frequency were examined between companies of various ethical characteristics: autonomy in ethics; ethics in the organizational structure; ethical organizational climate; main reason for adopting the Code of Ethics; and previous occurrence of ethical scandal. Using nonparametric Kruskal – Walli's test followed by the Bonferroni post hoc test we identified two exact differences. The fist is between companies who solve ethics under the Compliance Department and companies who solve it under Public Relations or Marketing Department which may be due to their different approaches. Companies who integrate the area of ethics under the Compliance department solve this more from the legal and legislative point of view and companies who integrate it under the Marketing of PR departments understand ethics as a tool for building company's goodwill. The second difference was found between companies who build strong and medium ethical organizational climate which can be explained by the different importance they attach to its building. Among businesses who know the benefits of a strong ethical organisational climate there is a group who strongly and systematically focus on its building using various tools and other companies who do not pay appropriate attention to it. Study contributes to the research of Business ethics and its formalization thorough Codes of Ethics or Codes of Conduct. Our outcomes can be used in the teaching of business-oriented study programmes, and it can also help to managers in their business practice.

Acknowledgement

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The influence of social media on the young generation's consumer behaviour of eco-innovations

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Abstract

Research background: The literature describes the use of social media to obtain various information instead of looking for it on official sources as a groundswell phenomenon. At the time of technological interference, it can be an important factor in determining the purchasing behaviour of consumers. Considering the importance and inevitability of ecological solutions, the use of social networks can be considered essential, especially in the area of raising awareness and eco-products, ecological services, as well as other ecological options available to customers, which ultimately can influence their consumer behaviour.

Purpose of the article: The paper aims to identify the manifestations of the groundswell in the use of social networks by consumers belonging to Generations Y and Z and to determine the influence of social networks on the consumer behaviour of these consumers in the field of eco-innovations and when purchasing eco-products.

Methods: The survey was conducted on a sample of 316 respondents aged 17-36. Data collection took place in the period from September 12 to 30, 2022. The method of selecting respondents was random, conditional only on the age of the respondents.

Findings & Value added: The results demonstrated the influence of social networks on the purchase of ecological products or the use of ecological services and the impact of the groundswell on consumer behaviour.

Keywords: *Groundswell; Eco-Products; Consumer Behaviour; Social Media*

JEL Classification: *M30; M31; M39*

1 Introduction

In recent years, the use of social networks for communication and social interaction has complemented the search for information. For example, Westerman, Spence, & Heide Van Der (2014) point to this trend. This is also confirmed by the data from the Digital Report (Kemp, 2022) on the use of social media. According to this data, the fourth most common reason for using social media platforms is finding content (31.6%) and the sixth most

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common reason is finding inspiration for things to do and buy (Kemp, 2022). Although the primary reason for using social media platforms continues to be keeping in touch with friends and family, the search for content and inspiration for purchase represent a new dimension in the use of these media.

As Voramontri and Klieb (2018) point out, the social media revolution has led to new ways of searching and obtaining information about several products and services on the market. According to Powers et al. (2012), this allowed consumers to connect and discuss brands quickly and easily. Smith (2009) emphasizes that consumers' opinions about products and services are increasingly controlled by strangers in digital spaces, which in turn affects opinions in the offline space. According to Mangold and Faulds (2009), social media has empowered consumers because marketers have no power over the content, timing, or frequency of online conversations between consumers.

Consumers' use of social media according to Darley et al. (2010) is keenly watched by marketers, but there is still not enough information about how they influence consumer behaviour and consumer decision-mak. Many studies (Ashman, Solomon, & Wolny, 2015; Bronner & Hoog, 2010; Grant, Clarke, & Kyriazis, 2007) focus on consumer behaviour in an online shopping environment, but without considering the effects of the Internet on the various stages of the consumer decision-making process.

Investigating the impact of social media and social platforms on consumer behaviour is also justified in the context of the groundswell phenomenon. Li and Bernoff (2011) define the groundswell as a societal trend where people use technology to achieve what they need from each other rather than from traditional institutions such as businesses. Through the mentioned technologies, we understand precisely social networks, blogs, applications and other tools that allow obtaining the necessary information or sharing it.

In connection with the growing interest in eco-innovations and an ecological way of life, we can also assume an increased influence of the lower wave precisely in the field of eco-products.

2 Theoretical starting points and analysis of the current state

The literature defines social networks not only as means of communication in an online environment serving for the transfer of information, cooperation and maintaining relationships between interconnected participants, communities and organizations (Tuten & Solomon, 2017), but also as an important tool of the marketing mix (Kotler, Kartajaya, & Setiawan, 2021). According to Powers et al. (2012), a key issue for marketers currently is to understand how digital and social media are used in the purchase decision process.

Simeone and Scarpato (2020) viewed social media as a factor in raising awareness of sustainable consumption because firms promote their green products/services to connect customers using the Internet and social networks.

Most of the extant empirical studies focus on examining the green consumption of organic foods (Kushwah et al., 2019) or general tourism (Chin et al., 2018). Little is known about eco-label, eco-brand, social media can transform individual motivation and environmental concern into demand for green consumption.

Chi (2022) brings interesting results. His study reveals that social networks strengthen the effects of political and social concerns on ethical consumption behaviour and reduce the gap between consumption intention and ethical consumption behaviour. Online interaction strengthens the linkages between companies and consumers, consumers' intentions, and their behaviour also according to Kane (2009).

In the area of the social web, individuals use different online channels to express their concerns – somewhat relating to politics, environment, and society (Kim and Tussyadiah, 2013). The authors, emphasize the importance of social network sites used for tourists to seek

support from their social network while travelling and social support does not always directly result from the intense social networks sites use but rather moderated by tourists' self-presentation strategies.

On the other hand, Kang and Hur (2012) argued that individuals tend to purchase green products or services through social media channels and their concern for the environment. The results of their study showed that green brand satisfaction has a positive effect on green trust, affect, and loyalty. In addition, the results also revealed that green brand, trust, and effect have a significantly positive influence on green brand loyalty. Furthermore, they found that green brand loyalty has a strongly positive influence on green brand equity. This study suggests that in addition to the perceived green trust arising from eco-friendly attributes, green affect characterized by positive emotional consumption plays an important role in building green loyalty and green brand equity for sustainable development.

According to Hansen (2021), there is a need for a notation between the ups and downs of media coverage of the environment and comparable trends in public environmental concern. He has been surveying environmental communication research of the past four decades, some of the key trends and approaches in research which have sought to address the role played by media and communication processes in the public and political definition, elaboration and contestation of environmental issues and problems.

3 Methodology

In the study, we found out the possible influence of social networks on consumer behaviour in the field of eco-innovation and manifestations of the groundswell in the time of technological interference. We focused on comparing two generations: Generation Y and Generation Z. We found out the way and extent of using social networks in general, as well as in the area of following profiles of ecological brands/products, actively searching for information about ecological products through social networks and purchasing such products. The survey was conducted on a sample of 316 respondents aged 17-36. Data collection took place in the period from September 12 to 30, 2022. The method of selecting respondents was random, conditional only on the age of the respondents. The population of the Slovak Republic in the age structure of 12-41 years, which corresponds to the span of Generations Y and Z, formed the basic set. The minimum size of the sample set (N) was calculated according to the formula:

$$N = \frac{(z^2 \cdot p \cdot (1 - p)) + e^2}{e^2} \qquad (1)$$

We set the maximum margin of error (e) to 5%, variance (p) to 0.5 and confidence level (z) to 95%.

$$N = \frac{(0.9025 \cdot 0.5 \cdot 0.5) + 0.0025}{0.0025} = 91{,}25 \qquad (2)$$

We set the following research questions:

RQ1: Are there differences in the way social networks are used between Generations Y and Z?

RQ2: Is it possible to identify the manifestations of the lower wave in the use of social networks in the respondents?

RQ3: Do social media influence the consumer behaviour of respondents in the field of eco-innovation?

4 Results and discussion

The results of our own empirical research showed that the respondents most often use social networks more than 5 times a day, while they most often spend more than 120 minutes a day using them. However, the comparison of both generations brought interesting results, which showed that while Generation Y uses social networks most often 3-5 times a day and spends a maximum of 120 minutes a day using them, Generation Z uses social networks most often more than 5 times a day, while using them they spend more than 120 minutes a day. From the results, we conclude that Generation Z spends more time using social networks and they spend more time on them overall. However, the differences in the maximum time spent using social networks between these generations are surprising. Figures1 and 2 show more detailed results.
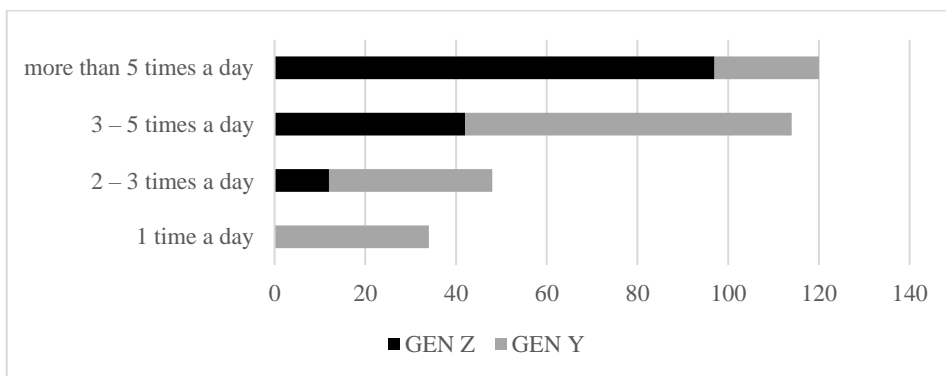
Figure 1. Use of social networks by Generations Y and Z (n Gen Y = 161 respondents, n Gen Z = 151 respondents)

Source: own processing, 2022
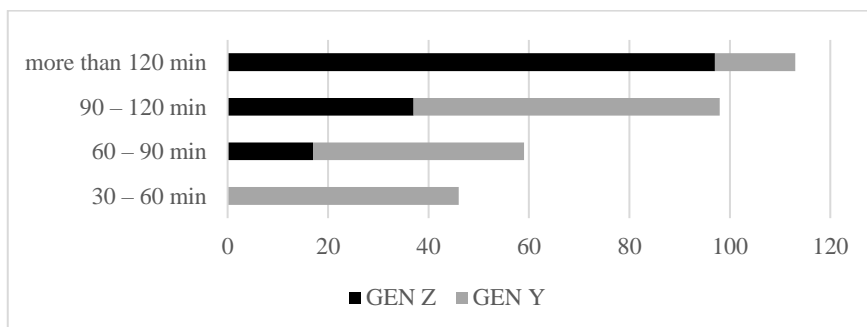
Figure 2. Time spent using social networks by Generation Y and Z (n Gen Y = 161 respondents, n Gen Z = 151 respondents)

Source: own processing, 2022

In the next part, we found out the purpose of using social networks. Respondents most often use social networks for keeping in touch with friends and family, followed by watching videos and reading news. These are the most common ways of using social networks in general. However, an interesting finding is that, similar to the literature on the groundswell, we can also see from the results of our survey the gradual use of social networks for finding tips and advice and finding necessary information and experiences of the users. Although from the total number of respondents, approximately 30% of respondents use social networks

for this purpose, we can also observe a trend of a new way of using social networks in our conditions, both in the case of Generation Y and Generation Z. Figure 3 shows more detailed results.
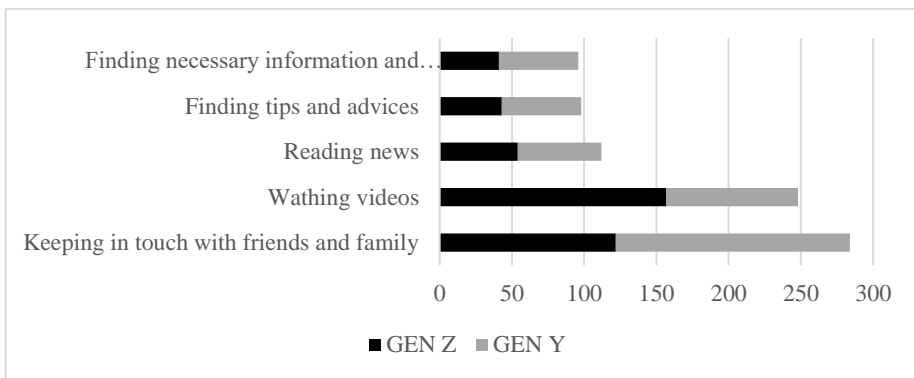
Figure 3. Reasons for using social networks (n Gen Y = 161 respondents, n Gen Z = 151 respondents)

Source: own processing, 2022

In the next part, we found out the use of social networks and their influence on consumer behaviour in the field of eco-innovations. We focused on whether the respondents follow brands or products that are ecological on social networks, how long they follow them, whether they search for information about a healthy lifestyle, ecological products or ecological alternatives through social networks, and whether they buy such products.

The survey results revealed that more than 60% of respondents follow eco-friendly brands and products on social media, both in the case of Generation Y and Generation Z. However, more than 70% of these respondents follow eco-friendly products or brands on social media only in the last year. Interesting findings were found by examining whether respondents search for information about healthy lifestyles, ecological products and ecological alternatives through social networks. In the case of Generation Y, almost 60% do so, while in the case of Generation Z, more than 80% do. A certain influence of social networks on consumer behaviour can also be seen in the consumer behaviour of the respondents. More than 70% of respondents said that they buy organic products regularly or occasionally. From the results, we can observe the influence of the lower wave and its more intense manifestations in the younger generation. Figures 4-7 show more detailed results.
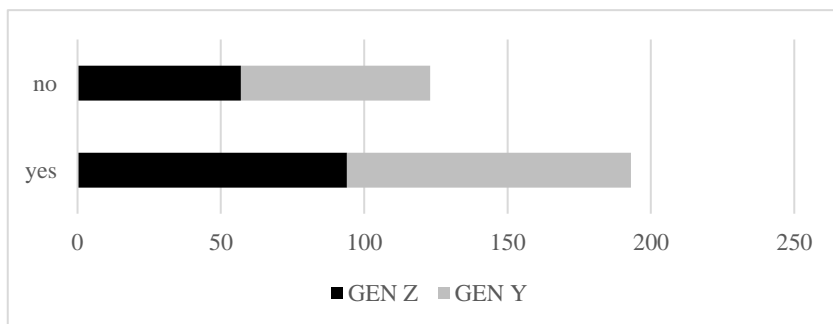
Figure 4. Following ecological products or brands on social networks (n Gen Y = 161 respondents, n Gen Z = 151 respondents)

Source: own processing, 2022
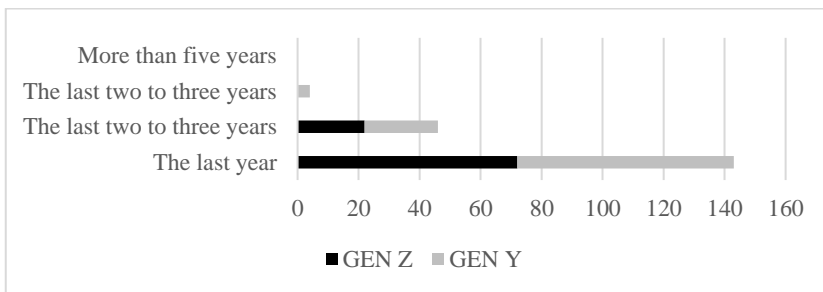
Figure 5. Duration of following profiles of ecological products or brands on social networks (n Gen Y = 94 respondents, n Gen Z = 99 respondents)

Source: own processing, 2022
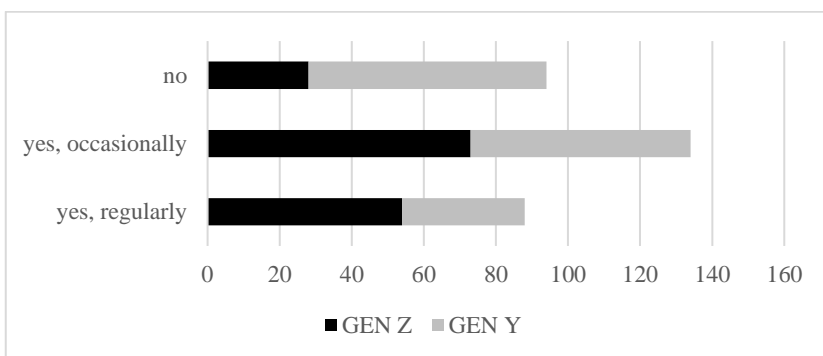
Figure 6. Searching for information about healthy lifestyles, ecological products and ecological alternatives through social networks (n Gen Y = 161 respondents, n Gen Z = 151 respondents)

Source: own processing, 2022
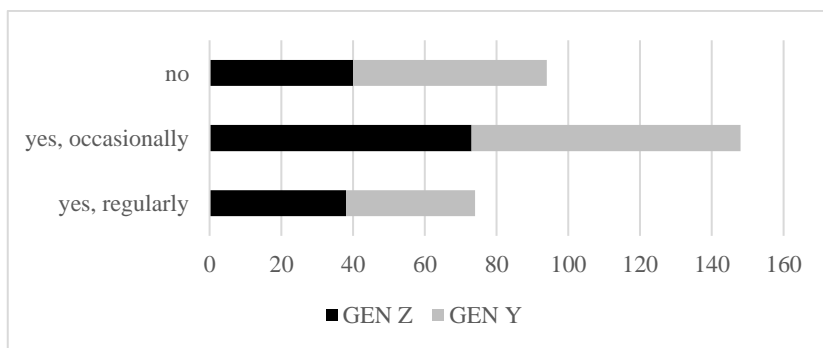
Figure 7. Buying eco-products or using eco-friendly services (n Gen Y = 161 respondents, n Gen Z = 151 respondents)

Source: own processing, 2022

5 Conclusion

The use of social networks for marketing communication is today a natural and necessary part of effective marketing and building relationships with customers. Social media, including social networks, are used in the communication process by both large, medium and

small business entities. Areas of operation, industry classification or other specific nature of business activity are not limiting. In the field of eco-innovation, the use of social media and social networks is equally important. As Krajčovič (2022) points out, given the importance of innovations and the necessity of ecological solutions, their use can even be considered necessary, especially in the area of raising awareness and eco-products, ecological services, as well as other ecological options available to customers.

According to Sarkar (2013), over the past 10-15 years there has been a significant shift away from a purely regulatory approach to a slow increase in greening as a corporate issue. The greening of markets is now starting to show, especially in the last few years, due to the current climate debate.

The interest of consumers in environmental topics was also confirmed by the author's own research (Krajčovič, 2019) on a sample of 493 respondents aged 15-65, according to which almost 90% of respondents are interested in environmental topics. The greatest level of interest was found among respondents in the age group of 55 and over and 46-55 years. Social media and posts on social networks are the most used when obtaining information about these topics, although the results are largely influenced by the age of the respondents. A similar trend was also found in the case of the media in which the respondents encountered the promotion of eco-innovations. Again, the results were largely related to the age of the respondents. While the younger generation prefers online or social media, the middle and older generations, on the contrary, prefer traditional media. This applies to the use of media in obtaining information about environmental products, as well as to the perception of which media are most suitable for promoting eco-innovations.

Čábyová and Krajčovič (2020) emphasize that the communication of eco-innovations is one of the key aspects of the successful establishment of a company or its eco-products on the market. From the point of view of building a competitive advantage, it is therefore important not only to implement these activities but also to communicate them in an appropriate way in public. Social media is one of the key tools for achieving this goal, especially when trying to reach the younger generation.

The results of our own empirical research confirmed the trend of gradual use of social networks also for findings tips and advice, as well as finding necessary information and experiences of the users. The results also confirmed that over the past year, the majority of respondents from Generation Y and Generation Z follow the profiles of ecological brands or products on social networks and search for information about healthy lifestyles, ecological products and ecological alternatives through social networks, although the majority only occasionally. The results also demonstrated the influence of social networks on the purchase of ecological products, respectively. the use of ecological services and the impact of the groundswell on consumer behaviour.

6 Limits and restrictions

Being a pilot survey, the study and survey results have several limits and limitations. The first is the limited number of respondents, as well as the duration of the survey. Another is the implementation of research in exclusively the conditions of the Slovak Republic. Nevertheless, the study and the results of the empirical investigation bring interesting results, which will be the subject of further research questions, as well as further research in order to confirm or reject the influence of the groundswell on the consumer behaviour of the young generation in the field of eco-products and eco-innovations.

Acknowledgements

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Shortage of medical personnel in Europe as a global problem

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Abstract

Research background: Ensuring the health sector with the necessary number of personnel and investigating the causes of its shortage in the Slovak Republic and in other countries of Central and Eastern Europe is carried out as a rule in the context of their migration to the countries of Western Europe. It follows that the shortage of medical personnel is caused by their migration abroad for work. Some analyzes of this problem and statistical indicators show that the lack of medical professionals is not only a problem in the countries of Central and Eastern Europe. At the same time, the migration of medical personnel from the countries of Central and Eastern Europe is not so extensive that it can be considered the main cause of the shortage of medical personnel.

Purpose of the article: Therefore, the main task of the given study is to find out the state of the current provision of healthcare in EU countries with the necessary personnel and to determine whether this lack of healthcare professionals is a European global problem.

Methods: Analysis of statistical indicators of the number of health workers and indicators of their ratio to the number of the country's population, statistical calculations of significance in the differences of the analyzed indicators.

Findings & Value added: Reasoning that the shortage of medical personnel is a current problem for most EU countries. In such a case, it is necessary to change the methodology of examining the movement of health care workers, the intensity and direction of their migration flows.

Keywords: *medical personnel; shortage; global problem*

JEL Classification: *J4; J6; I0; I2*

1 Introduction

The lack of medical personnel in the professional community, in scientific studies and mass media is starting to be discussed in the countries of Central and Eastern Europe after the enlargement of the European Union and the liberalization of its labor markets. It is from this period that people start talking and writing about the lack of medical personnel in health care

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facilities and especially in hospitals. As a rule, the cause of this state of affairs is considered to be the departure of health workers to work abroad for better working conditions, higher wages, conveniences of social systems, a more acceptable political and social climate, etc. This mainly concerns young doctors, unburdened by their own families or the need to take care of elderly parents, and recent medical school graduates. Over time, the intensity and scope of migration flows for work abroad is growing. And above all, the awareness by students of medical and other higher and secondary medical schools of new opportunities both for work and for the way of life. The named processes are characteristic especially for the newly admitted EU countries of Eastern Europe and the Baltic countries.

In this context, it is necessary to emphasize that from that time the migration of workers also began in other occupations and spheres of employment and not only in the health sector. Nevertheless, at that time, in most sectors of the economy and spheres of employment in the countries of Central and Eastern Europe, the current problem is considered to be unemployment rather than a lack of workers. Unemployment in the health sector as a phenomenon of the labor market did not exist either at that time or to this day in the same form as in other sectors or spheres of employment. But when health care facilities begin to feel understaffed, it can be caused by several economic as well as social factors and not just the departure of health workers for work abroad.

At the same time, the labor markets in the countries of Western Europe had for a long time experienced a chronic shortage of workers in most branches of economic production and in other spheres of employment. The health sector was no exception, where there was also a shortage of medical personnel. To a certain extent, this situation was caused by those processes and events that took place a few years later after the end of the world financial crisis of 2008. In this period, that is, after the end of the crisis, progress in economic development, growth in the number of employees in all sectors is observed economy and employment spheres. From time to time, there is also a shortage of workers in several spheres of employment. This means that the world financial crisis was a global phenomenon and all the changes that took place both during the crisis and after it ended had a global character. Just as the financial crisis affected economic and social decline, economic growth begins after its end in countries and regions of the world that experienced economic decline.

In contrast, healthcare is a very specific activity and sphere of employment. And economic phenomena and processes, as well as the world financial crisis, do not directly affect the development or decline of activities in the health sector, as well as trends in employment. Healthcare is not a production it is a service. Its tasks and activities are different from those of manufacturing enterprises. Nevertheless, phenomena and processes in the field of healthcare in individual countries or groups of countries can be characterized by similar trends both in their development and in employment. The economy and its activities are the source of the wealth of the countries of the regions and continents. And this also affects the development of healthcare and the provision of healthcare. At the same time, the scope and quality of health care provision are influenced by several other factors. These include the quality and specificity of the social system in a given country or group of countries, which includes the level of well-being of the population, its education, way of life, extent and quality of social insurance. This includes trends in the demographic development of the population under In that case, if the named phenomena and processes occur and develop similarly in several countries, groups of countries in a certain territory or continents, then they also affect the overall, which means global changes or trends in the development of healthcare.

2 Theoretical Background

The shortage of medical personnel as a certain social phenomenon and process arises and takes shape in several countries over the course of several decades. Even in the last decades

of the last century in the economically developed countries of the world, a problem arose with the recruitment and retention of medical personnel. These processes develop even more intensively before the occurrence of the world financial crisis of 2008 and a few years later after its overcoming. At the beginning of the twenty-first century, an initiative of the International Council of Nurses (ICN) offers important information, organized into five important priority areas, related to the shortage of nurses in health care facilities and ways to solve it. These included political interventions; macroeconomics and financing of the health sector; workforce planning and policy, including regulation; positive practice environment; and retention and recruitment (including migration); and nursing leadership (Oulton, 2006).

In a survey conducted in eight geographically and demographically diverse states, a selected sample of nurses offered to propose the "top 5" measures that, in their opinion, will improve the provision of nursing care and at the same time reduce the shortage of nursing staff. For example, the creation of career ladders was supported by the absolute majority of respondents (85%), and the least (33%) supported salary increases. When choosing one of the most important actions, they changed the order - the salary increase was supported by the most (26%), and the creation of career ladders and an increase in educational opportunities - less than 1%. And when asked about the "most important" action to implement, they chose a pay rise. (Lynn and Redman, 2006). According to Heilmann, (2010), the talent shortage in the Finnish healthcare sector, which is caused by the retirement of the baby boomers, creates problems in managing the recruitment and retention of healthcare workers (nurses and doctors).

The Danish authors state that the shortage of nursing staff in hospitals is caused by nurses' dissatisfaction with their management, extensive workload and stressful work environment. In a survey of nurses' experiences of practice in hospital wards with a low rate of nurse turnover in relation to culture, work environment, competence of nurses and their management, three themes emerged: community, professional pride and friendly management – revealing a sense of community between nurses and ward managers. Despite the exhausting daily practice, the nurses remained in their positions thanks to the special culture in the wards that brought them together. (Hølge-Hazelton and Berthelsen, 2021).

The shortage of medical personnel is felt not only by the economically developed countries of the world. The shortage and recruitment of nurses in developed countries threatens to deplete the supply of nurses and compliance with health initiatives in developing countries. Solving this problem requires a two-pronged approach. The first involves greater care by developing countries in creating a largely sustainable domestic nursing workforce. The second requires greater investment through international aid in building capacity for nursing education in less developed countries. (Aiken, et al., 2004).

In the later period, the issue of recruitment and retention of medical personnel is supplemented by turnover of medical personnel caused by job dissatisfaction. In a survey by Italian authors, the reasons for dissatisfaction in the work of nurses are insufficient number of employees and increased workload, emotional exhaustion, poor patient safety, non-nursing care. While job attractiveness factors include positive perceptions of quality and safety of care and performing basic nursing activities. And the predictive factors of nurses' intention to leave their jobs due to job dissatisfaction and subsequently turnover significantly increase the cost of nursing care and negatively affect the quality of health care provision. (Sasso, et al., 2019).

In a study by Canadian authors, the relationship between satisfaction with pay, job satisfaction and turnover was investigated. According to the authors, in the professions of social work and nursing workers are more driven by job satisfaction than job compensation. This means that nurses may be more motivated by the work itself than by the salary. In such a case, hospitals have various ways to improve their work environment in order to increase satisfaction with internal job factors and reduce turnover. (Singh and Loncar, 2010). A study

by German authors investigated the relationship between trends in job satisfaction and other aspects of employment, such as full-time or part-time employment and salary. It found that for 23 years, the job satisfaction of German nurses has steadily and gradually declined, falling by an average of 7.5%, while the satisfaction of doctors and other health professionals increased by 14.4% and 1%, respectively. At the same time, during this period, nurses' wages increased by only 3.8% compared to a 23.8% increase for doctors. The authors came to the conclusion that among the factors that contributed to the decrease in satisfaction with the work of nurses, there is a lower salary and a demanding, strenuous work environment. (Alameddine, et al., 2016).

The shortage of nurses in the UK's National Health Service (NHS) has led to the employment of an increasing number of nurses who have immigrated from other countries and qualified abroad. A survey of the named category of health workers explains the complex interplay of economic and non-economic factors involved in the decision to migrate. Most nurses migrated independently outside of recruitment drives, experienced downward labor mobility, and were used as a temporary stopgap to fill labor shortages. (Hardill and Macdonald, 2000).

A growing crisis and an enormous shortage of medical personnel characterized US primary care even a decade ago. The reason for this was that an increasing number of US medical graduates were avoiding employment in adult primary care. At that time, sixty-five million Americans lived in areas that were officially considered primary care shortage areas. At the same time, adults across the United States faced challenges in getting prompt access to primary care. (Bodenheimer and Pham, 2010). This situation in the field of healthcare in the USA two years ago is basically explained by assumptions in the development of healthcare, made by other authors. According to them, demographic growth and an aging population should increase the workload of family physicians and general internists by 29 percent between 2005 and 2025. However, the age- and sex-adjusted supply of general practitioners for adult care is expected to increase by 7 percent, or by just 2 percent if the number of graduates continues to decline by 2008. We expect 35,000-44,000 The GP deficit at the time was expected to be between thirty-five and forty-four thousand. (Colwill, et al., 2008). According to the authors, this condition threatened the national base of primary care for adults.

In order to identify a strategy for keeping nurses in hospital practice and to avoid the deterioration of the quality of care due to their shortage, a survey of nurses was carried out in 488 hospitals in 12 European countries (Belgium, England, Finland, Germany, Greece, Ireland, the Netherlands, Norway, Poland, Spain, Sweden and Switzerland). Between 11% and 56% of nurses were dissatisfied with their jobs in most countries, and dissatisfaction was expressed with regard to wages, educational opportunities and opportunities for advancement. A significant percentage (19-49%) of nurses considered leaving their job, although the percentage who thought it would be easy to find another job varied significantly between countries (16-77%). (Aiken, et al., 2013). In the end, it was emphasized that a shortage of nurses can be expected unless the working environment in hospitals is improved. Several other European countries have grappled with health workforce shortages and emphasized the need to develop effective recruitment and retention strategies (Kroezen, et al., 2015).

An even greater shortage of medical personnel is observed during the COVID-19 pandemic. In the analysis of the impact of the pandemic on the mental and emotional state of healthcare workers, which results in anxiety, burnout, emotional suffering, etc. very often the cause of these symptoms is considered to be a lack of employees and an increased workload. (Brophy, et al., 2020; Khosravi, et. al., 2021; Mehedi, et al., 2022).

The analysis of the investigation of the given issue indicates that the lack of medical personnel in health care facilities in various forms occurs in the last decades of the last

century and reaches its peak during the period of the COVID-19 pandemic. From a geographical point of view, the shortage of health workers occurs in different territories and continents. Above, we presented studies from most of the developed countries of Europe, the USA and Canada. At the same time, there is a shortage of health workers in both developed and developing countries. This means that the object of the analyzes of the mentioned studies was the lack of workers as a result of their departure or turnover and at the same time as a factor that influenced the working conditions in medical facilities. Based on this, we determined the scope and intensity of the shortage of personnel in the health sector of individual countries, territories, or continental Europe as the object of our analysis.

3 Methodology and data

Based on the defined object as the subject of our analyses, we determined the repeatability, similarity and universality of the occurrence of such a problem as the lack of medical personnel in health care facilities in individual countries, territories or continents. Based on this, we determined the main goal of our work to carry out an analysis of the named processes and justify that the lack of medical personnel as an economic and social problem is currently a general, overall, which means a global problem for countries, especially in such geographical areas as the group of countries of Central and Eastern Europe and Western Europe. In professional and scientific studies of the group of countries of Eastern and Central Europe, as a rule, the shortage of medical personnel is analyzed as a consequence of the emigration of medical workers, mainly doctors and nurses, to work abroad and not as a separate problem. In the countries of Western Europe, the lack of medical personnel is analyzed as an important problem in the health sector of the given country, and therefore the analysis, as a rule, also includes the causes and impact of this problem on the scope and quality of the provision of health care.

The criteria for placing individual countries into a general "global" problem characteristic of individual territories includes the term "global" itself, which means total, aggregate, collective; general; worldwide; common, general (Globalny, 2022). This means that the lack of medical personnel in individual countries as an economic and social problem takes on such characteristics as total, summary, general or the same, or similar to other countries of the given territory or continent. In such a case, it can be considered that the given problem has a global nature. Another criterion for the establishment of the shortage of medical personnel into a global problem is those factors that cause this shortage and which are already considered global problems, global trends, global changes, etc. in the professional and scientific communities. For example, the aging of the population, especially in developed countries, causes an increase in the scope of health care and thus also a greater number of health workers.

The source of information for assessing the lack of medical personnel as a global problem is the results of professional and scientific analyzes and investigations of the given problem in individual countries in most European countries. In several studies that analyze the problems with the shortage of medical personnel, as a rule, the causes of the shortage of medical personnel in the given country are also mentioned. The authors of similar studies even describe the criteria and define the shortage of medical personnel as a global problem. Adequate statistical data from national institutions, such as the number of doctors and nurses per thousand inhabitants, are also analyzed to justify the lack of health workers as a global problem at work.

4 Results and discussion

As we have already mentioned, the problems with the shortage of health workers are deepening under the influence of events and processes caused by the world financial crisis of 2008. After its end, economic development is observed in most countries from 2011-2012. The range of investments in economic production, especially in innovative industries, is growing. Investments are creating new jobs, causing an even greater shortage of workers in most sectors of economic production and services compared to the pre-crisis period. At that time, healthcare was one of several rapidly developing sectors of the world economy. According to OECD data, employment in the healthcare sector of most European countries during this period increased on average to 12-15% [OECD, 2019]. Nevertheless, a chronic shortage of medical personnel is observed in most European countries (Skills, 2020). Migration of health workers from Central and Eastern countries to Western Europe not only did not solve the problem of shortage of workers, but also caused their enormous shortage in countries such as Latvia, Poland, Romania, Hungary and Slovakia [Hardy, et al., 2014].

In the process of analyzing the problems associated with the recruitment and retention of staff ten years ago, Heilmann (2010) considered the shortage of health workers to be a global problem. In addition, he emphasized that while the shortage of personnel in the health sector is worldwide, the results of this document are also useful at the international level. Even before that, Oulton (2006) noted that today's global nursing shortage is having an adverse effect on health systems around the world. And his overview of the global nursing shortage (which has been called a global crisis since 2002) provides perspectives and discusses the International Council of Nurses (ICN) initiatives related to the crisis. In a survey of nurses' experiences of practice in hospital wards with a low turnover rate in relation to culture, work environment, competence and management, Hølge-Hazelton and Berthelsen (2021) emphasized that the shortage of nurses in hospitals is a global problem caused by nurses' dissatisfaction with their management, extensive workload and stressful work environment. The results of several studies show that the lack of healthcare workers, especially nurses, causes excessive workload and their subsequent departure from healthcare. Thus, a strange chain of causation is created, when the lack of workers in jobs causes an even greater lack of them. (Sasso, et al., 2019).

As we have already mentioned, the nature of the global problem is determined, among other things, by those factors that have already acquired global characteristics and subsequently create an adequate global problem. These include demographic changes in the population, which are affected by the socio-economic development of society. The growth of the well-being of the population in the developed countries of the world, especially in the second half of the 20th century, the improvement of living and working conditions influenced the health status and life expectancy of the population. As a result, the population is "ageing", which means that the number of people in its age structure increases, as a rule, in retirement age. At the same time, in economically developed countries, fertility is decreasing, and the associated number of young people in the population structure is decreasing. Despite everything, older people need a greater range of health care and thus a greater number of workers in the health sector. And this ultimately determines the lack of health workers, especially doctors and nurses. This means that the global trend in the aging of the population has affected another problem - the global shortage of medical personnel.

Problems in healthcare, excessive workload, stressful work environment to a certain extent affect the prestige of healthcare professions and the decline of applicants for studies at medical schools and faculties. In this context, it is necessary to emphasize that studies at medical high schools and universities are more accurate than in most other fields of study and professions. At the same time, there is a decrease in the number of graduates of medical

schools who are employed in jobs connected with the provision of health care, especially in developed countries of the world. (Khosravi, et al., 2021).

Those trends in the health sector and the mechanism that caused the shortage of workers in the health sector were multiplied by such an undoubtedly global factor as the COVID-19 pandemic. Emotional distress, intense physical pressure, deterioration of social relationships and the inability to manage family responsibilities are key challenges for healthcare personnel, which require extensive social, emotional and organizational support, practical strategies and effective tools to be able to adapt to such highly stressful conditions. (Mehedi and Hossain, 2022; Khosravi, et al., 2021). COVID-19 has become a very serious public health problem and at the same time a global threat to the most vulnerable social groups of the population, thus creating a potential pandemic of social inequality and at the same time a huge challenge in terms of public health, ethics, economy, environment, politics and culture (Benach, 2020; Frosh and Georgiou, 2022).

Another justification for the global nature of the shortage of medical personnel in health care facilities, especially in the group of countries of Central and Eastern Europe and Western Europe, is the statistical indicators of the number of the two most numerous categories of health workers, namely doctors and nurses. As for the countries of Central and Eastern Europe, as we mentioned above, the lack of doctors and nurses in the health sector is explained by their leaving for work abroad. To a certain extent, one can agree with that. For example, around 10 percent of Slovak doctors are employed in the Czech Republic and other Western European countries. At the same time, this decrease in health workers in the Slovak Republic is being replaced by health workers from Ukraine, partly from Romania and Serbia.

There is a different situation with a shortage of medical professionals in the countries of Western Europe. Their migration within the countries of Western Europe is negligible, except for a slightly increased one between Austria and Germany. And the relatively scattered emigration of medical professionals from the group of Central and Eastern countries to Western Europe does not solve their shortage, despite the fact that the number of doctors and nurses per 1000 inhabitants in the countries of Western Europe is, as a rule, greater. (Table 1).

Table 1. Number of doctors and nurses per 1000 inhabitants

Country	Doctors		Nurses	
	Year 2010	**Year 2020**	**Year 2010**	**Year 2020**
Austria	4,8	5,35	6,53	10,48
Belgium	2,92	3,21	9,59	-
Czech Republic	3,6	4,1	8,1	8,66
Denmark	3,73	-	9,82	-
Estonia	3,24	3,48	6,12	6,38
Finland	3,17	-	11,97	-
France	3,04	3,17	-	-
Germany	3,71	4,47	9,87	12,06
Hungary	2,87	3,14	6,21	6,58
Italy	3,82	4,0	5,23	6,28
Latvia	3,11	3.34	5,01	4,18
Lithuania	3,95	4,48	7,37	7,81
Luxembourg	2,77	-	11,05	-
Norway	4,11	5,09	16,13	18,01
Poland	2,19	-	5,28	-
Slovenia	2,43	3,3	8,19	10,47
Spain	3.76	4,58	5,15	6,1
Sweden	3,81	-	10,86	-
Switzerland	3,81	4,39	14,64	18,37
United Kingdom	2,65	3,3	8,41	8,46

Source: OECD, 2022.

These statistical data indicate that the lack of medical personnel in the group of countries of Central, Eastern and Western Europe is not caused by the migration of medical professionals. The lack of workers in the named countries of Europe is caused by other global problems and processes that developed during the last decades, primarily in the countries of Western Europe, and at the same time influenced their development in the group of countries of Central and Eastern Europe. This regularity is another justification for the fact that the lack of medical personnel in the group of countries of Central, Eastern and Western Europe is primarily a global European problem.

5 Conclusions

The analysis and justification of the shortage of medical personnel as a global European problem has a certain cognitive as well as practical significance. From a practical point of view, the perception of this problem as global primarily indicates that it is influenced by several factors and processes, most of which also have a global nature. In such a case, the creation of measures and policies to ensure health care with the necessary personnel has the necessary orientation and adequate direction. Focusing only on the emigration of medical professionals as the main factor causing the shortage of medical personnel, as is the case in most countries of Central Europe, is inadequate and ineffective. The perception of the shortage of medical personnel as a global problem from a theoretical point of view provides adequate milestones for the direction of further analysis and research of the shortage of medical personnel as a global problem and defining those factors that influence its global nature. At the same time, such an approach makes it possible to obtain additional necessary information and knowledge about laws and processes that develop under the influence of economic, social and scientific-technical factors and that affect the effective functioning and development of the health sector.

Acknowledgments

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Selected characteristics of R&D, and innovation in Slovakia

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Abstract

Research background: Slovakia is a market-oriented economy; its progress is dependent on integration into foreign trade and investment structures. Given the current geopolitical and energy crisis, increasing volatility of domestic and foreign markets, complexity of products, and sophistication of customers the generation of profits and realization of growth must be addressed with a long-term perspective. The concept of Industry 4.0 is therefore perceived as a promising means of finding solutions to the mentioned problems.

Purpose of the article: The aim of the paper is to analyse the area of R&D, and innovations of enterprises or other entities performing R&D in the conditions of Slovakia. These are the basic knowledge, based on which it is possible to identify the level of these activities within Slovakia, and at the same time to identify the basic problems that limit these activities.

Methods: Scientific methods such as analysis and synthesis will be applied. Necessary data, which will be the subject of the analysis, have the character of secondary data, and were obtained precisely by synthesizing already existing surveys or these are published statistical data. As part of the analysis, trend analysis, comparative analysis, and structural analysis of selected indicators will be carried out.

Findings & Value added: In the context of the importance of the implementation of Industry 4.0, it is possible to read from the findings what causes the relatively low involvement of relevant entities in the subject area. The findings indicate that the priority problem is financing of these activities, procedural aspects of obtaining financial assistance from the state, including EU structures.

Keywords: e*nterprise; Industry 4.0; innovations; R&D*

JEL Classification: *F43; F69; O30*

1 Introduction

Slovakia is a market-oriented economy, and its progress is largely dependent on integration into foreign trade and investment structures. The global economy is currently inter alia

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characterized by the increasing volatility of domestic and foreign markets, complexity of products, and sophistication of customers. Preservation or systematic building of competitiveness at the level of enterprises, and subsequently of the entire economy, is therefore necessary. Given the current geopolitical and energy crisis, the generation of profits and realization of growth must be addressed with a long-term perspective, for example by finding ways to deal with constraints in the energy, resources, environment, and social and economic impacts. The concept of Industry 4.0 is therefore perceived as a promising means of finding solutions to the mentioned problems.

Industrial sector plays a crucial role in Europe, serving as a key driver of economic growth and accounting approx. for 75% of all European exports and 80% of all innovations (Dujin et al., 2014, Eurostat, 2022). The industrial sector is also decisive for the Slovak economy, and therefore the necessity of supporting innovations and innovative concepts with application to business practice is essential from the point of view of maintaining the competitiveness of the Slovak industrial enterprises.

Currently, new innovative technologies and concepts are being introduced in the business environment. Their upcoming massive expansion and introduction in various types of businesses is referred to as the 4th industrial revolution, which is also referred to the innovative concept known as Industry 4.0, while Horizon 2020 became one of the main tools for supporting the implementation of the Industry 4.0 concept at the European level. According to e.g., Dalenogare et al. (2018), Oztemel and Gursev (2020) Hermann et al. (2015), Karre et al. (2017) etc. the basic pillars of this concept are Cyber-Physical Systems (CPS), Internet of Services (IoS), Internet of Things (IoT), Robotics, Big Data, Cloud Manufacturing, and Augmented Reality. For Industry 4.0 are characteristic different types of integration – vertical and horizontal integration, application of technology, and accelerating through exponential technologies (Kohnova et al., 2019). According to Pereira and Romero (2017), Zhang et al. (2021), Gajdzik et al. (2021), Ortt et al. (2020), Perrier et al. (2020), Stentoft (2021), Majstorovic (2022) etc. the quest of applying Industry 4.0 brings diverse technological challenges, with high influences on many dimensions not only in manufacturing. Lacko states (2018) that e.g., enterprises in Slovakia focus on increasing the efficiency and effectiveness of internal processes and they want to use technology primarily to save costs, increase competitiveness, and replace lack of employees.

In the case of Slovakia, to use the potential benefits of Industry 4.0, it is important to support the concept of innovations in business practice. The resulting efficiency can also be achieved by appropriate support of cooperation between public research institutions or universities and the business sector. It can be expected that this sector has at least the research potential for the implementation of R&D, the area of implementation of their results (in terms of innovation) is then typical for the business sector. According to the results of the study by Kohnova et al. (2019) it would be useful (in the case of Slovakia and e.g., Czechia) to develop a partnership of cooperation in the field of R&D, and innovation between educational institutions and the business sector.

2 Methodology

Based on the above, the aim of the paper is to analyse the area of R&D, and innovations of enterprises or other entities performing R&D in Slovakia. These are the basic knowledge, based on which it is possible to identify the level of these activities within Slovakia, and at the same time to identify the basic problems that limit these activities.

The necessary data, which will be the subject of the analysis, have the character of secondary data, and were obtained precisely by synthesizing already existing surveys or these are published statistical data. The data primarily comes from the sources of the Statistical Office of the Slovak Republic, Eurostat (both mainly quantitative) or from already published

empirical studies. The basic scientific methods applied are quantitative data analysis (especially temporal and spatial), qualitative data analysis, and synthesis. Selected findings are graphically presented.

3 Results

From the analysis of the legal framework of R&D, and innovation in Slovakia, i.e., from the Act no. 172/2005 Coll. on the organization of state support for research and development as amended, it follows that:

- according to the Section 2, paragraph 1 – 3, research is defined as a systematic creative activity carried out in the field of science and technology for the needs of society and in the interests of the development of knowledge. It includes basic research (a systematic creative activity, the main goal of which is the acquisition of new knowledge, regardless of the possibilities of their direct practical use), and applied research (a systematic creative activity aimed at acquiring new knowledge with the aim of directly using the obtained results in economic and social practice).
- according to the Section 2, paragraph 4, development represents a systematic creative activity in the field of science and technology using laws and knowledge obtained through research or based on practical experience in the creation of new materials, products, equipment, systems, methods, and processes or their improvement.
- according to the Section 2, paragraph 5, innovation means a new or improved product, a new or improved service or a new or improved process that is applicable on the market and based on the results of R&D or business activity.

In terms of state institutional support, the Slovak Research and Development Agency was established as an interdepartmental entity providing state budget funds for entities performing these activities. The core area of its activity is to support top basic research, applied research, and development in individual groups of fields of science and technology, including interdisciplinary and multidisciplinary research carried out by the university sector, state sector of R&D, business sector (including self-employed persons), and non-profit sector of R&D, which are also R&D organizations and workplaces categorized according to the international methodology – the Frascati manual. At the same time, it follows from the above that the data reported in R&D, and innovations statistics for Slovakia should be internationally comparable.

On an international scale (Fig. 1), expenses of Slovakia on R&D are below average compared to the situation in the EU and in the OECD countries. From the beginning of the period of our analysis (2007), only in 2015 there was an indication that the expenses in Slovakia approached 50% of the EU expenses (approx. 49.80% of the EU values, i.e., 2% of GDP versus 1.16% of GDP). Expenses on R&D in 2020, according to the findings, in Slovakia reached 0.91% of the Slovak GDP i.e., approx. 34.10% of the EU level (OECD, 2022). The most recent – but so far only estimated data of the Statistical Office of the Slovak Republic (2022) indicate that the share of expenses for R&D relative to the Slovak GDP was approx. 0.95% (i.e., an annual increase of 0.04 percentage points was identified).
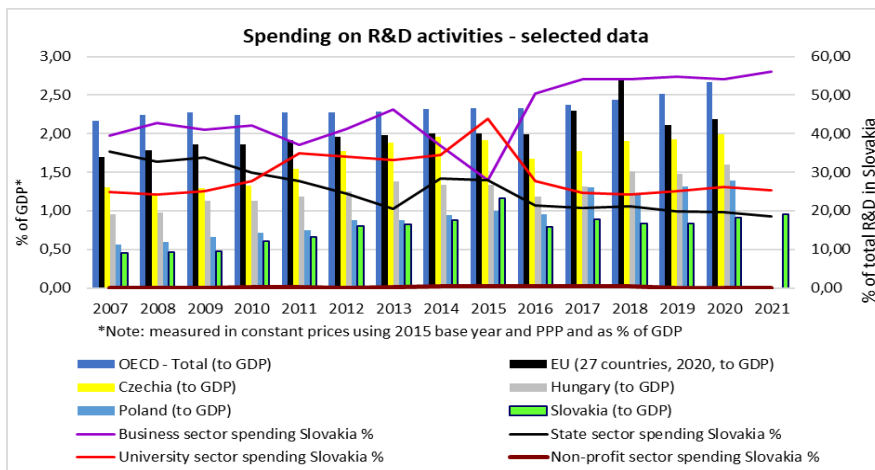
Figure 1. Spending on R&D activities – selected data.

Source: own collaboration based on Statical Office of the Slovak Republic, Eurostat, OECD

As for the structural aspect of R&D expenses according to their implementer (Fig. 1), it is evident that starting from 2016 there is a significant opening of the gap between the expenses of the business sector and the expenses of other sectors of the national economy. The business sector is the most important segment participating in R&D, even in the long term. Just for the last year, the expenses of this sector on R&D represented more than 56% of the total expenses in Slovakia. A significant change occurred only in 2015, when the expenses realized by the university sector represented almost 44% of all expenses and thus exceeded the expenses of the private and state sectors in proportion. In the mentioned year, there was a significant approximation of business and state sector expenses at the same time.

In a more detailed analysis of R&D expenses according to the source of financing (Fig. 2), the business sector again plays an important role, as for R&D activities used a significant part of own capital and current expenses from the total expenses refinanced for these activities. A change in the trend occurred from 2016 (apart from 2017), because until this year mainly public resources were used to finance R&D.
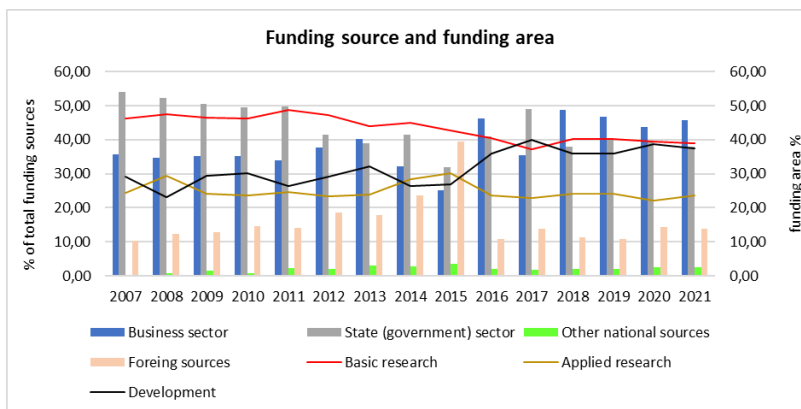
Figure 2. Funding source and funding area.

Source: own collaboration based on Statical Office of the Slovak Republic

As for the priorities for the use of these resources (in accordance with the framework classification according to Act No. 172/2005 Coll. on the organization of state support for research and development), the main part of these resources was used in the field of basic research and that in the long term. From a medium-term point of view, we can observe that since about 2017, the expenses realized in basic research have approximated the value of the expenses refinanced in development; they were even higher in 2017 by approx. 4.45 percentage points.

As for the use of expenses for financing the needs of applied research, their share in total expenses is relatively stable, and for the entire periods we monitored, their average share reached 24.9%. From the point of view of the scientific field, the priority part of expenwas invested in the technical sciences, which also corresponds with the focus of the Slovak economy – it is an industrially oriented economy (according to SK NACE, priority activities in production of motor vehicles, semi-trailers and trailers, production of electrical equipment, repair and installation of machines and devices). For example, in 2021, approx 54.83% of all expenses were refinanced in this scientific area. At the same time, this also corresponds with the focus of R&D expenses according to socio-economic goals – for Slovakia, and from a long-term point of view, it is significant that the expenses are directed mainly to the industrial production and technologies (expenses in 2021 reached the value of 348,285 thousand EUR that is approx. 37,6% of total expenses), then to the area of R&D implemented by universities (165,759 thousand EUR, approx. 18.05% of total expenses).

An important indicator of R&D potential is also the number of organizations or workplaces that either carry out R&D as their primary activity (independent R&D organizations) or they are organizations / workplaces that carry out activities other than R&D, but their R&D potential is in convert at least one man-year into a full-time equivalent (FTE) (non-independent R&D workplaces). From the point of view of the development of their number over time (Fig. 3), we can state that the situation in Slovakia is developing favourably, as the number of such workplaces is increasing year-on-year. The situation is particularly favourable in the case of non-independent R&D workplaces, as it follows from the above that activities in the field of R&D are also carried out by organizations that were not primarily established for this purpose. A significant part of such workplaces is located at universities and in the private sector – business one, while it is characteristic that in the case of many workplaces, cooperation between the education sector and businesses is evident.
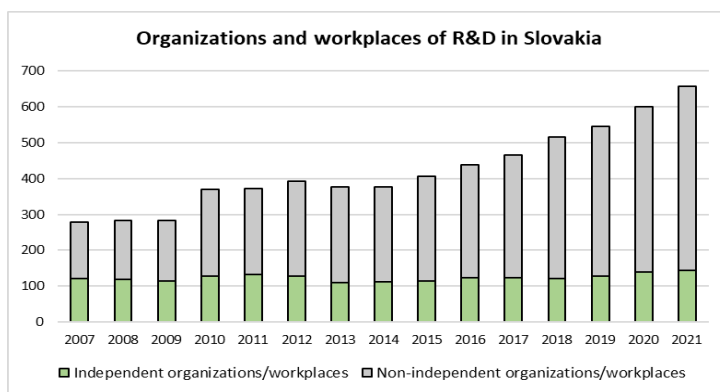
Figure 3. Organizations and workplaces of R&D in Slovakia.

Source: own collaboration based on Statical Office of the Slovak Republic

The data coming from the study by Grant Thornton Advisory and Visions Consulting (2020) (secondary data we worked with) show the existence of 374 different collaborations between different types of organizations at home and abroad in 2020. The most intensive

cooperation was found within the technological domain of advanced robotics, which included up to 24% of all cooperations. The second area was simulation with a share of 21%, and the third was artificial intelligence with a share of 16% of the total number of collaborations. The mentioned three areas together thus include up to 61% of all collaborations. At the same time, the findings of the study point to the fact that the successful cooperation of the public R&D sector with the business sphere at home or abroad is determined except other also by the availability of quality infrastructure. For example, up to 40% of respondents in the public R&D sector consider their technological equipment to be incomparable with the equipment of workplaces in developed countries. This simultaneously points to the large infrastructural debt of public R&D organizations in Industry 4.0 topics, which causes suboptimal performance of individual R&D teams. According to 95% of respondents, the current state of insufficient technological equipment of public R&D workplace equipment will significantly limit the international R&D competitiveness of public R&D organizations operating in Industry 4.0 topics within a 5-year horizon. In the same way, 45% of respondents from the environment of public R&D organizations consider the current technological equipment to be insufficient for solving the real problems of enterprises, which determines the success of mutual participation in R&D projects in Slovakia. This indicates that the current technological equipment is less suitable for the implementation of projects oriented to the needs of enterprises (including those within the Industry 4.0), which partly results from the evaluation mechanisms of public R&D organizations with a preference for scientometric outputs, and cooperation with the real economy is evaluated to an insufficient degree.

From the point of view of the efficiency of the resources spent, it is important to examine the evaluation of the expenditure on R&D in the implementation outputs, which find application in practice in the form of various forms of innovation that create an economic benefit at the level of enterprises, regions or the entire national economy and thus contribute to the increase their competitiveness. For example, it follows from the data of the Statistical Office of the Slovak Republic (Fig. 4), that in 2020, approx. 36.6% of enterprises with innovative activities were identified in Slovakia (40.6% were industrially oriented enterprises, 31.4% were service enterprises) within the entire set of business entities. At the same time, this is the best value that companies have reported in innovative activities for the entire period of evaluation of relevant statistics in Slovakia (since 2001). The closest to this value was the situation in 2008 and 2010 (36.1%, 35.6%).
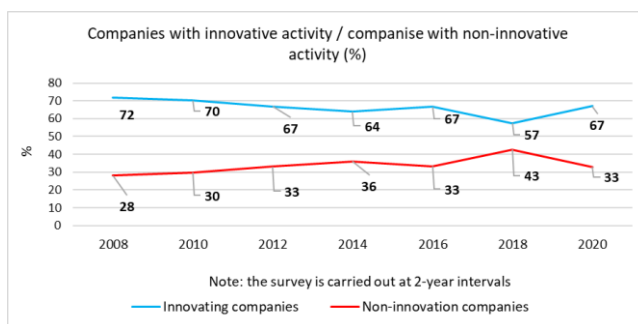
Figure 4. Companies with innovative activity.

Source: own collaboration based on Statical Office of the Slovak Republic

Expenses for the introduction of innovations were realized in various areas, while their level in relation to the reported sales of innovating enterprises did not even reach 2% in 2020, and they have been moving below this threshold for a long time. It is paradoxical that, despite the proclaimed growing support of innovative activities of enterprises (by the state), the highest share of reported sales was achieved by these expenses in the years 2001–2006, when

they were in the range of 3.0 up to 5.7%. In connection with this, it is necessary to point out the fact that business entities that were classified as enterprises implementing innovations (regardless of the focus of innovation) show more than a 60% share of the total sales of all enterprises, and therefore we can conclude that the implementation of innovations is an important factor supporting the growth of sales.

If we focus on the most significant factors that limit the implementation of innovation activities already in innovating enterprises, those related to the financing of enterprise innovations were named as the main, namely: too high costs (27.2% in 2020, 26.3% in 2018, 25.9% in 2016) , related lack of own financial capacities (25.7% in 2020, 25.8% in 2018 and 29.0% in 2016), and difficulties in obtaining state subsidies or grants for innovations (19.8% in 2020, 27.2% in 2018, 22.1% in 2016). This was followed by non-financial parameters, such as too high competition on the market and lack of qualified employees. If we focus on those companies that do not implement innovations, the most important reasons were the same: too high costs (25.4% in 2020, 26.3% in 2016), difficulties in obtaining state subsidies or grants for innovation (18.7% in 2020, 20.4 % in 2018), and lack of own financial capacities (22.5% in 2020, 24.1% in 2018) (Statistical Office of the Slovak Republic, 2022). If we connect the above with the existing support of innovative activities from the state or with public financial support, so we find that only 26.2% of innovative enterprises were that used this support. At the same time, the analysis shows that this is a long-term trend, based on which we can claim that public support for innovation in terms of the number of enterprises that implement innovations and that also enjoy this form of support is very low. I.e., a significant part of enterprises relies on own resources or external resources in the form of loans or sources of risk capital to finance innovations. At the same time, this may be related to what both innovating and non-innovating enterprises mentioned as an important limiting or preventing factor in the implementation of innovative activities – the procedural complexity of obtaining state subsidies and grants.
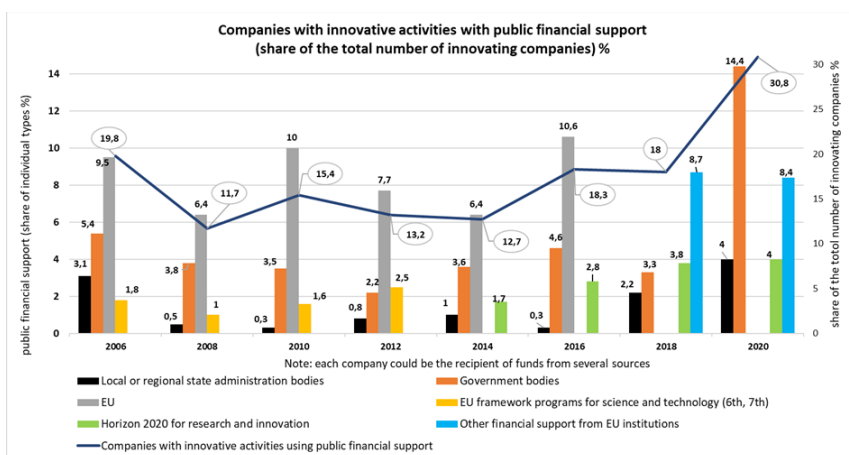
Figure 5. Companies with innovations with the public financial support.

Source: own collaboration based on Statical Office of the Slovak Republic

If we consider that a significant part of enterprises does not carry out innovative activities because they do not have their own resources, it could be expected that their supplement can be to some extent the budget resources of Slovakia or then funds from EU programs, but this is not confirmed by the following data. It follows from our findings (Fig. 5) that of the total number of enterprises that carry out innovations, only a minority receives public financial support, e.g., in 2020 it was 30.8% of innovating enterprises. What is favourable, however, is that the number of innovating businesses and simultaneously using public budget resources

has been increasing year-on-year since the sale in 2014. At the same time, it follows from the relevant analysis that, for example, resources from the Horizon 2020 were drawn by a minimum number of innovative enterprises (see green bar chart in Fig. 5).

As for the selected statistics monitoring innovative activities of enterprises, which include innovations in products, processes, organizational innovations, and marketing innovations, it is also necessary to monitor the predispositions to the fact whether innovative activities can be implemented in the country at all. The global indicator is e.g., the Global Innovation Index (GII). According to the complex evaluation of the innovation environment and potential, according to the score of the GII for 2022 Slovakia ranked 46th out of 132 observed countries and 39th within the group of high-income countries. Its overall score was 34.3 points, which represents a point gap between Slovakia and Switzerland, the leader, of 30.1 points. Except that Slovakia belongs withing the countries, which innovation performance is below the expectation for level of the national development together with e.g., Lithuania (39th), Greece (44th), and Romania (49th). According to the overall rating, Slovakia has deteriorated the position by 9 places compared to 2021 (37th) and by 7 places compared to 2020 (39th). Compared to the economically and historically close countries (the Vyšehrad Four), Slovakia has long been in the worst position of this group (i.e., for 2020: 30th for Czechia, 34th for Hungary, 38th for Poland). From the analysis of the structure of the GII, Slovakia ranked better in innovation outputs than in innovation inputs in 2022 (42 versus 35 position). At the same time, the analysis shows that Slovakia achieved the best position in "Knowledge and technology outputs" (28th place), but the worst in "Market sophistication" and "Creative outputs" (both 70th place). According to the findings, weaknesses for Slovakia in the GII 2022 are investment (and the related problem of investment financing), ease of starting of business, gross capital formation, and University-industry R&D collaboration (Dutta et al., 2022). At the same time, these are limiting factors, which we directly or indirectly commented on in previous findings.

4 Discussion and conclusion

From the point of view of the national economy, it is desirable for enterprises to participate in concepts supporting their competitiveness. One such concept is the Industry 4.0. However, the implementation of this concept is largely dependent on the "inclination" of enterprises or other adequate organizations to carry out R&D, subsequently the implementation of innovations. Regarding the above, the priority aim of the presented article was to perform an analysis of R&D, and innovation activities from the point of view of their implementation in the conditions of Slovakia, or to determine the limiting factors of their actual implementation. The findings show that the Slovak economy lags behind the developed economies of the world in all the mentioned parameters, while financial factors were determined as priority obstacles.

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Company's dividend policy scores modeling in present-day global economic environment: neutral approach

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Abstract

Research background: In the present-day global economic environment a selection of the dividend policy on the one hand has to ensure the basic financial management goal to be attained, *i.e.*, the maximum shareholders well-being, on the other, take into account all company stakeholders' interests. Therefore, the dividend policy management developing and justifying, an important role is paid to the formalized analysis and forecasting of the scores related to the requirements stated above.

Purpose of the article: The paper treats a concept of the formalized modeling of the dividend policy scores and company marketing performance scores derived (stock market position) within neutral dividend policy implementation approach conditions as an instrument of the scores analysis and forecasting.

Methods: The methodology of the research consists of the Dividend Irrelevance theory, Dividend Policy Significance theory and sustainable company development concept.

Findings & Value added: The conclusion is drawn, that the formalized models of the dividend policy scores and company marketing performance scores derived, having been developed, are an effective instrument for their forecasting and analysis so that proactive decisions to manage the company dividend policy implementation within neutral approach conditions are ensured. The formalized approach of the dividend policy implementation presumes a construction of the basic relevant scores models characterizing the company dividend policy and its marketing performance as Dividend Payout, Dividend Cover, expected Share Price, Dividend Yield, Price / Earnings Ratio. The formalized models of the scores mentioned are applicable for a forecast-analytical scores evaluation within the neutral dividend policy implementation approach conditions.

Keywords: *dividend policy; neutral approach; analysis; forecasting; modeling; company*

JEL Classification: *G32; G34; G35*

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1 Introduction

In present-day global economic environment, a selection of the dividend policy as a complex of decisions dealing with the Dividend Payout to shareholders is an essential aspect of the Public Limited Company (PLC) operation. The Dividend payout decisions are generally referred to financial decisions as dividend payables reduce the company retained earnings and thereby affect the company financial position.

Meanwhile, the dividend policy on the one hand has to ensure the basic financial management goal to be attained, *i.e.*, the maximum shareholders well-being, on the other, take into account all company stakeholders' interests.

Therefore, the dividend policy management developing and justifying, an important role is paid to the formalized analysis and forecasting of the scores related to the requirements stated above.

2 Previous research

It should be noted, that the issue of the dividend policy scores analysis and forecasting has been so far researched and covered in the relevant references, e.g., (Block et al., 2011; Brealey et al., 2017; Brigham and Gordon, 1970; Ham et al., 2020; Higgins, 1972; Higgins and Schall, 1975; Lee and Finnerty, 1990; Michaely and Moin, 2022; Penman, 2004; Shim and Siegel, 2008; Subramanyam and Venkatachalam, 2007; Van Horne, 1985, 1989).

Generalizing and classifying their views we present the key scores employed to analyze and forecast the company dividend policy as they form a sufficiently important company marketing performance scores subgroup (stock market position) in the following table (Table 1):

Table 1. Key scores of the company dividend policy analysis and forecasting

Score	Estimation formula	
	Numerator	**Denominator**
Dividend Payout (formula 1)	Dividend	Earning per Share
Dividend Payout (formula 2)	Dividends	Net income – Preferred Dividends
Dividend Cover	Earnings per Share	Dividend
Dividend Yield	Dividend	Share Price
Share Price/Dividend	Share Price	Dividend
Equity Profit	Common and Preferred Dividends	Net Income
Preferred Dividend Coverage	Net Income	Preferred Dividends
Common/Preferred Dividend	Dividends	Preferred Dividends

Source: Compiled by the author of the paper

The key scores of the company dividend policy analysis presented in Table 1 may be divided into two groups.

The scores of the first group (Dividend Payout, Dividend Cover, Equity Profit, Preferred Dividend Coverage and Common/Preferred Dividend) characterize exclusively the company dividend policy.

The scores of the second group (Dividend Yield, Share Price/Dividend) feature both the company dividend policy and their common stock investment attractiveness for potential investors.

Since the company common stock investment attractiveness is set by the company dividend policy so to analyze the dividend policy the scores of the first group are considered to be the basic ones.

Furthermore, the analysis and forecasting by the relevant determined factoring models construction enables to determine the dividend policy scores impact on the basic company performance scores, first and foremost Price / Earnings Ratio.

Price / Earnings Ratio are a certain common stock demand indicator featuring their investment attractiveness, to be used in inter-business comparisons in contrast to Earnings per Share. Generally known, the Earning per Share gain gives rise to the Share Price. The optimum is the situation when the Share Price increase exceeds its Earnings per Share, the Price / Earnings Ratio growing. That is why the score significance lies finally in the attainment of the basic company financial management (public limited company) goal – maximum increase of Share Price.

A factoring model of Price / Earnings Ratio is constructed as follows:

$$P/E = \frac{P}{E} = \frac{P}{D} \cdot \frac{D}{E} = \frac{DP}{DY} = \frac{\frac{CD}{NP-PD}}{DY} = \frac{\frac{\frac{CD}{PD}}{\frac{NP}{PD}-1}}{DY} = \frac{DCD}{(CPD-1) \cdot DY} \qquad (1)$$

where:

P/E	Price / Earnings Ratio;
DCD	Common/Preferred Dividend;
CPD	Preferred Dividend Coverage;
DP	Dividend Payout;
DY	Dividend Yield;
P	Share Price;
E	Earnings per Share;
D	Dividend;
CD	Dividends;
PD	Preferred Dividends;
NP	Net Income.

The factoring model bears a certain economic sense. The formula 1 reflects a sufficiently complex dependence of the company common stock investment attractiveness upon its basic dividend policy scores evaluation: Common /Preferred Dividend, Preferred Dividend Coverage and Dividend Yield. Obviously the first ratio growth comes to the company common stock investment attractiveness and Price / Earnings Ratio rise correspondingly. As for the second ratio it should be considered as a certain restraining factor of the Price / Earnings Ratio growth. However, the latter is needed since Preferred Dividend Coverage characterizing company ability to pay the dividends out and its decrease may cause market Preferred Share Price decline affecting, in turn, Share Price. The third ratio falling down involves paradoxically common stock investment attractiveness rise and Price / Earnings Ratio going up correspondingly When the Dividend Yield reduction results from the exceeding Share Price growth compared with the Dividend Payout the company common stock investment attractiveness increases. To estimate the factors causing the changes of the Price / Earnings Ratio variances the relevant factoring analysis method is applied.

The factoring Price / Earnings Ratio model serves as its forecasting value instrument basing on the anticipated values of the defining ratio factors.

3 Methodology of research

The methodology of the research, the results being presented in the paper, is based on the following concepts:

1) Dividend Irrelevance theory;
2) Dividend Policy Significance theory;
3) Sustainable company development concept.

The "corner stone" of the dividend policy defining its kinds (methods) is, in the end, the ratio between common stock dividend and earnings per share (Dividend and Net Income and Preferred Dividend net) that makes Dividend Payout (or Dividend Cover in inverse proportion to it) the most important score for the dividend policy analysis.

The value estimation results depend, for the most part, on the dividend policy implementation approach selected: passive or active one (Van Horne, 1989).

A passive dividend policy implementation approach or Dividend Irrelevance theory developed by Miller and Modiliani (Miller and Modiliani, 1961), implies, the Dividend Payout, with the set investment decisions choice, being a mere part of a general picture of no impact on the investors' well-being. Miller and Modiliani consider a company value to be defined exclusively by its assets yield or its investment policy rather than Equity Profit and retained earnings.

In other words, the Dividend Payout presents a "passive balance" left after the company investment projects funding. The Dividend Payout value changes periodically in accordance with the variation of the investment projects number acceptable by the company management. Should the company run a huge number of beneficial projects then the Dividend Payout would likely equal zero. *Vice versa*, a lack of profitable investment opportunities would drive the Dividend Payout to 1. The Dividend Payout value would fall from 0 to 1 for any intermediate situation (Van Horne, 1989). The shareholders seem to be indifferent to the factor of their well-being improvement either Dividend or fair value rise owing to the company investment projects implementation.

A formalized picture of the passive dividend policy approach is James E. Walter model (Walter, 1956) considered to be the first and favorable in terms of its simplicity and visualization:

$$P = \frac{D + \frac{r}{\rho} \cdot (E - D)}{\rho} \tag{2}$$

where:

P forecast Share Price,
D Dividend,
E Earnings per Share,
r Investment company profitability,
ρ market capitalization level (an average market discount rate employed to determine expected cash flows).

Under the active dividend policy approach or Dividend Policy Significance theory proposed by M. Gordon (Gordon, 1963) and G. Lintner (Lintner, 1962) the dividend payout decisions play an essentially active role. The thing is that in conditions of uncertainty inherent in practically any company activity in market environment it does matter for the investors whether they obtain their income in the form of dividends or Share Price rise. The Dividend Payout provides a sense of certainty to the shareholders since the dividends are referred to current income rather than capital gain in the future. That is why the investors are concerned about the factors improving their well-being: Dividend or Share Price gain due to the company investment projects implementation. Moreover, if potential investors prefer earlier

uncertainty settlement, they will be prepared to pay higher Share Price entitling higher Dividend (Van Horne, 1989).

The formalized reason in favor of the active dividend policy implementation is the economic growth model by M. Gordon (Gordon, 1959):

$$P_0 = \frac{D_1}{k\text{-}g} = \frac{D_0 \cdot (1+g)}{k\text{-}g} \tag{3}$$

where:

D_1 expected future period Dividend,
D_0 present period Dividend,
k acceptable discount rate (Equity Profit stipulated by investors),
g Dividend growth rate (taken as constant in time).

The above models (2) and (3) are considered as formalized instruments of the dividend policy forecasting and management within active and passive implementation approach defining the relevant criteria (Van Horne, 1989).

It should be taken into account that the company dividend policy is to provide both maximum shareholders well-being and its stakeholders' interests (suppliers, customers, employees, government, etc.) so that a sustainable company development is ensured in the long run providing a long-term company value (Dunphy et al., 2007; Freeman, 2010; Friedman and Miles, 2006).

4 Results and discussion

The postulated above statement that the dividend policy is to facilitate the achievement of the basic financial management goal – maximum shareholders well-being, on the one hand, take into account other company stakeholders on the other, so that a sustainable company development is ensured in the long run. The balance is to be attained between passive and active approaches within so called neutral dividend policy implementation approach that considers both the need of the financially beneficial investment projects and dividend payout to company shareholders (non-residual principle) driving its common stock to maximum Share Price.

Formalization of the neutral dividend policy implementation approach assumes appropriate models construction of Dividend Payout, Dividend Cover and Expected Share Price.

To construct the models of the Dividend Payout, Dividend Cover let us set the Expected Share Price estimated under D. E. Walter's model (2), equal to that determined under M. Gordon model for the economic growth (3) of the forecast current (theoretical) Share Price gain at zero moment; anticipating that a current expected Dividend complies with its Share Price essential for the Stock Market condition:

$$P = P_0 \tag{4}$$

entering a common symbol for a Dividend as D $(D = D_0)$.

We obtain the following equation:

$$\frac{D + \frac{r}{\rho} \cdot (E\text{-}D)}{\rho} = \frac{D \cdot (1+g)}{k\text{-}g} \tag{5}$$

By a number of transformations in formula (5) we get the Dividend Payout (DP) and Dividend Cover (DC) models:

$$DP = \frac{D}{E} = \frac{\frac{r}{\rho}}{\frac{\rho \cdot (1+g)}{k\text{-}g} + \frac{r}{\rho} \text{-} 1} \tag{6}$$

$$DC = \frac{E}{D} = \left(\frac{\rho \cdot (1+g)}{k-g} - 1\right) \cdot \frac{\rho}{r} + 1 \tag{7}$$

The formulas (6) and (7) demonstrate that in the neutral dividend policy implementation conditions the Dividend Payout and Dividend Cover are influenced by the following factors: investment company profitability, market capitalization level, Equity Profit required by investors and Dividend gain rate taken as constant in time. The Dividend Payout growth and Dividend Cover decrease correspondingly would be facilitated by the increase of the investment company profitability and Equity Profit required by investors, Dividend gain rate and market capitalization level fall as well. And *vice versa* the Dividend Payout decline and Dividend Cover rise would result from the decrease of the investment company profitability and Equity Profit required by investors, Dividend gain rate and market capitalization level drop. The estimation of the defining factors impact on the outcome scores variances in the models (6) and (7) is exercised with the relevant factoring analysis methods.

The Dividend Payout (formula 6) and Dividend Cover (formula 7) models having been constructed by the author of the article might be applied for the forecasting-analytical ratios values estimation within the neutral dividend policy implementation conditions. Other dividend policy scores analysis (*e.g,* common stock profitability (Dividend Yield)) and company market performance (*e.g.* Share Price) might be estimated with the models as well.

To construct a Share Price model let us express Dividends from D. E. Walter model (formula 2) and present-day period Dividend from the economic growth model by M. Gordon (formula 3) as follows:

$$D = \frac{\rho \cdot P - \frac{r}{\rho} \cdot E}{1 - \frac{r}{\rho}} \tag{8}$$

$$D_0 = \frac{P_0 \cdot (k-g)}{1+g} \tag{9}$$

Then let us make Dividend from the D. E. Walter model (formula (8)) equal to the present-day period Dividend from the economic growth model by M. Gordon (formula (9)):

$$D = D_0 \tag{10}$$

entering a common symbol for a Share Price expected, i.e., balanced to a specific investor position as P ($P = P_0$).

Thus, we get an equation:

$$\frac{\rho \cdot P - \frac{r}{\rho} \cdot E}{1 - \frac{r}{\rho}} = \frac{P \cdot (k-g)}{1+g} \tag{11}$$

obtaining the expected Share Price model:

$$P = \frac{\frac{r}{\rho} \cdot E}{\rho - (k-g) \cdot \frac{1 - \frac{r}{\rho}}{1+g}} \tag{12}$$

Under the formula (12) within the neutral dividend policy implementation conditions the expected Share Price is impacted by the following factors: the investment company profitability, market capitalization level, Dividend, Equity Profit required by investors and Dividend gain rate taken constant in time. The expected Share Price gain would be facilitated by the increase of the investment company profitability, Equity Profit required by investors, Dividend and slower Dividend gain rate and market capitalization level growth. *Vice versa,* the expected Share Price drop would result from the decline of the investment company profitability, Equity Profit required by investors and the rise of the Dividend gain rate and market capitalization level growth. The estimation of the defining factors impact on the

outcome scores variances in the model (12) is exercised with relevant factoring analysis methods.

The expected Share Price model (formula 12) obtained by the author might be employed for the forecasting-analytical estimation of the company market performance and investment attractiveness ratios values within the neutral dividend policy implementation conditions. Other dividend policy scores analysis (*e.g,* Dividend Yield) and company market performance (*e.g.* Price / Earnings Ratio) might be estimated with the models as well.

Thus, within the neutral dividend policy implementation conditions and basing on the entered above conventional symbols the following Dividend Yield and Price / Earnings Ratio models might be formed:

$$DY=\frac{D\cdot\rho-(k-g)\cdot\frac{1-\frac{r}{\rho}}{1+g}}{\frac{r}{\rho}\cdot E}=\frac{DP\cdot\rho-(k-g)\cdot\frac{1-\frac{r}{\rho}}{1+g}}{\frac{r}{\rho}} \qquad (13)$$

$$P/E=\frac{DCD\cdot\frac{r}{\rho}\cdot E}{(CPD-1)\cdot D\cdot\rho-(k-g)\cdot\frac{1-\frac{r}{\rho}}{1+g}}=\frac{DC\cdot DCD\cdot\frac{r}{\rho}}{(CPD-1)\cdot\rho-(k-g)\cdot\frac{1-\frac{r}{\rho}}{1+g}} \qquad (14)$$

According to the formula (13) within the neutral dividend policy implementation conditions the

Dividend Yield is defined by the following factors: the Dividend Payout (*i.e.,* Dividend and Earnings per Share ratio), market capitalization level, Equity Profit required by investors and Dividend gain rate taken constant in time. The Dividend Yield gain is ensured by the increase of the Dividend Payout (*i.e.,* Dividend and Earnings per Share ratio), market capitalization level, Dividend gain and the drop of the investment company profitability and Equity Profit required by investors. The Dividend Yield decline is caused by the fall of the Dividend Payout (*i.e.,* Dividend and Earnings per Share ratio), market capitalization level, Dividend gain and the rise of the company investment profitability and Equity Profit required by investors. The estimation of the defining factors impact on the outcome scores variances in the model (13) is exercised with corresponding factoring analysis methods.

The Dividend Yield model (formula 13) formed by the author of the article might be applied for the forecasting-analytical ratios values estimation within the neutral dividend policy implementation conditions and some other company market performance scores (*e.g.,* Share Value) estimated with the model as well.

Under to the formula (14) within the neutral dividend policy implementation conditions the Price / Earnings Ratio depends on such factors as Dividend Cover (*i.e.,* Dividend and Earnings per Share ratio), Common/Preferred Dividend, investment company profitability, market capitalization level, Preferred Dividend Coverage, Equity Profit required by investors and Dividend gain rate taken constant in time. The Price / Earnings Ratio is encouraged by the increase of the Dividend Cover (i.e., Earnings per Share and Dividend ratio), Common /Preferred Dividend, the company investment profitability and Equity Profit required by investors and the decrease of the company market performance level, Preferred Dividend Coverage and Dividend gain rate. The Price / Earnings Ratio decline is driven by the fall of the Dividend Cover (i.e., Earnings per Share and Dividend ratio), Common/Preferred Dividend ratio, company investment profitability, Equity Profit required by investors and the growth of the market capitalization level, Preferred Dividend Coverage and Dividend gain rate. The estimation of the defining factors impact on the outcome scores variances in the model (14) is exercised with the relevant factoring analysis methods.

The Price / Earnings Ratio model (formula 14) under the author of the paper might be employed for the forecasting-analytical ratio values estimation characterizing the company

market performance within the neutral dividend policy implementation conditions depending in the key scores.

The forecast values of the company dividend policy and market performance scores obtained above with the formulae (6), (7), (12), (13) and (14) might be analyzed by specific stakeholders interested in the sustainable company development, the results presenting a forecasting evaluation of the dividend policy management efficiency level (Large, Significant, Essential, Fairly small).

A practical application example of the models 6), (7), (12), (13) and (14) developed by the author presents forecasting of the corresponding annual data of Gamma PLC within the neutral dividend policy implementation conditions, the company name having been changed.

Model (6). Gamma PLC last year end data are as follows: r=0.239, *i.e.* 23.9%; ρ=0.153, *i.e.* 15.3%; k=0.12, *i.e.* 12%; g=0.05, *i.e.* 5%, then in the conditions DP=0,547, *i.e.* 54.7%. Hence within the neutral company dividend policy approach conditions at year end data the Dividend Payout is expedient to be set at the level of 54.7%. Today under Gamma PLC dividend policy its Dividend Payout equals 25%.

Model (7). The last year Gamma PLC bottom line data were measured as: r=0.239, *i.e.* 23.9%; ρ=0.153, *i.e.* 15.3%; k=0.12, *i.e.* 12%; g=0.05, *i.e.* 5%, then in the conditions DC=1.829. The estimations show that within the neutral dividend policy approach conditions at year end company data the Dividend Cover is needed to be set at the level 1.829. Currently under Gamma PLC dividend policy its Dividend Cover equals 4.

Model (12). Under the last year end bottom line data Gamma PLC reported on the following: r=0.239, *i.e.* 23.9%; ρ=0.153, *i.e.* 15.3%; k=0.12, *i.e.* 12%; g=0.05, *i.e.* 5%; E=157.48 roubles then in the conditions P=1294.73 roubles. According to the estimation in the neutral dividend policy approach conditions the company has to reach the Share Price up to 1294.73 roubles. At present the Share Price of Gamma PLC equals around 1019-1039 рублей.

Model (13). Gamma PLC reported the following last year data: r=0,239, *i.e.* 23.9%; ρ=0.153, *i.e.* 15.3%; k=0.12, *i.e.* 12%; g=0.05, *i.e.* 5%; DP=0.547, then in the conditions DY=0.077, *i.e.* 7.7%.

The estimation clarifies that within the neutral dividend policy approach conditions under the year end figures the company is to attain the Dividend Yield at the level of 7.7%. Today the Dividend Yield for Gamma PLC measures 6.5%.

Model (14). Gamma PLC last year end data are as follows: r=0.239, *i.e.* 23.9%; ρ=0.153, *i.e.* 15.3%; k=0.12, *i.e.* 12%; g=0.05, *i.e.* 5%; DC=1.829, DCD=23, CPD=60, then in the conditions P/E=7.250. According to the estimation in the neutral dividend policy approach conditions the company has to reach the Price / Earnings Ratio at the level of 7.250. The actual present figure of it by the year end data equals 6.3.

Thus, the neutral dividend policy approach discussed above as a practical application example in Gamma PLC presumes that the company exercises certain score value changes and market performance ones derived (stock market position) as well; the author believes the move is certain to improve Public Limited Company attractiveness for all stakeholders interested with a view to ensure its long-term sustainable development.

Having treated the results of the research the author considers necessary to compare them with those discussed in relevant references for the problem.

The comparison has stated the following:

The neutral dividend policy implementation approach proposed by the author is distinct from the dividend irrelevance theory and dividend policy significance theory enabling in a much greater extent consider all company stakeholders' interests ensuring thereby its sustainable development in the long run.

The formalized (mathematical) models of the most significant dividend policy scores and those of the company marketing performance derived developed within the neutral dividend

policy approach are more detailed and representative since they reflect the scores dependence upon a greater number of the defining factors compared with the existing models.

The most significant dividend policy scores and those of the company marketing performance derived available in the author's models as well as a greater number of the defining factors permit to carry out a more detailed factoring analysis of the scores by the relevant methods and their forecasting basing on the anticipated defining factor values, the whole of these improving a decision-making process in the field of the company dividend policy management.

Meanwhile the proposed by the author formalized models of the most significant dividend policy scores and those of the company marketing performance derived aimed at the permanent Dividend gain and high stock market efficiency bear certain restrictions. The restrictions to be overcome imply a problem for future research

5 Conclusions

Having completed the treatment of the formalized models to analyze and forecast the dividend policy scores and company marketing performance scores derived within neutral approach conditions of the company dividend policy implementation having been developed by the author the following conclusions are drawn:

The neutral approach conditions of the company dividend policy implementation enables taking into account all company stakeholders' interest ensuring its sustainable development in the long run;

The methodology of the neutral dividend policy implementation approach research is based on the concepts of the Dividend Irrelevance theory, Dividend Policy Significance theory and Sustainable company development concept.

The formalized statement of the neutral approach conditions of the dividend policy implementation implies the corresponding formalized models construction of the most significant dividend policy scores and company marketing performance scores derived: Dividend Payout, Dividend Cover, expected Share Price, Dividend Yield and Price / Earnings Ratio;

The formalized models of the most significant dividend policy scores and company marketing performance scores derived developed within the neutral dividend policy implementation approach reflect the score dependence upon a great number of the defining factors.

The factoring analysis execution of the most significant dividend policy scores and company marketing performance scores derived by corresponding methods due to the formalized models principles permits finding out the basic reasons of their changes within the neutral dividend policy implementation approach;

The formalized models of the most significant dividend policy scores and company marketing performance scores derived might be applied for their forecasting proceeding from the anticipated defining factors value that allows to improve and streamline the proactive management decisions making within the neutral dividend policy implementation approach.

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How to Create an Optimal Securities Portfolio

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Abstract

Research background: Although complex and relying on extensive professional knowledge, wise investments in securities can hugely increase the value of one's savings.
Purpose of the article: The aim of this paper is to describe theoretical approaches in the context of creating an optimal portfolio of securities and the use of fundamental analysis for a selected stock title or index. For this purpose, the share title of ČEZ a. s. was chosen.
Methods: Data are obtained from internet sources BCPP.cz, ČNB.cz, ČEZ.cz. Using fundamental analysis, the data that led to the fulfillment of the paper's purpose are presented here. After obtaining the data, the intrinsic value of the share is calculated using the dividend discount model, which is then compared with the market price of the share.
Findings & Value added: The findings suggest an investment recommendation for investing in the securities of ČEZ plc without taking serious risks. We may conclude that the portfolio of securities of ČEZ plc involves medium risk factors equal to 0.8% of the beta factor, indicating too high values for prudent shareholders. The stock is overrated and expects a decline in price since its intrinsic value does not track its current market price.

Keywords: *optimal portfolio; securities; dividend discount model; intrinsic value; market value*

JEL Classification: *G11; G12; G19*

1 Introduction

The stock market comprises a vital element of the free market, allowing negotiations with multiple securities of publicly owned companies and other competent financial subjects (Vochozka et al., 2021). The stock, aka securities market, is volatile, with wildly fluctuating prices, and inclined to non-linearity. The stock price depends on many factors, including the demand for the company's products, financial performance, new economic policies and the national political situation (Vochozka et al., 2020).

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High profits from securities investments kindled the investors' interest in analyzing portfolios, including shares, bonds and derivatives possessed by a person or group. Having optimized portfolio models, investors may smooth the path to stable profits (Kliestik et al., 2021).

Analyzing securities portfolio greases the wheels for investors negotiating with securities, looking for a perfect opportunity to sell or purchase them. These analyses help investors minimize investment risk.

The article explores theories of creating an optimum securities portfolio by applying fundamental analysis to a chosen stock certificate or index.

We have formulated research questions as follows (RQ):

RQ1: How should an optimal low-risk securities portfolio look like?

RQ2: What are the differences between intrinsic stock and market value in a selected stock certificate or index?

2 Literature research

The complexity of the stock market makes precisely predicting investment returns almost impossible. Sufficient data or their lack do not do their bit either; the former yields only random variables, while the latter involves high investment risks. Although seemingly unrelated, they are two sides of the same coin. Investors must rely on experienced experts (Huang and Jiang, 2021).

In reality, deciding on a portfolio entails an inherent risk (Hašková et al., 2020). Fjesme (2020) argues that investors' ability to generate huge profits from the portfolio grows with their trading experience.

The return on investment of securities portfolios reflects the shareholder's success. Its calculation involves the initial and end values of the portfolio (Katotay, 2021). General situations of analyzed portfolios are hard to describe, confining us to a portfolio where we can estimate its return from econometric studies (Anghelache et al., 2021).

The portfolio allocation is vital for calculating its returns and balancing the risk and reward by adjusting the percentage of all portfolio assets (Li et al., 2021a). In 1952, Markowitz published an excellent article on an effective portfolio selection which transformed the financial sphere. Although older than 65 years, the mean-variance model dominates all portfolios even these days (Aouni et al., 2018). Markowitz's mean-variance analysis seeks an optimal portfolio by balancing returns and risks (Kim et al., 2018). Markowitz's portfolio theory involves a covariance matrix of returns on assets estimated by its sample covariance matrix. The covariance matrix may not work well when the total assets are too big. Errors in portfolio estimates would hugely exceed the acceptable level, damaging the portfolio allocation (Li et al., 2021b).

Li and Teo (2021) consider skewness as an essential statistical measure of the asymmetry of the probability data. By its inclusion in investment decisions, investors can increase their profit. Li et al. (2015) analyzed the skewness concept for a fuzzy variable and number, suggesting a new model of a mean-variance-skewness-fuzzy portfolio. Li et al. (2021c) designed a limited and objective portfolio model, quantifying expected returns secured by fuzzy random variables. This method will identify vague and incidental uncertainties in the financial market. The situation gets more chaotic when investors want to penetrate a vast financial market since the analyzed data may be too extensive. We then devise a new intelligent hybrid algorithm to deal with the model. The experiments show that the parallel algorithm is scalable and can handle a model of more than 400 securities in a reasonable time.

The diversification of asset investments reflects two components, correlated and uncorrelated diversified asset investments. Lundstrum (2021) revealed that stock exposure in lively markets does not allow diversification, unlike monetary funds in thriving markets.

Mehralizade et al. (2021) introduce new risk factors, proposing a new mean-risk model for optimizing a fuzzy random portfolio. Holgersson et al. (2020) explore a risk perspective of estimating portfolio weights, suggesting that risk perspectives commonly used for estimating may be inadequate and should give way to alternative quality criteria.

3 Data and methods

The Prague Stock Exchange Praha.cz, ČNB.cz and ČEZ.cz provided the relevant data. We analyzed the ČEZ plc stock certificate between 2016 and 2021, using the data for calculating our objectives. Microsoft Excel compiled all calculations, presenting the results in a tabular overview.

We also conducted a fundamental analysis for predicting the stock price trend, exploring whether the intrinsic stock value is overrated or underrated (Abad et al., 2004)

Our objective relies on the intrinsic value of the stock certificate, reflected in the dividend discount model with unlimited possession. The model is applicable only when the stock is not likely to sell. The calculation observes the following formula (Kislingerová, 2011):

$$P_0 = \sum \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \ldots + \frac{D_n + P_n}{(1+r)^n} \tag{1}$$

where:
P_0 intrinsic stock value
D   annual dividends
P_n expected price at the end of the year
r   expected return expressed in decimals

The intrinsic stock value rests on a rate of return, calculated from the CAMP Model as follows:

$$E_{(ri)} = r_f + \beta_i\big[E(r_m) - r_f\big] \tag{2}$$

where:
$E_{(ri)}$ rate of return
r_f risk-free rate of return
β_i Beta coefficient
r_i market rate of return

The CAMP model requires several partial quantities, including a risk-free rate of return, the market rate of return and the Beta coefficient. The risk-free rate of return (rf) observes arithmetic means of treasury bills (TB), comprising data from ČNB.cz. The market rate of return arises from an analysis of year-to-year changes and arithmetic mean, reflecting data from BCPP.cz. We got the Beta factor from ČEZ - an investors' information website. Upon knowing these quantities, we calculate the rate of return by putting the obtained values into Formula No. 2. The exact rate of return is vital for detecting the intrinsic stock value (Alqisie, Alqurran, 2015).

Analyzing the obtained values allows for calculating the final intrinsic stock value using Formula 1, including annual dividends.

Eventually, the calculated alpha coefficient underlines the difference between the market and the expected rate of return, indicating if the stock is underrated, overrated or erroneously appreciated (Sirucek et al., 2014). We use the following formula:

$$\alpha = r_i - E_{(r)} \tag{3}$$

where:
α   difference between the market and expected rate of return
r_i market rate of return

E$_{(r)}$ expected rate of return

4 Results

Tables 1 - 5 suggest data used for calculating the rate of return by the CAMP Model. Then, we determined the intrinsic stock value of ČEZ plc.

Table 1. Risk-free rate of return (r$_f$) 1.

Date of issue	Average return of the TB (%)
22.01.2021	0.190
12.02.2021	0.230
26.02.2021	0.230
12.03.2021	0.370
26.03.2021	0.250
09.04.2021	0.310
23.04.2021	0.250
21.05.2021	0.000
22.10.2021	1.730
Risk-free rate of return (r_f)	**0.485**

Source: www.ČNB.cz – short-term bonds (TB) (2021), author's own interpretations and calculations.

Table 1 proposes values of nine TB issues in 2021 to 7th November 2021. Using the arithmetic mean, we calculated the risk-free rate of return (r_f) to 0.485%.

Table 2. Market rate of return (r$_i$).

Date	PX value	PX year-to-year change in (%)
31.10.2016	921.78	-
31.10.2017	1065.61	15.60
31.10.2018	1066.61	0.25
31.10.2019	1050.87	0.10
30.10.2020	842.92	-20.62
29.10.2021	1326.10	57.32
Arithmetic mean		**10.53**

Source: www.BCPP.cz (2021) – Stock indexes, author's own interpretations and calculations.

Table 2 depicts year-to-year PX values in per cent within 2016 and 2021. Using the arithmetic mean, we calculated the value of 10.53% indicating the market rate of return (r_i).

Table 3. Beta factor (β$_i$).

Date	Beta factor value (%)
6. 10. 2021	0.8

Source: www.ČEZ.cz (2021) – Investors' Information.

Table 3 presents Beta factor (β_i) of 0.8% taken from www.ČEZ.cz to 6th October 2021.

Table 4. The summary of the quantities for calculating the rate of return.

Risk-free rate of return	r_f	0.485 %
Beta factor	β_i	0.8 %
Market rate of return	r_i	10.53 %

Source: author's own interpretations and calculations.

Table 4 portrays the quantities for calculating the expected rate of return using the CAMP Model. The calculation is as follows:

$$E_{(r)} = 0.485 + 0.80 \, (10.53 - 0.485)$$
$$E_{(r)} = 0.485 + 0.80 \cdot (10.530 - 0.485) = \mathbf{12,91} \% \, \boldsymbol{p.a.} \tag{4}$$

The CAMP Model produced the rate of return of 12.91% p.a., allowing us to determine the intrinsic stock value using the dividend discount model.

Table 5. Dividends, discount dividends in 2017-2021.

Rok	Dividends	Discount dividends
2017	33	29.2268
2018	24	18.8255
2019	34	23.6201
2020	52	31.9943
2021	52 + 735	428.8571
Rate of return (expressed in decimals)		**0.1291 %**

Source: www. BCPP.cz (2021), author's own interpretations and calculations.

$$P_0 = \sum \frac{33}{(1+0.1291)^1} + \frac{24}{(1+0.1291)^2} + \frac{34}{(1+0.1291)^3} + \frac{52}{(1+0.1291)^4}$$
$$+ \frac{52+735}{(1+0.1291)^5} \tag{5}$$
$$P_0 = \sum 29.2268 + 18.8255 + 23.6201 + 31.9943 + 428.8571 = 532.5238$$
$$= \mathbf{532.52 \, Kč}$$

Table 5 suggests values of the paid dividends between 2017 and 2021 and the rate of return. Moreover, 2021 saw a takeover of the appreciation of the stock market value. Formula 1 produced the intrinsic stock value of 532.52 CZK, using the dividend discount model.

Table 6. Values for calculating coefficient alpha.

Market rate of return	r_i	**10.53 %**
Expected rate of return	$E_{(r)}$	12.91 %

Source: author's own interpretations and calculations.

$$\alpha = 10.53 \% - 12.91 \%$$
$$\alpha = -2.38 \% \tag{6}$$

Table 6 illustrates values from previous calculations, now used for determining the alpha coefficient. Its negative nature, -2.38 in particular, showed that the stock is overrated and should be sold (Sirucek et al., 2014).

5 Discussion of results

Our findings yielded an answer to the formulated research questions.

How should an optimal low-risk securities portfolio look? We calculated alpha and beta coefficients. The latter showed a value greater than one, indicating high-risk portfolios. The figures between 0 and 1 show medium-risk portfolios, whereas negative numbers refer to the least risky ones (Konečný and Zinecker, 2013). The results demonstrated that ČEZ plc built a medium-risk securities portfolio with a beta factor of 0.8%, catching no attention from investors seeking low risks. Shareholders eager to invest in securities portfolios and unwilling to roll the dice should explore stocks with negative beta coefficients. The alpha coefficient is -2.38%, implying overrated securities for trade before their prices plummet (Sirucek et al., 2014). Sound investment advice on building an optimal portfolio is as follows: invest in medium-risk securities of ČEZ plc and risk-free government bonds and treasury bills to create a low-risk portfolio.

What are the differences between intrinsic stock and market value in a selected stock certificate or index? Analyzing ČEZ plc using the CAMP Model provided for 532.52 CZK of the intrinsic stock value. The current stock price was 715.00 CZK on 27th November 2021 (Exchange rates 2021), indicating a difference of 118.48 CZK. This dissimilarity reflects current stock market prices and other related aspects, discouraging potential investors from purchasing securities so overrated. Their intrinsic value does not track the current stock, making it very likely to slump. The findings correspond to the previous research question.
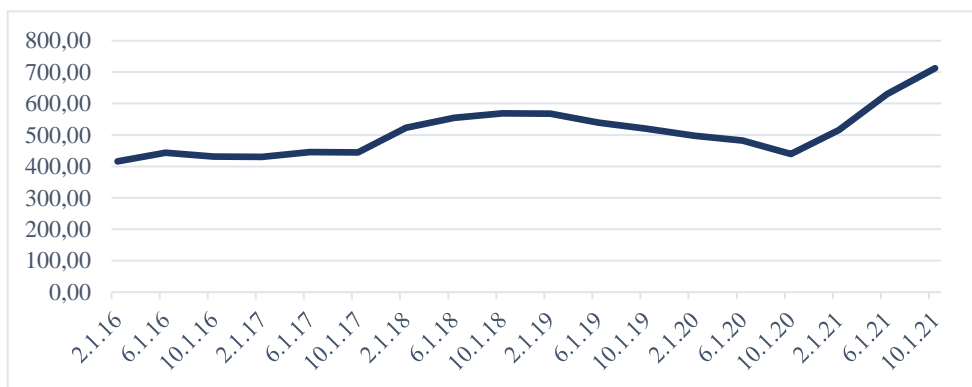
Figure 1. The stock price movement in 2016-2021.

Source: www. *kurzy*.cz (2022), author's own interpretation.

Figure 1 illustrates the stock price movement between 2016 and 2021, showing stock market values on the vertical and the timeline on the horizontal axis. We can see a variation in the market values from 416.19 CZK (01.02.2016) to 712.50 (01.10.2021). The graph suggests a price rise between 2017 and 2018, followed by a steady downturn until 2020. The values soared again in 2021, skyrocketing throughout the year. This draconian inflation probably reflected the bullish sentiment in the European energy market.

Huang and Jiang (2021) confirmed our findings, pointing to a tremendous stock market complexity. Historical data may not effectively mimic the investment return from the securities portfolio.

6 Conclusion

The article explored methods of creating an optimal securities portfolio using fundamental analysis on a selected stock certificate or index. The study met all the objectives.

The results reflected a risk-free and market rate of return and a beta factor, involved in the calculation of the rate of return using the CAMP Model. The resulting value produced an intrinsic stock value using a dividend discount model. We then determined an alpha coefficient to answer the first research question. The discussion compared the intrinsic stock price with the current market value to a given date, proposing a solution to the second research question.

The presented results inevitably lead to several questions, what would the results be if the same values were used but different methods? How is it possible that the market prices of ČEZ, a. s. shares are still rising? Based on the collected data, revised methodology and results, it is not possible to answer these questions objectively at the moment. In order to fulfill these questions, it is necessary to carry out follow-up research, on the basis of which it would be possible to answer these questions and identify this issue in more detail.

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Post Covid-19: Multidimensional Crises, Deteriorating Supply Chain and Regionalization

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Abstract

Research background: When Covid-19 started to subside, a conflict between Russia and Ukraine erupted. The impacts getting worse due to severe drought in Europe and Asia. The supply chain has deteriorated. The food and energy supply chain are disrupted, inflation soaring in many countries and even some developing countries collapsed. Just before the pandemic, the world is already split up into three major groups, those are Europe with its centre in Germany, Asia in China, and America in the USA. Regionalization seems to be more intense during the pandemic. Regionalization was also followed by the emergence of several regional economic powers, such as Mexico, Brazil, India, and Indonesia.
Purpose of the article: Determine some characteristics and policies of how the Indonesian government is dealing with multiple crises, deteriorating supply chains, and regionalization.
Methods: Cluster Analysis and Social Network Analysis are used to evaluate the connection between countries and group countries based on their similarity.
Findings & Value added: Indonesia is quite resilient in dealing with the crises since it has small debt, a younger population, abundant natural resources, self-reliance on staple food, and an economic surplus. Therefore, it has more room to manage crises. Trade with some countries is carried out by local currency. Yet, high commodity price creates disparities between domestic and international prices. Indonesia banned the export of thermal coal in January and palm oil in April 2022 to fulfill the domestic demand and lowering prices. The subsidy for fuel increases substantially. Indonesia has some degrees of similarity with the Philippines and India

Keywords: *Covid-19; Economic Surplus; Regionalization; Multiple Crises; Supply Chain*

JEL Classification: *F68; F63; C38; O53; O57*

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1 Introduction

1.1 Globalization

Globalization is formed due to the increasing interdependence and integration of economies, markets, countries, and cultures. The impacts of globalization are enormous, such as the growth of new global cities, the success of small countries, the increasing wealth in developing countries, the growth of consumers and the emerging middle class, as well as the rapidly changing tastes of consumers (O'Sullivan & Subramanian, 2015). The existence of globalization allows countries, especially developing countries, to participate in the world economy by specializing in certain semi-finished goods rather than building an entire industrial system. Certain countries can specialize in only a small part of the production process. A country simply joins the global supply chain because globalization breaks down production processes globally (Brakman & Van Marrewijk, 2022).

Since 1970 the ratio of world exports relative to world revenue has doubled from 13.3 percent in 1970 to 26.1 percent in 2020 (Brakman & Van Marrewijk, 2022). Nearly half (47 percent in 2015) of global manufacturing exports (in terms of value) came from developing countries (the Global South). Consumption in the Global South is increasing rapidly, with one estimate will reach 47 percent by 2025 (Horner & Nadvi, 2018).

Intra-industrial trade (IIT) has become important throughout Asia because of the rapid growth of Asian economies and their key role in the fragmentation of international production. ASEAN and high-income countries in East Asia showed the highest IIT rates, followed by China and India. R&D spending, openness, and a higher share of manufacturing exports were found to promote IIT, while geographical distance and differences in economic size had detrimental effects, especially for manufactured goods (Sawyer et al., 2010).

New MNEs are also emerging from developing countries, particularly in East and Southeast Asia as key strategic partners, and manufacturing service providers for MNEs from developed industrialized countries. These companies work with and integrate their geographically dispersed strategic partners, specialized suppliers, and customer bases into a complex structure referred to as a global commodity chain (GCC), global value chain (GVC), global production network (NPG), or global plant (Kano et al., 2020).

1.2 Deglobalization

After the global financial crisis began in 2008, economic growth began to slow down. Large deficits in the United States and other developed countries have triggered an economic crisis in 2008. This condition forces protectionism and international competition between the various great powers (Wolf, 2005). The easing of globalization was followed by the political awakening of new powers such as China, India, Russia, Brazil, and others. The era of Hyper Globalization is slowing down or has even stopped. Here, slowbalization, a term used to indicate a period of Hyper Globalization is slowing down (Brakman & Van Marrewijk, 2022). The year 2016 can be marked as "the end of globalization", replaced by a multipolar world.

Polarization is different from the process of regionalization. Regionalization refers to a group of countries within a single region that agree to cooperate by reducing or removing trade barriers. Polarization is the formation of economic forces that are the driving force of economic activity in a particular region. We are in a context in which integration processes are going into reverse and national identities are strengthening.

Some people say that MNE will be part of the history of business that once happened. This is like when globalization was adopted in the 1990s, there was a thought of the potential loss of national (state) autonomy with the presence of techno-globalism. This view assumes

the sustainability of a liberal economy at low or even no tariffs and respects the governance rules outlined, by the WTO. Globalization tends to negate the role of government and the state and in fact, this effort has never been achieved (Petricevic & Teece, 2019)

The results of the scenario analysis conducted by Giammetti et al (2022) in the European Union (EU), show the level of exposure to deglobalization. The Central-Eastern European Bloc is deeply integrated into the interregional production network, the Northern bloc is integrated with countries outside the European Union, and the Southern bloc is less dependent on regional and global supply chains. Further, Giammetti et al (2022) highlight the existence of two categories of territories that may have conflicting interests, namely those that will benefit from a return to the past when production fragmentation is more limited, and other regions that would benefit from the Europeanization of the GVC. In the aggregate, the main disadvantages of deglobalization affected those countries that have largely benefited from trade openness, such as Germany and China. On the other hand, among the main winners of deglobalization, are such powerful and developed economic groups as the United States, The United Kingdom, Italy, Japan, and France.

Current developments that occur challenge existing norms and rules, for example, the emergence of new players on the global stage, such as the MNE 'spring board' (Luo & Tung, 2018), the new motives of internationalization (Cuervo-Cazurra et al., 2017), and the rise of techno-nationalism by the nation-state. Neo-techno-nationalism creates a bifurcation of a new world order with some countries building their innovation capacity based on the protection of international intellectual property (states of law), and the regimes of other countries deliberately avoid such protection in the acquisition of technology in any way possible (Petricevic & Teece, 2019). Indian, Brazilian, and Chinese companies are building innovation capabilities and transitioning at an unparalleled pace from a production focus to an innovation focus. China is significantly creating globalization of world economic innovations. This shows that the role of the nation-state in the time of deglobalization is not fading but strengthening (Petricevic & Teece, 2019). State sovereignty remains effective and sovereignty unlike previously thought when nation-states are in the shadow of MNEs. The bifurcation approach is the occurrence of decoupling between the enterprise and the state as well as invasions and the economy.

Deglobalization will drive significant qualitative changes in strategies, structures, and behaviors that can be observed in international business. This qualitative change will require research to develop a much deeper political integration. The relevant theories of globalization from political science are liberalism and realism. Both predict deglobalization under current conditions but lead to different expectations about the future world economy: liberalism suggests a patchwork (improvement) of economic networks is needed, while realism predicts the emergence of economic blocs around major powers (Witt, 2019). Therefore, globalization, previously controlled by multinational corporations, and free market mechanisms were replaced by different regional powers (O'Sullivan & Subramanian, 2015).

1.3 Covid 19 Crisis and Ukraine War: Global Shock

The Covid-19 crisis that began in early 2020 and its disruptive effects on the Global Value Chain (GVC) have revealed the vulnerability of globalization. This crisis has led to a heated debate about whether conventional global value chains and production networks (based on just-in-time logic) should be replaced with more regional and domestic ones, based on just-in-case logic (Gong et al., 2022). World output plummeted as country after the country went into lockdown to try to slow the spread of the virus. The IMF also projects the most severe decline in the world output in economic activity since the Second World War (Sachs, 2020). The pandemic has delayed most of China's outbound investment and construction, making companies reluctant to disclose transactions as they did from 2005 to 2019.

The war in Ukraine goes hand in hand with other future manifestations such as economic and political instability and the possibility of the outbreak of large-scale conflicts. Economic protectionism and trade wars are on the rise. The global and local economic crisis is slowing down the world economy with a much lower growth rate than it has experienced in recent decades. The emergence of a new economic superpower (China) will influence the geopolitical balance that has been consolidated in the "Long Peace" period since the post-Cold War. Thus, global value chains (GVCs) show strong sensitivity to endogenous and exogenous shocks, as evidenced by the COVID-19 epidemic, paving the way to possible processes of deglobalization and regionalization. This manifestation seems to be due to the growing inequality and instability of the global economic and political order due to the GVC. (Mariotti, 2022).

Shocks also occur on production lines that are outside the country's direct trading partners. Furthermore, shock at a particular key supplier can cause a huge bottleneck in production, which affects not only directly related companies but also the entire value chain. Both types of shocks are currently looming large due to COVID-19-related lockdowns in many places around the world in major demand and supply hubs such as China, Europe, and North America. China's industrial disruption due to the pandemic has caused widespread adverse effects around the world (Pahl et al., 2022).

Shocks affect countries differently. Some countries were hit hard by the shock, and others were not. The key finding is that strong engagement in global supply chains is slowing countries' recovery from recession. Europe, which is heavily involved in global supply chains, is an example. More intense involvement in intra-industry trade flows implies that the duration of the trade recovery takes longer, such as that the recovery time is later (Brakman & Van Marrewijk, 2022). During the global crisis of 2008, it was seen that being part of a global supply chain could also make countries more vulnerable to shocks.

Brakman and van Marrewijk (2019) analyze several countries to analyze the heterogeneity of the experiences of countries participating in global supply chains. The main conclusion obtained is that the stronger the involvement in global supply chains, the slower the country's recovery from recession. The longer supply chains, the bullwhip effect is possible. The impact of credit (export) restrictions after the crisis may have limited trade along the supply chain. At the aggregate level, the (minimal) trough time occurs earlier in Developing Asia and at about the same time in other countries. The recovery time, that is, the return of pre-crisis trading volumes, varies greatly. Recovery is fast-paced in Asia and is progressing slowly in the Euro Area).

The GVC, at present, faces the risk of not only being geographically reorganized but also strategically derived. The most visible effect of this new trend is the call for the relocation of production activities from developing countries to developed countries (reshoring). The geographical relocation of production activities increased its popularity in recent years due to the uncertainty generated by Brexit, the US-China trade war, the COVID-19 pandemic (Canello et al., 2022), and recently Russia-Ukraina War.

Regarding demand shocks, there are striking differences among developing countries, in terms of the importance of hub markets for their products and related to the final demand they are aiming for. Bangladesh depends on the final demand in Europe (North America), where more than 90 percent is textile demand. In Vietnam, an even larger share depends on the final demand in Europe (North America). But compared to Bangladesh, Vietnam's export sector is more diversified, with only about a quarter to a third of the added value concentrated in one sector. On the supply side, shock analysis reveals a more complex picture. Several countries have a sizable share of their GDP in the GVC where their respective hubs are the main input suppliers (responsible for more than 5 percent of the added value across the GVC). This dependence puts the GDP of countries at risk of up to 18 percent (Vietnam) and 19 percent (Senegal). However, Vietnam and other Southeast Asian countries tend to be

relatively diversified in terms of input suppliers from major hubs. Unlike the case with Ethiopia, Mexico, and Senegal (Pahl et al., 2022).

Indonesia is the largest economy in the ASEAN, and the average net FDI inflow as a proportion of GDP is among the lowest in the group. These inflows have also tended to stagnate over the past decade. Indonesia is also less associated with the GVC, with an overall participation rate lower compared to many of its smaller neighbors in ASEAN. This is partly a consequence of an economy that strongly leans towards the export of natural resources (Surianta & Patunru, 2021) and also its huge domestic market.

The idea of "resilience" is currently receiving attention in the formulation of economic policy objectives given the occurrence of a crisis cycle in a shorter period. If economic shocks are inevitable, then the economic ability to cope with them should be a major concern. Nonetheless, most of the discussion regarding resiliency is static (retention of existing system functions in the case of a crisis), while the adaptive dimension receives less attention. One aspect of resilience is the capacity of the economy to absorb and recover quickly from adverse shocks (Brinkmann et al., 2017).

2 Methods

Cluster Analysis and Social Network Analysis are used to evaluate the connection between countries and group countries based on their similarity. Connection data are collected from the ASEM (The Asia-Europe Meeting) Sustainable Connectivity Portal, including data on Trade in Gas (2015-2017 average in kilograms), Trade in Electricity (2015-2017 average, in MWh) (Becker et al, 2018). Data before the pandemics are used in this analysis to illustrate prior crises and it can be used to estimate the spread of the virus and the possibility of an energy crisis in the ASEM countries. Analysis for Principal Component Analysis, and phylogenetic tree based on data obtained from the ASEM Sustainable Connectivity Portal for Trade in Gas (million tons, average 2015-2017), Trade in Electricity, Cross Border (number of crossings, 2018), International Flights (million seats, 2017). Public Debt as a percentage of GDP (2017) (Becker et al, 2018), GDP in billion USD (December 31, 2021) was collected from the Trading Economic Portal (2022) and economic growth was obtained from the World Bank (2022). Economic growth used in the analysis is cumulative growth in 2020 and 2021 combined as a pre covid variable. Covid 19 data, consisting of the number of infected people, number of dead, number of cases per 100 thousand population, and number of fully vaccinated people were obtained from the World Health Organization (2022). Data processing uses Gephi to describe networks (SNA) and R for PCA and phylogenetic tree.

3 Results

Connection data are collected from the ASEM (The Asia-Europe Meeting) Sustainable Connectivity Portal, including data on Trade in Gas (2015-2017 average in kilograms), and Trade in Electricity (2015-2017 average, in MWh).

Figure 1a shows the exporter/importer of gas. Norway (NO) is a major supplier of gas, particularly to Germany (DE), the United Kingdom (GB), and France (FR). For Asia, Korea (KR) acquires gas from many countries, while Japan (JP) acquires gas mainly from Malaysia (MY) and Russia (RU). For Singapore (SG), gas is supplied from Indonesia (ID). Interestingly, Thailand (TH), gained its gas supply from Myanmar (MM), so if Myanmar obtains international sanctions, then Thailand will be greatly affected. Figure 1b shows gas supplied by Russia. Many ASEM countries depend on Russia for their gas supply. The impact will be enormous when this supply is disrupted.
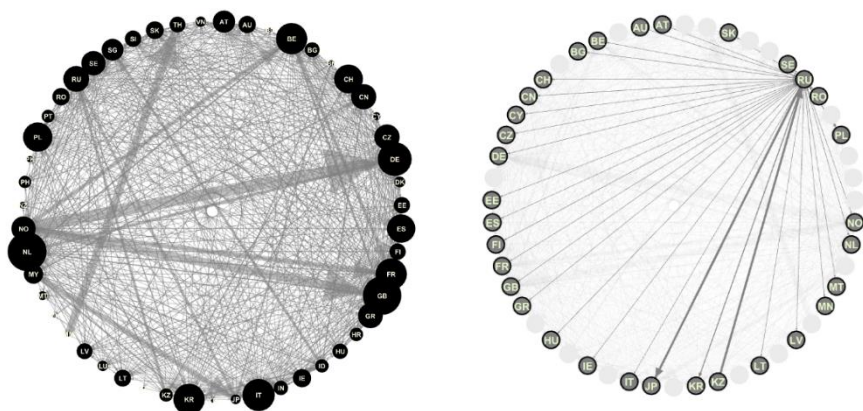
Figure 1. Gas Importer/Exporter in ASEM Countries.

Source: own processing

Figure 2a shows the linkage of the power grid between countries in Europe is much more intensive than in Asia. Electrical in Italy (IT) and Slovakia (SK) partly is supplied from Switzerland (CH), Finland (FI) is supplied from Sweden (SE), and electricity in the Netherlands (NL) and Poland (PL) is supplied from Germany (DE). Electricity supply in the UK (GB) is also partially supplied from the Netherlands (NL). The increase in electricity prices in electricity exporting countries will have a contagious effect on electricity in the importing countries. For instance, the impact of the war in Ukraine is obvious with high inflation in Europe, especially in the United Kingdom (GB), Netherland (NL), and Germany (DE) due to the increase in gas and electricity prices. Figure 2b shows Germany (DE) as the main supplier of electricity to other countries in Europe.
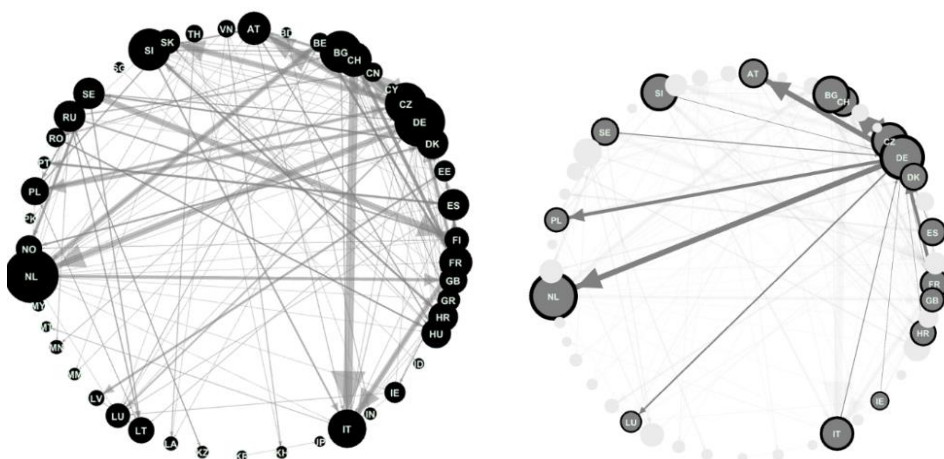
Figure 2. Power Grid Linkage.

Source: own processing

Figure 3 shows a phylogenetic tree with seven clusters. The first cluster consists of Eastern Europe and West Asia countries such as Bulgaria, Romania, Hungary, Croatia, Slovenia, Slovakia, Poland, Kazakhstan, and Russia. One of the characteristics of this cluster is that the vaccination rate is low. The second cluster consists of the Philippines, Indonesia, and India from Asia and Spain, the United Kingdom, and Italy from Europe. This cluster is characterized by a high infection and mortality rate for whom get infected. Government debt is below 60 percent of GDP. This contrasts with Spain, the United Kingdom, and Italy, whose debt-to-GDP ratio exceeds 100 percent. The third cluster is dominated by the countries of Indochina, except for Ireland and Bangladesh. China, Vietnam, Bangladesh, and Ireland have high economic growth and Covid is manageable. The next cluster contains countries with high debt ratios, but Covid is relatively under control such as in Japan, Singapore, Greece, Portugal, Cyprus, and Mongolia. Myanmar, Malaysia, Thailand, Belgium, and Norway are in the same cluster. For Asian countries, such as Malaysia, Thailand, and Myanmar, their cumulative growth (2020 and 2021) remains negative. The next cluster contains several Western European and Nordic countries such as Finland, Sweden, Germany, France, Austria, Netherlands, Switzerland, and Czech. The last cluster contains European countries adjacent to the Baltic Sea plus Australia, New Zealand, and Malta.
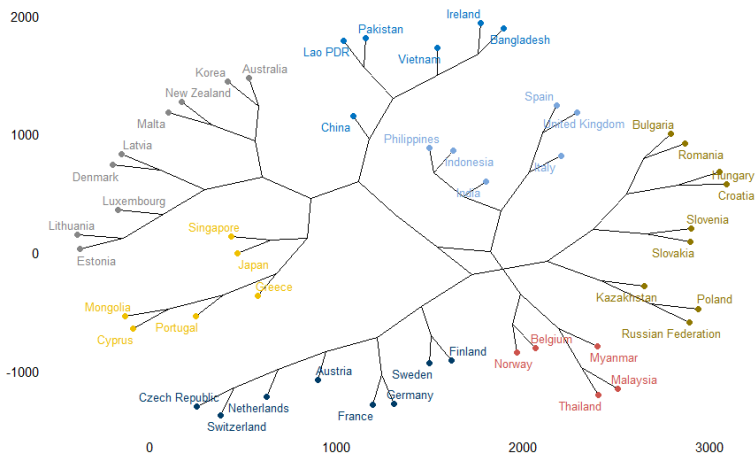
Figure 3. Phylogenetic Tree.

Source: Own processing

Figure 4 shows the biplot of the principal component analysis. To interpret the results, the farther a country's position is from the point of origin, the more important those countries are. The longer the vector length of a variable, such as International Flight, Death, Fully Vaccinated the more important the variable is. In this case, the pre-Covid variable that represents the cumulative GDP growth in 2020 and 2021 has no significant role.
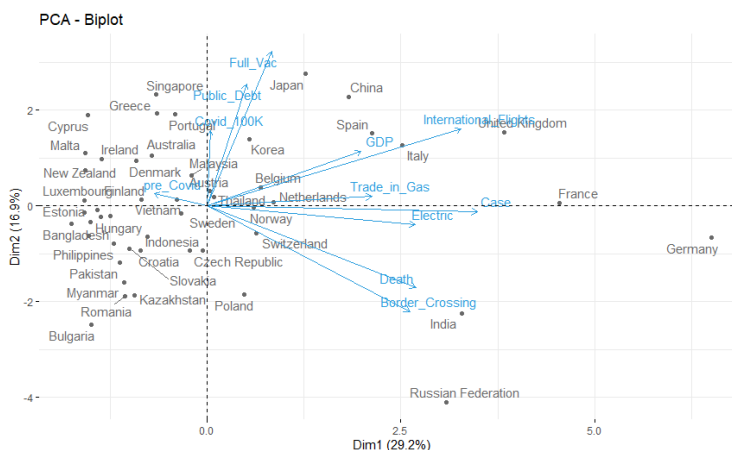
Figure 4. Biplot of PCA.

Source: own processing

From the results, it can be concluded that Germany and France are major importers and exporters of energy in Europe, although their covid cases are high. Germany's role in providing electricity in Europe is very important, demonstrated by its position which is far from the original point, and located in the direction of the vector the "Trade in Electricity". India and Russia have high mortality rates and India is located right on the "Death" vector path if it is extended. The UK and Italy have extensive international flights, as well as China. Japan and Singapore despite they have a high debt ratio, they are among the highest complete vaccination rate. Ireland, Malta, and New Zealand have low mortality cases since they are located opposite the vector "Death". Meanwhile, Eastern European countries, including

Indonesia, have a low debt ratio compared to Western European countries, but their full-vaccination coverage is mediocre, such as in Bulgaria and Romania, by European standards.

4 Discussion

After the pandemic, countries in Europe experienced severe impacts due to the war between Ukraine and Europe. Gas and wheat supplies have been disrupted. Indirect impacts of the conflict included (but were not limited to) refugee flows and costs from the war between the two countries. For Western Europe, countries whose electricity supply comes from West Germany will experience rising energy prices, such as the Netherlands. The United Kingdom after Brexit also suffered a heavy shock.

Indonesia has experienced several economic crises, among them the one in 1966 and 1988 which was followed by social and political unrest. The last crisis in 1998 taught Indonesia so many lessons for the following government. For example, the debt-to-GDP ratio is limited by law to a maximum of 60 percent of GDP. Indonesia is also very cautious in maintaining inflation, the rupiah (IDR) exchange rate, and deficit. Indonesia's external debt In May 2022, decreased in ratio to gross domestic product (GDP) from 32.6% in April 2022 to 32.3%. In addition, Indonesia's external debt was dominated by long-term external debt, which accounted for 86.7% of the total external debt in May 2022.

Based on the latest data published by the Central Statistics Agency of Indonesia, Indonesia recorded a trade surplus of USD5.76 billion in August 2022 compared to USD4.22 billion in the previous month. Thus, Indonesia's trade balance has remained positive since May 2022. For the January-August 2022 period, the overall trade surplus was recorded at USD34.92 billion, up from USD20.71 billion in the same period in 2021. The trade surplus recorded in August 2022 was attributable to the broader non-oil and gas trade balance surplus, coupled with a narrowing oil and gas trade balance deficit. In the reporting period, the non-oil and gas trade surplus increased to USD7.74 billion from USD7.31 billion in July 2022 (Trade Surplus Maintained in August 2022). This development is explained by the solid non-oil and gas exports of USD26.19 billion in August 2022, up from USD24.20 billion in the previous month, driven by exports of natural resources, such as crude palm oil (CPO), supported by the government's policy to extend the exemption of CPO export levies in line with the high international commodity prices (Bank Indonesia, 2022). Unlike other Southeast Asian countries, Indonesia's trade has more to do with other developing countries (Global South), along with the main trading partners with China, the United States, and Japan. Indonesia's economy is diverse (Bank Indonesia, 2022). This explains why Indonesia has resilience, at least in 2022, compared to the other countries even though Indonesia was hit hard by the Covid-19 Delta Variant in 2021 with many casualties.

5 Conclusion

China has had a major influence in slowing down the world economy due to covid-19. Most of the global manufacturing production depends on China, whilst until nowadays the Chinese government is still carrying out several lockdowns in its territory while the Russia-Ukraine war making it worse. This war has destroyed the energy and food supply chains, especially in Europe. Natural resource-producing countries are more stable facing the turmoil of the crisis, including Indonesia. Indonesia as the world's largest producer of commodities, such as coal, palm oil, and a major producer of tin, aluminium, gold, and nickel, has also benefited from rising commodity prices. Covid 19 has further accelerated deglobalization and polarization due to limited movement. Countries that are less integrated and have more diversified economies will have greater resilience. AFTA (ASEAN Free Trade Area, allows trade to be conducted with local currencies in several countries). Indonesia applies strict

controls on state finances. The Asian crisis in 1998 provided lessons for Indonesia to better safeguard the country's finances through various legal corridors. The government will keep the inflation rate at a safe level to keep the momentum of economic growth in the range of 5 percent

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e-Government as a SMART tool for communication with citizens

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Abstract

Research background: In the modern conditions of the society development, high requirements for the technological transformation of public administration can be observed. Technologies have changed the way of communication and set new requirements for the quality and speed of information in the conditions of public administration by citizens.

Purpose of the article: In the presented paper, we will look at the use of the Internet by citizens in the Slovak Republic when interacting with public authorities, obtaining information from the websites of public authorities and downloading official documents from these sites. We will compare these data with the Czech Republic and the average of the European Union member countries. The theoretical level of the contribution is focused on strategic documents related to the digitization of public administration and the implementation of SMART technologies in Slovakia.

Methods: The data presented in the paper are subjected to analysis, which helped us to extract important data for our article from the found information. By comparison, we compared data between selected countries. SWOT analysis of e-Government in Slovakia brings findings in the form of strengths, weaknesses, opportunities and threats in the implementation of e-Gov.

Findings and Value added: Indicators presenting the level of online tools usage in the mentioned areas compared to the neighboring country and the average of other EU countries are important information about the state of e-Government in Slovakia. Citizens' willingness and motivation to use introduced new solutions in practice are an indicator of future changes.

Keywords: *Citizens; Communication; e- Government; Regional marketing*

JEL: *M31; R58; M30*

1 Introduction

As part of the introductory part of our paper, we will look at the issue from the point of view of various authors devoted to this topic.

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The author Linhartová thinks that society has moved into a so-called era of digital governance, which is characterised by modern ways of providing public services to citizens. In this era, services are provided online, they are highly personalised, and networks and voluntary partnerships between different stakeholders are being established (Linhartová, 2022). This application of information and communications technologies (ICTs) to the business of government has grown to be the most significant innovation in public administration over the past four decades (Turner et al., 2022).

About the importance of digital competences of citizens writes the author Morte Nadal and her colleague. The e-government requires citizens that have a certain level of digital skills. Contact restrictions caused by the COVID-19 pandemic has accelerated the digital transformation of Public Administration in most countries and has increased the social digital divide. Therefore, the training of citizens in digital competences is one of the main challenges of the knowledge society (Morte Nadal and Esteban-Navarro, 2022).

Based on a multidimensional conceptualization of service, we define three key service perceptions, each comprising different design characteristics, that jointly influence perceived service quality and citizen satisfaction with e-government services. The service perceptions and their corresponding design characteristics are: (1) perceptions of a core service-accuracy, completeness, self-service capability, and convenience; (2) perceptions of facilitating services-accessibility, privacy protection, security protection, and user support; and (3) perceptions of supporting services-personalization capability and transparency (Chan, Frank K. Y. et al., 2020). With digitization of public services happening so quickly, it leaves the question of how this transformation is actually viewed by the citizens. The change in medium from traditional communication by standard mail to digital communication can be argued to have both positive and negative effects (Krotel, Sarah M. L., 2021).

Over the past decade, e-government has evolved from providing static content and services to integrating user generated content and social media technologies. This allows citizens to participate and provide regular feedback on policies and programs, both of which promote public value through e-democracy (Manoharan, Aroon P. et. al., 2022). Public participation is a way for stakeholders of public institutions to participate in the public decision-making process, planning, organizing, and financing activities to achieve common public goals (Androniceanu, A. and Georgescu, I., 2022). Administrative practices have always been acknowledged as a crucial tool for establishing good governance. Strong evidence shows that good governance extensively influences citizens' behaviors toward government (Jameel, A. et. al., 2019).

The results of Barrera-Barrera and his colleagues research show that citizens who prefer to use the internet as a means of contact or who use eGovernment are characterized as being young people, undergraduate students or with a university degree. On the other hand, those who do not use electronic administration or who prefer the face-to-face channel are mostly elderly people or those with basic education. Secondly, although citizens perceive a high quality and have a high degree of satisfaction with these public services, this does not translate into high rates of use of eGovernment. Finally, increasing the use of electronic administration implies in using simple, intuitive and user-friendly interfaces, especially targeting the elderly and those with basic education (Barrera-Barrera, R. et. al., 2019). The high number of public services available at the administrative level and the physical proximity of service-providing agencies and citizens, which supports the foundation of electronic support for face-to-face public service provision, have spurred the development of eGovernment applications in this sector (Piehler, R. et al., 2016). The impact of digitization on street-level discretion can be best understood by examining the affordances and constraints that emerge relationally through the interactions between users (social) and technology (material) (Alshallaqi, M., 2022).

2 Methods

The European Commission has monitored Member States' progress on digital and published annual Digital Economy and Society Index (DESI) reports since 2014. Each year, the reports include country profiles, which help Member States identify areas for priority action, and thematic chapters providing an EU-level analysis in the key digital policy areas. In 2021, the Commission adjusted DESI to reflect the two major policy initiatives that will have an impact on digital transformation in the EU over the coming years: the Recovery and Resilience Facility and the Digital Decade Compass (European Commission, 2022).

On the graph below, we can see Slovakia in the context of - Digital economy and society index raking for 2021 in the areas - Human Capital, Connectivity, Integration of digital technology and Digital public services.
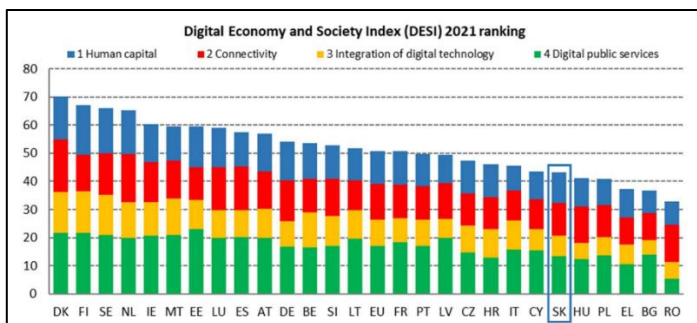
Figure 1. Digital Economy and Society Index ranking.

Source: European Commission (September, 2022)

Slovakia ranks 22ND of 27 EU Member States in the 2021 edition of the Digital Economy and Society Index (DESI). The country stays at the same position as in 2020. Slovakia is just below or around the EU average across the human capital dimension indicators. 54% of Slovaks have at least basic digital skills and 27% have above-basic digital skills in comparison to 56% and 31% for the EU average. The number of enterprises providing ICT training was 16% in 2020, which is 4 percentage points lower than the EU average of 20%. The share of ICT specialists in total employment has also grown and almost reached the EU average. Overall fixed broadband take-up in Slovakia increased steadily from 72% in 2019 to 78% in 2020. Slovakia has significantly improved the take-up of super-fast internet and progressed in VHCN coverage, and the completed 5G auction improved the score in 5G readiness. 52% of SMEs have at least a basic level of digital intensity, which is below the EU average of 60%. 15% of enterprises used at least two artificial intelligence (AI) technologies in 2020, in comparison to 25% in the EU. The percentage of enterprises using e-invoices is 16%, significantly below the EU average of 32%. Most indicators for the Digital public services dimension are lower than the EU average, except for the 68% share of e-government users in 2020, compared to 64% for the EU. (European Commission, 2022)

In the Human capital dimension (Figure 2), Slovakia ranks 19th out of 27 EU countries and is thus below the EU average. 54% of Slovaks have basic digital skills and 27% have advanced digital skills. Both indicators are below the EU average of 56% and 31% respectively. The share of enterprises that provide ICT training to their employees decreased to 16%. The proportion of ICT specialists in total employment grew to 4.2%, although it is still slightly below the EU average (4.3%). 16% of ICT specialists are women. (European Commission, 2022)

	Slovakia			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
1a1 At least basic digital skills % individuals	59% 2017	54% 2019	54% 2019	56% 2019
1a2 Above basic digital skills % individuals	33% 2017	27% 2019	27% 2019	31% 2019
1a3 At least basic software skills % individuals	63% 2017	56% 2019	56% 2019	58% 2019
1b1 ICT specialists % individuals in employment aged 15-74	3.2% 2018	3.7% 2019	4.2% 2020	4.3% 2020
1b2 Female ICT specialists % ICT specialists	13% 2018	14% 2019	16% 2020	19% 2020
1b3 Enterprises providing ICT training % enterprises	18% 2018	18% 2019	16% 2020	20% 2020
1b4 ICT graduates % graduates	3.3% 2017	3.9% 2018	3.9% 2019	3.9% 2019

Figure 2. Human Capital in Slovakia.

Source: European Commission (2022, September)

With a score of 53.7 in 2021, Slovakia ranks 23rd in the EU for Digital public services. The share of egovernment users among internet users has slightly decreased to 68% but is still above the EU average (64%). In all other monitored indicators, Slovakia scores below the EU average. In the category of 'amount of data pre-filled in public service online forms', the country scores 36 in 2020, which is significantly below the EU average of 63. Digital public services for citizens is also below the EU average, being 64 in comparison to 75 at EU level. This gap is less pronounced for digital public services for businesses, where Slovakia scores 79 compared to an EU average of 84. Slovakia's public administration is underperforming, and the compartively low level of digitalisation of the public administration and of public services is a key bottleneck for the business environment and economic growth. Important barriers continue to prevent a wider use of digital public services in Slovakia. The main obstacles include the lack of integration between public registers and re-use of available data. (European Commission, 2022).

	Slovakia			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
4a1 e-Government users % internet users	62% 2018	69% 2019	68% 2020	64% 2020
4a2 Pre-filled forms Score (0 to 100)	NA	NA	36 2020	63 2020
4a3 Digital public services for citizens Score (0 to 100)	NA	NA	64 2020	75 2020
4a4 Digital public services for businesses Score (0 to 100)	NA	NA	79 2020	84 2020
4a5 Open data % maximum score	NA	NA	53% 2020	78% 2020

Figure 3. Digital public services.

Source: European Commission (2022, September)

In the next chapter, closer look at e-Government in Slovakia is represented. We focus on the Internet use by citizens in the Slovak Republic when interacting with public authorities, obtaining information from the websites of public authorities and downloading official documents from these sites. We compare these data with the Czech Republic and the average of the European Union member countries. Czech Republic was chosen because of the common history and the acquired independence in the same year, which can be described as an imaginary separate start for both countries. We therefore perceive it as important to follow the development of both countries and compare them from the point of view of various primary areas - economic, social and regional development. In addition to a common history, the countries are located in the same region and have the same government form.

	Czechia	Slovakia
Region:	Eastern Europe	Eastern Europe
Area:	78,870 km²	49,030 km²
Official language:	Czech	Slovakian
Government form:	Parliamentary republic	Parliamentary republic
Independent since:	1993 AD	1993 AD
Capital:	Prague	Bratislava

Figure 4. General Information Czechia vs Slovakia.

Source: WorldData.info (2022, September).

As for the differences between these 2 countries, there are noticeable differences in the number of inhabitants of the countries and in other areas as well. The Czech Republic has 10.7 million inhabitants, Slovakia 5.4 million. The Czech Republic with a GDP of $245.2B ranked the 46th largest economy in the world, while Slovakia ranked 62nd with $105.9B. By GDP 5-year average growth and GDP per capita, the Czech Republic and Slovakia ranked 64th vs. 65th and 43rd vs. 47th, respectively. Slovakia has been using the EURO as its currency since 2009, in the Czech Republic it is still Czech crowns, although according to some sources, the country is actively preparing to switch to the European currency. In addition to GDP, Slovakia achieves worse results in the unemployment rate, which is at the level of 6.7% compared to 2.9% in the Czech Republic.

	Czechia	Slovakia
Political stability:	81	73
Civil rights:	75	67
Health:	90	77
Climate:	22	35
Cost of Living:	49	42
Popularity:	40	34

Figure 5. Quality of life Czechia vs Slovakia.

Source: WorldData.info (2022, September).

A total of 36 factors were included in the calculation of the overall index, which were divided into seven subject areas – Stability; Rights; Health; Safety; Climate; Costs; Popularity. The best achievable value in each division is 100. The most popular country, based on these 7 areas is Australia with ranking 76.

3 Results

The results are shown in the form of tables representing Individuals using the internet for interacting with public authorities; Individuals obtaining information from public authorities' web sites; Individuals downloading official forms from authorities' web sites. There are 3 key areas in which the involvement of the population in the adoption of technologies by the public administration is shown. We divided Individuals into 4 groups – Males 25 – 64 years old; Females 25-64 years old; Individuals living in cities and Individuals living in rural areas. The age range was chosen based on the fact that this is the age at which citizens need to interact with public administration offices the most. Since this is a large group of the population in Slovakia, the Czech Republic and the EU, we divided this group into genders. Due to persistent regional differences, it is necessary to look at these results in the context of living in cities and living in rural areas. In general, people living in cities are closer to digitization and technology than people living in villages, where the age structure of the population is higher. But is it the same when interacting with public authorities?

Table 1. Individuals using the internet for interacting with public authorities

Individuals using the internet for interacting with public authorities	in %	Individuals obtaining information from public authorities web sites	in %	Individuals downloading offcial forms	in %
Males 25 - 64 years old		Males 25 - 64 years old		Males 25 - 64 years old	
European Union	63	European Union	51	European Union	43
Czechia	69	Czechia	57	Czechia	33
Slovakia	57	Slovakia	50	Slovakia	33
Females 25 - 64 years old		Females 25 - 64 years old		Females 25 - 64 years old	
European Union	63	European Union	52	European Union	42
Czechia	77	Czechia	66	Czechia	34
Slovakia	58	Slovakia	54	Slovakia	33
Individuals living in cities		Individuals living in cities		Individuals living in cities	
European Union	65	European Union	54	European Union	44
Czechia	73	Czechia	65	Czechia	34
Slovakia	69	Slovakia	65	Slovakia	31
Individuals living in rural areas		Individuals living in rural areas		Individuals living in rural areas	
European Union	52	European Union	40	European Union	33
Czechia	63	Czechia	52	Czechia	24
Slovakia	51	Slovakia	47	Slovakia	28

Source: Own processing based on Eurostat (September, 2022).

In Table 1 we see the results of individuals using the internet for interacting with public authorities. The results of the European Union are at the same level for both sexes and a surprisingly high 63%. An even higher result was recorded in the Czech Republic, where mainly women are above the average. Slovakia lags behind the results of the EU and the Czech Republic. Both countries achieve a higher result than the EU average for citizens living in cities. For citizens living in villages, the Czech Republic achieves a higher result.

As part of obtaining information from public authorities' web sites, the data in all categories of citizens is lower, as the choice has been narrowed from using the Internet to just the web site. Some cities and municipalities use social networks to primarily inform citizens, and the website has become a platform containing out-of-date information or just copying information from social networks.

We see the lowest numbers when downloading official documents from the websites of cities and municipalities, where both countries lag behind the EU average. Paradoxically, the reason is most often the fact that the documents on the web site are out of date or absent. Another practical reason is the fact that most official documents need to be signed, which involves the printing of documents, which represents a time and financial cost for citizens, so the preferred method is still the use of documents at offices, or from office workers.
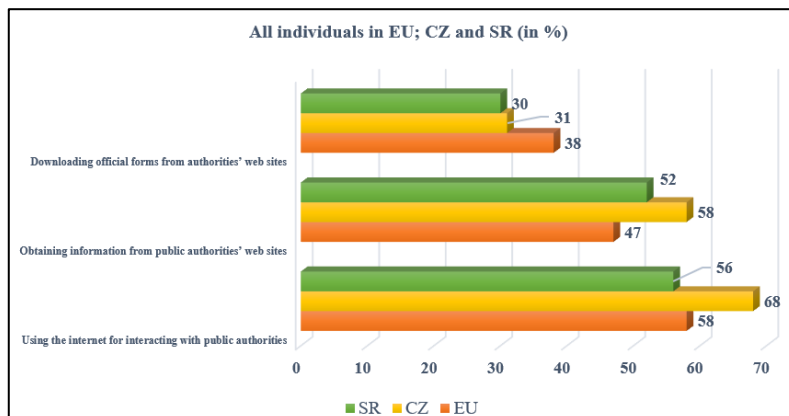
Figure 6. All individuals.

Source: Own processing based on Eurostat (September, 2022).

The results in Figure 6 present the data as a whole, not divided into categories. 3 key areas are left – Downloading official forms from authorities' web sites; Obtaining information from public authorities' web sites; Using the internet for interacting with public authorities. The only area in which Slovakia is above the average of EU countries is the area of Obtaining information from public authorities' web sites. In the case of the Czech Republic, there are 2 of the mentioned areas. Overall, the results show a tendency to digitize public offices. The digital literacy of the population is growing, which should have a positive impact on online communication at the resident-city/municipality level. First of all, the focus should be on the digitization of the most frequently used documents and the electronic signature of documents whose nature allows it. Communicating these innovations to citizens needs to be conducted in the spirit of positive change and facilitation of actions with clearly defined instructions.

Table 2. SWOT Analysis of e-Government in Slovakia.

Strenghts	Weaknesses
Labour force with basic digital skills	Lack of workforce with ICT skills
Increase in computerization of public administration	Unclearly defined processes and standards for the execution of the public administration agenda
The availability of electronic public administration services for entrepreneurs is close to the EU average	Low level of transparency
Increase in the interest of the younger generation to work in public administration	Low foreign language competence in public administration
Existence of key strategic documents at the national level	Average computer skills of public administration workers
High level of broadband internet coverage	Low motivation to learn and progress
	Low wages
	Inadequate use of EU funds and subsidies by cities and municipalities
	Weak marketing of cities and municipalities in Slovakia
	The absence of a single Smart City platform for cities and municipalities

Opportunities	Threats
Demand for e-Governmnet services	Low involvement of citizens in public events
Using the best experience from abroad as an example	Computerization will deepen the differences in society - the digital divide
Involvement of creative and young people in public administration	Pressure to reduce the budget of public administration institutions
New innovative technologies increasing service possibilities	Insufficient awareness of the public about the possibilities of open data and their little use in practice
Funds for e-services to improve social and physical infrastructure	Cyber crimes
Increasing of population digital literacy	IT-proficient people can have better opportunity for employment
Existing examples of successful automation and electronicization of processes	Fear of losing private information
The potential of the gigabit company and the availability of 5G networks	Population aging
	High costs for implementing solutions, especially for smaller cities and towns - high initial costs
	The deepening of regional differences between regions

Source: Own processing

The SWOT analysis presents a complete picture of the internal environment of the region – strengths and weaknesses and the external environment – opportunities and threats. The factors that the region is able to influence are located between weak and strong sides. Factors on which the city/municipality does not have that much influence are located between opportunities and threats.

Focused on the current state of e-Government in Slovakia, we identified the following as the strongest points:

− Increase in computerization of public administration;

- Existence of key strategic documents at the national level;
- High level of broadband internet coverage.

Among the weakest factors we can include:

- Low motivation to learn and progress;
- The absence of a single Smart City platform for cities and municipalities ;
- Lack of workforce with ICT skills.

As part of the opportunities that are emerging at the moment, we include among the most important:

- Increasing of population digital literacy;
- Demand for e-Governmnet services;
- Using the best experience from abroad as an example.

The biggest threats that municipalities are currently facing:

- High costs for implementing solutions, especially for smaller cities and towns - high initial costs;
- IT-proficient people can have better opportunity for employment;
- Insufficient awareness of the public about the possibilities of open data and their little use in practice.

4 Discussions

The onset of the information age has caused a large part of public administration activities to be in intangible nature. The development of the computerization also brought changes in the way of obtaining, processing and storing public administration information, which today exists mainly in the form of electronic data. The recent Internet development Internet and social networks has made citizens and companies, as well as public administration authorities, communicate and cooperate incomparably more effectively. The social dimension of the communication technolgy development has shown that there are tools and methods for more effective, clearer and faster interaction and cooperation of citizens and institutions. Public administration produces enormous amounts of intangible wealth by creating and managing information and data that it uses to run public administration and improve services. By using this information and data only internally by the institution that records them, their potential is not fully utilized. It should be true that any intangible wealth procured or created thanks to public resources should be freely and free of charge available to the public, in a predefined scope, content and form, so as to allow its unlimited reuse and sharing. Only in exceptional cases should the scope of repeated use be limited or linked to the payment of costs incurred by the public administration for its creation and dissemination.

Acknowledgements

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The causes and consequences of regulatory compliance in public procurement management in Vietnam

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Abstract

Research background: Rules and procedures governing public procurement are important determinants of the effectiveness and performance of public resource management. Following the first procurement review in 1994, when separate regulations for capital and recurring expenditures were developed, the establishment of a modern procurement framework for public expenditures in Vietnam, based on the principles of competitive bidding, started. Despite the creation of an institutional and legal framework that is appropriate for public procurement, local procurement practices nevertheless lag behind global best practices. Policymakers also know that if more experience is gained and laws are improved and enforced, there could be even more economic and social benefits.

Purpose of the article: Aiming to explore the relationship between the causes and consequences of public procurement compliance in a developing country context, this study will analyze the factors that impact public procurement regulatory compliance including familiarity, enforcement, and resistance to political pressure with the mediating effect of ethical behaviors. The cost-effectiveness and time-consuming of regulatory compliance in public procurement are also examined.

Methods: With the PLS-SEM approach, this quantitative research deploys a dataset of 151 samples collected from 175 purchasers in the public sector in Vietnam to discover the relationships among causing factors of public procurement regulatory compliance and its consequences.

Findings & Value added: Empirical study verifies the fully mediating role of ethical behaviors in relationships of familiarity to procurement regulatory compliance, political resistance impact significantly on ethical behaviors and procurement regulatory compliance. The findings also confirm the cost-effectiveness of regulatory compliance in the public procurement procedure.

Keywords: *public procurement; developing country; regulatory compliance*

JEL Classification: *K42; P43; H83*

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1 Introduction

Public procurement is an essential government activity. Government expenditure has a significant impact on the economy and must be well handled. Public procurement needs substantial time and resources to establish collaborative, transparent, shared, and procedure compliance. Therefore, good administration and management of procurement have always been a challenge for many nations, particularly emerging nations with several unimplemented development initiatives. In terms of the efficiency and performance of managed power capacity, only management public procurement regulations and information are essential.

Scholars recognize that a public resource management framework and effective public procurement regulations and practices are essential for good governance in both developed and developing nations like Vietnam. Accordingly, a suitable legislative and institutional environment for public procurement has been investigated and constructed. Typically, current contracts in the public sector are funded through a method that assures fair competition. Public procurement has become less corrupt. The quality of goods and services procured via competitive bidding has increased. Vietnam's procurement capability has been vastly increased as a result of these efforts, particularly the valuable experience that government procurement officials at all levels and the procurement community have garnered via actual procurement and bidding for development projects. Policymakers also acknowledge that as operational and managerial expertise improves and rules are tightened and enforced, further potential economic and social gains can be realized. If the equitization initiative is advanced and the government moves swiftly to a market-oriented procurement system following internationally accepted standards, these savings might be compounded significantly.

Despite experiencing improvement, Vietnam's public procurement procedures continue to lag behind international standards. Researchers have demonstrated that efficient supervision of Vietnam's public spending programs might cut costs and save time, but bad operations result in waste and delays, which are frequently cited as evidence of government inefficiency and corruption. The benefits of well-managed procurement in government-funded projects can and should be extended to all public sector procurement. The basic components of an effective procurement system are economy, efficiency, and transparency. Although Vietnam has made substantial progress toward a consistent and efficient system, public procurement is nevertheless hampered by several issues. Poor processes, systems, and human resource management at all levels of the public procurement process have led to this dilemma.

Inadequate regulatory compliance is the largest impediment. The problem of noncompliance affects not just third-world nations but also European Union nations. According to (Gelderman et al., 2006), compliance in public procurement remains a key concern. While analyzing procurement issues in Malaysia, it was revealed that procurement officials were responsible for neglect and noncompliance with procurement regulations and procedures (Shu et al., 2011). This study aims to investigate the effects of psychological variables on compliance behavior in public procurement and to establish if compliance behavior hinders the efficiency of public procurement.

2 Conceptual framework

Public procurement is broadly defined as the purchase, lease, or receipt of any other contractual means by the public sector for goods, works, and services. It is alternatively defined as the purchase of goods and contracting for construction works and services if such acquisition uses resources from the state budget, local budget, state funds, and domestic

loans. or state-guaranteed foreign loans, foreign aid as well as revenue received from a state's economic activities. Public procurement is accountable to the public which includes the source of funds being spent, citizens, and stakeholders including those with limited capacity and potential suppliers. As such, they must put in place procedures and practices that are subject to scrutiny during government audits and inspections or be held accountable in court for any purchase decisions made. out the wrong procedure. The primary purpose of public accountability is to prevent the misuse of taxpayer funds.

Previous studies have found that training courses, ethical practices, and enforcement procedures have a significant impact on compliance Abere & Muturi (2015). Similarly, Chikwere et al. (2019) showed significant effects of familiarity, incompetence, political involvement, and inadequate enforcement on non-compliance with a procurement regulatory framework public in Ghana. In addition, Omagbon (2016) reported that the low regulatory compliance on public procurement among local government councils is mainly due to a lack of professionalism, and social media coverage on public procurement issues. and significant political interference in the procurement process. Similarly, Sandada & Kambarami (2016) found that perception of procurement regulation, enforcement of such restrictions, and political interference are the most important predictors of procurement regulatory compliance. Contrary to existing research, Hyacinth & Yibis (2017) found that familiarity and professionalism did not affect compliance with public procurement regulations in an encyclopedic environment in Nigeria, even though the institutional features exist.

2.1 Ethical behaviors and compliance with public procurement regulations

Within the context of public procurement, ethical conduct has been highlighted as the most crucial variable. Ethics is a requirement for minimizing noncompliance (Saini, 2010). This phrase indicates that ethics is a precondition for reaching high levels of compliance, even while other variables are advantageous. In addition, Ogol & Moronge (2017) demonstrates that ethical behavior can improve the procurement performance of businesses. Additionally, it is underlined that ethical norms must be adhered to throughout the procurement process to avoid severe consequences (Mwangi & Kwasira, 2015). Following the emphasis on ethics and ethical behavior in procurement compliance, it is possible to claim that ethical behavior may serve as a mediator between public procurement regulatory compliance and the factors that influence it. In other words, ethical behavior may explain why these determinants have consistently shown compliance with public procurement regulations in a variety of circumstances.

2.2 Familiarity, ethical behaviors, and compliance with public procurement regulations

Familiarity with procurement regulations may be obtained through practical experience gained through interactions with experienced colleagues or by studying and practicing procurement regulations regularly. When individuals engage with coworkers who are knowledgeable about purchasing regulations, they may be influenced to become similarly knowledgeable. In the common situation of individual learning, the theory also highlights the significance of cognitive learning at various stages of development in compliance decisions (Gelderman et al., 2006; Mwelu et al., 2020; Tukamuhabwa, 2012). Consider familiarity obtained via specialized training courses and on-the-job growth as means for establishing conformity with professional and ethical norms (Changalima et al., 2020; Sandada & Kambarami, 2016; Sarawa & Mas'ud, 2020), it can be argued that as individuals go through cognitive development processes, they may experience an increase in internal competence resulting in a heightened sense of familiarity, followed by an increase in ethical duties (ethical conduct), and lastly compliance with public procurement legislation.

H1. Familiarity has a positive impact on compliance with public procurement regulations via ethical behavior.

2.3 Enforcement, ethical behaviors, and compliance with public procurement regulations

The second recommended factor of the public procurement regulatory compliance strategy described in this study is enforcement. Enforcement is defined as activities performed by regulators to guarantee compliance (Zubcic & Sims, 2011). Effective management, according to Shu et al. (2011), is one of the most effective techniques to enhance accountability and transparency which enables monitoring and offers a solid foundation for preventing corruption. Compliance with procurement regulations must be checked by impartial internal or external authorities for it to be effective. Even with high levels of moral duty and social influence, Tukamuhabwa (2012) found that the adoption of a coercive enforcement mechanism remained an essential aspect of regulatory compliance. It might be argued that the enforcement of public procurement legislation will compel public procurement officials to conduct themselves ethically and hence comply with public procurement regulations. Specifically, Sutinen & Kuperan (1999) emphasizes that an individual's intrinsic duty (ethical behavior) can be achieved through the command of public authorities such as the police, local authorities, and authorities based on one's loyalty, even when such orders are contrary to one's interests. This suggests that enforcement will likely result in this type of intrinsic incentive, hence enhancing regulatory compliance.

H2. Enforcement has a positive impact on compliance with public procurement regulations via ethical behavior.

2.4 Resistance to political pressure, ethical behaviors, and compliance with public procurement regulations

The third determinant is the ability to resist political pressure. The notion emphasizes that "subordinates" must be loyal to their superiors for compliance choices to be legitimate (Sutinen & Kuperan, 1999). Given that politicians primarily influence public procurement officers to conduct unethically in their efforts to award contracts to associates (McCue et al., 2015), operating ethically requires public procurement officials to reject political influences. This suggests that procurement officers must evaluate the legality of such rules and resist pressure to violate them, even when politicians, Executives, and other strong elements inside an organization directly violate regulations or exert pressure to do so. This will ultimately result in ethical behavior that enhances regulatory compliance. Sutinen and Kuperan (1999) add that the sense of procedural legitimacy is connected to an individual's perception of procedural fairness, therefore individuals will be more inclined to comply with laws and regulations if they believe the approach followed by political authorities is fair. Therefore, integrating these theoretical insights with resistance to political pressure, it is possible to argue that public procurement officers would reject political influence if they believe that procedures established by political authorities are fair or lawful. Eventually, these officials will be expected to conduct themselves ethically and guarantee compliance with the applicable public procurement legislation.

H3. Resistance to political pressure has a positive impact on compliance with public procurement regulations via ethical behavior.

2.5 Consequences of compliance with public procurement regulations

Due to the bureaucratic culture that emphasizes rules, procedures, and stability, public organizations lack orientation towards productivity and efficiency (Parker et al., 2003). As suggested by Grant & Ashford (2008) initiative is essential to organizational effectiveness and, if unduly constrained, it can complicate an officer's task in a way that is unnecessary and more inefficient and costly service. Sequential procurement frameworks and regulations are more or less costly in terms of procedures, slow to adapt to changes, and erode the skill requirements of purchasing officers. As government agencies operate within a framework that ensures public accountability and cost-effectiveness, there is a significant emphasis on fair treatment of suppliers, compliance, competitive bidding, and procedures to ensure correctness and regularity. This impedes the development of collaborative procurement agreements and slows down service delivery because of the exchange of cooperative purchases which is important for service delivery (Tumuhairwe & Ahimbisibwe, 2016). The requirement to comply reduces a government official's authority and decision-making power over matters. For organizations with a culture of compliance based on rules, processes, and little change, the results are often not as effective and productive as expected. According to Trepte (2007), stricter regulation hinders the efficiency of procurement. Research by Kovacic (1992) commented that it is conceivable that public procurement is increasingly becoming the domain of public organizations whose distinguishing characteristics are not in their superior capacity in production or services, but in skills to understand and respond to government regulations and requirements. Regulatory compliance requirements require lengthy procedures, especially in open procurement practices that delay service delivery.

H4: Compliance with public procurement regulations related to a time-consuming procedure.

H5: Compliance with public procurement regulations related to an expensive procedure.

3 Methodology

This study was performed using a cross-sectional design. According to Cooper and Schindler (2003), a research design is descriptive if it is concerned with why and how one variable causes a change in another and cross-sectional if it is conducted only at a single point in time or for a limited period, and data collection regarding population or sample variables is performed at a single point in time. A descriptive cross-sectional approach is suitable for determining the elements influencing compliance with the law on public procurement in Vietnam.

The number of observed variables in the research model is 24 variables, according to (J. F. Hair et al., 2014), and the minimum number of samples required to perform exploratory factor analysis (EFA) is 100. The required ratio of a sample size to the number of observed variables is 1:5, so with 24 observed variables, the study requires the survey sample to have a size of over 100 samples.

Survey subjects are full-time officials or involved in the public procurement process in Ho Chi Minh City. The author designed the survey on the Google Form application to facilitate the collection, checking, and processing of data later. The author conducts the survey using convenient and snowball methods to ensure that the survey is sent to at least 200 full-time officers or officials involved in public procurement. Survey data were collected from July 2022 to August 2022. The total number of individuals participating in the survey was 175 samples. After filtering the survey samples that did not meet the requirements in terms of time and quality of answers, the number of samples used for analysis was 151 samples, reaching the rate of 86.2%.

This study collects data based on a questionnaire designed on a 5-point Likert scale, ranging from "1 = strongly disagree" to "5 = strongly agree". The scale has a total of five structural variables, which are adopted from (Sarawa & Mas'ud, 2020), including familiarity, enforcement, political resistance, ethical behavior, and regulatory compliance on public procurement, and two directly measured variables related to time-consuming and expensive procuring procedures. The measuring model assessment has been conducted to evaluate the reliability and validity of measurement scales. All requirements for the reliability, and convergent and discriminant validity of the measurement model are satisfied (Hair et al., 2014).

Table 1: Convergent validity *(Source: Authors)*

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
	> 0.6	> 0.7	> 0.7	> 0.5
Enforcement	0.651	0.711	0.805	0.581
Ethical behaviors	0.794	0.81	0.865	0.618
Familiarity	0.902	0.951	0.929	0.766
Political resistance	0.974	0.974	0.981	0.927
Procurement regulatory compliance	0.788	0.819	0.854	0.543

Table 2: Fornell-Larcker Criterion *(Source: Authors)*

	(1)	(2)	(3)	(4)	(5)
(1) Enforcement	**0.762**				
(2) Ethical behaviors	0.224	**0.786**			
(3) Familiarity	0.502	0.328	**0.875**		
(4) Political resistance	0.464	0.456	0.441	**0.963**	
(5) Procurement regulatory compliance	0.278	0.476	0.372	0.465	**0.737**

Table 3: Heterotrait-Monotrait Ratio (HTMT) *(Source: Authors)*

	(1)	(2)	(3)	(4)	(5)
(1) Enforcement					
(2) Ethical behaviors	0.268				
(3) Familiarity	0.672	0.338			
(4) Political resistance	0.569	0.508	0.478		
(5) Procurement regulatory compliance	0.393	0.57	0.441	0.506	

4 Result
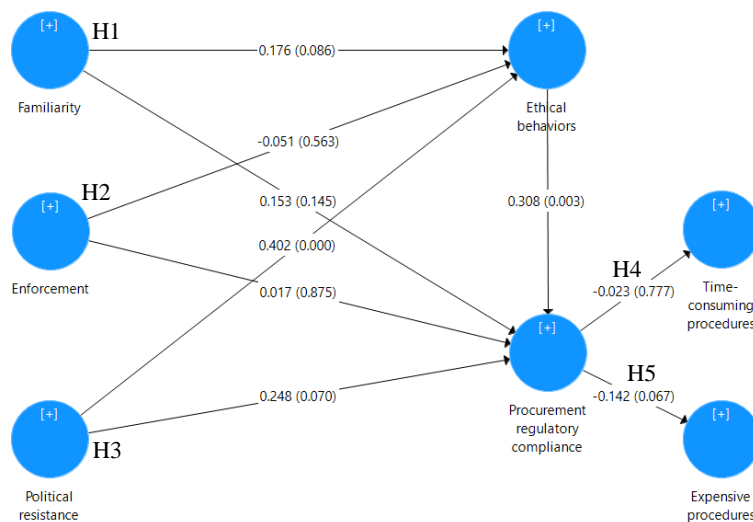
Figure 1: Structural model results

Source: Authors

We analyze the structural model using 4999 sample bootstrapping to get p-values for significant values. Three out of five hypotheses are proven to be significant with p-values of 0.1, equal to a 10% significance threshold, as shown in Figure 1. Following the results, via ethical behaviors, familiarity (H1) only has an indirect impact while resistance to political pressure (H3) has both direct and indirect impacts on procurement regulatory compliance. Even well-proved by empirical evidence in several countries, enforcement has not demonstrated any impact on procurement regulatory compliance in this study (H2). The significantly negative coefficient in the regression of procurement regulatory compliance and expensive procedure also confirms that procurement regulatory compliance does not lead to the expensive procedure (H5).

5 Discussion

With practical evidence, the study has re-tested the correctness of previous studies. While (Sarawa & Mas'ud, 2020) provided evidence of a positive relationship between professionalism and familiarity, enforcement and resilience to political pressures for regulatory compliance in public procurement, in addition to reaffirming the role of officials' resilience to political pressure in improving compliance in public sector procurement, the study does not provide the evidence for a direct relationship of the remaining variables on regulatory compliance in public procurement. The impact of ethical behavior strongly promotes compliance with public procurement regulations.

With evidence of the negative impact of enforcement on the ethical behavior of procurement officers, the study proved the argument of (Sparrow, 1994) to be completely valid when he doubted the positive impact of enforcement tools on regulatory compliance. In agreement with (May & Winter, 2011), it is clear that institutional enforcement has not only promoted compliance. Public organizations need to take a closer look at the allocation of resources for enforcement to increase compliance in their organization.

The study also could not provide empirical evidence that compliance with regulations on public procurement reduces efficiency in terms of time and costs as some studies have shown (Kovacic, 1992; Trepte, 2007), which even demonstrated cost-saving actions in public procurement regulatory compliance. The role of regulatory compliance in public procurement has always been emphasized. Compliance with regulations in public procurement always ensures efficiency and transparency.

6 Conclusions

This study focuses on the link between the causes and effects of public procurement compliance in the context of developing countries. By employing the dataset of 151 Vietnamese procurement officers, this study discovers that familiarity has primarily an indirect effect on procurement regulation compliance, but resistance to political pressure has both direct and indirect effects. In this study, enforcement has not shown any effect on compliance with procurement regulations, despite being supported by empirical data in several nations. The significantly negative coefficient in the regression of compliance with procurement regulations and expensive procedures further indicates that compliance with procurement regulations does not contribute to the expensive procedure.

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Selected environmental aspects of the globalization process

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Abstract

Research background: Globalization is understood as a worldwide process of integration, which affects various activities in a certain way. As a rule, companies perceive the economic dimension of the globalization process. Foreign direct investments, which have several of effects on the economy, have a special place in this process. However, less attention is paid to the ecological dimension of globalization. Many studies have concluded that the economic growth associated with globalization has its limits and can have a negative impact on the environment.

Purpose of the article: The paper deals with selected environmental aspects and foreign direct investments within the globalization process.

Methods: For the statistical analysis of the data, a time series of the studied parameters was created. Based on secondary research data, statistical evaluation was performed through regression analysis.

Findings & Value added: Results presented in the paper deal with the impact of foreign direct investment in relation to selected environmental aspects in Slovakia. From a comprehensive perspective on the issue, foreign direct investments have a positive impact on sustainability in Slovakia. However, from the point of view of the environment, an external relationship was manifested. As foreign direct investments increase, the burden on the environment also increases.

Keywords: *globalization; foreign direct investment; environmental aspects; sustainability; Slovakia*

JEL Classification: *O16; Q56; Q54*

1 Introduction

Economic advancement has tended to affect the processes of industrialization, which has increased the value of exploited natural resources. Intensive use of natural resources via total reserves, technological innovation, foreign direct investment (FDI), and renewable energy can have an impact on the environment (Gyamfi et al., 2022).

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Environmental pollution caused by the increase in carbon emissions has become the main problem of nations all over the world in recent years. Unless this pollution is controlled, it becomes one of the dangers that humanity will face in the long term. Even the fulfilment of the goals of sustainable development is not possible without improving the quality of the environment. Thus, reliable measurement of carbon emissions plays an important role in developing an effective climate strategy to solve current environmental problems (Azam et al., 2022).

The process of globalization is associated with expectations that lead to the convergence of countries, which can lead to an increase in the production of goods and services and subsequently support economic growth. Foreign direct investment is one of the accompanying signs of globalization. One of the alarming aspects of globalization that has attracted the interest of economists is the movement of polluting industries between countries, which is supported by the inconsistency of environmental regulations in individual countries, which have also contributed to the lack of pollution control around the world. The characteristics of efficiency, innovation and regulation are key to a better understanding of the consequences of FDI flows (Marques et al., 2020).

Social, economic, political, and other dimensions of globalization, foreign direct investment and trade are key external factors having a significant impact on CO_2 emissions as well as environmental degradation. As we have mentioned, globalization has a significant impact on international trade and investments. They are reflected in the state of the environment. On the one hand, globalization is perceived in a negative sense, as it exhausts renewable energy (for example, deforestation and fishing extinctions that may be linked to trade). On the other hand, massive tree plantations, environment friendly commodities and technologies (e.g. renewable energy sources, hybrid cars) they are provided by the forces of globalization at lower costs, lower rents, and are therefore more quickly adopted by consumers (Copeland, 2013; Malindzakova et al., 2022).

In recent years, a considerable amount of empirical research has focused on the use of CO_2 emissions as an indicator of environmental degradation, which is caused by both external factors (e.g. globalization, foreign direct investment and trade) and internal dynamics (e.g. economic growth, urbanization, energy consumption and innovation). The relationship between the dynamics among the mentioned factors (external and internal) and CO_2 emissions largely depends on the quality of the competent institutions (Islam et al. 2021).

Environmental awareness differs among countries, and the aforementioned differences are subsequently reflected in their economic priorities. Countries react differently in finding a compromise between economic growths and reducing carbon dioxide emissions. It is in the interest of every country to increase their incomes, but they should not forget the environmental area as well. Within their deliberations, they also consider foreign direct investments, which have both advantages and disadvantages (Balsalobre-Lorente et al., 2019).

Differences among countries are also caused by the different nature of regulations that countries apply to protect the environment. These regulations take a formal form (e.g. legal regulations such as laws, regulations, rules and administrative sanctions, pollution charges, environmental taxes and emission trading mechanisms or voluntary environmental regulations refer to agreements, commitments or plans that enterprises propose themselves with the aim to protect the environment at their own discretion) and informal environmental regulations (Shen et al., 2020; Paluš et al., 2020).

When assessing the impact of FDI on the environment, the characteristics of the country itself must also be considered. In some countries, they primarily play a positive and significant role in reducing emissions due to the transfer and adoption of greener technologies. This technology increases efficiency and improves the quality of the

environment, while in other countries, FDI increases CO_2 emissions, which in turn leads to environmental degradation (Pao and Tsai, 2011).

Therefore, the aim of this paper is to examine the relationship between direct foreign investments and the goal of SDG 13 - metric CO_2 emissions from fossil fuel combustion and cement production in Slovakia.

2 Methodology

Following the theoretical knowledge by analysis we have gained the necessary and relevant information related to the issue of foreign direct investment and sustainability in relation to the goal of SDG 13 - metric CO_2 emissions from fossil fuel combustion and cement production. The data are obtained from the database server Eurostat (2022) and Sustainability development report (2022). Indicators relevant to the analysis of parameters of foreign direct investments and sustainability in relation to the goal SDG 13 - metric CO_2 emissions from fossil fuel combustion and cement production are for the period 2013 -2020. Subsequently, the study of dependencies between foreign direct investments and sustainability in relation to the goal of SDG 13 - metric CO_2 emissions from fossil fuel combustion and cement production is realized through correlation and regression analysis. "With regression we analyze the relationship between variables. The dependent variable is denoted Y, the independent variable X. The variables will never be perfectly related, so there is always an error term. Variation from the regression line can be thought of as having two parts: explained variation, which is accounted for by the independent variable, and unexplained variation, which is unaccounted for by the independent variable. It means that part of the change in a variable is due to another variable that we hypothesize, and part is due to other factors. In regression analysis we are concerned with whether the relationship pattern between two values of variables can be described as a straight line, which is the simplest and most commonly used form. The greater the slope or regression coefficient, the more influence the independent variable has on the dependent variable, and the more change in Y associated with a change in X. This statistic numerically describes how strong the straight-line or linear relationship is between the two variables and the direction, positive or negative. In ANOVA, we partitioned the variation using sums of squares so we could identify a treatment effect opposed to random variation that occurred in our data. The sums of squares and mean sums of squares are typically presented in the regression analysis of variance table. The ratio of the mean sums of squares for the regression and mean sums of squares for error form an F-test statistic used to test the regression model. A quantitative measure of the explanatory power of a model is R2, the Coefficient of Determination. The Coefficient of Determination measures the percent variation in the response variable (y) that is explained by the model. Values range from 0 to 1. R2 close to zero indicates a model with very little explanatory power. R2 close to one indicates a model with more explanatory power" (Kiernan, D., 2007). In conclusion, the inductive-deductive method summarizes the facts and findings and formulates general conclusions based on the facts of the previous analyses.

3 Results and discussion

Slovakia, regarding the valuation of the foreign direct investments and sustainability for the years 2013 to 2020, indicates their fluctuating increase (Table 1).

Table 1. Basic data of the examined parameters in Slovakia

Years	2013	2014	2015	2016	2017	2018	2019	2020
Foreign direct investments	3502.1	2322.9	2261.6	2496	3827	4004.9	: c	: c
Metric CO_2 emissions from fossil fuel combustion and cement production	6.549	6.188	6.331	6.405	6.614	6.607	6.189	5.629

Legends:
(:) Not available
(c) Confidential

Source: Eurostat (2022); Sustainability development report (2022)

Based on the data from Eurostat (2022) and the Sustainability development report (2022), we made the correlation and regression analysis of the dependence between foreign direct investments and sustainability in relation to the goal of SDG 13 - metric CO_2 emissions from fossil fuel combustion and cement production in Slovakia, Table 2.

Table 2. Results - regression statistics

SUMMARY OUTPUT	
Regression Statistics	
Multiple R	0.926949
R Square	0.859234
Adjusted R Square	0.824042
Standard Error	0.071721

ANOVA					
	df	SS	MS	F	Significance F
Regression	1	0.125594	0.125594	24.41591	0.00781
Residual	4	0.020576	0,005144		
Total	5	0.14617			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	5.838584	0,126957	45.98853	1.34E-06	5.486094	6.191074
X Variable	0.000199	4.03E-05	4.941246	0.00781	8.71E-05	0.000311

Source: Authors' computation (2022)

The result of the correlation analysis is the first part of the regression statistics output. The value of the correlation coefficient is 0.926949. The closer this value is to 1, the stronger the dependence is. In our case it is a high degree of tightness of the relation between foreign direct investments and sustainability in relation to the goal of SDG 13 - metric CO_2 emissions from fossil fuel combustion and cement production to Slovakia. The value of R-Square is the value of the determination coefficient and in our case it is the value of 0.859234. This multiplication value of 100 indicates that the selected regression line explains the variability in metric CO2 emissions to about 86 %. The other represents unexplained variability, the

impact of random factors, and other unspecified effects. Adjusted R-square also takes into account the number of estimated parameters and the number of measurements. The Standard Error should be as small as possible. In the ANOVA section, we are testing a null hypothesis that argues that the model we have chosen to explain dependency is not appropriate (an alternative hypothesis claims the opposite).

The F test is used to evaluate this claim. Significance F = 0.00781 < 0.05 (α - significance level). Therefore, we reject H0, which means that the model has been chosen correctly and therefore metric CO_2 emissions is dependent on foreign direct investments. We find out whether there is dependence between metric CO_2 emissions and foreign direct investment. This claim is statistically significant on the basis of the p-value for the foreign direct investment and sustainability in relation to the goal of SDG 13 - metric CO_2 emissions from fossil fuel combustion and cement production to Slovakia, as its value is less than 0.05 (1.34E-06). In addition to this information, this part of the output table also offers a 95 % confidence interval for b0 and b1. If the foreign direct investment increases by 1 %, the metric CO_2 emissions with 95 % probability increases in the range from 8.71E-05 to 0.000311.

Our findings also confirm the theoretical basis. As Islam et al. (2021) states the relationship between the external and internal factors dynamics (i.e. foreign direct investments) and CO_2 emissions.

These results are also confirmed by Pao and Tsai (2011), who claim that foreign direct investment in some countries increases environmental pollution. At the same time, they also point out that in some countries; on the contrary, they lead to a reduction of emissions through the transfer and adoption of ecological technologies. These innovation technologies increase efficiency and improve the quality of the environment. Therefore, it is appropriate to support research and development, innovations, ecological innovations for increasing the efficiency of technology for improving the quality of the environment and sustainable economic growth.

As stated by the Office of the Government of the Slovak Republic, Slovakia, within the support of research and development as a factor of sustainable economic development, should focus on its development of strong stands in this area, eliminating weaknesses and threats.

These results show that Slovakia needs to increase its R&D support for sustainable economic growth. The research and development is the basis for sustainable development of society. Therefore it is natural to focus on system of support for research and development as a factor of important elements of ensuring sustainable economic growth and development of society, competitiveness of the economy and quality of life of Slovak citizens (Loučanová and Nosáľová, 2020; Loučanová et al., 2021; Parobek et al., 2020).

4 Conclusion

Based on the analyses we found:

- a relationship between foreign direct investments and sustainability in relation to the goal SDG 13 - metric CO2 emissions from fossil fuel combustion and cement production,
- this claim is statistically significant on the basis of the p-value (1.34E-06) for the foreign direct investment and sustainability in relation to the goal of SDG 13 - metric CO2 emissions from fossil fuel combustion and cement production to Slovakia,
- foreign direct investments are a key element in increasing the goal of SDG 13 - metric CO2 emissions from fossil fuel combustion and cement production to Slovakia,

- therefore, it is appropriate to support research and development, innovations, ecological innovations for increasing the efficiency of technology for improving the quality of the environment and sustainable economic growth.

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Migration of Ukrainians during the war: scale and consequences for the country's economy

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Abstract

Research background: During the years of independence, Ukraine experienced several waves of migration, which, together with other factors such as a decrease in the birth rate, an increase in mortality, and an increase in life expectancy, led to a significant reduction in the population. The full-scale war in Ukraine intensified migration movements: increased the number of internally displaced persons, forced even more Ukrainians to go abroad and seek refuge in other countries.

Purpose of the article: The purpose of the article is to study the migration processes exacerbated by the war in Ukraine, and to determine their impact on the post-war recovery of the domestic economy.

Methods: For the study, the methods of systemic approach and generalization, economic-statistical and comparative analysis, abstract-logical and graphic methods for visualization of the research results were used.

Findings & Value added: The article provides an in-depth analysis of the internal displacement of Ukrainians caused by Russian aggression during the seven months of the war. In terms of macro-regions, trends in the movement of refugees based on their place of origin and current stay were investigated. The forced displacement of Ukrainians outside the country was also considered, and their age and gender characteristics were noted.

Keywords: *forced migration; refugees; internally-displaced persons; post-war recovery of the economy italics; words separated with semicolon*

JEL Classification: *J11; J60; F22*

> *It was determined that Ukrainian refugees found themselves in a situation of complete or partial loss of income, housing, and constant danger, which pushes them to go abroad. At the same time, the protracted nature of the war leads to the fact that the longer Ukrainian refugees live abroad, the greater the risk that they will not return home. However, after the end of the war, the Ukrainian economy, whose decline is predicted at the level of 45%, will need workers. The*

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> *restoration of Ukraine without sufficient labour potential, primarily youth, is impossible, even with financial support from international organizations.*

1 Introduction

Russia's attack on Ukraine on February 24, 2022, became the first case of full-scale military aggression in Europe after World War II. In 2022, peace and unity in Europe are at stake. Russian aggression has put pressure on global commodity prices, exacerbated disruptions in supply chains, and provoked inflation in most countries around the world. According to the forecast of the Economist Intelligence Unit (EIU) (2022, August 4), the world economy will lose a trillion dollars this year alone due to Russia's invasion of Ukraine. The decline of the Ukrainian economy in the first quarter of 2022 amounted to 15.1%, in the second quarter - 39.3%. According to the Ministry of Economy of Ukraine, the real GDP of Ukraine may fall by 35-45% in 2022. The main international creditors of Ukraine - the IMF and the World Bank - predict that in 2022 the Ukrainian economy will shrink by 45% (Dorosh and Zanuda, 2022).

Ukraine is an important supplier of food products in the world. Before the war, the country produced about half of the world's sunflower oil. According to the US Department of Agriculture, Ukraine accounts for 15 percent of world supplies of corn, as well as 10 percent of wheat. According to the Food and Agriculture Organization of the United Nations (FAO), the food price index, which reflects monthly price fluctuations of a basket of five food commodity groups, reached an all-time high in March 2022 (since 1961). Global inflation has more than doubled in the year since March 2021. In the Eurozone, inflation reached 8.1 percent in May, which is a record figure in history. Moreover, experts predict that prices may remain at a high level for the next few years. Inflation in Ukraine by the end of this year, as predicted by the NBU, will exceed 30% (Dorosh and Zanuda, 2022).

In general, according to the Kyiv School of Economics (KSE), which, together with the government, calculates the losses caused to Ukraine by Russian aggression, the amount of direct documented damage to infrastructure as of August 22, 2022, is $113.5 billion. 261 schools and 127 hospitals were completely destroyed. Also, at least 15,300 high-rise buildings, 115,900 private houses, 798 kindergartens, 715 cultural buildings, and 388 enterprises were destroyed or captured. According to experts of the "Russia will pay" project, the minimum needs for the restoration of destroyed assets are approaching 200 billion dollars (Financial Club, 2022).

However, the biggest loss for Ukraine is the loss of its human potential. According to the UN, 5,587 people from the civilian population died during the time that passed from the beginning of the Russian aggression against Ukraine to August 22. According to UN estimates, there are 362 children among them. The Office of the High Commissioner for Human Rights of the United Nations emphasizes that the actual number of civilian deaths is much higher, because there is a delay in receiving information from places where intense fighting is going on, and many reports of civilian deaths are still being verified. Experts say that in Mariupol alone, the number of dead may exceed 20,000 people. Losses of Ukrainian soldiers amounted to 9,000 people. 60-100 military personnel die in Ukraine every day (Dorosh and Zanuda, 2022). The loss of labour potential due to the forced migration of the population to Europe and other countries of the world has become an extremely painful problem for the country and its economy.

2 Methodology

The twenty-first century is the century of the migrant, being global mobility a highly stratified phenomenon, from the global tourist to the undocumented employee, and from human

trafficking to refugees forced to leave their country of origin because of climate changes, poverty or wars (Castles and Miller, 2014).

The most common factor for forced migration around the world is conflict. As of 2020, 1 person is uprooted every 2 seconds (often with nothing but the clothes on their backs). Currently, the global total of forcibly-displaced people is over 68.5 million (Giovetti, 2019).

The only international documents directly related to refugees are the 1951 UN Convention Relating to the Status of Refugees and the 1967 Protocol Relating to the Status of Refugees. A refugee "is someone who is unable or unwilling to return to their country of origin owing to a well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group, or political opinion." (UNHCR, 1967).

In Ukraine, the concept of "refugee" is enshrined in the Law "On Refugees and Persons in Need of Additional or Temporary Protection" dated July 5, 2012. A refugee is a person who is not a citizen of Ukraine and, due to well-founded fears of becoming a victim of persecution based on race, religion, nationality, citizenship (citizenship), belonging to a certain social group or political beliefs, is outside the country of his/her citizenship and cannot use protection of this country or does not wish to use this protection due to such fears, or, not having citizenship (nationality) and being outside the country of his previous permanent residence, is unable or unwilling to return to it due to such fears (Verkhovna Rada of Ukraine, 2012).

The concept of "refugee" should not be confused with the concept of "internally displaced person". These two concepts differ from each other in terms of the content load carried by each of them, the range of rights and responsibilities that rest on these persons. According to the legislation of Ukraine, an internally displaced person is a citizen of Ukraine who permanently resides in Ukraine, who was forced or who independently left his place of residence because of or in order to avoid the negative consequences of an armed conflict, temporary occupation, widespread manifestations of violence, mass violations of human rights and emergencies natural or man-made situations (Verkhovna Rada of Ukraine, 2015).

Problems of mass migration, refugee and forced migrants are being actively discussed (Bauer et al., 2019; Becker, 2022; Verme and Schuettler, 2021). Syria's deadly civil war has caused over 11 million instances of forced migration. To-date nearly 6.2 million Syrians are internally displaced, and over 5.6 million Syrians are counted as refugees. The problems of the Syrian refugees from the point of view of the security of the host countries were considered Murshidi (2016). The Syrian refugee crisis, for example, has led to security incidents, such as riots, popular protests, and militant attacks in camps along the borders with Turkey, Lebanon, and Jordan. The Democratic Republic of Congo has the highest number of displaced people on the continent of Africa, with nearly 6 million people forced from their homes by various conflicts. Fajth et al. (2019) examined the long-term presence of Congolese refugees in Ruanda in terms of national security and confidence.

Becker and Ferrara (2019) argue that forced migration can have distinct consequences for the migrants *themselves* because of the forceful nature of the displacement experience as well the loss of possessions and homes against their own will. While voluntary migration is likely to follow economic cost–benefit considerations of the migrants, involuntary migration is the result of forces that are largely outside the control of the migrants. In Europe, these concerns came to a head in the migration crisis of 2015–2016, and the backlash from that experience has led to a range of policy reforms, particularly tougher border controls (Hotton, 2020). Aksoya and Poutvaara (2021) analyzed the country choices made by the forced migrants and refugees for their temporary protection.

The modern movement of IDPs within conflict countries and the flow of refugees out of conflict countries is clearly a humanitarian disaster. It is also a major issue in contemporary world politics, with economic, demographic, political, and security implications for host states (Braithwaite et al., 2019).

The current displacement of IDPs within conflict countries and the flow of refugees from conflict countries is a clearly humanitarian disaster. It is also an important problem of modern world policy, which has economic, demographic, political and security implications for the host countries. The removal of a large number of people leads to the destruction of human (physical) capital and can cause damage to the sending country in the long term. (Testa, 2021). According to experts, the flow of refugees from Ukraine caused by the war in Ukraine is the greatest.

3 Results

During the period of independence of Ukraine since 1991, its population decreased by 10.6 million people and as of 01.01.2022 it was 40,997.7 thousand people (Fig.1).
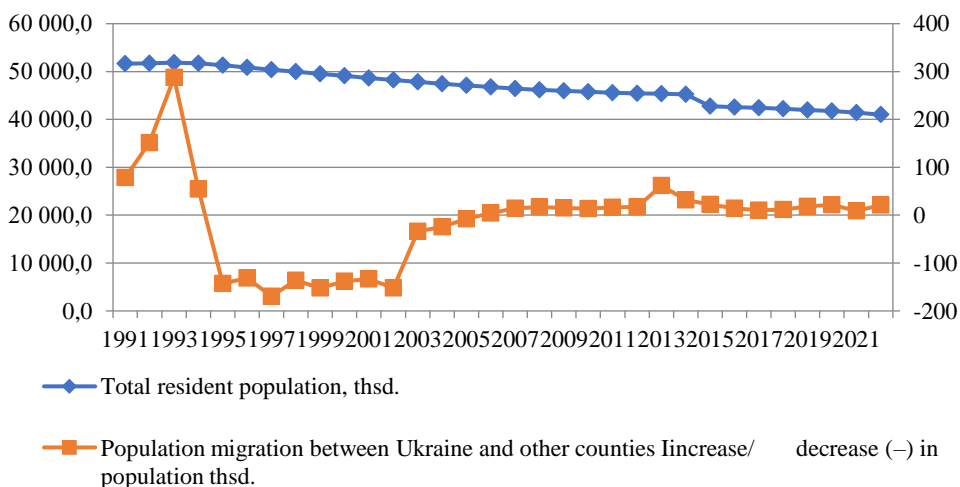
Figure 1. Dynamics of permanent population and migration increase/decrease in Ukraine in 1991-2021.

Source: State Statistics Service of Ukraine (2022)

The population of Ukraine is constantly decreasing due to various reasons. Population decline as a result of demographic processes (declining birth rate, aging) is considered completely natural and such that is characteristic of the developed countries of the world. At that time, the population decrease due to emigration indicates a set of unfavourable conditions inside the country, which push the population into international migration processes. During the period 1991-2021, migration flows of Ukrainians had different dynamics. The exit of Ukraine from the Soviet Union and its acquisition of independence led to a rapid increase in migration to the country. The largest increase of 287,800 people was achieved in 1993. However, since 1995, Ukrainians actively began to leave for Europe and other countries in search of better earnings. Migration processes gradually acquired a "family" character. Families went to Italy, Portugal, Greece, and other countries. The largest volume of migration reduction was noted in 1997 - 169.2 thousand people, in 2002 - 152.2 thousand people. Since 2006, domestic statistics have recorded migration increases with the highest figure of 61.8 thousand people in 2013. For the period 2006-2014, migration processes are characterized by the stabilization of external labour migration and the cessation of shuttle trade, which took place in the 1990s.

The military conflict that broke out in the east of Ukraine in 2014 led to an increase in the scale of external labour migration and the formation of forced migration flows. As a result of

Russia's annexation of Crimea and Ukraine's loss of control over part of the territory of Donetsk and Luhansk regions, large flows of people appeared who were forced to leave their places of permanent residence and move to other regions of Ukraine. Internally displaced persons have officially appeared in Ukraine. As of July 31, 2021, their number was 1 million 470 thousand 234 Ukrainians. The largest number of displaced people moved to Donetsk and Luhansk regions - 514 thousand 982 people and 285 thousand 651 people, respectively. 165 thousand 150 migrants were registered in Kyiv, 135 thousand 580 in Kharkiv region, 71 thousand 321 in Dnipropetrovsk region, 67 thousand 210 in Kyiv region. The least number of migrants were looking for a place of residence in the western part of Ukraine (Slovo i Dilo, 2021). In 2014-2021, the main countries of migration for Ukrainian workers were Poland, Germany, the Russian Federation, the Czech Republic, and Italy. They accounted for about 80% of the total flows of short-term and long-term labour migrants from Ukraine. The flow of migrants was increasingly replenished by young people who left both for work and for education. Current trends have caused a gradual deformation of the age structure of the population of Ukraine and an increase in the demand for qualified labour.

Since the beginning of Russia's full-scale invasion of Ukraine on February 24, 2022, more than 13 million Ukrainians have left their homes, fleeing the war to other regions of Ukraine or abroad. According to the International Organization for Migration (IOM), as of August 23, 2022, the number of internally displaced persons was 6,975,000 (IOM UN Migration, 2022). In fig. 2 presents the origin of internally displaced persons (IDPs) from macro-regions of Ukraine.
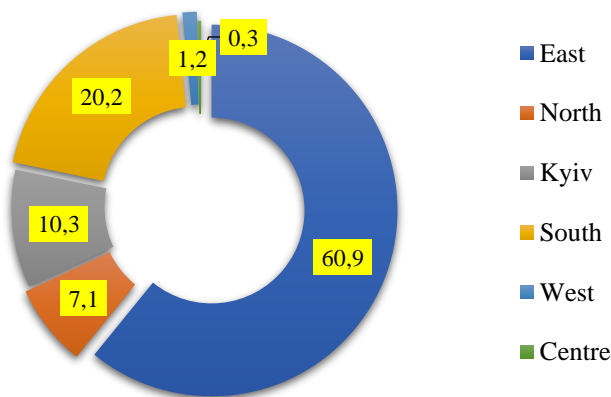
Figure 2. Estimate of the number of internally displaced persons in Ukraine by macro-region of origin (as of August 23, 2022), % IOM

Source: International Organization for Migration (2022)

The largest share of IDPs from the East (Luhansk, Donetsk, Zaporizhzhya, Kharkiv and Dnipropetrovsk regions) - 60.9% (4,245 thousand people) and the South of Ukraine (Kherson, Mykolaiv, Odesa regions) - 20% (1,408 thousand people). During the six months of the war, the intensity of the movement of Ukrainians changed somewhat. During February-March 2022, the largest number of IDPs was observed from Kyiv (Kyiv and Zhytomyr regions) and the East of Ukraine. As of April 1, 2022, these indicators were 2,384 and 2,363 thousand people, respectively. A little less - 1,656,000 people - were relocated from the North of the country (Sumy and Chernihiv regions). Gradually, the number of displaced persons from Kyiv and the North decreased due to the liberation of these territories and the transfer of active hostilities to the East and South of the country. The share of immigrants from the eastern region gradually increased from April 2022 and remains high. IDPs from the East now make up 61% of the total number of IDPs in Ukraine (compared to 55% in May 2022).

With the beginning of the full-scale war in Ukraine, the flows of immigrants were directed primarily to the west of the country. Western regions such as Khmelnytskyi, Chernivtsi, Ternopil, Lviv, Rivne, Volyn, Ivano-Frankivsk and Zakarpattia (macro-region West) have accepted almost 3 million refugees (2,850,000 people) as of 04/07/2022. In the Centre of the country (Poltava, Cherkasy, Kirovohrad and Vinnytsia regions) 1,802,000 Ukrainians found shelter. The western region remains the safest place for IDPs to live. Figure 3 shows the estimate of the number of internally displaced persons in Ukraine by macro-region of current stay (as of 08/23/2022), %.
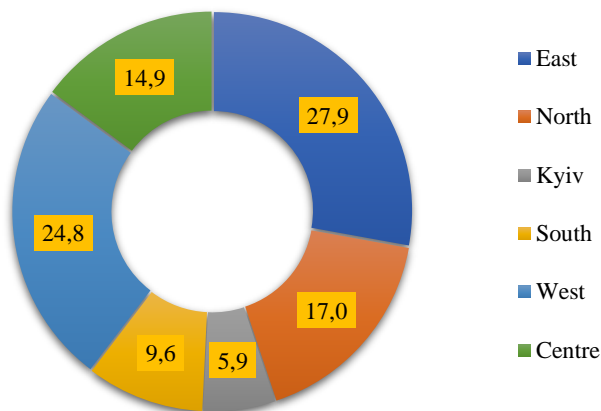
Figure 3. Estimate of the number of internally displaced persons in Ukraine by macro-regions of current stay as of 08/23/2022, %

Source: International Organization for Migration (2022)

Over the last month of summer, a cumulative increase in the number of people who returned to their places of residence was observed. These are mainly Kyiv and North regions. According to IOM, the number of returnees in the central macro-region has doubled since the end of July. The increase in the number of returnees was the smallest in the Eastern macro-region, where an additional 9,000 people are estimated to have returned, despite persistent insecurity in the macro-region. It is not possible to determine the nature of such returns (permanent or temporary), but 78% of those who returned plan to stay in their homes. This is about 4.7 million people who returned (IOM UN Migration, 2022).

The war in Ukraine led to a huge wave of refugees. According to the UN Refugee Agency (Operational Data Portal, 2022), the number of border crossings from Ukraine since February 24, 2022 was 12 million people. 7,283,716 people left the country and were registered as refugees in Europe. Among Western European countries, the largest number of Ukrainians found temporary shelter in Poland (1.43 million), Germany (780 thousand) and the Czech Republic (361.5 thousand). Tens of thousands of Ukrainians have also either already arrived or received permission to stay in the USA and Canada.

Consequently, the flow of refugees from Ukraine, which arose as a result of Russian aggression, caused one of the largest migration crises in the world. Millions of people were also internally displaced. Ukrainian refugees are mostly women with minor children.

4 Discussion

The forced migration of Ukrainians, if we compare it with the migrations of refugees from Syria, Iraq, and Afghanistan, which took place in recent decades, differs in that the EU accepted everyone who wanted to get there from Ukraine. This is a unique situation. 4034631

Ukrainians registered in the temporary protection program or similar national protection programs (Operational Data Portal, 2022).

In the Table 1 the number of refugees from Ukraine registered for temporary protection or similar national protection schemes in Europe is shown.

Table 1. The number of refugees from Ukraine registered for temporary protection or similar national protection schemes in Europe

Country	Date	Refugees from Ukraine recorded in country
Bulgaria	13.09.2022	133775
Czech Republic	13.09.2022	431285
France	29.08.2022	101369
Germany	06.09.2022	655800
Hungary	13.09.2022	29170
Ireland	29.08.2022	50423
Italy	13.09.2022	153664
Poland	13.09.2022	1379470
Republic of Moldova	12.09.2022	81158
Romania	11.09.2022	90745
Russian Federation	12.09.2022	2593209
Slovakia	13.09.2022	93384
Spain	11.09.2022	141846

Source: Operational Data Portal Ukraine Refugee Situation (2022)

Poland (1,379.5 thousand people) and Germany (655.8 thousand people) accepted the largest number of Ukrainian refugees. The next European countries in terms of the number of Ukrainian refugees are the Czech Republic, Italy and Spain. In the case of Poland, Slovakia and Hungary, the statistics reflect the number of Ukrainians who received the national equivalent of special protected status in these countries. Russia also provides data on the acceptance of Ukrainian refugees. However, although UNHCR officially includes the data submitted by the Russian Federation, it does not have the means to verify reports of forced deportations of Ukrainians.

A lot is done for refugees in host countries: housing, food, and financial assistance are provided. There is no universal practice, so each European country decides what it can offer. The government of Ireland provides Ukrainian refugees with the largest monthly allowance — 800 euros per adult (Great Britain — 405 euros, Germany — 400 euros, Poland — 150 euros). For 2023, Ireland has already planned almost 3 billion euros in the budget to support new Ukrainians, whose arrival they expect (Haydukky, 2022). According to the US Department of Homeland Security, more than 45,000 Americans have applied for admission of Ukrainians displaced by the war. They took responsibility for the maintenance of those invited from Ukraine. According to the Canadian government, as of June 2022, 296,000 Ukrainians have applied to participate in the program. Almost 132,000 applications were approved. The number of Ukrainians who have already arrived in Canada is much smaller - 43 thousand since the beginning of 2022 (the number includes the number of all people of Ukrainian origin who arrived in the country since January 1 - not only within the framework of the program) (Kovalenko, 2022).

There are two groups of Ukrainian migrants who leave the country. The first is those who are really fleeing the war, protecting their lives and the lives of their children. Such people are more inclined to return. Such 85-90%. The other 10-15% try to take advantage of the liberal conditions of stay of Ukrainians in these countries, to obtain legal status there, to find work.

According to the UN Refugee Agency, as of August 30, 2022, 5.3 million people returned to Ukraine. It is natural for people to want to return home. At home, at least there are basic conditions for life: work, housing, educational institutions for children. However, the significant destruction of the infrastructure of Ukrainian cities and villages as a result of Russian aggression, problems with employment, constant air alarms and danger cause the population to want to return to life abroad. Such a situation leads to the country's loss of human resources. If migrant women adapt to life abroad, enrol their children in kindergartens, find work and rent housing, then with a high probability, after the war is won, men will come to them. UNICEF estimates that up to 50% of all people who left Ukraine during the full-scale war are children. The children have already gone to school in the host countries, and many like the education systems there — despite the stress, young Ukrainians adapt to new teams and learn the language. The longer hostilities continue, the more Ukrainians will settle in neighbouring countries. According to Libanova (2022), if the war lasts until the end of summer, Ukraine will lose 500-600 thousand people. If the conflict drags on for a year, the irreversible losses will be measured in millions.

In Ukraine, the employment situation is difficult. Among IDPs who were employed before the war, 60% have lost their jobs since displacement (as of February 2022). During the last 6 months, almost half (48%) of all displaced persons tried to find employment after leaving their place of residence due to the war. However, 45% of them remain unemployed and are actively looking for work. The most used job search channels were the Internet (81%), mobile job search applications (23%), relatives/friends/acquaintances (17%), State Employment Service (13%) and visual information materials (posters, notice boards) (6%).

5 Conclusion

So, before the full-scale war, migration in Ukraine was a common phenomenon, but its nature was somewhat different. Labour migration prevailed: people went abroad to work, returned home and imported the earned funds into the country, replenishing its budget. The war changed the lives of Ukrainians and caused a significant wave of forced migration. Compared to 2014, the number of internally displaced persons has increased significantly. Given the duration of hostilities, there is a growing possibility that forcibly displaced persons will change their place of residence and look for permanent housing and employment, possibly abroad, due to the loss of their own housing and lack of employment.

Many European countries have created conditions for simplified hiring of Ukrainians who left because of the war. At the same time, for example, according to the work.ua survey, only 39% of those who were looking for a job found a job. Yes, Ukrainians face several obstacles when finding employment - some are forced to agree to downshifting, some cannot apply for a job in their specialty due to a language barrier, competition for jobs in European countries is generally high (WORK.ua, 2022).

But it is a matter of time: people with a proactive attitude will find an opportunity to realize themselves, if necessary, even if they have to learn a new profession or start their own business.

The outlined trends lead to a change in the structure of labour supply and demand, which is a new challenge for the post-war labour market in Ukraine. Reduction of the labour potential due to the loss of its most active working part - young people, huge internal displacements, the growth of emigration (refugees) have intensified the pre-war trends of the reduction of the Ukrainian population and may lead to a demographic catastrophe.

The state faced two challenges: to provide people with living conditions and work. These factors will affect people's desire to return home. If Ukrainians, in particular, young people, do not feel supported and do not see interesting opportunities for themselves in Ukraine -

after a few years of study, they will integrate into new communities abroad and find work there, and our economy will lose them for a long time, and possibly forever.

Place the figure as close as possible after the point where it is first referenced in the text. If there is a large number of figures and tables, it might be necessary to place some before their text citation.

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Balanced scorecard and Six Market model towards stakeholder engagement

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Abstract

Research background: It is necessary for managers to be focused on company's performance, tasks, and values. Especially in such turbulent economic environment they required to use modern instruments, which allow efficient management. In this paper we would like to assess Six Markets model and Balanced scorecard (BSC) system as tools in terms of stakeholder engagement, measuring stakeholder impact on company.
Purpose of the article: In this paper we compared BSC system and Six Markets model as tools for stakeholder engagement. Six Markets model is focused on more marketing purposes, many of its' concepts are giving an attentive and deep insights of how management must behave towards stakeholders, built its' analysis and strategy. Balanced scorecard shown itself as effective and useful measurement tool for different managers tasks. We compare those two models and argue that those have plenty in common where the biggest similarity is that both have evidence in increasing company's performance and evolved in different forms, such as ESG metrics.
Methods: In this paper we used analysis and synthesis, secondary data and cases analysis.
Findings & Value added: Our offered approach toward stakeholder capitalism would be useful for managers in long-term value creation as in short term profiting. We would like to offer an adaptation of this model for current economic situation with a focus on performance measurement.

Keywords: *stakeholder engagement; business performance measurement; BSC; Six Market model; stakeholder capitalism*

JEL Classification: *M14; M21; M31; Q56*

1 Introduction

In this chapter we would like to go to the origins of stakeholder management, then its evolution. Afterwards we will do the same with the balanced scorecard method and Six

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Markets model respectively. We consider that such tools have a lot in common especially towards the stakeholder approach in management.

1.1 Stakeholder origins

The godfather of stakeholder theory considered to be Edward Freeman, who wrote about stakeholder management in 1984. He states that stakeholders are those groups or individuals who can affect or be affected by the corporation: customers, shareholders, employees, suppliers, lenders and society. Engaging with stakeholders, satisfying their needs are main goals for business to succeed in a long term. Freeman argues that firm should analyse stakeholder's interests and make its' strategy according to them. So, the company's' value and performance could be determined by that strategy actions in order to meet stakeholder's expectations and needs. Since that time Stakeholder management started gaining more attention and developed to a stakeholder theory, namely descriptive accuracy, instrumental power and normative validity (Donaldson and Preston, 1995). There are two common approaches how to group stakeholders. One is that stakeholders to be divided in two groups: internal (managers, employees) and external (advocacy groups, authorities, society) (Johnson & Scholes, 2005). Second approach is to divide them in primary (customers, employees, suppliers, financiers) and secondary (media, competitors, government) as it depicted in Figure 1 (Freeman et al. 2007). It is up to the manager, which approach to use, or combination of both in his stakeholder analysis. Stakeholder's groups evaluate company behaviour and set norms in environment in which company operates. In response, managers must engage with address expectations of the different stakeholder groups. This type of relationships should increase the company's value (Clarkson, 1995; Donaldson & Preston, 1995). Some authors offer relationship based stakeholders approach as values creating and exchanging, instead of classical market transactions withing its network (Christopher et al., 2002, Gummesson, 1999). Payne et al (2004) used stakeholder approach in relationship market strategy his and proposes a framework for analysing stakeholder relationships and planning stakeholder strategy on the "Six Markets" model. In the next sub-chapter, we will discuss Six Markets model from stakeholders perspective and will point on some possible similarities in approaches. Having those similarities, we could move forward to Balanced scorecard and try to find there commonalities to.
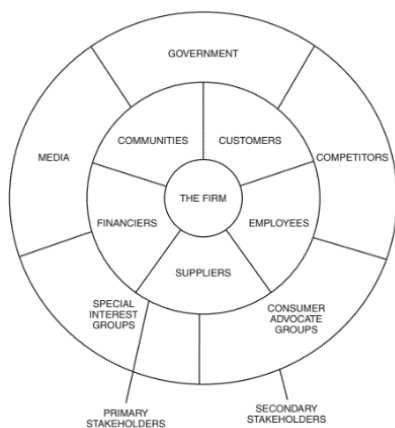
Figure 1. Stakeholders example.

Source: Freeman et al. 2007. Originally from a conversation with Robert Phillips.

1.2 Six Markets model

The Christophers et al (1991) offered original model described six market domains: (1) "customer markets" (including existing and prospective customers as well as intermediaries); (2) "referral markets" (these include two main categories – existing customers who recommend their suppliers to others, and referral sources, or "multipliers", such as an accounting firm who may refer work to a law firm); (3) "influencer markets" (which included financial analysts, shareholders, the business press, the government, and consumer groups); (4) "employee markets" (concerned with attracting the right employees to the organisation); (5) "supplier markets" (these include traditional suppliers as well as organisations with which the firms has some form of strategic alliance); and (6) "internal markets" (the organisation including internal departments and staff), which depicted in Figure 2.

Figure 2. Six markets model.

Source: Payne, Ballantyne and Christopher (2005)

Further, Payne et al (2005) for stakeholder approach developed that model as next: 1. Customer markets are made up of buyers (e.g. a wholesaler), intermediaries and final consumers. 2. Referral markets comprise two main categories – customer and non-customer referral sources. The customer category includes advocacy referrals (or advocate-initiated customer referrals) and customer-base development (or company-initiated customer referrals). The wide range of non-customer referrals are divided into general referrals, reciprocal referrals, incentive-based referrals and staff referrals. 3. Supplier and alliance markets – suppliers provide physical resources to the business and can be classified into strategic suppliers, key suppliers, approved suppliers and nominated suppliers. 4. Alliance partners supply competencies and capabilities that are typically knowledge-based rather than product-based. 5. Influence markets have the most diverse range of constituent groups, including financial and investor groups, unions, industry bodies, regulatory bodies, business press and media, user and evaluator groups, environmental groups, political and government agencies, and competitors. 6. Recruitment markets comprise all potential employees together with the third parties that serve as access channels. They can be segmented by function, job role, geography, and level of seniority. He offered a planning framework showed in Figure 3 for stakeholder relationships based on elements of the relationship strategy framework of Christopher et al. (1991) and the relationship management chain of Christopher et al. (2002)
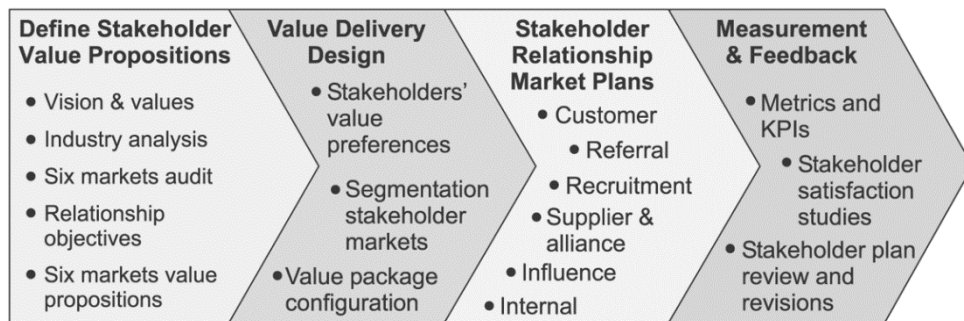
Figure 3. A planning framework for stakeholder relationships.

Source: Payne, Ballantyne and Christopher (2005).

In the next sub-chapter, we will describe a Balanced scorecard development to its modern state of "sustainability balanced scorecard" (SBSC).

1.3 Balanced Scorecard performance measurement system

Kaplan and Norton introduced universal performance measurement system – Balanced scorecard, which could be applied for plenty of dimensions and firm's KPIs (1992). The balanced scorecard summurises companys goals and minimases information overload of managers. This system combines both financial and non-financial tasks. This system requires identifying key issues, setting goals for them, and finding ways to measure progress towards their achievement (Leon-Soriano et al., 2010). Initially it has 4 pillars: Financial perspective - how do managers look to shareholders? Internal business perspective – what firm should excel at? Innovation and learning perspective -how could company continue to improve and create value? Customer perspective – how customer do recognise a company? Later on with environmental concerns, the fifth pillar was added – sustainability – how to connect corporate sustainability goals with company's outcomes? (Kalender, Vayvaya 2016). All five pillars are depicted in Figure 4.
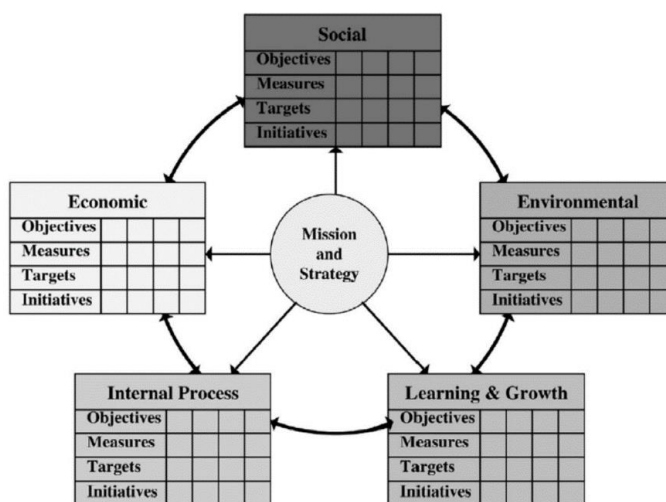
Figure 4. Sustainability balanced scorecard.

Source: Rabbani et al. (2014)

Each company must has its own mission and vision, based on which it set own goals. Those goals should be transformed in some type of quantitative metrics to put the balanced scorecard to work. E.g., from financial perspective, the goal « To prosper » could be measure by ROE and increasing of market share (Kaplan and Norton, 1992).From the customers perspective could be used goal "Quality of customer services" measured by set of metrics as "complains" and "customer ranking services". Example of BSC application towards stakeholder "customer" is depicted in Table 1.

Table 1. Example of BSC application towards Stakeholder "Customer".

Stakeholder	Expectation	As measured by the metric	Year 1	Year 2	Year 3	Current year	Results	Target
Customers	Quality of internet service	Fluctuations in speed connection less than 20% minutes per year	35	30	28	20	25%	5
		Average minutes outage per customer per year	20	40	16	15	67%	10
		46%						
	Quality of customer service	N of complaints per 100 customers per year	16	14	10	7	71%	5
		Per cent customers ranking service as very good or excellent on survey	68	74	78	82	96%	85
		Average days to repair issues	6	6	5	3	67%	2
		82%						
		64%						

Source: authors' adaptation from Curtice, 2006.

2 Methodology, results, and discussion

Each company has its own prioritised list o stakeholders, depends on their own analysis and company type. Nevertheless, we could distinct several commonalities, which could be applied to an any firm withing described above systems.

Table 2. Common stakeholders in different dimension systems

Six Markets model	BSC system	SBSC system	Stakeholder
Customer markets	Customer, Financial	Social, Economic	Customers, communities
Referral markets	Customer	Social	Customers, communities
Supplier and alliance markets	Financial, Learning&Growth	Economic, Learning&Growth, Environmental	Suppliers, subcontractors
Influence markets	Financial	Economic, Environmental	Financial and investor groups, unions, industry bodies, regulatory bodies, business press and media, user and evaluator groups, environmental groups, political and government agencies, and competitors
Recruitment markets	Internal business process, Learning&Growth	Internal business process, Learning&Growth, Social	Employees, subcontractors, communities
Internal markets	Internal business process, Learning&Growth	Internal business process, Learning&Growth, Social	Employees, subcontractors, communities

Source: author processing.

We would like to point on that among existing of several systems, which were developed through several decades and had found their strong positions in the tools of managers, have a lot in common. The main commonality is that Stakeholder management approach, introduced by Freeman in 1984, was and still is visionary and truly actual for current socio-economic threats. The framework of identification and engagement of stakeholders are applicable and could be even necessary to face business challenges, including environmental and societal issues. Within this framework could be applied and adapt different set of measurement systems and methods. Also, this stakeholder approach is under one umbrella with CSR and sustainability agenda (Freeman 2007). Such approach could be useful as managers, facing new challenges for their companies and academia in developing such useful tools and reducing complexity of those instruments. One of such examples could be ESG metrics, notwithstanding their huge complexity. Academical findings of applying CSR or ESG are quite controversial, as they could state positive and negative impacts on company performance. Buallay et al. (2019) findings from the empirical research in Mediterranean companies showed that CSR disclosure negatively affects operational and market performance but does not affect financial performance. Alareeni and Hamdan (2020) did an analysis of ESG impact on performance of US S&P 500 companies, where they showed ESG disclosure positively affects a firms' performance measures. Haninun et at. (2018) showed that environmental performance and environmental disclosure positively significantly affect financial performance But influence of ESG sub-components separately could be negative for some financial indicators. In our opinion, it would take a time to accept the same metric system for each company. Probably a combination of set from above ESG metrics with own adaptation in form of SBSC could be a solution, which is a direction for the further research.

Acknowledgements

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The right to communicate on digital platforms and its impact on boosting their global reach

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Abstract

Research background: Digital transformation, accelerated by the COVID-19 pandemic, is shaping the EU economy. Digital labour platforms have become an important element shaping new social and economic conditions. They provide support to innovative services, new business models and create numerous opportunities for consumers and businesses. Digital labour platforms use automated systems to assign tasks, evaluate and make decisions about the people who work through them, while there is usually no single place of work and virtually no personal contact between employees.

Purpose of the article: The aim of the paper is to analyze the newly conceived right to communication, which is supposed to guarantee that persons working through digital labour platforms get to know each other and communicate with each other, especially when defending their interests and providing feedback.

Methods: As the new right to communication is not enforced in practice, the paper made use of analytical, inductive, deductive and comparative research methods enabling the formulation of theoretical conclusions and frameworks of their application. The paper also made use of knowledge published in internationally-published literature due to the absence of Slovak sources and the innovative nature of the topic discussed herein.

Findings & Value added: The paper re-examines definitions of the terms and specifics which will pose a problem after the new legislation on the right to communication is transposed to the national legislation, in particular with regard to the national specifics of the operation of virtual infrastructures of digital platforms.

Keywords: *digital platforms; digital infrastructure; the right to communicate; social networks*

JEL Classification: *K24; M54; O36*

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1 Introduction

The rapid pace of digitization and its penetration even in areas where digitization was not originally expected are accompanied by social and legislative changes that try to identify, understand and subsequently react to its effects. Reactions depend on areas to which digitization brings changes (either positive or negative) as well as on the importance of this area for the national and transnational community. The way digital platforms operate has brough forward several issues. The most important one is the issue of digital space replacing the physical space, particularly in terms of business activities, and, at the same time, the necessity of performing work for these digital platforms in an environment of rigid local labour regulations so typical for the member states of the European Union. Business activities take place and products and services are offered and advertised regardless of the boundaries of space and time, often outside strict regulations. However, this also means a direct threat to the social rights of people who work for these digital labour platforms (Godany and Mura, 2021). Thus, a question arises whether and how to reconcile these ambivalent elements of digital labour platforms in times businesses have more opportunities to conduct their business activities thanks to the globalized market while at the same time consumers have the power to influence the behavior of businesses through the groundswell concept (by sharing information and commenting on facts on social media or using other digital platforms) (Pacalajova and Kubinec, 2021). It should also be noted that the social and economic conditions of persons performing activities for these digital labour platforms degenerate, as the continued depersonalization of the content of labour due to the use of algorithmic management means a weaker protection of the rights and legally protected interests of these persons.

To remain objective in our perception of the gradual increase in the use of digital labour platforms, we must jointly look for a tool that would not only preserve the positive effects digital platforms brough, including individualized approach to the evaluation of activities of digital labour platforms through the concept of the groundswell, but also strengthen the protection of rights and promote the legitimate interests of persons working for digital labour platforms. To a certain extent, the starting point appears to be the new right granted to persons performing work for digital labour platforms, in particular the right to communication according to Art. 15 of the draft directive of the European Parliament and of the Council on improving working conditions in platform work no. 2021/0414 (hereinafter referred to as the "Platforms Directive"), the aim of which is to address the said imbalance by guaranteeing the right to contact each other and communicate through the digital infrastructure of digital labour platforms. This concept (the right to communication) is all the more ambitious in that it is not only an obligation for digital labour platforms to guarantee the right to communication to persons who are defined as employees under national legislation when meeting the defining characteristics of dependent labour under national labour legislation, but that it represents an obligation also towards their "business partners", because according to estimates, nine out of ten platforms operating in the EU currently classify the persons who work for them as self-employed (De Groen et al., 2021). With regard to the above, the paper will therefore be pointing out the concept of operation of digital labour platforms and the impact they have on legal relations with potential customers and persons performing work for them, in particular regarding the protection of rights and protected interests of customers and persons performing work for them. The solution seems to be the right to communication and its incorporation into other legal frameworks so as to mitigate these negative impacts and thus ensure an effective and efficient means of protecting these persons while simultaneously preserving the positive effects of the groundswell concept throughout digital labour platforms.

2 Methodology

The paper analyses the competitive environment of the market and the role digital labour platforms play in it on the basis of expert estimation and the scientific methods described below. The paper also identifies relevant instruments and their legal framework, which could be able to overcome the ambivalent effect digital labour platforms have on natural persons interacting with them, i.e. customers, business partners or persons performing work for digital labour platforms. Particular attention is paid to the potentially most promising means representing an imaginary bridge between the positive effects digital labour platforms have on market in terms of strengthening the groundswell (the concept supporting freedom of expression) and their negative impacts in terms of the economic and social conditions of persons performing work for digital labour platforms. The authors made use a combined methodological approach, the aim of which is to ensure a comprehensive and systematic overview of the selected issue using selected qualitative and logical-cognitive methods (although with a high degree of presumption of the application of individual legislative amendments). In addition to an in-depth critical analysis focusing on the adoption of the proposed European legislation (directive on digital platforms) used for the purpose of approximating the future legislative state, induction, deduction, comparison and synthesis were also used to deepen knowledge, stimulate discussion and reach conclusions. In this regard, the authors used the existing documents of the European Commission developed for the purpose of identifying the stance the economic market and national legislation of the member states of the European Union hold with regard to the position of digital labour platforms. As a source of information served national and international literature on the topic. However, it should be noted that the literature did not provide answers to the scientific questions posed herein. For this reason, the paper aims and seeks to provide answers to these questions. The emphasis was also placed on knowledge published in monographic works and peer-reviewed journal outputs registered in internationally respected bibliographic databases.

3 Results and discussion

Results of various statistics (Barcevičius et al., 2021) state positive effects digital labour platforms have on the labour market and business activities in Europe and around the world. More than 28 million people in the EU currently work through digital labour platforms; this number is expected to rise to 43 million in 2025, with revenues from the EU's digital labour platform economy estimated to have increased by 500% over the past five years. Digital labour platforms create new jobs and enable people with certain social or health disadvantages (Van Doorn, 2017) as well as young people (Laursen et al., 2021) to enter the labour market. The right to communication, which is the subject matter of the paper hereunder, is undoubtedly capable of compensating for the absence of a physical "world" in the online environment in which digital labour platforms operate. However, this right cannot compensate (to a large extent) for the shortcomings associated with the inherent nature of the activities taking place on digital labour platforms, in particular social "separation" and promotion of an individualized and subjective approach to problem-solving issues (these are subsequently shared with other persons, thus giving rise to the groundswell concept). Some information shared about the service provided by a digital labour platform (or a person who performs their activity through the digital labour platform) may not be based on truth, may be a result of a misunderstanding or, as a case may be, even be completely false, there are no regulations to tackle such intentional "non-conforming behavior", and even the right to communication given to the persons who perform work for the digital labour platforms is not able to eliminate this fundamental flaw. Therefore, the aforementioned depersonalization of legal relations between digital labour platforms and persons who provide certain activities

for them cannot be compensated for by granting these persons the right to communication, as this right should ensure a closer connection among these persons, especially assuming that persons involved hold different legal statuses (employees vs. self-employed persons as determined according to national laws) due to the fact that they are based in different member states of the European Union with different legal and social frameworks.

The right to communication according to Art. 15 of the Platforms Directive should lead to the premise that digital labour platforms allow the persons working for them to contact and communicate with each other and to be contacted by the representatives of the persons working for the digital labour platforms through the infrastructure of the digital labour platforms or using similarly effective means. That means to allow such persons working for digital labour platforms to get to know each other and communicate with each other, including when defending their interests despite the lack of a common workplace. According to Recital 45 of the Platforms Directive, the right to communication is based on the assumption that work for digital labour platforms is characterized by the absence of a common workplace where persons have the opportunity to get to know each other and communicate with each other and with their representatives, also in view of defending their interests towards the employer or the work contractor (the digital labour platform). Therefore, it is necessary to create digital communication channels that would suit the nature of work performed for digital labour platforms, within which persons working for the platforms can communicate with each other and be contacted by their representatives. Digital labour platforms therefore should create such communication channels within their digital infrastructure or using similarly effective means, respecting the protection of personal data and refraining from accessing or monitoring these communications.

However, the above-mentioned legal and social starting points of the right to communication come into conflict not only with the fundamental principles on which digital labour platforms were built in the past and their very purpose, but also with the effort to unify different legal characteristics of persons performing work for digital labour platforms and legal regulations valid in national legal systems of EU countries (the fact that the proposal has a form of a directive which will have to be transposed into national laws with an unpredictable results due to the diverse nature of national legal systems of EU countries does not help). The use of algorithmic management as a form of depersonalization of labour and commercial relations also plays a role here (Jurčová et al., 2019). This is also why the authors believe that the mandatory obligation under the right to communication defined in Art. 15 of the Platforms Directive should be seen positively, even though it does little to tackle the issue of the operation of digital labour platforms on the European and global economic market. The legal status of persons performing work for digital labour platforms should be strengthened (in this regard, the draft directive is undoubtedly unambitious and legal instruments proposed might be alien to legal systems of some member states of the European Union). As a result, there are two basic areas where the introduction of the right to communication could prove problematic. One is the right to communication as a tool for solving the "remoteness" of the relationship between the digital labour platform and the persons performing work for them, the second being the nature of the relationship between the two.

The ongoing fourth industrial revolution and the expected onset of the fifth industrial revolution (Di Nardo and Yu, 2021) have changed not only the global market but also their own character. The fourth industrial revolution (or the second age of machines or industry 4.0) is characterized by the idea of complete digitization of the labour market. The connection between the virtual world and the physical one will increase the efficiency of work, but at the same time it may threaten the existence of a whole range of job positions as these might be replaced by machines and many professions will disappear (Klingenberg et al., 2022), or at least change their character (Dúbravská, 2015). This grim outlook was presented by several

expert authorities (Wang et al., 2022). The birth and growth of digital labour platforms over the course of the last 10-12 years, and work practices this entails (jobs that no longer could be described as dependent work), not only saved costs, but also meant new business opportunities for traditional business entities and startups. Thus, in the simplest definition, digital labour platforms mediate work or a certain activity, while having either the form of an application or a web interface that is accessible through an Internet browser. The advent of new technologies, including their continued development, has a fundamental impact on the working environment itself. Automated work tools like production lines, new virtual applications and the devices and software solutions on which these run will be multi-purpose, reconfigurable and transformable, thus allowing them to make significant progress in their autonomous management of persons tasked with using them (Zauskova et al., 2022). Thanks to the online environment and the Internet of Things (IoT), these "work and business tools" will become interconnected through a wireless connection, and new possibilities for mutual interaction between individual systems will arise, as well as new possibilities for their management, monitoring and provision of advanced services in relation to the physical production of final products. Thanks to technologies such as the digital enterprise, intelligent robots, a huge amount of data, machine learning and artificial intelligence, the production process will be able to self-manage and self-organize itself. It will thus be a system with decentralized control capable of autonomous decision-making (intelligent factory), which is referred to as a cyber-physical system (Dolphin, 2015). A significant phenomenon brought about the Industry 4.0 is also the change in the structure of business entities and the nature of their own business activities. Due to outsourcing, the original hierarchical pyramid structure of business entities crumbles, giving way to the so-called networking, or network structure, the basis of which are small teams of employees working on different projects (members of individual teams may work in several teams at once while the composition of a team may change very quickly depending on new projects). Outsourcing also means business entities may assign certain activities or tasks to digital platforms, as these carry out outsourced activities more efficiently, cheaply and often without being tied down by local geographical restrictions (the gig economy means business entities use external experts or business entities instead of their own employees to carry out various tasks; tasks can be carried out regardless of geographic area a contractor is in).

The environment in which digital labour platforms were "born" also determines the nature of their relationship with the persons who are to provide a certain activity through them. The technological innovation represented by digital labour platforms is therefore radical in that it enables the automated linking of supply with demand based on the available data that the digital labour platform possesses, while this automated linking is based on algorithms created by the digital platform. However, the problem with digital platforms is that they are not fundamentally economically successful in themselves, as their entire concept is based on the future assumption of success provided certain radical changes in the field of technical change will take place (e.g. autonomous driving cars) (De Reuver, 2018). Often, digital labour platforms are financed using risk capital, assuming that the "loss" they make will be mitigated using cost-saving measures, in particular by moving away from traditional labour relations requiring a certain level of employee protection. However, the latest trends show the risks are placed upon users of these digital platforms, i.e. that users bear any tax or levy obligations in connection with the service provided (tax optimization with respect to the headquarters of the digital labour platform; depending on the seat of the digital labour platform consumer protection laws may vary as these laws are independent of the actual location the digital labour platform provides its service in).

Probably the biggest hinderance to the right to communication is the fact that digital labour platforms mediate work for specific persons irregularly (mostly just a one-off gig), with the most important fact being that these persons are not subject to local labour

regulations (i.e., most often the contractor-customer relationship). The one-off nature of the activity does not mean that the person cannot carry out the activity repeatedly for these platforms or perform several different tasks or activities. However, the performance of these one-off tasks does not establish any long-term relationship between the digital labour platform and the person carrying out the task that would imply any social or economic obligations in this regard (O´Farrell and Montagnier, 2020). If we also take into account the so-called extractive nature of digital labour platforms, i.e. that they themselves siphon off a certain part of the value that was created by the person working for the digital labour platform, the relevance of the protection of the rights of the affected natural persons is lost at the moment the service is transferred to the digital labour platform for money, since part of it has already been consumed directly by the digital labour platform. If the commercial nature of the status of persons performing work for digital labour platforms, i.e. a self-employed person, is taken into account, than the relevance of the right to communication is highly questionable (Žuľová, 2021). Based on the assumption that natural persons working for digital labour platforms perform one-off jobs and, thus, are seen as small business entities (a self-employed person), what is the significance of giving such persons the right to contact and communicate with each other, including the right to communicate with their representatives, if, as is the case with microworking, the right is inherently obsolete and will not be used on a large scale. These persons will not be able to effectively defend this right, not only because of discrepancies in local legal regulations, but especially because of the nature of the work they carry out (short-term or individual tasks making up a bigger picture put together by different entities from different EU member states). If the person will need to communicate, their problem will be solved by ending the legal relationship with the digital labour platform or by completing the mediated task, which will automatically terminate their relationship with the digital labour platform. In this sense, therefore, the reported absence of a common workplace and of any closer ties between individual persons working for the platforms will significantly reduce the degree of usability of the right to communication for such persons.

The right to communicate, especially when defending the rights and interests protected by the law of persons performing work for digital labour platforms is further complicated by the inherent nature of the rights of not only digital labour platforms but also people carrying out work through digital labour platforms as well as the solution proposed by the European Commission in the draft Platforms Directive. With regard to the above, digital labour platforms do not use algorithmic management only in relation to connecting supply and demand, i.e. to implement their business model, but also to manage the persons who perform the work in question for them and to analyze the statements of the affected entities that use their digital infrastructure (e.g. customers commenting on the service provided). Algorithmic management, i.e. decisions on digital labour platforms taken and supported by automated monitoring and decision-making systems, is not a new trend, although with the advent of digital labour platforms, its use has significantly expanded into the field of labour and commercial relations (Woodcock, 2021). As part of the original European legislation on the protection of personal data (Directive 2016/679 on the protection of natural persons in relation to the processing of personal data), later replaced by GDPR, the issue of automated processing of personal data was regulated under the right to object to automated individualized decision-making. The new legislation in the form of the draft Platforms Directive also addressed the issue of increased depersonalization and the negative impact depersonalization is expected to have on the content of legal relationships (gender bias, discrimination, remuneration for the performed activity, using information about these persons to determine what type of tasks to assign them, activity productivity measurement, evaluating the performance of a natural person, etc.). All of the above, therefore, leads to a more significant reduction in the legal protection of these persons (Kupec and Pisar, 2021).

The rapid rise of digital labour platforms in which algorithmic management plays an essential role, more pronounced enforcement of algorithmic management in job tasks falling under the IoT (also when working from home / telework) and also in tasks not directly related to the performance of work (but which affect basic human rights of natural persons (e.g. anti-terrorist screening of natural persons under AEO certificate proceedings) will undoubtedly lead to the need for major changes in Slovak labour laws, especially with regard to the adoption and later on transposition of the Platforms Directive into local legal frameworks of EU member states (Terry et al., 2022). It should be noted that the use of algorithmic management at workplace and when performing job tasks is still an unregulated area. However, a broader discussion on the transposition of legislation aimed at protecting the rights of these persons should also focus on the nature of the legal status of entities that will become parties to legal relationships bound to follow the wording of the new European and national legislation, in particular the legal status of persons performing work for digital labour platforms under the new Platforms Directive. The national approach means the legal status of such persons varies, which of course entails differing legal consequences when granting legal protection to persons working for digital labour platforms, and at the same time significantly limits the scope of European and national legislation (such persons can be in the position of an employee or a self-employed person). According to some authors, up to five and a half million people working through and for digital labour platforms may be at risk of employment status b. This may entail unfavourable working conditions, no access to social protection programs, etc. As a result of misclassification, these persons are not able to enjoy the rights and protections to which they are entitled to. These are rights such as the right to a minimum wage, regulation of working hours, safety and health protection at work, equal pay, the right to paid vacation, as well as the employment injury insurance and protection, unemployment benefits, the right to sick leave and old-age benefits (De Groen, 2021). One of the solutions to the above may be the introduction of new rights under the Platforms Directive (and also new rights). One of these new rights should be the right to transparency in the use and operation of automated monitoring and decision-making systems, thus supplementing the existing rights under the GDPR.

4 Conclusion

The transposition of the Platforms Directive into national legislation, despite good intentions of lawmakers, will prove more than difficult, because the individual EU member states differ not only in terms of their historical legal traditions, but also in the basic legal terminology, which the Platform Directive fails to unify (and even refers to national laws and customary legal approaches). Some of the legal presumptions under the Platform Directive, for example the very definition of the digital labour platform in Art. 2, point 1, the definition of a contractual relationship between the digital labour platform and the person who performs the work for it outlined in Art. 4, point 2, or provisions on protection from dismissal according to Art. 18 have no tradition in Slovak or Czech legislation, and their implementation will prove problematic with regard to de lege lata legislation. For this purpose, the Platforms Directive introduces the so-called reversed burden of proof, a provision within a statute enforcing a party to prove that the subject in question is or is not a digital labour platform or that the relationship in question is not that of an employee and employer (although the parties concluded a contract under the commercial law instead the labour law). Due to the fragmented nature of the protection of the rights of persons performing work for digital labour platforms, only the right to communication through the infrastructure of digital labour platforms remains applicable. Thanks to this right, persons working for digital labour platforms are able to contact each other and discuss rights protection problems stemming from different legal status granted to these individuals by national laws of EU member states

as well as consequences of the transposition of the directive into national laws and the consequences (often differing) this might have for their own rights. Given the legislative chaos at the European level, the persons working through digital labour platforms have no choice but to fight for the protection of their rights also using the concept of groundswell to raise awareness of the issue and share their thoughts to convince others that their concerns are justified and valid.

Acknowledgements

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The shifts in the purchasing behaviour of postal customers due to global changes

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Abstract

Research background: The Covid-19 pandemic, as the most recent effect of globalisation, was and still is an unprecedented situation that has affected consumer attitudes. As a result, consumer behaviour is undergoing a significant change. In the early days of the pandemic, the regular purchases have moved from bricks-and-mortar stores to the virtual world. Therefore, the sellers were forced to change distribution channels and service offerings. This situation has also significantly affected the postal services sector. Therefore, postal operators changed the conditions and methods of collecting and delivering parcels.
Purpose of the article: The objective of the article is to monitor the changes in postal customer habits and attitudes and identifying new patterns of behaviour. These findings can then lead to the development of a new customer policy.
Methods: Statistical methods as a Mann-Whitney test, Kruskal-Wallis test, Chi-square test of independence and Fisher's exact test where used in the article.
Findings & Value added: The article brings answers to the questions related to security, scope and availability of services, contactless and environmentally friendly way of their provision in pandemic conditions of the national postal operator, which is a part of the critical infrastructure of the State and is connected with the global world postal network. The product portfolio of a national postal operator is not only linked to domestic or international mail distribution. It is connected to the functions of the State related to, e.g. social policy, the monetary system, in particular pensions, collection services, data management and communication routes.

Keywords: *customer; shopping behaviour; postal services*

JEL Classification: *F61; F68; L81; L87; L88*

1 Introduction

Parcel distribution is a key activity of postal and logistics operators. They try to offer a variety of services to customers. At the time of the pandemic, distribution has become even more

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important. The availability of many services was limited in space and time. Normal movement and travel was restricted. [1] The shortage of couriers and other staff in the area was also a problem. Providers were faced with many challenges (some persisting to the present day) and problems in arranging last mile delivery. Many were also related to changes in customer behaviour. This was also influenced by global trade issues, the unavailability of goods and services and the temporary dislocation of both global and national supply chains. [2]. Such challenges include high order fulfilment costs, increased shipment volumes, increased customer expectations towards low price, free delivery and returns, individual scheduling of delivery time and place, new forms of delivery, ecology, etc. The Last Mile was also under pressure on security during the pandemic. This is related to the use of contactless forms of delivery in the last mile (documentless, self-service devices, machines, parcel lockers, etc.). [3,4,5,6,7]

Buying behaviour in recent times has been greatly influenced by the availability of new technologies and the Internet. It is not only the customer's expectation, it is also the ability of the business entity to adapt to new conditions (pandemic, climate, energy crisis, ...) It is the digital transformation that has intervened in the emergence of new business models [8] and brings new opportunities for all stakeholders. For the customer, it mostly means increased convenience and new products. Especially thanks to the development of e-commerce, operators' operations or their mutual cooperation and interoperability have grown to global dimensions. The Internet and the provision of shopping services on the Internet as well as the subsequent distribution have a major impact on overall customer satisfaction. [9] The study [10] highlights the impact of the quality of Internet services on consumers' purchasing behaviour as well as on their attitudes towards the intentions and consequently other attributes of online shopping such as the delivery method. The quality of these services influences online shopping behaviour. The link between these aspects is also demonstrated in a study on forms of parcel delivery in European countries. [11]

Many authors today refer to the need to achieve sustainable customer purchasing behaviour. [12] Ecological aspects influencing customers' purchasing behaviour are very important nowadays. But many times, perceived differently due to regional and cultural disparities. [13] They came much more to the fore at the time of the pandemic, when comparisons related to air pollution were often presented. Many authors speak of new models of value attitude and customer behaviour [14] Here we can also see the behaviour of postal and logistics service providers, who try to take this requirement into account and, what is more, to present socially responsible behaviour. [6,15]

The pandemic has affected customer behaviour in many aspects, and many business models that were traditionally established have been modified. [16,17] The main insights are about changing products, distribution channels and motivations. It also shows how customers react and perceive the changed conditions, creating pressure for practical solutions. [18,19,20] This was also demonstrated in the rapid change in the frequency of online purchases and new delivery requirements. [21]

2 Methodology

The aim is to analyse the changes in the buying behaviour of a postal enterprise customer that have arisen as a result of the Covid pandemic. The opinions presented are derived from the analysis of data obtained by quantitative questionnaire research on a sample of respondents aged 18 years and over. With a confidence level of 95% and a margin of error of 5%, a sample of 385 respondents is required. After data collection was completed, 391 responses could be used. For the analysis and evaluation of the collected data we used statistical methods - non-parametric tests namely: Mann-Whitney test, Kruskal-Wallis test, Chi-square test of independence and Fisher's exact test. The presented results represent a

selected part of the research, oriented on changes in the use of postal services of the national postal operator. The focus was on the attributes that emerged from the secondary research. The specificities of the position of the national postal operator were also taken into account. This includes the obligation to ensure the availability of postal services throughout the territory. In addition to the distribution of parcels and letters, these are also money services. The so-called state services also have a special status. The national postal operator is thus the point of contact for the citizen for his contact with the services of the state and local government. The basic stratification of respondents is shown in Table 1.

Table 1 Basic data on the sample of respondents.

Gender	Male			Female	
	113 (28,90%)			278 (71,10%)	
Age	**18-25**	**26-35**	**36-50**	**51-65**	**66 and more**
	141 (36,06%)	61 (15,60%)	69 (17,65%)	77 (19,69%)	43 (11,00%)
Residence	Urban			Rural	
	133 (34,02%)			258 (65,98%)	
Education	**Without**	**Primary**	**Secondary**	**University (bachelor)**	**University (master´s)**	**University (doctoral)**
	12 (3,07%)	21 (5,37%)	227 (58,06%)	77 (19,69%)	50 (12,79%)	4 (1,02%)

Source: author (2022)

3 Results

In this paper, we present selected parts of the research that represent the purchasing behaviour of customers using postal services.

A.   Analysis of changes in the purchasing behaviour of customers using postal services.
     For this part of the research, a sample of 353 participating respondents was analysed, representing 90.28% of the total. These are respondents who satisfied the filtering question: the respondent is a customer of a national postal operator.

     The baseline survey showed that the frequency of use of the different services in the portfolio of the national postal operator (postal and non-postal services) was almost the same at the time of the pandemic as before the pandemic. The situation can be described as stable. Services that were expected to be reduced at the time of the pandemic have also retained their importance. Letter and parcel services are the most used. The surprising result is in the parcel services segment. There was no significant increase in the use of parcel services during the pandemic by the national postal operator.

     Differences in the use of different postal services and non-postal services were analysed in terms of different criteria e.g. gender, economic activity, location. We used hypothesis testing - Mann-Whitney test, Kruskal - Wallis test.

Situation A1 Monetary services are a special category of postal service, belonging to the public interest. Frequency of use is measured on a four-step scale.
H0: We assume that there is no statistically significant difference in postal establishment patronage between males and females due to the use of monetary services.
H1: We assume that there is a statistically significant difference in visitation to the postal establishment between males and females due to the use of monetary services.
     Descriptive statistics (Table 2) show that men are more likely than women to use the services of a postal enterprise for monetary services.

Table 2. Descriptive statistics of the use of monetary services by gender for the Mann-Whitney test

Gender			Male	Female
Use of monetary services (1-4)	Average value		2,71	2,05
	95% confidence interval for the mean	Lower bound	2,48	1,90
		Upper bound	2,94	2,19
	Median		2,00	2,00

Mann-Whitney test - the difference in the number of visitors to the postal company between men and women due to the use of monetary services					
	N	Average rank	Z	Mann-Whitney U	Asymptotic significance P
Female	240	160,06	-4,778	9494,500	0,000
Male	113	212,98			

Source: author (2022)

Table 2 shows the mean rankings for the Mann Whitney U test. For females this value is 160.06 for males 212.98. The p value of Mann-Whitney U test is less than 0.05 and hence we reject the null hypothesis. There is a statistically significant difference in postal establishment patronage between males and females due to the use of money services. Higher scores for males indicate that males visit the postal establishment more frequently than females because of the use of monetary services.

Situation A2 Parcel services - the method of delivery also determines the location of the respondent. At the time of the pandemic, rural-based customers were faced with a lack of options for fast and secure forms of delivery (especially contactless).

H0: We assume that there is no statistically significant difference between visiting a postal establishment for parcel services and the location of the respondent.

H1: We assume that there is a statistically significant difference between visiting a postal establishment for parcel services and the respondent's residence.

As in the previous case, descriptive statistics: the use of package services and the respondent's location (urban or rural) were processed for the Mann-Whitney test.

The p value is 0.16 and therefore the null hypothesis cannot be rejected. There is no statistically significant difference between visiting a postal establishment for parcel services and the residence/residence of the respondent.

Situation A3 Government services are non-postal services but represent the availability of public administration institutions. They are specific to national postal operators. At the time of the pandemic, they were in many cases the only option for carrying out specific actions (criminal record, land registry extract).

H0: We assume that there is no statistically significant difference in the use of a group of non-postal services (government services) and the economic status of the respondent.

H1: We assume that there is a statistically significant difference in the use of the group of non-postal services (government services) and the economic status of the respondent.

Table 3 shows the average ranking calculated for the Kruskal-Wallis test. We see that the highest difference is between the employed and the unemployed. The P value is less than 0.05. We reject the null hypothesis. There are differences in the use of non-postal services by economic status.

Table 3. Descriptive statistics of the use of postal services (government services) for the Kruskal - Wallis test

| | | Average value | 95% confidence interval for the mean | | Median |
			Lower bound	Upper bound	
Non-postal services (government services)	Retired	1,32	1,13	1,52	1,00
	Maternity leave	1,17	1,00	1,34	1,00
	Unemployed	1,00	1,00	1,00	1,00
	Employed	1,58	1,41	1,76	1,00
	Entrepreneur	1,54	1,28	1,80	1,00
	Student	1,47	1,25	1,68	1,00

Kruskal - Wallis test - use of non-postal services (government services)					
	N	Average rank	Kruskal – Wallis U	Degree of freedom	Asymptotic significance P
Retired	71	166,00			
Maternity leave	47	154,77			
Unemployed	6	140,00			
Employed	106	190,74	12,508	5	0,028
Entrepreneur	48	186,99			
Student	75	178,49			

Source: author (2022)

Situation A4: We hypothesise that perceptions of the attributes that determine the use of services in postal premises have changed. Security was often a limiting factor for respondents to visit a brick-and-mortar establishment.
H0: We assume that there is no statistically significant difference between respondents' perceptions of the factor security and gender.
H1: We hypothesize that there is no statistically significant difference between the perception of the factor safety and the gender of the respondents.

Descriptive statistics - perception of safety factor and gender for Mann - Whitney test were compiled. We evaluated the situation the same as in previous cases.

The mean ranking for females is 162.96 for males 215.13. The P value of Mann-Whitney U test is less than 0.05 and hence the null hypothesis of significance is rejected. There is a statistically significant difference between the perception of safety factor and gender of the respondents. Females tend to be neutral, with males finding safety unimportant.

B. *Analysis of changes in the purchasing behaviour of customers using delivery services when buying on the Internet.*

255 respondents, which is 65.21% of the total respondents, commented on the issue. The sample corresponds to the filtering question: the respondent used Internet shopping before the pandemic. The investigation is aimed at detecting the change of habits in the use of delivery services. E.g. form and method of delivery, environmental aspect, safety from the point of view of various criteria, e.g. residence, age, gender. We used hypothesis testing - Mann-Whitney test, Kruskal-Wallis test, Chi-square test, Fisher's exact P test.

Situation B1 The self-service facility of the Parcel locker (ParcelBox) creates the prerequisite for continuous and contactless availability.

H0: We assume that there is no statistically significant difference in the use of Parcel lockers between rural and urban based respondents.

H1: We hypothesize that there is a statistically significant difference in the use of Parcel lockers between rural and urban-based respondents.

Even before the pandemic, 16.1% of respondents were already using the Parcel lockers service, 20% started using it during the pandemic, and 63.9% of respondents did not start using it. Of the 84 respondents living in the city, 27.4% were already using Parcel lockers before the pandemic, 15.5% joined during the pandemic, and 57.1% of people living in the city continue not to use the service. Of the 171 respondents living in rural areas, 10.5% were already using Parcel Lockers before the pandemic. During the pandemic, an additional 22.2% added them. 67.3% of respondents living in rural areas did not use the services at all.

Table 4. Descriptive statistics of Parcel lockers usage and residence for Chi-square test.

Residence			Urban	Rural
Use of Parcel lockers (BalíkoBoxes)	Yes, I started	Count	13	38
		The expected count	16,8	34,2
		% in residence	15,5%	22,2%
	I used this form before the pandemic	Count	23	18
		The expected count	13,5	27,5
		% in residence	27,4%	10,5%
	No, I haven't started	Count	48	115
		The expected count	53,7	109,3
		% in residence	57,1%	67,3%

Chí-square test – use of Parcel lockers and residence			
N	Chí-square	Degree of freedom	Asymptotic significance P
255	12,135	2	0,002

Source: author (2022)

Again, the P value (Table 4) is less than 0.05 and hence we reject the null hypothesis. There are significant differences in the use of Parcel lockers depending on the place of residence. People from urban areas tended to use Parcel lockers even before the pandemic, people from rural areas joined only during the pandemic.

Situation B2 Delivery to address is a convenience for customers with low mobility.

H0: We assume that there is no difference in the use of delivery to address by respondents of different age groups.

H1: We assume that there is a difference in the use of delivery to address by respondents of different ages.

The P value of Fisher's exact test is 0.547 and therefore the null hypothesis cannot be rejected. There are no differences in delivery to address depending on age.

Table 5. Descriptive statistics for delivery to the address and age for Chi-square test.

Age			18 -25	26 - 35	36 -50	51 and more
Delivery to the address	I don't use it	Count	4	1	2	2
		Expected number	4,2	1,6	1,8	1,4
		% within the age range	3,4%	2,3%	3,9%	4,9%
	During the pandemic	Count	13	2	7	1
		Expected number	10,7	4,0	4,6	3,7
		% within the age	10,9%	4,5%	13,7%	2,4%
	Before the pandemic	Count	22	8	12	6
		Expected number	22,4	8,3	9,6	7,7
		% within the age	18,5%	18,2%	23,5%	14,6%
	Before the pandemic and during the pandemic	Count	80	33	30	32
		Expected number	81,7	30,2	35,0	28,1
		% within the age	67,2%	75,0%	58,8%	78,0%
Chi-square test - delivery to address and age						
N	Chí-square	Degree of freedom	Asymptotic significance P		Fisher's exact P test	
255	7,654	9	0,569		0,547	

Source: author (2022)

Situation B3 The environmental aspect of parcel delivery is often presented as an important decision element.
H0: We assume that there is no difference in the perception of the factor of ecological delivery methods and the age studied.
H1: We hypothesize that there is a difference in the perception of the factor organic delivery methods of shipments and the examined age.

According to the previous case, descriptive statistics of ecological delivery method and age were processed for the Kruskal-Wallis test.

The average score according to the Kruskal-Wallis test is shown in the table below. Similar scores were obtained for the age categories 26-35 and 36-50. The lowest scores-the highest importance is given to green delivery methods by young people. The highest score-lowest importance is given by the oldest people. P value is less than 0.05. We reject the null hypothesis. There are differences in the perceived importance of green delivery methods by age.

Situation B4 Lower risk of infection as a factor in the decision to buy online and how to ship.
H0: We hypothesize that there are no significant differences in the perceived importance of lower risk of infection for internet shopping and subsequent delivery between men and women.
H1: We hypothesise that there are significant differences in perceptions of the importance of lower risk of infection for internet shopping and subsequent delivery between men and women.

Descriptive statistics for perceptions of the factor of safety from infection and gender show that the mean rating for males is 1.78 and for females is 2.37. We can conclude that men perceive a lower risk of infection when shopping online more than women. According to the Mann-Whitney test the average ranking for men is 101.55 and for women 136.86. The

P value of Mann-Whitney U test is less than 0.05. We reject the null hypothesis. There are significant differences in the perceived importance of lower risk of infection in internet shopping and subsequent delivery between males and females.

4 Discussion

The presented results are part of a research aimed at identifying changes in the purchasing behaviour of postal customers. The aspects investigated and research assumptions were established based on knowledge gained from international studies and publications. First of all, we were interested in the extent and frequency with which selected postal and non-postal services were used by customers of a national postal operator. Here it was confirmed that there was no significant decline in any of the product segments The same observation in the evolution of traditional postal services almost globally, was published by the Universal Postal Union (UPU). The lottery, lottery tickets, games segment was also balanced, where the influence of the respondent's economic status on the use of these services was confirmed. Retirees are a key customer segment. Given the specific position of the national postal operator, the assessment of changes in the distribution services segment (particularly interesting in the context of the pandemic is the last mile) and money services and government services is key. Here, the perceptions of respondents with respect to their age, location or other attributes were also identified. A surprising result was obtained by tracking the use of money services at the post office, where the difference between men and women was confirmed (men visit the post office more often than women to use money services). In times of crisis, it was shown that there is no significant difference between visiting a post office for parcel services and the location/residence of the respondent. When examining the contactless accessibility of postal services via parcel box. Here, the existence of differences in their usage depending on the place of residence was confirmed. Rural respondents started using them significantly only during the pandemic, while urban respondents were using them even before the pandemic. However, in terms of education, there are no differences between the different groups of respondents. For the contact method of delivery (to address), there are no differences by age. For the national postal operator, this finding is crucial in terms of postal infrastructure innovation. Many other operators (e.g. DPD, DHL, GLS, ...) have built such forms of service availability and continue to expand them. Government services, represented by access to various government registers and databases, have an important place in the national postal operator's portfolio. Research has shown existing differences in the use of these services by economic status. The largest difference is between the segment employed - unemployed. Significantly, not only pensioners and students use these services, but also entrepreneurs and the employed seek them out at post offices. Ecological aspects as shown in the secondary research are an important decision-making element in the choice of delivery service. The research confirmed that this aspect is perceived differently by respondents with regard to age. This attribute is particularly key for the young. In terms of gender, it is significant for women. The risk of infection in bricks-and-mortar premises is also perceived sensitively by women.

5 Conclusion

The Covid-19 outbreak has significantly changed consumer attitudes, intentions and purchasing habits. They are also visible in the area of parcel distribution. The consequences of this global crisis have also affected the operations of the national postal operator. It must respond to the unprecedented demands of covering the territory with both traditional and digital forms of communication and distribution. From a global point of view, in practice, we see many changes triggered by customers and many changes brought about by the unwanted

effects of the crisis period. Adapting to changing customer demands is complicated, as the national postal operator has a public service role and is obliged to ensure that international postal services and connections to the global UPU network are available in an affordable way. It is not easy for it to change the portfolio and availability of services. Only providers that are not bound by obligations to the State have this advantage. In spite of the negative attitudes voiced against national postal operators, the research has once again shown the validity of their position and also the global availability of postal and non-postal services nationwide, regardless of the customer segment. Examining changes in customer behaviour is an important part of the opinions for the development and innovation in the customer policy of a national postal operator. Therefore, analyses of individual responses are considered according to various attributes such as age, residence, education, and social status of the respondent. These recommended opinions can only be provided after a detailed evaluation of the entire research, including in the section dedicated to customers who only started shopping online as a result of the pandemic. Attitudes towards cashless payments, premises security, reliability attributes of delivery, delivery forms, returns, environmental aspects should be considered. All these need to be examined in the segment of respondents who have only started shopping on the Internet in the aftermath of the pandemic.

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Parallels between the stages of the industrial revolution and marketing approaches

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Abstract

Research background: In order to ensure competitiveness and to strengthen Germany as an innovative and competitive country in international comparison, the future project "Industry 4.0" was introduced as part of the High Tech Strategy 2011. The term has really become a buzzword in recent years, until it could actually be said about the fourth industrial revolution.
Purpose of the article: The concept of Industry 4.0 is also promoted in other activities related to industry. The aim of the paper is to summarize the development phases of the industry in parallel with the development phases of marketing and to try to approximate the importance of the connection of Industry 4.0 with marketing approaches.
Methods: The article uses the basic procedure of desk research for the purpose of finding, collecting, and evaluating secondary data on the given issue. Scientific methods such as analysis, synthesis, induction, deduction, and comparison are also used.
Findings & Value added: As a conclusion of the contribution, the fact that Marketing 4.0 is based directly on the essence of the concept of Industry 4.0 can be presented. This concept opens up new possibilities for marketing - marketers can rely on real analysis and data connections.

Keywords: *industrial revolution; marketing approaches; industry 4.0; marketing 5.0*

JEL Classification: *L60; M31; F60*

1 Introduction

In times of globalization, the economic pressure on individual companies increases, which is why the three factors of cost, time and quality in the production process are decisive for economic success. It is about overcoming the increasing complexity in production and logistics, about individualizing the products and making production more flexible. Companies that recognize these changed framework conditions at an early stage and develop solution strategies will be able to assert themselves successfully on the market. One of the

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triggers of the new framework conditions is certainly the megatrend of digitization, which not only brings technological changes with it, but, just like globalization, permeates all areas of life and business processes and also changes them (Kovacova and Lăzăroiu, 2021; Hawkins, 2021; Nica and Stehel, 2021; Riley, 2021) In order to generate new forms of value creation and remain competitive, there is no avoiding the term "Industry 4.0". This points to the fourth industrial revolution and implies a new level of organization and control of the entire value-added flow over the product life cycle. "This cycle is based on the increasingly individualized customer requirements and extends from the idea, the order, through development and production, to the delivery of a product to the end customer, to recycling, including the associated services" (Implementation strategy Industry 4.0, 2015). This suggests a possible parallel between industrial and marketing development phases.

1.1 Industrial development phases

The development phases of industry are associated with industrial revolutions. The first industrial revolution had its origins in England around 1750. It spread to large parts of Europe until the second half of the 19th century. The trigger for this revolution was the invention of the steam engine by Thomas Newcomon and its further development by James Watt. Mechanized production methods developed from this, in which machines powered by water and steam performed mechanical work. In this way, a far-reaching problem that existed up to that point could be solved: the sufficient provision and supply of mechanical energy. These achievements heralded the transformation from an agricultural economy to an industrial society. Since more and more companies settled in the cities in the course of this industrialization, there was an explosive increase in the population and thus an overburdening of living space (Mohajan, 2019).

The advent of electrical energy and the resulting mass production based on the division of labour marked the beginning of the second industrial revolution in 1870. Electrical drives were a symbol of technical progress and made inventions such as Henry Ford's assembly line possible in the first place. With the use of assembly lines and conveyor belts, the mechanization of companies was further advanced and mass production expanded rapidly. This effect was particularly noticeable in the chemical and electrical engineering industries. Also meaningful for the beginning of the second revolution at the beginning of the 20th century was the so-called scientific management, which was coined by Frederick W. Taylor. This term is preceded by a management concept that provides for the optimization of work processes and structures in handicraft-oriented mass production facilities. Traditional areas such as agriculture or classic handicraft businesses have lost more and more of their relevance. Fuelled by technical progress, added value and employment have clearly shifted in the direction of large-scale industrial mass production. This mass production eventually led to mass income, which was badly needed to support the required demand development. However, the increased production output and the development of mass markets in the 1950s also had their downsides. Resource consumption has skyrocketed to record levels and high levels of emissions have severely impacted the environment. The prosperity of Western society and the new attitude towards life thanks to mobility finally reached other parts of the world and almost brought the natural resources to a collapse (Popjakova and Mintalova, 2019; Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, 2008). While the first and second industrial revolutions focused on mass production and economies of scale in predominantly craft-dominated companies, the third industrial revolution at the beginning of the 1960s was all about the first "digital revolution". The increased use of electronics and information and communication technologies (ICT) have paved the way for the automation of production processes. With the invention of the Internet, knowledge became accessible to the masses. On the one hand, this resulted in a varied series production,

on the other hand, there was a strong rationalization as a result of the introduction of automated assembly systems, the emergence of industrial robots and the spread of computer-aided manufacturing and administrative processes. Manual human labour has been and is increasingly being replaced by machines in series and series production. Many markets became oversaturated, since the basic needs of affluent societies were satisfied due to the enormous economic upswing. Sellers' markets have also become buyers' markets. In addition, customer demands have become increasingly differentiated from each other. Quality and customer-specific preferences have come to the fore. With the help of the varied series production up to mass customization, the desire for more and more individual products, which the consumer has been demanding from now on, could be fulfilled and implemented. The prerequisite was making production more flexible. A milestone in the third industrial revolution, triggered by new communication and information technologies and subsequently by the development of the Internet, was the uncomplicated exchange of knowledge. This enabled a new dynamic of cooperation and also brought far-reaching organizational changes (Popjakova and Mintalova, 2019; Potiskova, 2019; Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, 2008).

The fourth industrial revolution follows the third revolution in all areas, but especially connects all these areas into a digital whole. It is also commonly referred to as the digital revolution. Among the characteristics of this era is mainly the mass expansion of the Internet and its impact on human activity. Of course, the Internet as such is nothing new, but the connection of the Internet of Things, people and services and the large volumes of generated data are characteristic of this era. Production is characterized by the emergence of new technologies such as autonomous robots, big data analysis, computer simulation and virtual or augmented reality, cloud or 3D weaving. These new technologies bring change not only in value chains and new business models, but also an interdisciplinary approach and an acute need for cyber security. Technologies are merging with the physical, biological, and digital realms. There is networking and digitalization of individual devices, information systems and people into a single entity. The so-called intelligent factories are created where production becomes essentially autonomous. The fourth revolution reflects customer demands for price efficiency and high adaptability of production. Industry 4.0 uses cyber-physical systems, the Internet of Things and system services to fulfil the above requirements. The principle of Industry 4.0 makes it possible to implement new business models, production concepts, intelligent control and tailor-made user requirements. The fourth industrial revolution brings with it many opportunities for improving the quality of life, improving the environment and its long-term sustainability, increasing the competitiveness of individual companies or national economies. Such a transformation will of course require a lot of capital, but also the adaptation of education for the needs of a society living in the time of Industry 4.0 (Grant, 2021; Lawrence and Durana, 2021; Popescu et al., 2021).

1.2 Marketing development phases

Opinions are divided as to what exactly the early days of marketing, i.e. Marketing 1.0, looked like. Some are convinced that in this era companies dictated their products to the market and thus determined consumer needs. Consumer needs were in the background, even if the products were of course geared to market demand. Others, on the other hand, believe that products were developed and advertised here for the first time that consumers didn't even know they needed in everyday life. However, this concept that focuses on the product and its features that differentiate it from the competition (Fuciu and Dumitrescu, 2018; Jara, 2012; Tarabasz, 2013; Jiménez-Zarco et al., 2017).

The basic orientation changed with the transition to Marketing 2.0, the start of which was around the 1970s. The marketing strategy became more consumer oriented. This was partly

due to the fact that consumers had more information at their disposal – and therefore more alternatives. Companies slowly realized that if they want to sell their products, they also have to address the needs and wishes of their potential customers. The shift in understanding of marketing is well illustrated in these three quotes. "The permanent analysis of the demand on one hand and on the other hand, the development and usage of the means to satisfy this demand in the condition of having a profit." "Marketing represents an entire system of economic activities regarding the programming, pricing, promotion and distribution of products and services meant to satisfy the needs of current and potential consumers." "Marketing is a process of exchange between individuals and/or organizations which is concluded to the mutual benefit and satisfaction of the parties" In summary, Marketing 2.0 has already turned away from the idea that only selling products or services is relevant. A relationship between customers and companies became more and more important. Marketing 2.0 focuses on the fact that there are many reasons for people to choose and buy products. They make decisions not only with their heads, but also with their hearts. So it's not just about product performance. The concept explains to companies that if they strive for high-touch (personal approach in the field of customer relations) in addition to high-tech (advancement in technology), it will clearly benefit them (Fuciu and Dumitrescu, 2018; Jara, 2012; Tarabasz, 2013; Jiménez-Zarco et al., 2017).

After this customer-oriented concept found its origin in Marketing 2.0, it really picked up speed in Marketing 3.0. Now it was no longer just about satisfying the wishes and needs of the customers, but also their goals and dreams. Marketing became spiritual in a way, if we can call it that, in the 1980s. Products were no longer developed vertically from company to market. Instead, product development was also influenced from the other direction - concrete consumer needs and other external factors. Brand awareness grew, niche products emerged. The concept looks at the issue from a higher perspective. Every marketing activity has an economic or social impact or affects the environment. It was necessary to create a mechanism that would measure the level of society's perception in relation to these areas. Smaller companies could now specifically compete directly with larger companies. During this time, it became more important to keep an eye on your target groups and to address potential customers precisely. (Kotler et al., 2010; Fuciu and Dumitrescu, 2018; Varey and McKie, 2010; Jara, 2012; Erragcha and Romdhane, 2014).

For many years, the marketing 3.0 concept was completely sufficient - until the current Marketing 4.0 with the Internet, social media and progressive globalization presented and still presents companies with new marketing challenges. People are networking more and more these days; they exchange information nationally and internationally. Businesses and business practices are becoming more transparent. At the same time, the amount of information that potential customers gather before deciding on an offer or a service provider is skyrocketing. They no longer only consume products that are on offer, but judge and rate them publicly. In this way, they influence companies and help shape product development in this way. Marketing 4.0 also brings with it a certain displeasure with the classic marketing strategies of the past. Consumers are increasingly blocking out disruptive advertising unless it explicitly meets their current needs. With the result that marketing must now also offer a certain added value so that the important relationship between companies and consumers can develop and exist. Addressing customers individually is now extremely important, and direct contact must be made possible and encouraged. Social media is becoming a new and essential part of marketing strategies. Companies are therefore faced with the increasingly difficult task of satisfying customers. But Marketing 4.0 also brings a great opportunity in its development: because many people now spend a large part of the day online as a matter of course, companies can address potential customers in almost any situation (Kotler et al., 2016; Dhiraj and Ahmad, 2019; Fuciu and Dumitrescu, 2018; Dholakia et al., 2010;

Vassileva, 2017; Dash et al., 2021; Martínez-Ruiz, 2021; Wereda and Wozniak, 2019; Gau, 2019).

2 Methodology

The article uses the basic procedure of desk research for the purpose of finding, collecting, and evaluating secondary data on the given issue. Scientific methods such as analysis, synthesis, induction, deduction, and comparison are also used.

3 Results and Discussion

For the summarization of development phases of the industry in parallel with the development phases of marketing was designed Table 1, which provides an overview of the connection of Industry 4.0 with marketing approaches in addition to the summary

Table 1. Summarization of development phases of the industry in parallel with the development phases of marketing.

	Industry 1.0	**Industry 2.0**	**Industry 3.0**	**Industry 4.0**
Dominant technology and raw materials	steam engine, mechanical loom, iron processing	electricity, chemistry, internal combustion engine, assembly line, plastics, electronics	ICT, microelectronics, new materials, cleaner technology, biotechnology, recycling, renewable raw materials	AI, IoT, IoE, cloud computing, edge computing, big data, renewable raw materials, geothermal energy
Dominant energy sources	coal	coal, oil, nuclear	renewable energies, energy efficiency	renewable energies, efficient energy infrastructure
Traffic/ communication	railway, telegraph	car, plane, radio, television	rapid internet, mobile communications	human-robot collaboration, cognitive systems
Society/ State	civil society, freedom of trade, rule of law	mass production, mass society, parliamentary democracy, welfare state	civil society, globalization	customization of the production, digitization and networking, globalization, cyber-physical system
	Marketing 1.0	**Marketing 2.0**	**Marketing 3.0**	**Marketing 4.0**
Emphasis	product	customer	moral values and ethics	network and digital technologies

Goal	sale of products and services	customer satisfaction and retention	improving society	listening to society
Reason for creation	industrial revolution	information technologies	new technological wave	Web 2.0, big data
Market perception	general public and materially oriented societies	more informed client	human being as a whole	connected consumer
Key concept	development of new products and services	distinguishing oneself from others	values	adapting
Value type	functional	functional, emotional	functional, emotional, spiritual,	functional, emotional, spiritual, interconnected

Source: authors according to Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, 2008; Kotler et al., 2010; Kotler et al., 2017; Fuciu and Dumitrescu, 2018; Jiménez-Zarco et al., 2017; Ungerman, and Dedkova, 2019)

Based on the comparison of the individual development phases of the industry and marketing approaches, it must be stated that marketing 4.0 is based directly on the essence of the concept of Industry 4.0. This concept opens up new feedback possibilities for marketing - marketers can rely on real analyses and data connections. Current marketing in its form as we know it, and especially marketing 4.0, is closely connected to the concept of Industry 4.0. As an example, we can cite the area of using the Internet of Services, which is often used, either generally in marketing, or specifically in one of the elements of the marketing mix, namely in distribution. The Internet of Services can be characterized as an area of Industry 4.0 that offers the sale of services using the Internet. It mediates the business and technical basis for advanced business models and can include, for example, research and development. This approach helps create a new way of managing the service industry. Internet stores eBay and Amazon can serve as a practical example. The Internet of Services is also closely connected with Cloud Computing, where the user is connected to the Cloud on their device (computer, mobile phone) and information, software, servers, or networks rebuild a certain service provided. Undoubtedly, the area of marketing in which Industry 4.0 technologies are used the most is digital marketing. As an example, we can cite the collection of data about consumers using Big Data technology (Hopkins and Siekelova, 2021; Rogers and Kalinova; Kotler et al., 2016; Fuciu and Dumitrescu, 2018; Dholakia et al., 2010; Vassileva, 2017; Rosario and Dias, 2022; Székely et al, 2020; Ungerman, 2018)

4 Conclusion

As a conclusion of the contribution, the fact that Marketing 4.0 is based directly on the essence of the concept of Industry 4.0 can be presented. Current marketing in its form as we know it, and especially marketing 4.0, is closely connected and connected to the concept of Industry 4.0. But the development of marketing does not stop with Marketing 4.0. For many people, the Internet and the numerous social media platforms are still new territory. But new technologies are already pushing themselves to the fore and promising completely different possibilities: artificial intelligence, virtual reality, speech recognition and storytelling herald the age of Marketing 5.0. It is also justified by the development of the next phase of the

industry. Industry 5.0 is currently designed to use the unique creativity of human experts to collaborate with powerful, intelligent, and precise machines. Many technical visionaries believe that Industry 5.0 will return a human approach to the manufacturing industry. Industry 5.0 is expected to bring together fast and precise machines and the critical, cognitive thinking of humans. Another important benefit of Industry 5.0 is mass personalization, where customers can prefer personalized and tailor-made products according to their tastes and needs. Industry 5.0 will significantly increase the efficiency of production and create versatility between people and machines, which will enable responsibility for interaction and continuous monitoring activities. Cooperation between people and machines aims to increase production at a rapid pace. Industry 5.0 can increase production quality by assigning repetitive and monotonous tasks to robots/machines and tasks requiring critical thinking to humans.

Acknowledgement

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Research, development, and innovation from the point of view of taxes and tax incentives

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Abstract

Research background: R&D and innovation are ultimately a predisposition to sustainable economic growth and all the sub-goals that are related to it. And that is why state support for activities oriented in this way is required.

Purpose of the article: It is generally true, that countries differ in the extent to which they rely on tax measures to support R&D. The aim of the contribution will therefore be to analyse selected method of tax support in Slovakia, specifically the specific tax regime "Super Deduction", primarily from its procedural point of view. We will also point out its quantitative impacts in connection with the support of R&D activities of corporate subjects conducting business in Slovakia.

Methods: In accordance with the defined goal, we will mainly based on the analysis of tax and accounting legislation, primarily Act no. 595/2003 Coll. on the Income Tax as later amended and specific tax regime – so-called "Super Deduction". We will also use a time series analysis and space analysis of the R&D expenditures.

Findings & Value added: From the analysis of the selected tax support, it follows that its use in practice is limited to fulfilling the strict conditions prescribed by law. Entities must demonstrate as a matter of priority that their tax expenses are expenses directly related to R&D project(s). Since the "deployment" of this aid, the method of deduction of expenses has been changed 3 times. The conditions to use this way of tax support, especially for micro and small businesses without the necessary professional external support, are often unclear.

Keywords: *Act on Income Tax; Industry 4.; R&D; R&D expenditures; Super Deduction*

JEL Classification: *H25; O30; O39*

1 Introduction

The global industrial environment has transformed dramatically in recent years because of technological advances and application of innovative solutions into practice. Following this transformation, the concept of the Industry 4.0 was presented. Industry 4.0 has a significant

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impact on the industrial sector because it introduces relevant improvements related to smart and future factories. This concept is an umbrella term for a new industrial paradigm that includes Cyber-Physical Systems (CPS), the Internet of Services (IoS), the Internet of Things (IoT), Robotics, Big Data, Cloud Manufacturing, Augmented Reality etc. (Oztemel and Gursev, 2020).

Many researchers and practitioners stress, all these components are necessary and integral to the Industry 4.0 concept to achieve desired effects not only in the industry sector itself but also in the area of individual products, services, business models and markets, value chains, supply chains, work environment and skills development (Abdelmajied, 2022; Quin et al., 2016; Karnik et al., 2021). The current superstructure, which complements the existing Industry 4.0 approach (Industry 5.0), in relation to the current global economic, social, and environmental threats and challenges, focuses and strengthens the role and contribution of industry to society and specifically puts research and innovation at the service of the transition to a sustainable, human-centred and resilient European industry.

However, the practical implementation of the concept is faced by many obstacles. The readiness and ability to introduce Industry 4.0 depends except other on the framework conditions, therefore the financial environment, the availability of skilled workers, extensive and high-performance broadband access, state support, and legal framework conditions are the key factors. E.g., Abdelmajied (2021), Orzes et al. (2018), O'Halloran and Kvochko (2015), Schröder (2016), Koch et al. (2014) etc. emphasize financial needs of practical application and functionality of the Industry 4.0., which is closely related to the issue of financing R&D activities.

Innovations, R&D are financially demanding. According to the data of the Statistical Office of the Slovak Republic (2022), the total expenditure on corporate research in Slovakia, which is barely sufficiently supported by the state, represents only 0.52% of the Slovak GDP for 2021, thus Slovakia belongs among the worst in the EU countries. According to the same data, only 18% of small and medium-sized enterprises devote themselves to innovation, while this type of enterprises represents almost 99,9% of all business entities in Slovakia.

For Slovakia, the support of innovation and science is an investment and a fundamental pillar of maintaining the competitiveness of products on the market and competitiveness of the whole Slovak economy. In connection with this, the article will therefore focus on how R&D is supported in Slovakia from the perspective of the tax policy and the taxation of corporate subjects carrying out R&D activities. It is generally true that countries differ in the extent to which they rely on tax measures to support R&D, and that do design tax relief measures in substantially different ways (OECD, 2022; Ehsan, 2021; Cernikova and Hyblerova, 2021; Nilsen et al., 2020).

We consider a properly set tax policy to be one of the aspects and at the same time incentives supporting these activities.

2 Methodology

We will examine the support of R&D activities of corporate subjects in Slovakia in close connection with the Slovak tax legislation. The basic method applied by us will therefore be the analysis of tax and accounting legislation, but primarily Act no. 595/2003 Coll. on the Income Tax as later amended (hereinafter "ITA") and features of the specific tax regime that is targeted to support R&D activities of entities doing business in Slovakia, so-called "Super Deduction". Quantitative analysis – an analysis of R&D expenditures will primarily consist of a time series analysis of expenditures for these activities and special comparative analysis based on raw data mainly provided by the Statistical Office of the Slovak Republic and Eurostat. We will use also the data provided by the Financial Directorate of the Slovak Republic.

3 Results

3.1 Analysis of R&D expenditures

It has been established for a long time that the support of R&D activities of entities in Slovakia (regardless of their closer classification) is not sufficient, or that the system of allocating resources to these activities on the part of the state is not effective.

Expenditures in thousand EUR	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011
Corporate entities (total)	514 656	453 666	425 823	406 077	405 321	322 720	259 189	246 678	282 609	241 979	174 145
small (0 - 49)	90 012	69 981	50 679	43 356	40 412	34 664	33 091	33 979	33 358	32 752	27 022
medium (50 - 249)	140 841	127 518	94 218	78 251	75 031	78 801	66 221	60 457	60 932	58 324	52 261
large (250 a viac)	283 803	256 167	280 926	284 470	289 878	209 255	159 877	152 242	188 320	150 903	94 862
Government sector	169 854	165 414	154 939	159 386	155 827	137 394	258 341	189 768	125 126	143 515	129 575
small (0 - 49)	19 658	23 122	20 322	16 377	17 456	21 438	34 814	27 848	27 830	24 939	22 077
medium (50 - 249)	93 208	89 930	87 811	85 734	71 409	63 423	135 302	101 609	91 673	113 487	103 071
large (250 a viac)	56 988	52 362	46 805	57 275	66 961	52 533	88 226	60 311	5 623	5 090	4 428
Universities	233 421	219 637	195 597	182 299	184 761	177 605	406 069	230 458	202 219	199 132	163 712
small (0 - 49)	593	578	D	D	D	D	D	D	D	D	D
medium (50 - 249)	4 534	4 263	D	D	D	D	D	D	D	D	D
large (250 a viac)	228 294	214 797	D	D	D	D	D	D	D	D	D
Private non-profit sector	415	210	231	3 185	3 046	3 116	3 673	2 728	922	600	1 007
small (0 - 49)	415	210	D	D	D	D	D	D	D	D	D
medium (50 - 249)	0	0	D	D	D	D	D	D	D	D	D
large (250 a viac)	0	0	D	D	D	D	D	D	D	D	D
Total in Slovakia	918 346	838 927	776 590	750 947	748 955	640 835	927 272	669 632	610 876	585 225	468 439
HDP in mil. EUR	98 523	93 413	94 437	89 874	84 669	81 265	80 126	76 354	74 492	73 649	71 785
% on HDP	0,93	0,90	0,82	0,84	0,88	0,79	1,16	0,88	0,82	0,79	0,65
% on HDP only corporate entities	0,52	0,49	0,45	0,45	0,48	0,40	0,32	0,32	0,38	0,33	0,24

Figure 1. R&D expenditures in Slovakia

Source: author (2022)

R&D expenditures, even though they are continuously increasing in absolute terms (in current prices), do not reach the same level as in other EU countries (or the EU average), and Slovakia has long been among the countries with the smallest ratio of R&D expenditures to the national GDP. According to the available data, in 2020 EU R&D expenditures relative to EU GDP were 2.31% i.e., Slovakia lagged the EU expenditures on R&D expressed as a share of GDP by 1.82 percentual points. In absolute terms, the EU spent €310 billion on research and development (which equated to an average of €692 of R&D expenditures per inhabitant). The share of Slovakia on these expenditures was only 0.27% (approx. €154 of R&D expenditures per inhabitant). If we consider only the expenses of the corporate sector, which together with universities should be the driving force of R&D, and innovation the share of these expenditures slightly exceeded 0.50% of the GDP in 2021 in Slovakia. For comparison, in EU in 2020, most of the R&D expenditures were performed in the corporate sector – 1.52% of the EU GDP and R&D expenditures in Slovakia were only 0.52% of the GDP (Eurostat, 2022, Statistický úrad SR, 2022).

3.2 Tax incentives in the field of R&D activities in Slovakia

The results of the previous analysis show that R&D expenditures, regardless of whether they are total expenditures or only expenditures of the corporate sector, are a financially undersized area. Support from the state, as the positive results of R&D activities are undeniable, is highly desirable.

Investment in R&D activities is a key factor driving innovation and economic growth. Governments worldwide adopt various financial support instruments to promote R&D by businesses (Milosevic, 2021; Cheng et al., 2022) and increasingly rely on tax incentives to

incentivise business R&D investment. As of 2021, 34 of the 38 OECD countries, 22 of 27 EU countries and several partner economies (Argentina, Brazil, the People's Republic of China, the Russian Federation, South Africa, and Thailand) offered tax relief for R&D expenditures at central or subnational government level (OECD, 2022).

To the mentioned group of 22 EU countries belong also Slovakia. The existing options within Slovakia, in addition to various subsidy aid schemes, are the supports of own R&D activities of companies from their own resources through an appropriately set tax policy, while specific tax regimes of support are incorporated into the ITA. In the period of the last 8 years, we can observe the gradual inclusion of such provisions, which are aimed, among other things, at providing special tax benefits for tax entities carrying out R&D.

As for the definition of the terms "R&D", the ITA does not contain this. From the analysis of the existing legislation, the definition of these terms can be found in other legislation, namely in the Act no. 172/2002 Coll. on the Organization of State Support for Research and Development as later amended. According to the Section 2, research is a systematic creative activity that is carried out in the field of science and technology for the needs of society and in the interests of the development of knowledge. Research consists of basic research and applied research. Development is defined as a systematic creative activity in the field of science and technology using laws and knowledge obtained through research or based on practical experience in the creation of new materials, products, devices, systems, methods and processes and their improvement.

From a tax point of view, it is necessary to proceed from the Measure of the Ministry of Finance of the Slovak Republic no. 23054/2002-92, which establishes the details of accounting procedures and the general accounting framework for entrepreneurs accounting in the double-entry bookkeeping system (hereinafter "Accounting Procedures"). According to the Section 37 (2), the term development includes the application of research findings or other knowledge to plan or design the production of new or significantly improved materials, devices, products, processes, systems or services before starting their serial production or use, design, production and testing of prototypes and models, production of tools, templates, forms and chips using technology, construction and operation of a test operation that is not at the stage of economic feasibility of production, construction and operation of a selected alternative for new or improved materials, equipment, products, processes, systems or services. According to the Section 37 (5) of the same act, by research, we mean original and planned investigations carried out with the aim of obtaining new scientific or technical knowledge. These are mainly activities aimed at obtaining new knowledge, research, evaluation, and final selection of applications from the conclusions of research or other knowledge, search for alternative materials, equipment, products, processes, systems or services, formulation, design, evaluation, and final selection of possible alternatives of new or improved materials, equipment, products, processes, systems, or services.

From the analysis of the basic legislation in this context – the ITA, it follows that in the case of Slovakia, support can be achieved either on the side of costs (expenditures) in the form of their additional deduction (from 2015; so-called "Super Deduction"), or on the side of income in the form of exemption of certain income from taxation (from 2018; so-called "PatentBox"). The application of the mentioned incentives is subject to an assessment of whether they are in fact R&D activities of the company and the recipients of the incentives provided in this form are only legally authorized persons.

3.2.1 Super Deduction

R&D expenditures which, in accordance with the Section 30c (1) of the ITA, can be deducted from the tax base are defined in accounting terms – specifically in the Section 17 of the Accounting Procedures and relate to wage and other labour-law entitlements of employees

who work on the R&D project, depreciation of buildings, machines, equipment to the extent that they are used in the implementation of the R&D, consumed material, energy, and services consumed in the implementation of the project. To recognize the services consumed as tax expenses, it is necessary to undergo a test – it is necessary to exclude expenses of those services that would be deducted in duplicate, i.e., with the supplier who provided the R&D service (through the exemption of sales resulting from the provision of these services), as well as with the customer who procured these services for his R&D project.

The examined support of a tax nature cannot be applied "generally" to expenses that are nevertheless tied to the implemented R&D project, e.g., the Section 30c (5) of the ITA, states that reimbursement in the form of a deduction is not permissible in the case of expenditures that were subsidized from of public budget funds, which is the most common reason (apart from the already mentioned duplicated services) for excluding R&D expenditures as unauthorized. The law specifically does not allow the simultaneous application of the Super Deduction and tax relief for recipients of investment incentives (Section 30b of the ITA). On the other hand, the concurrence of the Super Deduction and the tax relief for the beneficiaries of the investment allowance is not prohibited (Section 30a of the ITA). This is in response to the negative impact of the applied anti-pandemic measures against the spread of the Covid-19 on the business sector, this does not apply if there was a refund of wages for which a contribution was provided from public sources, based on the Section 54 (1) letter e) of the Act No. 5/2004 Coll. on employment services, as later amended, for the payment of part of the wage costs for each employee depending on the decrease in sales (measure 3B of the First Aid).

In accordance with the Accounting Procedures, the authorized person must keep adequate analytical records for R&D expenditures. If the setting of his accounting software does not allow the taxpayer to record expenditures spent on R&D also through the analytical records for synthetic accounts, he should have an internal directive created for this purpose, including the introduction of rules for internal records of tax expenses with the help of which he will demonstrate expenses spent on R&D according to individual projects, because expenditures for additional deduction must be tracked separately from other expenses of the taxpayer, which implements R&D.

The authorized person is a taxpayer who implements a R&D project; is a legal entity or a natural person with income from business or other self-employment (defined by the Section 6 (1-2) of the ITA). Unlike subsidies, which are subject to approval by a public authority, the deduction of R&D expenditures does not require the eligible person to apply to the relevant authority. A specific group of taxpayers is excluded from the system of this form of tax incentives, namely business entities that hold a certificate of ability to carry out R&D. Their complete list can be found on the Central Information Portal for Research, Development, and Innovation, which was established and is operated by the Ministry of Education, Science, Research and Sport of the Slovak Republic.

A R&D project for these needs is understood as a written document in which the taxpayer defines its subject and its R&D activity even before starting the solution of this project. The project, for tax purposes, must be submitted within the deadline for filing the tax return, in which the taxpayer claimed a deduction for the implementation of the R&D project. The requirements of the submitted project are defined in Section 30c (7) of the ITA.

The law grants the right to the tax administrator or the Financial Directorate of the Slovak Republic as part of the tax audit to invite the taxpayer to submit a R&D project, based on which he realized the deduction of expenditures, within 8 days from the delivery of the invitation to the taxpayer.

The mode of R&D application is linked to the preparation of a tax return and its submission within the deadline set by law. From the time analysis of the amount of deduction of the authorized expenditures, it follows that the legislation has undergone 3 changes in this

direction, while the most suitable conditions applied in the tax periods of 2020 – 2021 (including):

- until the end of 2019, the deduction of the authorized R&D expenditures for the given tax period was at their 100% amount plus 100% of the amount of the deduction for the average increase of these expenses (if it was positive), which was calculated as the average increase of R&D expenditures for two immediately preceding tax periods,
- starting from 2020, the deduction increased to 200% of the value of authorized R&D expenditures for the given tax period after adjustment in accordance with the Section 30c (4-5) of the ITA plus 100% of the amount of the deduction for the average increase of these expenditures (if it was positive), which was calculated as the average increase of R&D expenditures for two immediately preceding tax periods,
- with effect from 01/01/2022 and in accordance with the transitional provision the Section 52zzm (4) of the ITA, the percentage amount of expenditures that can be applied within the framework of the Super Deduction is again 100% plus 100% of the amount of the deduction for the average increase of these of expenditures (if it was positive), which was calculated as the average increase R&D expenditures for two immediately preceding tax periods.

If the eligible taxpayer has reported a tax loss or for the purposes of fully exercising the possibility of deducting expenditures, his tax base is low, he can transfer his right of deduction to the next five tax periods and will apply it all at once or gradually, depending on the tax base. Until 2019 inclusive, the taxpayer could use this option only during four consecutive tax periods.

Entities entitled to deduct R&D expenditures are published annually by the Financial Directorate of the Slovak Republic. For 2021, this tax incentive was used in 735 projects. The total amount of the applied deduction was more than €708 million, which on average represented an annual deduction of R&D expenditures of €962,000 per project. This hypothetically means a tax saving of approximately €149 million.

4 Discussion and conclusion

In the case of Slovakia, the support of R&D activities is solved through "refund" in the form of a reduction of the tax obligations of these entities towards the state in the name of income tax (so-called Super Deduction of R&D expenditures) or in the form of tax exemption of selected incomes achieved from the commercial use of intangible assets (so-called PatentBox). Specifically, in the case of this article, the first of the mentioned forms of tax incentives was analysed. At the same time, the analysis shows that regardless of the specific form of tax incentive, Slovakia is among the 22 EU countries that support the activity of the private business sector in the field of R&D through tax policy instruments. From a practical point of view, the issue and application of the Super Deduction institute, as well as the PatentBox, is still quite complicated for many entrepreneurs and thus an unavailable form of tax support for their R&D activities.

Even though the government expected a high percentage of the use of the mentioned tax incentives by subjects of the corporate sector, these expectations were not fulfilled. Entrepreneurs have rather taken a very cautious stance in this area (primarily micro and small businesses) and are waiting for the publication of more information and procedures on how to apply the mentioned institutes of support correctly and effectively to their business without being sanctioned by the state in the future. It is therefore clear from the above that if the very goal of the Industry 4.0 concept or its current superstructure is to be fulfilled, the transparency and enlightenment of the tax incentives scheme is necessary in this case, as well as the support

of assistance services from the state, which would especially help micro and small businesses in the use and correct application of the institutes of tax support in question.

Acknowledgements

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The impact of the modernization of production logistics on the selected section of production and its impact on employee satisfaction

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Abstract

Research background: The aim of the scientific paper is to analyze the satisfaction of employees in the selected company. We got the necessary information about the production process in the selected department from the personal experience of the author and also from consultations with the management of the production department, but also from the experiences of the employees themselves. The main topic of the consultations was the application of modernizations and new ones technologies into the production process and their impact on employees from the point of view of ergonomics, and safety, work facilitation, time saving and space saving.

Purpose of the article: The aim of the scientific article was to determine the impact of the modernization of the production of the selected enterprise on employee satisfaction. Modernization of production and innovation are an essential part of the functioning of production companies.

Methods: Before analyzing the company itself, it is necessary to know in detail the production process and the functioning of the production department, which is the focus of our thesis. The author of the thesis will draw this information on the basis of personal experience.

After processing the previous information, a satisfaction survey will be conducted employees, through a questionnaire filled out by all employees of the selected department.

Findings & Value added: Based on this questionnaire, we found that employees have a positive attitude towards modernization. We also found that they were most pleased with the modernizations, which mainly simplified their work, improved ergonomics and saved time.

Keywords: *logistics; transport; logistics performance; transport modes*

JEL Classification: *J54; J64; J63*

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1 Introduction

Modernization and innovation of individual products, services and processes are an integral part of manufacturing enterprises. By the term innovation we mean all technical, economic, management or business activities, the aim of which is to improve the efficiency of the enterprise, to increase the competitiveness of the enterprise and, above all, its profitability. We can apply modernizations in the company through changed current methods or by introducing new technologies (The World Bank, 2021).

Despite the early beginnings of logistics already in history, it became the subject of research in the 20th century, when it began to be used in the economic sphere and began to be implemented in enterprises. In these years, logistics focuses primarily on marketing, trade and distribution. The situation in the markets at the time led to increased stocks. It led to the use of total costs to assess the effectiveness of processes in enterprises. The synergistic effect of logistics was discovered thanks to the functioning of logistics in companies and their departments, and optimization and harmonization of all processes began to occur. The main topic of logistics in this period was integrated logistics - physical distribution, management of material management and corporate logistics. Majercak, P., Kliestik, T. et.al. (2013) defined an integrated system of planning and organizing the movement of goods from the producer to the consumer at a given time to a given place at optimal costs (Adewale, A. R., 2017).

According to Kampf, R., Majercak, P., Svagr, P. (2016), logistics is beginning to be understood as a business management method and as a source of possible profit growth. Logistics has become a powerful tool for competition, there are integrations of stores, suppliers and distribution. The term "Supply Chain Managememt" is born. They defined Supply Chain Management as a supply chain that represents a set of companies that move materials forward. They assessed that several independent companies participate in the production of the product (manufacturers of raw materials and components, assembly companies, retailers, transport companies) until the finished product reaches the consumer (Azam, M. & Haseeb, M.,2021).

The European Commission published a document called the Green Paper of Innovation (1995), in which it defines innovation as a synonym for the successful production, assimilation and use of novelties in the economic, social and industrial spheres. Innovation must also be distinguished from the concept of invention. Invention means ingenuity and thus it is the discovery of new knowledge and the ability to see new useful changes. Invention is actually the first step in the innovation process. However, it should be added that not all knowledge becomes innovations. The word innovation comes from the Latin word "innovatio", which represents novelty or change, that is, something new. The term innovation expresses new developmental changes and their practical application in the company.

2 Materials and methods

Thus, the practical part initially focuses on the description of the production process according to the individual steps of the production process in the creation of EDC servo valves. Subsequently, after personal consultations with the management of the production department, the technologist and the foreman, an analysis of the modernizations already applied to the production process and their benefits for employees from the point of view of ergonomics, safety and health protection at work, facilitating work, saving space and saving time will be carried out. After processing the previous information, an employee satisfaction survey will be conducted, through a questionnaire that will be filled out by all employees of the selected department. After completing the questionnaires, it is evaluated and, based on the research assumptions, it is determined whether the answers of the workers confirm these assumptions. Through the questionnaire, we will find out the attitude of the employees

towards modernizations, the attitude towards already introduced modernizations from a positive and negative point of view, and also whether they noticed an improvement in the situation of modernization areas after the application of modernization (Hammes, G., De Souza, E. D., et al., 2020).

Production can be defined as a transformation process, when production inputs such as raw materials are transformed into final outputs, i.e. finished products. The goal of production is to produce products that meet several criteria, it is also necessary to constantly innovate production processes and products, deliver them to customers on time, ensure flexible production, achieve profit at the lowest possible costs and fight against competition. Disagreements are also part of the production process, which can be caused by the human factor, but also by mechanical errors (Chan, L. & Daim, T., 2012). With these disagreements, the company incurs increased costs and downtime. These errors can arise due to inappropriately chosen strategies, when working under stress, insufficient qualifications, intentional damage by the worker, etc.

The beginning of the production process occurs when the material is purchased. At this stage, the selection of a suitable supplier is important. The latter should be able to supply the input material that the customer, therefore, the manufacturer requires from him. The services that suppliers provide, such as service or the provision of spare parts, also play a big role. We know four laws of production processes Nedeliakova, E., Sekulova, J., et.al. (2014):

- *proportionality is the quantitative balance of the individual components of the production process,*
- *parallelism represents the simultaneous execution of all production operations, the aim of which is to shorten the production process,*
- *rhythmicity means the regular and even course of the production process, the same production inputs are entered at regular time intervals and, on the contrary, production outputs also come out at regular intervals,*
- *continuity means that the production process is not stopped or interrupted.*

Thanks to the constant modernization of the working environment and working procedures, the requirements for creating and modifying the working environment are increasing.

The employee has a great influence on co-creating and changing the working environment with his mental, physical and psychological work. The creation of a suitable work environment is important because employees spend an average of one third of the day at work, sometimes even more. The scientific discipline that deals with the adaptation of a person's working environment and work tools to a person's needs is called ergonomics. The company's investment in improving the working environment increases the return on invested funds through the creation of better working conditions.

It is important to pay attention to the quality of the working environment, because interested parties place great emphasis on this aspect when choosing a profession. The factors of the working environment, whether positive or negative, affect the moods, behavior and feelings of employees and are also reflected in their health. When creating a safe working environment, it is important to pay attention to physical, hygienic, organizational, social-psychological conditions, but also occupational health and safety (OSH) and ergonomic conditions, i.e. the spatial and functional solution of the workplace (Lan, S., Tseng, M., Yang, C. & Huisingh, D., 2020).

Next, we recommend vibrations, in which the employer is also obliged to ensure organizational measures so that the resulting vibrations meet the standards. Ionizing radiation, electromagnetic radiation and optical radiation should be assessed by the public health authority. Another factor is increased air pressure, physical stress (moving loads, working while standing or sitting), heat or cold stress, etc.

3 Results and discussion

We will name the company selected by us, in which we will conduct an analysis of employee satisfaction with the impact of production modernization, as the company Hydra, a.s., due to protection against the misuse of published sensitive data. The company Hydra, a.s. is based in the city of Považská Bystrica and is one of several branches within the global operation. It has been operating in this city since 1995. The company Hydra, a.s. also operates in North America, other European cities, and also in Asia. The company is engineering in nature and focuses on a wide range of products in the areas of the automotive industry, central heating projects, mobile hydraulics, refrigeration and air conditioning, etc. The branch to which our work is oriented is specifically focused on hydraulic equipment, which is used primarily in the agricultural and construction sectors. The products are designed in high quality to be reliable for agricultural and construction machinery. In machines intended for the construction of buildings, it is important that they are reliable, as they must handle various maneuvers and must be precise and safe. The company Hydra, a.s. is among the best employers according to a ranking created by a regional newspaper.

Applied modernizations in the production process and their impact on employees

In this part, we will take a closer look at the individual modernizations applied to the production process in the company.

Poka-yoke

The poka-yoke serves for better orientation of the operator, and thus which component to assign to the individual type of body. Poka-yoke is a light signaling in individual racks of the assembly line (Hu, G., 2021).

This significantly saves the operator time, as he does not have to study the work orders in detail and follow the numerical markings of the components to see if they belong to the given body type. Furthermore, they make the operator's work easier from the point of view that he does not have to deal with the subsequent repairs of his manufactured servovalves, when he would only find out about the error during an air test or a subsequent complaint from the customer (Jerabek, K., Majercak, P. et al, 2016). In the past, assembly lines did not contain poka-yoke, and there was a higher error rate during the assembly of servo valves and more subsequent repairs (Samargandi, N. & Kutan, A. M., 2016).

Replacement of the sieve type and modification of the pressing equipment

In the past, 8 mm sieves were used, for which the operator needed a larger number of tools and the pressing of the sieve had a more demanding workflow. In the past, the retaining ring was also pressed together with the strainer, and the operator had to press these components with great care with a lever press, holding the strainer with the retaining ring with one hand and controlling the lever press with the other hand. For this reason, a new form of sieve pressing was proposed, where the sieve was replaced with a new 12 mm version and the pressing device was designed from the point of view of higher operator safety (Agility, 2021).

To ensure greater safety, this press works on the principle that the operator places the strainer on the vacuum valve and then presses it with the two-handed button. As a result of this modernization, the risk of injury to the worker's hands has been minimized, as the operator is forced to press the two-handed buttons with both hands to press the sieve. It is also beneficial for the worker because the number of necessary components from the strainer and the safety ring has been reduced, only to the strainer, thus simplifying the work process and saving the time required for this operation (Çepni, O., Gül, S., Hacıhasanoğlu, Y. S. & Yılmaz, M. H., 2020).

This design of the press has also improved ergonomics to a great extent, because the operator does not have to bend over for the given activity or concentrate on properly fitting the safety ring and strainer by means of special pliers. Ultimately, this kind of upgrade was

also appreciated by the packers, where visually inspecting the 8mm strainer made it harder to tell if it was in the final servo valve or not (Gani, A., 2017), (HAJI, K., 2021) .

In one of the initial steps, i.e. the assembly of the input components, in the recent past pistol screwdrivers were used to screw in the plugs and nuts. However, they had poorly resolved ergonomics for the operator, as during their operation they exerted a lot of pressure on the worker's wrist, and also the operator held this pistol screwdriver at an inappropriate angle, and thus their wrists were excessively overloaded. Another negative was less time saving, as the pistol screwdriver was stored in a special case and before assembling each piece it was necessary to remove it from that case, carry out the assembly and then put it back in the case.

For this reason, they were replaced by stationary screwdrivers on balancers, which are more practical from the point of view of ergonomics, because the operator has the screwdrivers in a set vertical position and his only duty is to grasp the given screwdriver and fix the nut with the plug. The screwdrivers have an ergonomically set trigger button, so the operators do not strain their wrists. Thanks to the balancers, the operator simply lets go of the screwdriver after tightening and it retracts to its position to free up space on the line for the next steps of the production process, thus the operator is able to save time (Tavasszy, L. A., 2020).

4 Conclusion

Most of the employees are friendly towards the area of modernizations and they are important to them. They consider the most important modernizations to be those that primarily made their work easier, are more ergonomically designed, increase safety and health protection at work, and save the time needed to make products. On the contrary, they consider such modernizations as the least beneficial, although they increase the quality of the manufactured products, but it is aggravating for the employees due to the performance of more operations and the loss of free working time at the expense of performing these operations (Barykin, S., Kapustina, I., Kalinina, O., et al., 2021).

According to VP 12, where the majority of employees agreed that they would welcome a box in which they could publish their ideas for new modernizations for financial compensation, we propose to XYZ, a.s., the creation of this box. The box would be placed near the production department and the employee would, if necessary, fill out a form in which he would indicate what modernization he thought would be beneficial in the selected department, the modernization area in which this modernization would be helpful and his name.

This box would be checked regularly once a week and the management consisting of foreman, technologist, quality technician and coordinator would assess the suitability of this idea for the efficient functioning of the department. After this thorough review, suitable ideas would be selected and then consulted with the top management, when the construction procedure and technological execution of this modernization would be thought through and, if necessary, the worker who proposed this modernization would also contribute his ideas. If the selected modernization was applied, the financial reward for the worker who proposed this modernization would be calculated.

The amount of the financial reward would be assessed based on its efficiency, the difficulty of implementation and the overall benefit for society. Individual proposals from the box would be kept in the archive in case of legal misunderstandings, when the employee could accuse the company that he proposed this type of modernization, but his idea was appropriated and he did not receive a financial reward. I consider this type of cooperation to be highly effective, since the employees know the individual production processes best and

can therefore effectively evaluate which areas they consider to be problematic and could improve them.

A great motivation for them would be a financial reward and that would certainly increase the rate of proposals. For management, this suggestion is beneficial, as the more people think about upgrades, the more great ideas it can bring. This modernization is low-cost, as it is only necessary to place a box for proposals and print the necessary forms.

During the testing of the servo valve on the TEST stand, the operator is forced to set the neutral position through the torque wrench to complete the test. In case of insufficiently accurate setting, the TEST stand evaluates the test as NOK. Also, if the operator is careless, it can happen that he sets the neutral position the other way around, and thus the line on the nut, which indicates the direction in which it should be turned, will be turned by 180°. Also, this operation takes the operator's time, which could be used more efficiently in the assembly process for other activities (Balcilar, M. & Usman, O., 2021).

Therefore, the proposal would be to introduce an automated setting of the neutral position, when an automated torque tightening cylinder would be introduced directly into the TEST stand, instead of a manual torque wrench. It would work on the same principle as the manual version where you would grip, loosen and tighten the outer nut via a molded cylinder for it and the inner bit in the cylinder would set the desired position.

This process would save the total time needed to produce the required product. In the following calculation, we can see the effectiveness of this benefit:

Table 1. Diagnostic matrix for the "customs" indicator

Setting the neutral position	Currently	Automated
exam time on the TEST stend	195s	195s
neutral position setting time	60s	15s
sum of testing time 1pcs	255s	210s
realistically possible number of pieces per hour	14pcs	17pcs

Source: the authors' calculations based on the Logistics Performance data

After the introduction of the automated setting of the neutral position, the setting time would be reduced to 15 seconds and thus the total time savings per piece would be 45 seconds. Ultimately, when converting this result to an hour, we found that thanks to this upgrade, he would be able to produce more pieces than in the current situation, which is a benefit for the company and for the operators, it would be a benefit in terms of making the work easier and saving the working time needed to the production of the product, but also from the point of view of ergonomics, because workers suffer from strained wrists when constantly using the torque wrench. This modernization would be more expensive for the company, due to the greater complexity of its implementation from a design and technological point of view, but it would bring the company a higher number of manufactured products in the future and thus higher profits.

Acknowledgements

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The added value of camera-based observations in a statistical prediction of fog occurrence at the Poprad-Tatry Airport, Slovakia

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Abstract

Research background: Fog is dangerous meteorological phenomena for all kinds of transport. In aviation, fog complicates landing/take-offs and causes delays; thus, an accurate fog forecast may help in a more effective planning of the airport routines.

Purpose of the article: The study deals with statistical fog forecasting targeted for the Poprad-Tatry Airport (Slovakia) by means of different machine learning methods. The target attribute is fog (i.e., visibility below 300 m) at the airport.

Methods: We utilize the *k*-nearest neighbors and the extreme gradient boosting algorithms, and examine various meteorological variables as a set of potential fog predictors. Additionally, we make use of a camera that periodically (each 5 min) records photos on the horizontal visibility from all eight cardinal directions at the target site. The models' ability to correctly forecast fog occurrence (1 = fog, 0 = no-fog) is evaluated by means of scores that are commonly used in assessing the performance of forecasting models: accuracy, false alarm ratio and F1 score.

Findings & Value added: The presented remote observing approach is our answer to one of the several challenges of the globalization. Having a remote observing system installed, the human observer does not have to be physically present at the target site, and what is more, sitting in a centralized office, he/she can provide observations at a multitude of different sites.

Keywords: *aviation; fog; forecast; machine learning; remote observations*

JEL Classification: *R42; Q54; Q55*

1 Introduction

Fog is a meteorological phenomenon with horizontal visibility below 1000 m on the ground (WMO, 2011). Fog seriously influences various aspects of our everyday life, probably with the transportation sector being the most affected by the consequences of the decreased visibility and/or slippery roads. In aviation, fog complicates landing/take-off and causes

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delays at airports, thus, high quality fog forecast is needed in a more effective planning of the airport common routines and minimizing the economic losses.

Fog predictions, in general, are either constructed as outcomes of numerical weather prediction models, or by means of specific techniques of statistics. The first approach (dynamical fog forecasting) attempts to forecast fog by numerical modelling, on the basis of conservation laws of the atmosphere and parametrized processes therein, but also due to a very local character of fog, dynamical fog forecasting faces considerable challenges (e.g., Ducongé et al., 2020). The second approach (statistical fog forecasting) is based on collecting a large set of meteorological variables, and looking for some of the most significant ones that can predict the occurrence and/or further properties of fog. Statistical fog forecast models are computationally highly efficient; however, their validity is usually restricted to the site of interest (Koračin, 2017). They make use of a wide spectrum of machine learning (ML) algorithms (e.g., Bari and Ougabi, 2020; Cornejo-Bueno et al., 2021; Negishi and Kusaka, 2022; Castillo-Botón et al., 2022).

Even though automated weather observation systems (AWOS) are effectively used to get accurate and high frequency measurements of the majority of meteorological variables, there are still a few of them (e.g., cloud coverage, cloud height, visibility), which need the complex perception of the human observer, and cannot be entirely replaced by automated devices. Remote, camera-based observation systems, however, offer a possible solution to overcome these difficulties. Their development and operational testing has started in the framework of international SESAR projects (www.sesarju.eu). Bartok et al. (2022a) examined a remote camera-based system to observe prevailing visibility and cloud coverage/height, in the light of the similar measurements by automated sensors and/or human observers. They concluded that the camera-based remote approach to observations might be a promising supplement to eliminate the sensors' deficiencies, mainly in spatially inhomogeneous meteorological conditions. Their conclusions are also in line with the one of the most significant features of the globalization: even without travelling and with the appropriate technological tools, distant regions can be reached immediately. It also holds true for the remote observing system with cameras, which allows for an observer to carry out observations at several target sites remotely, e.g., from a centralized office or their home.

Bartok et al. (2022b) developed ML methods to predict fog occurrence at the Poprad-Tatry Airport, Slovakia, with a 30 min lead time. The study showed that ML predictors defined on the basis of camera imagery helped in improving the performance of the models in forecasting the initiation and the dissipation of fog, which is important for the air traffic controllers from the operational point of view. The current study is an extension of the work of Bartok et al. (2022b) in a way that it systematically examines the effect of the inclusion of ML predictors based on different visibility sensors (remote camera imagery included) on the performance of the constructed fog forecast models.

The paper is structured as follows: After a short introduction of the target site (Section 2.1), the pros and cons of different ways of visibility observations are discussed, including remote observation by cameras (Section 2.2). This is followed by the description of the input dataset (Section 2.3) and the selected machine learning methods (Section 2.4). The Methods section is then finished with a detailed description of the modelling procedures, including the evaluation metrics of the forecast models (Section 2.5). The results of the analysis are summarized in Section 3, whereas Section 4 is devoted to their discussion, deriving the conclusions and delineating possible paths for the upcoming research in fog forecasting.

2 Methods

2.1 Target Site

The measurements and the analysis were carried out at the Poprad-Tatry Airport (ICAO: LZTT, IATA: TAT). The target site is located in Northern Slovakia, in the so called Poprad basin, which is encompassed between two significant geographical units of the Carpathian mountain range. From the North, it is the High Tatras Mountain (with peaks over 2500 m), and from the South, it is the Low Tatras Mountain (with maximum heights around 2000 m). From the West and East, the basin is open and without hilly obstacles.

2.2 Camera-Based Observations of Visibility

Atmospheric visibility in meteorology is defined as the greatest distance in the horizontal direction, at which the normal (healthy) human eye can reliably distinguish or recognize sufficiently large terrain objects and parts of the natural surface in the landscape (or their outline) from the background, without obstruction in the direction of observation and determination. Visibility, along with further standard meteorological variables, is estimated by professional observers at a 30 minute frequency, to include them in the regularly issued METAR messages.

Professional observatories are usually also equipped with automated tools for measuring the visibility, e.g., with transmissiometers or forward scatter sensors (Bartok et al., 2022a). These devices provide high frequency and accurate measurements of visibility; however, since they operate at a certain point of the space, they cannot convey accurate information related to their entire surrounding, particularly in the case of inhomogeneous meteorological conditions, such as fog in patches.

Camera-based observation of visibility is a relatively novel technique to supplement the traditional and automated visibility observations. The camera is usually placed at a suitable location with sufficient and unobstructed view, mounted on a programmable rotator. Camera images are shot at pre-defined azimuths. In our case, the entire horizon is represented as a series of eight consecutive shots by the camera in each of the cardinal directions. An example of an eight-shot representation of the horizon circle is shown in Figure 1.
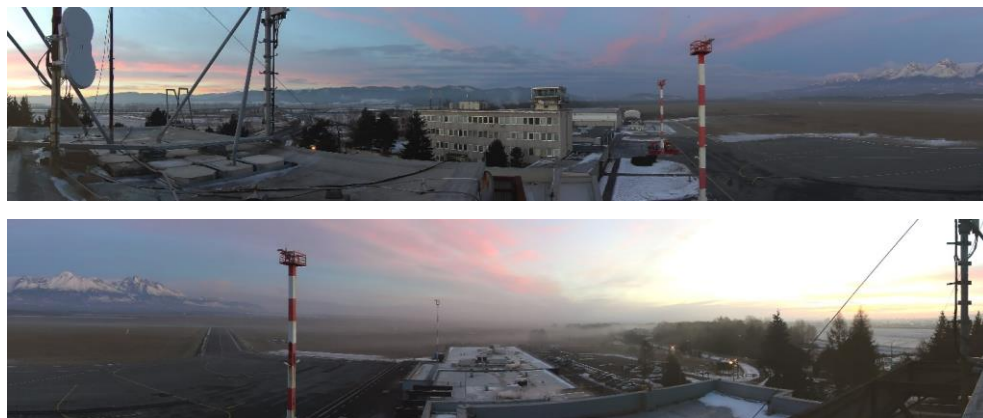
Figure 1. An illustration of the 360° panoramic view of horizontal visibility at the Poprad-Tatry Airport, constructed on the basis of eight camera images from the individual cardinal directions.

Source: authors (2022)

Camera imagery is then processed to estimate the visibility, with the principle to mimic the estimation procedures of human observers as much as possible. This can be carried out either manually (this is also the case of the current study) or automatically (e.g., Li et al., 2017; Palvanov and Cho, 2019). Each direction contains handpicked landmarks at different distances from the origin of observation. The observer, using a specially developed graphical user interface, then decides which of the landmarks are visible and which of them are obscured. Based on the labeling of the landmarks, the final visibility in a given direction is estimated as the distance of the farthest visible landmark in that direction.

2.3 Dataset

The measurement campaign was carried out in the period from January 2018 until March 2021, i.e., it covers a period of a length of 3 and ¼ years. The initially collected, relatively wide dataset of observations and measurements was, for the current study, narrowed down to the following variables:
- standard AWOS sensor measurements:
  - wind speed (*ws*, in [m/s]),
  - wind direction (*wd*, [degrees]),
  - air temperature (*at*, [°C]),
  - relative humidity (*rh*, [%]),
  - atmospheric pressure (*ap*, [hPa]).

  The measurements are available with a 1 min frequency, and are averaged through a 10 min moving window.
- different sources of information on visibility:
  - visibility from the METAR messages available in a 30 min frequency (*vsMM*), which, by the definition, is a 10 min running average of the human observations;
  - visibility from the automated sensor (forward scatter), available with a 1 min frequency, averaged through a 10 min moving window (*vsFS*);
  - visibility from the camera records, available with a 5 min frequency; more specifically, the minimum visibility estimated from all the 8 cardinal directions, and available from the 5 min and 10 min earlier time relative to the current time (*vsCR5*, *vsCR10*).

The target attribute of our ML models is the occurrence of fog. WMO (2011) defines fog as a phenomenon with horizontal visibility below 1000 m. Nevertheless, in our study, we did not stick strictly to this rule, and following a series of consultations with air traffic controllers and airport operators, we modified the decision threshold to 300 m. In other words, in the current study we talk about 'fog events' ('no-fog events') as soon as the 10 min running average of the visibility from the METAR messages is ≤ 300 m (> 300 m).

In the light of this definition of fog, we revised and considerably reduced the entire collected database, which consisted of approximately 56 thousands of entries (METAR messages in a periodicity of 30 min for 3 and ¼ years). This procedure included three steps:
1) removing the entries with missing values or no data;
2) setting the focus on the cold season (October−March) that is in line with the fog climatology in continental type of climate of the Central Europe, and
3) removing the entries where the occurrence of fog is unrealistic (based on the expert knowledge and the occurrence of fog/no-fog events conditioned on the statistical distribution of meteorological variables).

Following the above described operations, the dataset of input variables was reduced to the total number of 4214 entries potentially related to the occurrence of fog. Consequently, the ratio of fog events increased to 35%. For more details on these decision procedures, please refer to Bartok et al. (2022b).

2.4 Machine Learning Methods

Nowadays, classification tasks in weather forecasting (Zeyad and Hossain, 2021) are increasingly being solved with ML methods. Below we present a short overview of the ones we adopted in the current study. We chose the *k*-nearest neighbors algorithm as a representative of a simple ML method and the extreme gradient boosting method as an ensemble approach.

2.4.1 K-Nearest Neighbors

The *k*-nearest neighbors algorithm (kNN; Altman, 1992) is a lazy supervised learning method that is well suited both for classification and regression tasks with labelled datasets. During the training phase, the data is simply stored, making it a computationally cheap. During the evaluation, the distance between the considered data point and all stored training points in the feature space is determined, then *k* points, which are nearest to the considered data point, are selected. Finally, the predicted label is determined based on the majority vote. kNN makes no assumption about the data distribution and performs well on pattern recognition tasks. An optimal value of neighbors should be determined during the validation phase. The algorithm is sensitive to irrelevant features and suffers from a high likelihood of overfitting if many features are considered. The reliability of the algorithm can be improved by feature normalization and reduction.

2.4.2 Extreme Gradient Boosting

The extreme gradient boosting (XGB; Chen and Guestrin, 2016) is an ensemble learning algorithm, which can be easily parallelized. It utilizes shallow trees as input, making the individual models transparent and interpretable. During the validation phase of the k-fold validation, it is recommended to fine tune at least some of the parameters such as the number of trees, their depth and the gradient boosting rate. The number of trees should be restricted to avoid overfitting. The overall performance of this legendary algorithm is astonishing, it is a frequent winner of various comparisons of ML approaches.

2.5 Verification Methodology

For this study, the following model protocol was utilized:
1. Prepare the dataset for stratified nested k-fold validation (Tsamardinos et al., 2015).
   The dataset was normalized, randomly shuffled with a set value of random seed. Subsequently two sub datasets for both classes (fog vs. no-fog) were created. Each of them was divided into 10 x 5 parts. Following this, each of the 50 parts for the non-fog class was recombined with its corresponding counterpart, ensuring that each of the 50 smaller datasets contained the same class distribution as the original one. Subsequently, the 50 smaller datasets were recombined to create a set of TEST datasets labelled as TEST_N, a set of TRAINING datasets labelled as TRAIN_N, a set of smaller TRAINING datasets TRAIN_N_L and a set of validation datasets VALID_N_L, where N is the index of the outer k-fold split and L is the index of the inner k-fold split.
2. Select features based on field expert recommendation and divide them into groups.
   Two feature groups were created on the basis of the stratification of the variables as introduced in the dataset description (Section 2.3):
   - 'Meteo': meteorological variables from the AWOS sensors (*ws*, *wd*, *at*, *rh*, *ap*);
   - 'Visibility': visibility from different sources (*vsMM*, *vsFS*, *vsCR5*, *vsCR10*).
3. Design the ML experiments.

The influence of the systematic addition of variables from the 'visibility' feature group to the 'meteo' one on the overall performance of the ML methods was investigated. In other words, the following eleven experiments were carried out:

- 'A' – only the whole set of variables from the 'meteo' feature group (A);
- 'B' – the 'meteo' feature group, combined always with one 'visibility' feature (B1, B2, B3, B4);
- 'C' – the 'meteo' feature group, combined always with two variables from the 'visibility' feature group (C1, C2, C3, C4, C5, C6).

4. Choose ML methods and their hyperparameters to be fine-tuned during the validation. For the current study, the following settings were considered:

- Model kNN with hyperparameters $k = 1, 3, 5, 7, 9, 15$, and
- Model XGB with trees depths 1, 3, 5 as hyperparameters.

5. Perform the ML experiments.
This step involves training, validation and testing in the framework of stratified nested k-fold validation and can be illustrated with the following pseudo code:

```
for exp in experiments:
      for model in models:
            for N = 1, ..., 10                      (outer k-fold loop)
                  for param in hyperparameters:
                        for L = 1, ..., 5           (inner k-fold loop)
                              valid = VALID_N_L
                              train = TRAIN_N_L
                              train model (train, param, exp)
                              validate model (valid, param, exp)
                  choose best_param (model, exp)
                  train_full = TRAIN_N
                  test = TEST_N
                  train model (train_full, best_param, exp)
                  test model (test, best_param, exp)
            evaluate model(exp)
```

Note that the expression *exp* in the pseudo code corresponds to the different set of input features labelled herein as A, B1, … C6 (bullet point 3 above), *model* indicates one of the two adopted ML approaches (kNN and XGB, Section 2.4), and *param* denotes the hyperparameters of the individual ML approaches (bullet point 4 above).

6. Evaluate the overall statistics.
The obtained results were evaluated on the basis of the 2×2 confusion matrix:

Table 1. Confusion matrix.

Truth/Prediction	No fog	Fog
No fog observed	TN	FP
Fog observed	FN	TP

Source: authors (2022)

- TN = true negatives, i.e., cases when no fog was predicted, and no fog occurred;
- FP = false positives, i.e., cases with fog forecast but fog did not occur;
- FN = false negatives, i.e., cases when no fog was predicted but fog occurred; and
- TP = true positives, i.e., cases with fog forecast and fog also occurred.

The statistics TN, FP, FN and TP are then used to define the statistical scores of the prediction models. In this study, we used the accuracy (ACC), the false alarm ratio (FAR) and the F1 score (F1):

$$ACC = \frac{TP+TN}{TP+TN+FP+FN} \tag{1}$$

$$FAR = \frac{FP}{FP+TP} \tag{2}$$

$$F1 = \frac{TP}{TP+1/2(FN+FP)} \tag{3}$$

In the case of the score ACC and F1, higher values indicate better model performance, whereas for the FAR score, better models are associated with lower figures.

3 Results

The results of the series of ML experiments according to the algorithm described in Section 2.5 are summarized in Table 2. The labels of A, B1, B2, … C6 for the individual sets of input features can be decoded as follows:

- A: *ws*, *wd*, *at*, *rh*, *ap*
- B1: A & *vsFS*,
- B2: A & *vsMM* ,
- B3: A & *vsCR5*,
- B4: A & *vsCR10*,
- C1: A & *vsFS* & *vsMM*,
- C2: A & *vsFS* & *vsCR5*,
- C3: A & *vsFS* & *vsCR10*,
- C4: A & *vsMM* & *vsCR5*,
- C5: A & *vsMM* & *vsCR10*,
- C6: A & *vsCR5* & *vsCR10*.

Table 2. Statistical scores F1 (F1 score), ACC (accuracy) and FAR (false alarm ratio) for the combinations of two machine learning algorithms XGB (extreme gradient boosting) and kNN (*k*-nearest neighbors) and 11 different sets (denoted as A, B1, …, C6) of input features.

Score	Method	A	B1	B2	B3	B4	C1	C2	C3	C4	C5	C6
F1	XGB	0.58	0.79	0.73	0.81	0.76	0.78	0.79	0.80	0.80	0.76	0.80
	kNN	0.56	0.71	0.70	0.70	0.67	0.72	0.72	0.72	0.72	0.70	0.71
ACC	XGB	0.78	0.88	0.85	0.89	0.86	0.87	0.88	0.89	0.89	0.87	0.89
	kNN	0.76	0.83	0.82	0.82	0.81	0.83	0.83	0.83	0.83	0.83	0.83
FAR	XGB	0.35	0.23	0.27	0.20	0.26	0.23	0.20	0.21	0.20	0.22	0.19
	kNN	0.40	0.32	0.32	0.34	0.32	0.32	0.32	0.32	0.31	0.32	0.32

Source: authors (2022)

The systematic comparison of the constructed ML models to forecast fog occurrence, summarized in Table 2, conveys the following information:

- **'A' vs 'B or C'**. All of the models utilizing any feature from the group 'visibility' (B & C) results in better performance than those using purely basic variables from the 'meteo' feature group (A). This is exactly according to the expectations: if one needs to improve predictions of a visibility-based target attribute (fog), it is obvious that feature sets with some visibility information would represent some added value.
- **'B' vs 'C'**. It cannot be unambiguously generalized, but for the given model, the variants utilizing two visibility features (C) perform slightly better than those based on sets with a single visibility feature (B), for instance when comparing the average scores for the sets of B1…B4 vs C1…C6.

- **Visibility features**. Due to the relatively balanced performance of the models utilizing one or two visibility features, it is rather hard to conclude, which one is the superior from the four visibility characteristics. Nevertheless, there is one case when a certain feature clearly stands out, and this is the camera-based visibility with the lag of 5 min (*visCR5*) when combined with the basic 'meteo' variables (the set labelled as B3) for the XGB model. For these settings, we reached the highest F1 (0.81) and ACC (0.89) values and the lowest FAR value (0.20) for the entire feature set of B, and only the feature set of C6 (*visCR5* supported by *visCR10*) resulted in a slightly better FAR value (0.19).
- **kNN vs XGB**. The analysis confirmed that the XGB approach is clearly superior to the kNN method. Regardless of the feature sets, XGB resulted in higher (lower) figure for ACC and F1 (FAR) than kNN.
- **kNN hyperparameters**. The design of this study has not enabled us to univocally conclude, which of the analyzed hyperparameters of the kNN model results in the best performance. Such a drawback stems in the settings of the nested *k*-fold validation (Section 2.5) where the final statistical scores are obtained as the average of 10 loops (indicated as N in Section 2.1) for the best performing models, where each of the loop may be related with a model with a different hyperparameter. On the other hand, this methodology allows us to have a more realistic feel for the likely performance of the ML models in real world settings. The results for the validation sets indicate that models with the number of neighbors smaller than $k = 10$ perform better than models with higher number of neighbors.
- **XGB hyperparameters**. A similar line of reasoning as in the case of kNN hyperparameters holds true. We can, however, safely conclude that the hyperparameter corresponding to the shortest tree depth (1), outperformed the other hyperparameters in almost all cases for the metrics F1 and ACC. The results for the FAR metric were less clear cut.

The analysis of the outcomes of the study continues in the Discussion section.

4 Discussion and conclusions

In the presented study, an attempt was made to systematically analyze and evaluate the effect of different sources of visibility on the performance of selected machine learning models to predict the occurrence of fog at the Poprad-Tatry Airport (Slovakia). The *k*-nearest neighbors and the extreme gradient boosting algorithms were trained and evaluated with different numbers and combinations of input feature sets including: (i) only the basic meteorological variables 'meteo', and (ii) the 'meteo' feature group extended with one or two visibility characteristics. The source of visibility data were the METAR messages (i.e., from human observers), the automated visibility sensor, and the remote camera imagery processed in a manual way.

The analysis of the traditional performance metrics of the prediction models (accuracy, F1 score, false alarm ratio) revealed that the visibility information represents added value in the modelling of fog occurrence, and even though there are only minor differences in the metrics of the models based on input sets including one or two visibility features, we can conclude that the visibility information obtained from the camera imagery (the variable denoted as *vsCR5*, i.e., the minimum visibility from the eight cardinal directions estimated 5 minutes before the prediction time) yields the best overall performance.

The findings of the current study are not an ultimate proof of the superiority of the remote camera-based observations over the other sources of visibility information, but they nicely fit in the wider picture on the usefulness of the remote observation systems. Further and much elaborated studies are necessary to arrive at a firmer conclusion. Nevertheless, our results

complement the findings of Bartok et al. (2022b) who found the camera-based imagery useful particularly in the cases of forecasting changes in foggy situations, i.e., in fog initiation and fog dissipation. One of the potential directions to extend the current study is to go this way. Another possibility is to set up a much wider series of experiments, including a considerably higher number of different ML approaches and test their performance in a similar framework.

The camera-based remote approach to visibility observations is considered a promising supplement to eliminate the sensors' deficiencies, mainly in spatially inhomogeneous meteorological conditions when the sensor's point measurement cannot be generalized for its entire surroundings. Remote observation systems offer a feasible solution for so-far unexpected situations that the society had to face during the latest episodes of the COVID-19 pandemic, e.g., restrictions in social contacts and travelling, unseen regulations at work, preferring the home office where it is possible etc. The benefits of the remote observing systems coincide with the one of the most significant features of the globalization, which is 'the world at your fingertips' – even without travelling and with the appropriate technological tools, distant regions can be reached immediately. Camera-based remote observing systems, in this context, can also be understood as boosters of globalization – they allow for an observer to carry out observations at several target sites remotely, e.g., from a centralized office or their home.

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Financial distress and earnings quality in the European transport industry

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Abstract

Research background: The transport industry has been hit several times recently. First, the Covid-19 pandemic has paralyzed transport worldwide; secondly, the threat of an energy crisis and high fuel prices can have a fatal impact on many transport companies. The growing risk of financial distress is putting pressure on the quality of reported profits. Both aspects of risk change throughout the business life cycle.
Purpose of the article: The aim of the paper is to analyse and investigate the relationship between financial distress and earnings quality in relation to the life cycle in the European transport industry.
Methods: Analysis of variance methods are applied in the studies, including post hoc tests to examine the impact of the life cycle; the relevance of the mutual relationship between financial distress and earnings management of transport companies is also tested. The sample covers more than 30,000 transport companies for the period of 2019 immediately preceding the first Covid-19 crisis. The business life cycle was estimated by the Dickinson cash flow patterns model.
Findings & Value added: European transport companies manipulated earnings in 2019; start-ups, growth and decline businesses tend to increase reported profit. Growing businesses, on the other hand, show a lower profit than their cash flow. Financial distress also behaves similarly, it is significantly higher for start-up, growing and declining businesses. Transport companies manipulating profits have a significant risk of financial distress and thus bankruptcy, which can significantly affect the entire sector in the current uncertain situation.

Keywords: *earnings management; financial distress; corporate life cycle*

JEL Classification: *G31; G32; H43*

1 Introduction

The consequences of the Covid-19 pandemic have affected the global economy in many areas. On the one hand, it meant a slowdown in many industries such as tourism, various forms of services, including transport. On the other hand, circumstances stimulated demand

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for some products, including pharmaceuticals. The second factor affecting the global economy is the current energy crisis, which hinders the expected economic growth and, on the contrary, brings about a deep economic decline. Once again, one of the most affected industries is transport services.

Both mentioned factors create significant pressure on the financial management of enterprises, including transport ones. Stakeholders require relevant information about businesses, but it can be misinterpreted as a result of manipulation of financial statements. This can affect the risk of financial distress and cause bankruptcy. Earnings quality can be measured by various metrics, the most common being discretionary accruals as reported by Dechow, et al. (2010), Hlawiczka, et al. (2021) or Valaskova, et al. (2021). Hribar and Yehuda (2015), Habib and Hasan (2016) and Chen (2016) pointed out the inhomogeneity of discretionary accruals estimated within one industry and the impact of the life cycle on the quality of reported earnings. Similar results were also found by Michalkova (2021), Durana, et al. (2021) or Hussain, et al. (2020).

Each of the stages of the life cycle of the company is specific in terms of financial performance, including the risk of bankruptcy. Platt and Platt (2006) distinguish between bankruptcy and financial distress, bankruptcy is considered a choice of a business in an effort to protect assets from creditors. Financial distress, on the other hand, is a situation created as a result of operational decisions or external forces. Similarly, Grice and Dugan (2003) distinguish between bankruptcy and financial distress, where they found, based on empirical studies, that every bankruptcy is preceded by a state of financial distress, but not every state of financial distress necessarily results in bankruptcy. Campa and Camacho-Minano (2015) pointed out that companies with a higher risk of financial distress use earnings management techniques more than those with a low risk. Jardin et al. (2019) argued that earnings management distorts bankruptcy prediction. Akbar et al. (2019) investigated the impact of life cycle on bankruptcy risk and found that bankruptcy risk varies in accordance with a U-shape, where startups and declining businesses have the highest bankruptcy risk. Akbar et al. (2022) examined financial distress in the context of restructuring and found that the mode of restructuring depends on the stage of the life cycle.

The above-mentioned studies point to the importance of profit manipulation, the risk of financial distress as well as the life cycle on corporate financial performance. To the best of our knowledge, these factors have been investigated separately to a significant extent, and their interrelationship has been the subject of only a few studies. The aim of the paper is to examine the interrelationship between financial distress and earnings quality in the context of the business life cycle in the European transport industry. Financial distress was estimated using a modified Zmijewski model from Grice and Dugan (2003), which directly estimates the risk of financial distress. Dickinson's (2011) non-sequential life cycle model based on cash flow patterns was the basis for estimating life cycle stages. A proxy for earnings quality was discretionary accruals estimated using the modified Jones model by Dechow, et al. (1995). The interrelationship between variables was quantified using Pearson's correlation coefficient. Subsequently, it was examined by a two-way ANOVA, where the explanatory variable was the probability of financial distress and the factors were the stage of the life cycle and the Direction of earnings management given as positive earnings management or negative earnings management. The data needed to estimate the model covered the transport sector given as NACE class H and the last pre-pandemic year 2019. This data covered more than 30,000 transport companies from all over Europe.

2 Methods

The aim of this paper is to investigate and evaluate the interrelationship between financial distress and profit quality within the business life cycle of transport companies across Europe.

The previous chapter pointed out that financial distress, along with earnings quality, significantly affect corporate financial performance over the life cycle.

Within this study, two factors were analysed: earnings quality and corporate life cycle; financial distress was the quantitative variable examined. Earnings quality was estimated as a discretionary accrual from the modified Jones model. If the discretionary accrual was positive, the company applies upward earnings management (EM). Otherwise, the company reduces its accounting profit in relation to cash flow and applies downward EM.

Financial distress was estimated using modified Zmijewski Model by Grice and Dugan (2003). The model estimates the probability of bankruptcy or financial distress, where a probability higher than 50% indicates an increase in the risk of financial distress.

The corporate life cycle factor was determined according to the unique combination of operating, investment and financial cash flow according to the Dickinson (2011) model. The existing eight combinations of cash flows belong to five stages of the life cycle (Introduction, Growth, Mature, Shake-out, Decline). Specific cash flow patterns belonging to individual stages are given in Table 1.

Table 3. Cash flow patterns according to corporate life cycle

Cash flow	Introduction	Growth	Mature	Shake-out			Decline	
Operating	-	+	+	-	+	-	-	-
Investing	-	-	-	-	+	+	+	+
Financing	+	+	-	-	+	-	+	-

Source: own processing according to Dickinson (2011)

The variables mentioned above were examined by correlation coefficient and two-way ANOVA. First of all, the mutual relationship between financial distress and earnings management was tested by Pearson's correlation coefficient, at a significance level of 0.05. In the second row, the two-way ANOVA variables are financial distress, the factors are Life Cycle and Direction of earnings management, where positive discretionary accrual means Positive earnings management, negative discretionary accrual Negative earnings management.

Two-way ANOVA is subject to several assumptions, which were tested by the Kolmogorov-Smirn test and the Levene test at the 0.05 significance level. If the assumptions of the model were not met, ANOVA with robust standard errors would be used, which allows for non-compliance with the assumptions of standard ANOVA. If the alternative hypothesis is confirmed and the factors would be significant, then post hoc tests such as the Scheffé test would be done at a significance level of 0.05.

The model can be described in regression form as in Eq.1.

$$FD_i = \mu + Life\ cycle_j + Direction\ of\ EM_k + Life\ cycle \cdot Direction\ of\ EM_{j \cdot k} + \varepsilon_{ijk} \tag{1}$$

Where: FD – financial management proxy, $i = 1,2, \dots, 31\ 281$ – number of cases in net sample, $j = 1, 2, \dots, 5$ – number of life cycle stage (1 – Introduction, 2 – Growth, 3 – Mature, 4 – Shake-out, 5 - Decline), $k = 1,2$ – number of direction of EM (Positive – 1, Negative – 1), $Lifecycle \cdot Direction\ of\ EM_{j \cdot k}$- interaction term ($j \cdot k = 1,2, \dots, 10$).

The sample for the study was obtained from the AMADEUS database, where there were two selection criteria: the value of total assets higher than EUR 500,000 in 2019 and the affiliation of the enterprise to NACE category H, i.e. transport companies. The gross sample contained 64,463 enterprises, covering the financial data of 2019. The net sample, after removing missing data, contained 31,281 observations. Outliers were removed by wisorizing at the 1% and 99% levels.

3 Results and discussion

In the first step, the pure sample was examined for composition. As shown in Figure 1., almost 42% of all enterprises were classified as Shake-out enterprises. These are businesses that have diverse cash flow patterns, which indicate different directions of business development after the stage of business maturity. The fewest enterprises are considered to be start-ups, which is related to the nature of the entire transport industry. The second lowest share is held by mature companies, on the contrary, declining companies have a share of almost 16%.
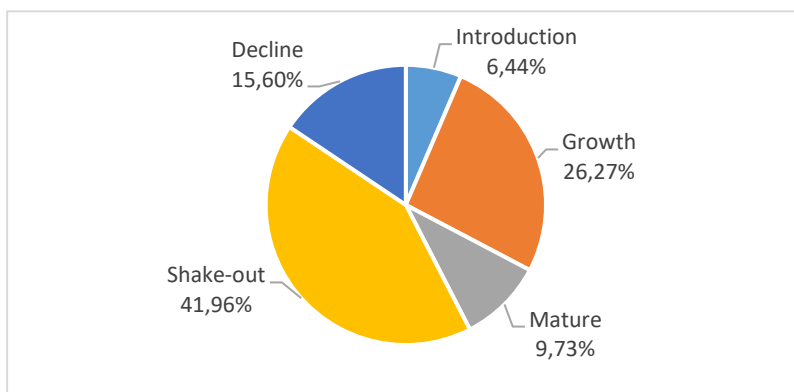
Figure 5. Proportions of enterprises by stage of the life cycle

Source: author

Table 2 summarizes the descriptive statistics of both investigated variables of financial distress and earnings quality represented by discretionary accruals according to two factors. The financial distress of start-up, mature and declining businesses is on average higher than 50%, which indicates a higher risk of financial difficulties and the possibility of bankruptcy. Growing companies, on the other hand, have an average probability of financial distress lower than 45%, i.e. positive operating and financial cash flows can be collateral in case of fluctuations in operating cash flows. On the other hand, companies manipulating profit upwards show a lower risk of bankruptcy compared to companies with undervalued accounting profit.

From the point of view of earnings management, during the life cycle, companies with improving financial condition advance from upward earnings management (EM) to downward EM and back to upward EM in the decline stage.

Table 4. Descriptive statistics of financial distress and earnings management dummy variables

Variable	Financial distress (FD)		Earnings management (EM)	
Factor	Mean	Std. Dev.	Mean	Std. Dev.
Life cycle				
Introduction	0,5310	0,2413	0,0288	0,1513
Growth	0,4225	0,2102	0,0003	0,1062
Mature	0,5297	0,2375	-0,0230	0,1347
Shake-out	0,4800	0,2423	-0,0125	0,1169
Decline	0,5494	0,2637	0,0185	0,1426
Direction of EM				
Positive EM	0,4611	0,2358	0,0822	0,0771
Negative EM	0,5081	0,2452	-0,0931	0,0922
Total sample	0,4839	0,2415	-0,0027	0,1238

Source: author

Descriptive statistics unambiguously assess the mutual relationship between both variables within the life cycle, therefore the Pearson correlation coefficient was used as shown in Table 3.

Table 5. Correlations between financial distress and earnings management proxy in corporate life cycle

Life cycle	Pearson Correlation		Sig. (2-tailed)
	variable	EM	
Introduction		0,043	0,054
Growth		-0,139	0,000
Mature	FD	-0,160	0,000
Shake-out		-0,197	0,000
Decline		-0,053	0,000
Total sample		-0,123	0,000

Source: author

The results of the Pearson correlation coefficient indicate a weak correlation between the probability of financial distress and earnings management, with the exception of the Introduction stage, where no correlation was demonstrated. The ambiguity of the interpretation of discretionary accruals as an earnings quality proxy is a problematic point in the investigation of the interrelationship between variables. For this reason, the qualitative variable Direction of EM was used in the variance analysis.

In the first step, the normality of the subsamples was examined by the Kolmogorov-Smirn test. However, this criterion was not met as the null hypothesis of normality of the subsamples was rejected at the 0.05 level. The second assumption of homogeneity of variances was investigated by the Levene test. Rejection of this assumption at the 0.05 level resulted in the use of a two-way analysis of variance with robust standard errors. This method refined the results with respect to the existence of type I error.

Table 6. Summary table of two-way ANOVA results

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	82,422a	9	9,158	164,363	0,000	0,045
Intercept	5077,865	1	5077,865	91134,951	0,000	0,745
Life cycle	60,383	4	15,096	270,933	0,000	0,033
Direction of EM	6,757	1	6,757	121,265	0,000	0,004
Life cycle * Direction of EM	3,305	4	0,826	14,829	0,000	0,002
Error	1742,360	31271	0,056			
Total	9148,176	31281				
Corrected Total	1824,782	31280				

R Squared = ,045 (Adjusted R Squared = ,045)

Source: author

Table 4 summarizes the results of the ANOVA model. Both main effects, life cycle and direction, have a significant impact on the risk of financial distress, i.e. the risk of financial distress varies in accordance with changes in cash flow patterns. The interaction of both main effects is also significant, indicating that the risk of financial distress varies at different stages of the life cycle depending on the preferred earnings manipulation techniques. The explanatory power of the interaction variable is low as shown by Partial Eta Squared, only 0.02% is explained by this variable. The main Life cycle factor explains 3.3% of the variability of the risk of financial distress.
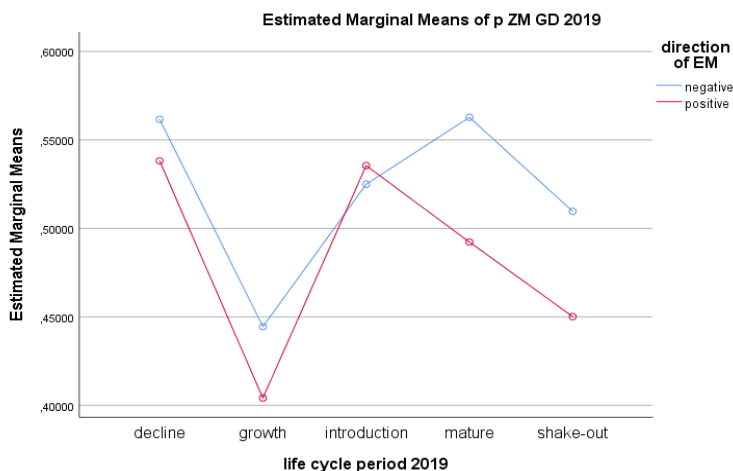
Figure 6. Interaction effect of Direction of EM and Life cycle

Source: author

The interaction between the factors is weak, as shown by the low value of Partial Eta Squared and the almost parallel lines in Figure 2. The more pronounced interaction between the factors in the Introduction stage explains the insignificant correlation coefficient in this

stage and indicates significant differences in the risk of financial difficulties depending on the choice of the direction of earnings manipulation. The life cycle factor was investigated as a simple main factor, i.e. the factor was examined separately in the sub-sample of companies with Positive EM and separately in the sub-sample with Negative EM. A deeper analysis of subsamples by post hoc tests is given in Table 5.

Table 7. Summary table of significant differences (post hoc test) between financial distress in companies with a different approach to earnings management

significant difference (post hoc tests)	Direction of EM	
	Positive EM	Negative EM
introduction – growth	H1	H1
introduction – mature	H1	H1
introduction – shake-out	H1	H0
introduction – decline	H0	H1
growth – mature	H1	H1
growth – shake-out	H1	H1
growth – decline	H1	H1
mature – shake-out	H1	H1
mature – decline	H1	H0
shake-out – decline	H1	H1

Source: author

Post hoc tests of the life cycle simple main factor pointed to a significant influence of the life cycle on the financial distress of European transport companies. Starting companies applying upward EM are similarly risky as declining ones, on the contrary, companies that reduce their accounting profit have a similar probability of financial distress, regardless of maturity or stage of decline. Similarly, start-ups and shake-out businesses with negative discretionary accruals have a similar tendency towards an increase in bankruptcy risk.

Table 8. Descriptive statistics of financial distress dummy in companies with different approach to earnings management

Factor	Variable: Financial distress			
	Positive EM		Negative EM	
	Mean	Std. Dev.	Mean	Std. Dev.
Introduction	0,535	0,235	0,525	0,008
Growth	0,404	0,210	0,444	0,004
Mature	0,492	0,232	0,563	0,006
Shake-out	0,450	0,234	0,510	0,003
Decline	0,538	0,254	0,562	0,005

Source: author

Table 6. shows the descriptive statistics of the financial distress dummy depending on the direction of earnings management. In accordance with post hoc tests, significant differences in the risk of financial distress are noticeable between the introduction and decline stages in upward EM, and between mature and declining, or start-up and shake-out companies

applying downward EM techniques. The risk of financial distress (bankruptcy) has a variable tendency between stages of the life cycle, which is in contrast to the findings of Akbar, et al. (2019), who found a u-shaped shape of bankruptcy risk depending on the Dickinson (2011) life cycle. Similarly, Durana, et al. (2021) investigated the interdependence of earnings management and bankruptcy risk and found U-shaped earnings management depending on the growth of the probability of bankruptcy within the life cycle. Akbar et al. (2022) point out that the U-shaped risk of bankruptcy is associated with the decision on the way of restructuring the company within the life cycle. However, the aforementioned studies investigated multiple industries, in contrast to this study, which focused only on transport companies.

Secondly, Table 6. shows a significant difference between the risk of financial distress of a mature company that increases accounting profit and one that applies downward EM. Mature companies with negative EM have a significantly higher risk of financial difficulties than those with positive EM. Most studies (Hussain, et al., 2020; Habib and Hasan, 2017 or Hribar and Yehuda, 2015) point to a connection between corporate maturity and downward earnings management. Even among mature transport companies in this study, those with negative discretionary accruals predominate. On the other hand, mature companies that increase their accounting profit also manipulate indicators of the risk of financial distress, which can distort the view and decisions of stakeholders, including competitors, about the financial health of the given company.

4 Conclusions

The risk of another economic crisis emphasized the fragility of the financial health of companies in general, as well as in individual sectors, including the transport sector. Hand in hand with the rising risk of financial distress or bankruptcy come various possibilities for manipulating financial statements and improving the image of the company. In connection with this, there is a need for high-quality financial statements that would reflect the financial difficulties of companies and help stakeholders in making financial decisions.

The aim of the study was to examine the interrelationship between the risk of financial distress and the quality of reported earnings in the context of the business life cycle. Based on a sample of more than 30,000 transport companies from across Europe, we found that discretionary accruals have an inverted U-shape over the life cycle, in contrast to the risk of financial distress, which has a wave-like nature, where the risk of start-ups and declining companies is highest. Mature businesses are subject to a different risk of financial difficulties depending on the Direction of earnings management; companies with downward earnings management are subject to higher risk. Most studies attribute the course of the risk of financial distress to a U-shape, which was not confirmed in the case of transport companies and we attribute it to the specifics of the given industry. The mutual relationship between the value of discretionary accruals and the probability of financial distress is weakly negative, the direction of discretionary accruals has a more significant influence on the risk of financial distress.

The specificity of the industry of transport companies was not sufficiently explored in this study, therefore further studies could deal with the research of financial distress of transport companies in more detail. Second, the study pointed to a significant impact of the life cycle and direction of earnings management on the probability of financial distress; the estimation of the financial distress model could also include management earnings direction and/or life cycle variables as explanatory variables.

Acknowledgements

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The Influence of the Global Phenomenon, Influencer Marketing, on the Consumers of the Slovak Republic

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Abstract

Research background: Influencer marketing is a very effective way to make brands more and more aware of customers on various social networks, thereby increasing the demand for various products and services. Influencer marketing brings benefits not only for the brands themselves but also for influencers—people who promote brands through social networks—and ultimately for customers, who can take advantage of various promotional discounts, events, gifts, or other benefits. Customers are increasingly preferring to buy goods via the Internet over choosing to buy in a brick-and-mortar store, which emphasizes the contemporaneity and importance of the investigated issue.

Purpose of the article: The aim of this research is to find out the attitude of Slovak consumers towards influencer marketing, what customers' experience with this marketing activity is, and whether it can convince them to buy the advertised product.

Methods: Deduction, Synthesis, Induction, Graphic Display Method, Inquiry Method.

Findings & Value added: 384 respondents took part in the research. More than half of the respondents have come across the term "influencer marketing," while young people aged 18–25 have come across this term the most. Respondents are most motivated to follow influencers by their lifestyle, and at the same time, it motivates them. Customers follow influencers, and more than 60% of respondents bought a product based on a positive review from an influencer.

Keywords: *Influencer marketing; Influencer; Brand; Marketing Communication Tools of Marketing Communication*

JEL Classification: *M30; M31; M37*

1 Introduction

In the US, the amount spent on digital advertising in 2019 exceeded the amount spent on traditional advertising for the first time, accounting for 54.2% of the media advertising budget. By 2023, it is expected that digital advertising would make up 66.8% of all media

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spending, based on this rapid rise. Influencer marketing is the key area of inquiry in this study, and social media has become one of the most important digital marketing channels. By 2022, influencer marketing is expected to generate $15 million, up from $8 million in 2019. (Lee et al., 2021).

Influencer marketing has become an integral part of brands' marketing strategies; however, marketers lack an adequate understanding of its scope, effectiveness, and potential threats. Based on knowledge from interviews with experts and consumers and in accordance with the theory of social capital, the authors created a definition of how influencer marketing can be understood. It is the use of resources influencing people to increase the effectiveness of a company's marketing communication (Leung et al., 2022).

Social media is extensively utilized today and makes information sharing simple, giving it a wonderful platform for product promotion. Influencers on social media networks provide a foundation of potential clients because of their enormous popularity. It is difficult to choose influencers for a marketing strategy that may produce large returns with little expenses, though (Doshi et al., 2022)

It makes sense to pursue influencer marketing if it is found to improve engagement results for a business and double its ROI—11 times higher than that acquired through other digital forms. Additionally, ad blockers, which are already strongly connected to the majority of internet advertising, are used by 50% of consumers. Companies are attempting to influence consumers who are more anchored in content in order to get through the growing communication barrier of reaching consumers online, which is where influencer marketing comes in (Martinez-Lopez et al., 2020).

While brands often struggle to create engaging social media content, influencers are specialists in creating content that engages with the consumer, helping it spread across social networks (Campbell and Farrell, 2020). Social media platforms allow brands to increase customer loyalty and trust. Social media now plays a bigger role in branding. Telling tales is what brands do best. Managers can design interactive digital advertising campaigns in this environment using virtual social media resource communities. Social media users play a significant part in enhancing the general rapport between customers and businesses in terms of trust, value proposition, sociability, knowledge exchange, and information sharing (Jilkova, 2018).

Someone who shares content on social media in return for money is an influencer. Although Instagram and Facebook are the most popular social media platforms, influencers can post to any of them (Campbell and Grimm, 2019). An influencer is considered to be a person who has built up a large following on a social media platform like Instagram, and these people are widely used by society today as a marketing tool to effectively reach their target audience. This individual has the power to alter consumer behavior or buying choices. Influencers on social media create content on subjects with a specific target audience in mind (Jilkova, 2018).

On social media, influencers interact with their publications through photos, videos, and other social activities to create their online personas and showcase their expertise in important areas such as fashion, beauty, and travel. They play an important role in this process; they follow the influence, communicate with them, support them and encourage them. Influencers and followers together create the social environment and group norms of influencer accounts (Farivar and Wang, 2022).

Social media, especially influencer marketing based on social media, has become important in consumer decision making. Studies have recently begun to investigate how this influence consumer behavior. Pick (2021) discovered that a key factor influencing purchasing intentions, attitudes toward advertising, and product choice is the perceived credibility of an influencer. Additionally, it aids in the dissemination of messages that persuade by increasing the sense of psychological ownership over the product and the perceived relationship with

the influencer, both of which have a beneficial impact on consumer behavior. Rosenthal and Brito (2017) demonstrate how crucial it is for admirers of a celebrity to engage in social interaction and respectable social behaviors on company sites. According to Pop et al. (2018), an event with a high level of globalization has great quality, value, and prestige.

Opinion leadership (Belanche et al., 2021), physical beauty (Sokolova and Kefi, 2020), credibility (Reinikainen et al., 2020), and trustworthiness (Schouten et al., 2020) are influencer qualities that might favorably effect followers' buying decisions.

Research by Farivar et al. (2021) adapted the complementary effects of opinion leadership and parasocial relationships in influencer marketing and revealed more significant parasocial relationships than opinion leadership in influencing the purchase intention of followers. Both narratives contribute to amplifying both effects. Matching inference increases the influence of parasocial relationships but not the influence of opinion leadership. These findings highlight the international aspect of influencer marketing and inform influencer marketing research and practice on "who says what" to improve the social effectiveness of communication.

Campbell and Farrell (2020) in their study defined types of influencers according to number of followers as Celebrity Influencer, Mega-Influencer, Macro-Influencer, Micro-Influencer and Nano-Influencer (shown in figure 1.)
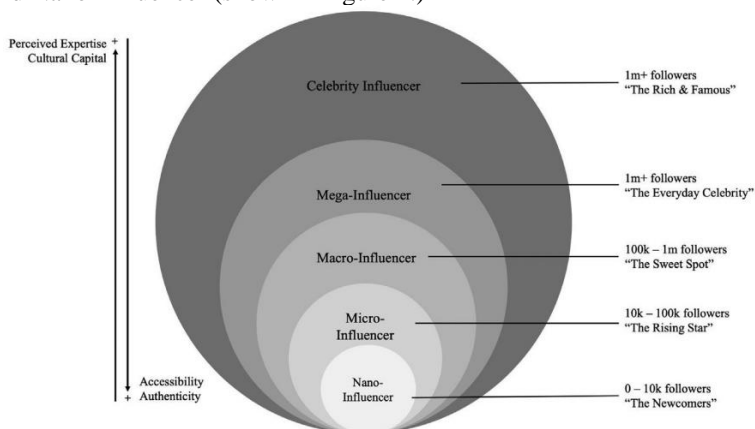
Figure 7. Types of social media inluencers

Source: Campbell and Farrell, 2020

All types of influencers we described in table 1.

Table 9. Description of influencer types

Type of influencer	Number of followers	Description
Celebrity influencer	Over 1 million	• any individual who enjoys public recognition outside of social media, • work with brands associated with their prior work, • cultural capital lets them command significantly higher price tags than other, noncelebrity influencers, • charge over $250,000 per post.
Mega-influencer	Having attained 1 million or more	• people who lacked celebrity status prior to their becoming social media mavens, • often align their brands more closely with paid partnerships, • charge around $50,000 per post.
Macro-influencer	Between 100,000 and 1 million	• achieve strong engagement rates, • provide brands with the most bang for their buck, • dominant within their subject domains (e.g., travel, food), • charge around $5,000 per post.
Micro-influencer	Between 10,000 and 100,000	• audience tends to be more localized to their geographic base, • often partner with multiple and diverse industries • greater authenticity and trust and often are more connected to the needs and interests of their followers.
Nano-influencer	Fewer than 10,000	• at the beginnings of their influencer careers, • the highest engagement rates of all influencer categories, because of authenticity.

Source: Own processing according to Campbell and Farrell, 2020

2 Methodology

The survey was conducted in the form of an online Google Forms questionnaire. Answers were collected from 10/12/2021 to 22/3/2022. The Sample Size Calculator was also used to determine the sample size, which generated the required sample size, namely 391 respondents. The questionnaire consisted of 17 questions. We obtained the population size from the current data of the statistical office, available at www.slovak.statistcs.sk. The individual answers to the questions were evaluated using the graphic display method using the MS Excel program. By using deduction, synthesis, and induction, we then revealed individual relationships between age and socioeconomic status from the individual answers and created conclusions that can serve as a basis for another research. At the same time, we want to use this basis in our further research.

3 Results

The content of the questionnaire was 17 questions, in which a total of 391 respondents participated. The first question regarding the gender of the respondents was answered by all participants, while 201 respondents were women, which represents 51.41% of the respondents, and the remaining 190 respondents were men, which means 48.59% of the respondents. Based on this, we can accept the statement that the share of women and men

was balanced. From an ethical point of view, we limited the age group of respondents from 18 years of age. 216 respondents, who represented 55.24%, were respondents aged 18-25 years, another category from 26-45 years represented 39.64% (155) and the age category from 46 years and older had the smallest number of respondents, and only 5.12% (20). With the results, we can confirm that the largest number of respondents were between the ages of 18-25. In picture no. 2 we can see a graphic evaluation of the question asked, which was aimed at classifying which socio-economic group the respondent belongs to. Based on the answers, we can say that out of 391 respondents, up to 48.59% (190) were students. A large part was also employed, which represented 36.06% (141). A smaller representation was made up of groups of self-employed persons and entrepreneurs, namely 5.63% (22), unemployed 5.77% (21), or women on maternity or fathers on parental leave, which represented only 4.35% (17) respondents. From the results, we can confirm that mainly students answered the questions in the questionnaire.
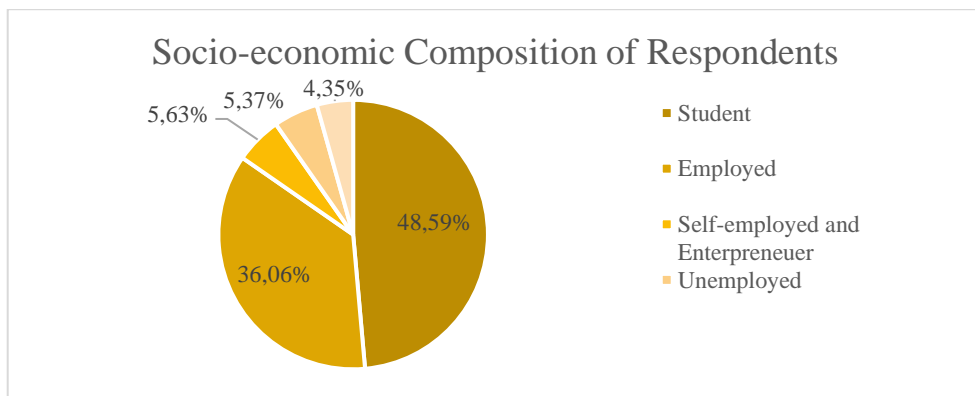
Figure 8. Socio-economic Composition of Respondents

Source: Own processing

62.92% (246) of respondents answered yes to the question, Do you know the term influencer marketing? Out of this, people aged 18-25 know the term the most, 57.72% (142), followed by respondents aged 26-45, 38.21% (94) and the least people aged 46 years and over, 4.06% (10). Influencer marketing is mostly known to women 56.91% (140), 62.38% (88) aged 18-25 and at least 2.86% (4) aged 46 and over. Men aged 18-25 are most familiar with the term influencer marketing 50.94% (54) and 46 and older 4.29% (6) the least. The most familiar with this term are students 50.41% (124) and employed 34.55% (85) and the least unemployed people 3.25% (8) with people on maternity or paternity leave 4.47% (11). From this, it is possible to draw the conclusion that the term influencer marketing is mostly known to students and people aged 18–25, while gender does not play a significant role in understanding this term.

People consider the most important parameter for following an influencer to be that they like the influencer's lifestyle and that motivates them by 49.10% (192). Subsequently, it is the possibility of obtaining various discounts or participation in competitions that attracts 37.85% (148) and a large number of followers 13.04% (51). Respondents aged 18–25 consider the fact that they like the influencer's lifestyle to be the most important parameter and thus motivate them. At the age of 26–45, there is a slight predominance of the same parameter again, and for the last age group, this parameter is balanced with the possibility of obtaining various discounts or participating in competitions. From the point of view of gender, the results are very similar, and both genders mostly recognize the lifestyle parameter.
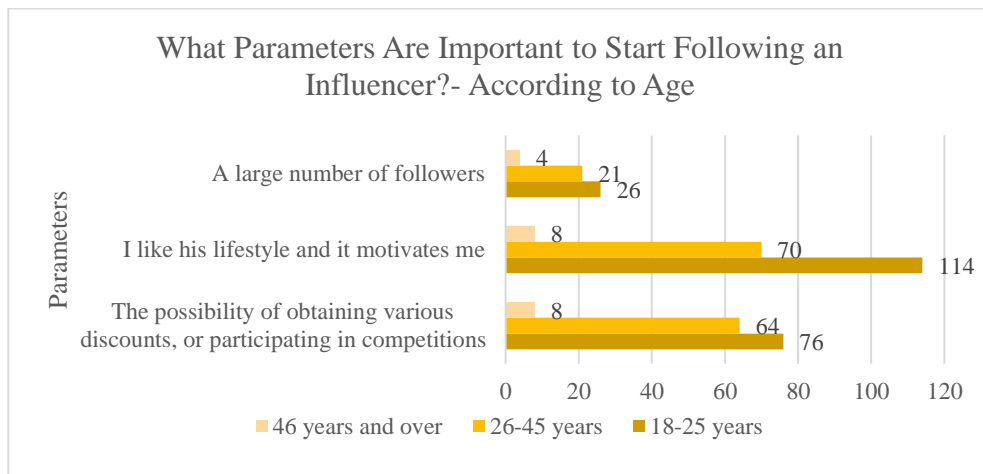
Figure 9. What parameters are important to start following an influencer? - According to age

Source: Own processing

150 (38.36%) answered no to the question of whether respondents perceive advertising through an influencer. 241 (61.64%) respondents answered yes. Most people aged 18-25, men, and the group of students gave the answer "no." If the respondent answered yes to the given question, we subsequently found out how often they perceive advertising through influencers. The answer was marked very often by 87 respondents (36.10%). Up to 94 (39.00%) respondents answered only occasionally. 60 (24.90%) respondents indicated that I perceived them to be reasonable. People aged 18–25 and students marked the option very often, which is an expected result, as these groups spend the most time on social networks and are the most frequent target groups for product promotion through influencers. We also asked the respondents what benefits they use from influencers when buying products. They could choose more than one option for this question. More than 50% (202) of respondents use discount codes. 25.46% (103) of respondents use actions such as 1+1 free, 2+1 free, free shipping, or gift with purchase. 17.87% (72) of respondents chose to participate in competitions. Only 26 respondents did not use any of the mentioned options.

46.52% (178) of respondents made a purchase after viewing an advertisement from an influencer. 26.37% (103) plan to do so in the future. 64 (16.37%) have not done it yet, and 11.76% (46) of the respondents do not plan to do it in the future because they do not believe in this type of product promotion. 87 (22.25%) of respondents aged 18–25 made a purchase after promotions from an influencer. 83 (21.23%) people aged 26-45 also made a purchase. 16.37% of respondents aged 18–25 plan to do so in the future. When we look at the extent to which they were motivated to buy a product based on influencer promotion, we see that up to 71.86% (281) of the respondents were influenced to buy a product based on influencer promotion. It can be concluded that, based on the selected sample, influencer marketing is an important tool for fulfilling and motivating customers to buy products in the territory of the Slovak Republic, while it mainly concerns people aged 18–45 who spend a lot of time on social networks.
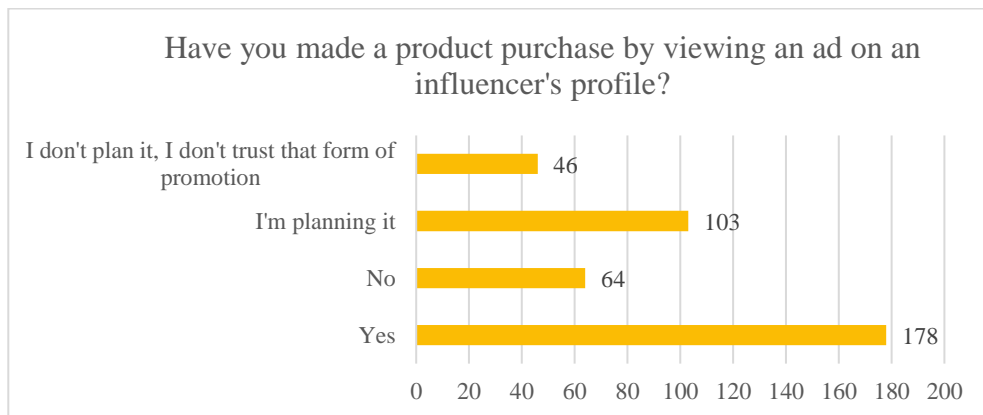
Figure 10. Have you made a product purchase by viewing an ad on an influencer's profile?

Source: Own processing

As many as 292 (74.68%) respondents would buy a product based on a positive review from an influencer. The remaining 99 (25.31%) respondents would not do so. This means that 11 respondents, even though they did not make a purchase after the influencer's promotion, would do so if the product had a positive review.

214 (54.73%) respondents were satisfied with the purchase and would repeat the purchase after purchasing the product promoted by the influencer. 25.32% (99) of respondents had a negative experience and the product was unsatisfactory for them. 19.95% (78) of people could not determine whether the product was satisfactory for them or not. It can be concluded that more than half of the respondents were satisfied with the product. The dissatisfaction of the respondents could have been created by exaggerated expectations, products from unknown brands, or brands that do not suffer from high quality products.

Figure 11. What was your experience buying products after influencer promotions?

Source: Own processing

To the question: Were you dissatisfied with a product that had a positive review from an influencer? 218 (55.75%) respondents answered no, as they were very satisfied with the product, and it met their expectations. According to 18.93% (74) of the people, the product was good, but there is a version on the market that is cheaper and of the same quality. The same number of people as in the previous question agreed that the product was expensive or did not meet their expectations. If we compare the results of this question with the previous

one, we find a discrepancy, as 78 people said that they had a neutral experience with the product promoted by the influencer. However, when asked if they were dissatisfied with the product after a positive review from the influencer, 4 people answered no, they were satisfied with the product. This may indicate that they changed their mind while filling out the questionnaire, or misunderstood the question asked.

4 Conclusion

Based on the results of our research, we can say that influencer marketing in the territory of the Slovak Republic is a well-known term, as it is known to 62.92% of the respondents. It is known mainly among young people who spend a lot of time on social networks. People aged 18–25 who know this term represent 57.72% of the total number of respondents. Accordingly, this term is also the most familiar to students. It is also possible to state that gender does not play a role in understanding this concept.

For almost half of the respondents, it is essential that they start following the influencer's lifestyle, which also creates motivation for the follower. More than a third of the respondents consider participating in competitions or various discount coupons to be an important factor. Only 13% of respondents consider the number of followers to be significant. From this, it can be concluded that influencers nowadays set trends in various areas, such as lifestyle, fashion, travel, electronics, health, etc. On the other hand, few people focus on how many followers a given influencer has, which means that people focus on the content and what the influencer can offer them and not on its popularity. When following an influencer, followers count on various co-rights and subsequent promotion. However, from various research, as we pointed out in the introduction, it is essential that influencer profiles are not oversaturated with advertisements, as such content is no longer attractive to followers.

Today, influencers represent one of the best tools for promoting companies' products, as these people set trends in various areas of life. According to our results, up to 46.52% of respondents have already made a purchase based on an influencer's promotion, and more than 16% of respondents plan to do so. Therefore, influencer marketing can be considered an important tool for fulfilling and motivating customers to buy products on the territory of the Slovak Republic. Of course, this does not only apply to the territory of the Slovak Republic, other foreign research also proves it. Moreover, in today's digital age, people spend more time on social networks than watching TV, reading magazines, etc., so it is necessary to engage customers in new ways.

It is necessary to realize that influencers become a certain guarantee of product quality. If they promote products that are not of great quality, the influencer can damage their reputation. For that reason, they have to think about whether it is worthwhile for them to accept cooperation and financial compensation if they are threatened with damage to their own name. If we look at the results of our survey, as many as 292 respondents would buy a product based on a positive review from an influencer. This proves that influencers know how to "sell" various products. On the other hand, it is also necessary to verify the product itself and look at reviews from regular customers. More than half of the respondents were satisfied with the product after purchase, while more than a quarter were dissatisfied. More than half of the respondents were satisfied with the product if it had a positive review from an influencer. Less than 19% were satisfied with the product, but they know that there is a cheaper and equally high-quality version on the market. However, 99 people had a negative experience after a positive review. Therefore, it is necessary for people to be more informed about the product. Based on the results achieved, we will focus on possible risks associated with influencer marketing in the future, and how these risks affect customers.

Acknowledgements

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East European outwear textile producers and their financial performance after Covid-19 period

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Abstract

Research background: For the companies is financial performance considered as key area of their business activities. Also it is not important the industry of the company. Therefore, similar approach is possible to apply in field of outdoor wear production. In the outwear industry there should be difference for companies from Eastern Europe because of the customers perception of their products.

Purpose of the article: The main objective of the paper is to find key indicators in grouped factor in the field of financial performance for companies in outwear production industry.

Methods: For definition of composite indicator we employed data of Orbis Europe database, from which we got data of 2097 companies, which operated in Eastern Europe (Czech Republic, Slovakia, Hungary, Poland, Romania, Bulgaria, and Ukraina). To definition of the mentioned composite factor we employed factor analysis, which helps to reduce number of input variables into less number of factors.

Findings & Value added: We defined three composite factors, which should be used for evaluation of financial performance of outwear producers. All chosen companies in outwear production should focus on application one of three observed factors, which help them to improve own competitiveness within companies of other European regions (especially Scandinavians) and from world area.

Keywords: *outdoor production; performance; financial indicators; global brands*

JEL Classification: *L26; M31; M37*

1 Introduction

The popularity of using outdoor clothing in the everyday life of many people stems from the original purpose of outdoor clothing for "extreme" conditions and high comfort during all-day use. Many manufacturers of outdoor clothing have taken advantage of this popularity for their collections, which are suitable not only for the mountains or nature, but also for everyday wear in the city. It is clear that in these conditions there is no need to use materials

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with such extreme properties, but it is also necessary to maintain good functionality. Nowadays, there is also an increasing need to think about environmental factors. Customers are not the only ones who want to hear that materials (and their production) are environmentally friendly. All this can then be signed at the factory itself and also determine the economic side of the production and sale of outdoor clothing. The importance of this topic also mentions several studies (Krykpayev et al., 2017; Wang et al., 2022; Clancy, Froling, Peters, 2015).

The producers of outdoor clothes increase own popularity in several past years. Due customers' feedback they received and accepted all relevant requirements in the product's innovation to apply the clothes in extreme nature environment (Mansi et al., 2021). Because of the changes of life style in cities by vary generations of tourists, the producers become more focused on increasing quality of products with decreasing impact on the environment (Clancy, Froling, Peters, 2015; Filho et al., 2019). However, lot of producers decrease products' quality level to increase own financial results.

The outdoor-wear is usually perceived as fashion style by customers, on which producers have not adapt in past and now they change own production. Due the becoming fashion clothe, producers want to be part of whole market in specific region or market within global potential. The one of relevant reasons is that lot of customers start to use out-wear equipment in day-to-day life. They look for clothes combination technical level of material and products, high usage value, fashion trends and image. The quality of complex product is required by customers who look for high value and want to participate by co-creating value and sharing own opinions, which provide better value perception of final product. Increasing product values is usually supported by suppliers and material producers, other clothes producers and of course by sellers (Gossen, Kropfeld, 2022; Freudenreich, Schaltegger, 2020; Khmara, Kronenberg, 2018).

To evaluate complex performance the company should employ vary methods. Typically, they focus on evaluation realised investments in the connection to own business activities with possibility to continue self-improvement and accomplishment of business objectives (Muchiri et al., 2010; Hornungová, 2015) as the way to support internal operations of the company (Zhang, Lawrence, Anderson, 2015; Loeschenbrand, 2016). Performance evaluation is one of the tools helping the company management to decide how to do the business activity effectively (Arena, Azzone, Bengo, 2015). At present days, companies evaluate own processes and products for performance by application financial results, what they consider as relevant way to compare themselves with the adequate competitors. Kind of problem could be due different accounting systems and individual financial indicators. In the context of accounting results, these values express absolute results from past which provide a clear picture of productivity due profit or loss (Brignall, 2007). Into group of traditional indicators is possible to put return indicators (e.g. Return on investment - ROI, Return on assets - ROA, or Return on sales - ROS). These ratios provide information helping the company to compare its productivity, expected by shareholders to evaluate financial attractiveness (Mohamed et al., 2014).

According to scholars, performance of the company is examined as kind of function for alternative managerial orientations such as an entrepreneurial orientation (Ross, Westgren, 2009), market orientation (Verhees, Meulenberg, 2004), and strategic choice. For a firm to achieve success in implementing orientations different from a production orientation, the manager must have a willingness to change and to question current business strategies (Micheels, Gow, 2015).

2 Methodology

The main objective of the paper is to find key indicators in grouped factor in the field of financial performance for companies in outwear production industry.

For definition of composite indicator we employed data of Orbis Europe database, from which we got data of 2097 companies, which operated in Eastern Europe (Czech Republic, Slovakia, Hungary, Poland, Romania, Bulgaria, and Ukraina). Individual number of companies is presented in Table 1.

Table 1. Structure of the companies according to country.

	Frequency	Relative frequency
Bulgaria	445	21,2
Czech Republic	31	1,5
Hungary	262	12,5
Poland	115	5,5
Romania	850	40,5
Slovakia	96	4,6
Ukraina	298	14,2
Total	2097	100,0

Source: authors (2022)

To definition of the mentioned composite factor we employed factor analysis, which helps to reduce number of input variables into less number of factors. The factor analysis is employed as tool for reduction input variables and into less one. It is based on the selection of correlation and partial correlation coefficients. The correlation coefficient represents the closeness of linear dependence of individual variables and partial correlation coefficients. The partial correlation coefficient shows a similarity of two variables in such a situation that the other variables are assumed constant. If it is possible to explain the dependence of variables using common factors, the partial correlation coefficients are very small, close to zero. To assess the suitability of the factor analysis, two tests can be used (Tarnanidis et al., 2015; Conti et al., 2014):

- Kaiser-Meier-Olkin (KMO) - coefficient which could reach values between 0 lowest and 1 as highest.
- Bartlett's sphericity test lies in testing the null hypothesis stating that the correlation matrix of variables is unit.

For the purposes of verification of the factor analysis Cronbach's alpha indicator must be used. This indicator is understood as a reliability coefficient, used as a kind of analogy with the correlation coefficient. Normally, values oscillate in the interval ⟨0;1⟩. Zero, as the extreme value, describes the situation in which individual variables are uncorrelated. On the other hand, the value 1 describes correlated variables. When the value is closer to 1, a higher degree of conformity is reported (Hrach, Mihola, 2006; Cronbach, 1951).

Cronbach's alpha does not imply that the measure is dimensionless. If, in addition to measuring internal consistency, you wish to provide evidence that the scale in question is dimensionless, additional analyses can be performed. Exploratory factor analysis is one of the method to check dimensionality. Cronbach's alpha is not a statistical test; it is a coefficient of reliability (or consistency). The value could be expressed as the function of

number of test items and the average inter-correlation among the items. Below, for conceptual purposes, we show the formula for the standardized Cronbach's alpha:

$$\alpha = \frac{N \times \bar{c}}{v + (N + 1) \times \bar{c}} \tag{1}$$

where N equals to the number of items;
c-bar is the average inter-item covariance among the items;
v-bar equals to the average variance.

The values of Cronbach's alpha could be from 0 to 1. If the values are close to 0.5, it signifies a bad level of internal consistency. Over 0.7 means that the value is acceptable and values close to 1 are excellent. A "high" value of the alpha is often used (along with substantive arguments and other statistical measures) as evidence that the items measure an underlying (or latent) construct (Conti et al., 2014).

3 Results and discussion

At present time, companies focus on financial way of performance evaluation. Financial performance is evaluated by many indicators, but the basic group refers mainly to eight areas in together synergy. These indicators, we employed for evaluation, were as follow:

- C – Cash flow [th EUR];
- N – P/L for period (Net income) [th EUR];
- O – Operating revenue (Turnover) [th EUR];
- G – Gross profit [th EUR];
- S – Shareholder funds [th EUR];
- Ra – ROA using P/L before tax [%];
- Re – ROE before tax [%].

According to gained data of these indicators from ORBIS Europe database, we apply statistical characteristics of the examined indicators to conclude an approximate result, limited by the resulting reliability. In the results of the paper there are characteristics of research barriers and future research possibilities. On the gained data we used factor analyse to define key indicators in specific groups. Kaiser-Meyer-Olkin test (KMO) and Bartlett's test of sphericity have to be used to verify possibility of application factor analyse on the input data.

Value for KMO test was reached by 0,613 and for Bartlett's test by 0,000. Therefore, factor analysis should be applied. The total variance of the performance indicators is explained by means of eigenvalues, representing the total variance explained by each factor. The eigenvalues show that only three items have reached the minimum value of 1. From this point of view, Extraction Sums of Squared Loadings with cumulative percentage are important. Factor analysis has extracted different numbers of factors, which explains variances of all cases (92,292 %). According to process of factor analysis, we found out three factors including input variables.

Value of these factors can be calculated for the individual outdoor producer and on the basis of their results, a list of businesses can be compiled. All factors can determine important factors of business, playing the key role in achieving the set of objectives. Proposed financial performance indicators should help companies to demonstrate a progress towards the objectives of sustainability.

Table 2. Defined factors by application of factor analysis.

	Input variables		Cronbach's alpha rate
Factor 1	Cash flow	0,841	0,876 *Acceptable*
	Turnover	0,977	
	Gross profit	0,984	
	Shareholder funds	0,979	
Factor 2	Net income	0,600	0,912 *Acceptable*
	Operating revenue	0,860	
Factor 3	ROA before tax	0,672	0,609 *Acceptable*
	ROE before tax	0,641	

Source: authors (2022)

Results of factor analysis provide in three factors, from which are acceptable value of Cronbach's alpha for all of them. These coefficients express significance of the used elements. Their sum total must be 1. The individual factors' formula have been defined by the procedures as follow:

$$F_1 = 0,22243 \times C + 0,25840 \times T + 0,26025 \times G + 0,25893 \times S \qquad (2)$$

$$F_2 = 0,41096 \times N + 0,58904 \times O \qquad (3)$$

$$F_3 = 0,51181 \times Ra + 0,48819 \times Re \qquad (4)$$

Value of these factors can be calculated for the individual outdoor producer and on the basis of their results a list of businesses can be compiled. Indices can determine important factors of business, playing the key role in achieving the set of objectives. Proposed financial performance indicators should help companies to demonstrate a progress towards the objectives of sustainability and financial performance.

4 Conclusions

The evaluation of performance in the company requires specific approaches, especially in narrow way such is financial performance. In present, companies usually focus on application of traditional indicators derived from accounting sheets. As traditional indicators they enable only limited traceability in the context of compulsory reports to government by financial reports as financial statements, balance and profit/loss statement form the part of annual balancing. Employment of vary financial indicators in specific areas of the company is recommended by lot of authors (Cardinaels, Van Veen-Dirks, 2010; Martinez, Cooper, 2019).

The reason for financial indicators' usage is their simplicity for employment by top management in the context of strategic activities, by which is possible to improve own competitiveness and to reach requirements of all stakeholders of the company. Typically, the stakeholders look after values such balance sheets, income statements, and statements of cash flows (Kotane, Kuzmina-Merlino, 2012; Gossen, Kropfeld, 2022; Micheels, Gow, 2015).

The main objective of the paper is to find key indicators in grouped factor in the field of financial performance for companies in outwear production industry. The research showed that the financial indicators out outdoor producers should be divided into three individual

factors, which are confirmed by Cronbach's alpha rate and all of them should be implemented in internal measurement system.

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Competence of confidence. Assertiveness as a right of "Z" Generations

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Abstract

Research background: The background of the research was provided by the NICE+ project of Erasmus+ KA2 –Cooperation for innovation and the exchange of good practices –Strategic partnerships for school education. The transfer of knowledge necessary for high school students to become entrepreneurs in partnership with Hungarian, Polish, Czech and Slovak universities. In connection with the project, it was possible to examine the competences of becoming an entrepreneur through university lecturers' presentations and control questions.

Purpose of the article: The purpose of the article is to point out, based on the international scientific literature and own research, a competence and skill that is especially a defining tool for the age group of high school students. Aim is to emphasize the advantages attributed to assertiveness.

Methods: An exhaustive review of the literature on assertiveness, entrepreneurship and competences has been carried out. In addition a questionnaire supported the research and filled the place of primary research.

Findings & Value added: The questionnaire answered by secondary school students and teachers provides that the article is able to mediate new mark. Added value of the paper, that it reflects the direct answers of future entrepreneurs. The paper is addressed to teachers, university lecturers, students, researchers, leaders, employers and employees.

Keywords: *competence; skill; assertiveness; student; "Z"Generations*

JEL Classification: *K19; K39; L26*

1 Introduction

The concept of assertiveness arises in the examination of the behavior of persons, in communication between persons, in relation to organizations and finally in relation to society as a whole. "Assertive rights" can be seen and heard in many situations, authors list our assertive rights (McBride, 1998, Maogoto 2000), and we were curious about how important assertiveness is to today's high school students. Considering the current challenges of Generation Z (Garai et al, 2021, Menendez et al, 2020, Hameed et al, 2020), how conscious is the assertiveness of the students. Absolutely: can assertiveness be learned by itself or can

students gain it by learning other subjects and knowledge materials? Becoming a successful entrepreneur requires assertiveness as one of the outstanding competencies. Lubis (2019) emphasizes that assertiveness is useful for generation Z as their guide in entering the work world to complete the competencies needed in the industrial revolution 4.0 era. Most of the composition of employees both from the lower, middle and top level manager level is occupied by human resources from generation Y (millennial generation) (Lubis, 2019). Generation Z is a generation of modern workers who will enter the workforce. The company is ready or not ready to accept the Generation Z as a workforce with personal characteristics and traits that will certainly be very different from previous generations. Generation Z develops in the environment infused by technology, communication and information and can be defined as a hyper-connected generation. Generation Z grows in a world surrounded by technology and the internet, with smartphones, games and social media (Haddouche and Salomone, 2018).

2 Methodology

Assertivity is measured in societies, in countries. (Hofstede, 2006) Assertiveness (ASS) refers to people who are dominant, assertive, and tough (House et al., 2004). According to the GLOBE, societies that score high on assertiveness value competition, success and progress, and believe that anybody can be successful in case of hard work. Assertive societies value taking initiative, and having control over the environment. In addition, as mentioned before, ASS is a specific trait of masculine societies, normally considered supportive of entrepreneurship. In assertive societies, individuals emphasize results over relationships. They expect demanding and challenging results, and the desire for self-affirmation makes them more decisive. (Calza et al, 2020)

GLOBE authors report there is a significant negative correlation between practices and values for seven of their nine national culture dimensions: assertiveness, institutional collectivism, future orientation, humane orientation, performance orientation, power distance and uncertainty avoidance. (Brewer-Venaik, 2010)

In an effort to extend theory and research linking personality to team effectiveness, Pearsall et al's study (2006) used the workflow networks literature to investigate the effects of critical team member dispositional assertiveness on team performance and satisfaction. Results from 64 teams working on a command-and-control simulation indicated that critical team member dispositional assertiveness positively affected team performance and team satisfaction. Results also indicated that both of those effects were due to improvements in the team's transactive memory system. (Pearsall et al, 2006) Others aim to look at the relationship among Assertiveness, a National Value Dimensions (NVD) component, CSR practices, and brand association (Bari et al, 2021)

Assertive leadership as an emerging domain of inquiry in leadership research has been portrayed as a new phenomenon in analyzing the role of leaders in organizations. The concept of assertive leadership has recently developed as an amendment to ethical and transformational leadership. (Moutangili, 2020)

The results in the survey of Authors Raisle-Ting (2021) showed that groups of Gen Y and Gen Z were similar in their general characteristics, which included preferences for group-work, affirmation, clear rules, and for their opinions to be valued. They liked face-to-face communication, and using visuals for online communication. There were significant differences in some of their study and work habits, that is, the Gen Y are better than Gen Z at analysing information obtained from the Internet, and handling a lot of work at one time, whereas Gen Z expected more instantaneous feedback than Gen Y. As for communication style, they were amiable communicators who were low on assertiveness, prioritised relationship over task in task completion, and had a slow-paced communication style. The

results showed that Gen Y and Gen Z had some style-typing ability, whereby they compared their communication style with their peers. More practised style-flexing, as in fitting their communication to the target group but Gen Y had a stronger information-focus. Their demographic background (gender, ethnic group, socio-economic status) did not influence their communication style, indicating the stronger influence of their generational cohort. The study suggests that employers who require goal-oriented communication need to make their expectations clear to Gen Y and Gen Z employees. (Raisle-Ting, 2021)

The technical and technological development of the 21st century presents new challenges to all actors of the labour market. In accordance with the changed needs, higher education must be able to develop labour market competencies that employers expect, and that make their graduates more valuable and in demand among domestic employers. The 21st century needs such skills. 21st century worker, among others, such as independence, responsibility, effective cooperation with others - for the development and mastery of which, it is not necessary to develop new subjects, but to be able to apply new methodological elements during the teaching of the subjects. (Nyéki, 2019)

Organizational norms in high assertiveness cultures are therefore likely to signal that assertive behavior is appropriate because it can maximize instrumental outcomes, beyond being concerned about harming social relationships. These norms therefore signal to employees that voice behaviours that actively express employee opinions and concerns are positive and key to organizational success. Therefore, management is likely to encourage employees to speak out by establishing and supporting both informal and formal voice channels. Authors, like Kwon-Fardale (2020) therefore propos for example, that organizations in high assertiveness cultures embrace the use of both informal and formal voice channels in line with cultural norms, whereby associated organizational norms signal both voice channels to be safe and effective. Authors highlighted that employee voice is a behaviour aimed at improving work-related issues or resolving complaints through formal or informal voice channels. Organizational norms related to different voice channels signal to employees about voice safety and effectiveness. (Kwon-Fardale, 2020)

Five things that companies need to know about facing the Z generation include Generation Z, the first generation that is truly a genuine digital generation; Diversity is common for generation Z; Generation Z is more pragmatic; Generation Z is more entrepreneurial and still hopes for harmonious interpersonal relationships among coworkers (Lanier, 2017). Whereas according to (Bharat Chillakuri, 2018) the characteristics of the z generation are among those who are active in using social media, very ambitious to achieve their goals, have an entrepreneurial spirit naturally, multitasking, flexible and able to work with colleagues from various countries and culture, and greatly take advantage of technological developments. (Lubis et al, 2019)

A next possible level of investigation of assertiveness is communication. From the point of view of our study, it is worthwhile to get a glimpse of the already revealed communication habits of Generation Z. Communication style plays a crucial role in managing the multigenerational ecosystem of the present world. Raisle-Ting (2021) examined the communication style of Gen Y and Gen Z with 311 youth (Gen Y, 68; Gen Z, 243) participants.

Table 1 shows scores of communication style types examining assertiveness versus responsiveness. For the statement When we meet for projects, I usually start the discussion and I talk more than I listen, furthermore 'When I talk, I need to express my feelings', average assertiveness score in case of Gen Y 2.60, while in case of Gen Z it is 2.64.

Table 1. Mean scores showing the communication style of Gen Y and Gen Z participants (N=311)

Types of communication style							
Assertiveness versus responsiveness	5	When we meet for projects, I usually start the discussion.	3.52	1.01	3.42	1.02	
	6	I talk more than I listen.	2.46	1.06	2.76	1.09	*p=0.04
	7	When I talk, I need to express my feelings.[R]	3.16[R]	1.13	3.25[R]	1.06	
		Average Assertiveness Score	2.60		2.64		

Source: Humaira Raisle, Su-Hie Ting (2021)

To help the Gen Y and Gen Z to become better communicators, they need to be trained to recognise communication styles. Next, the results on the four communication types are described, focussing on the assertivenessresponsiveness, and task-relationship priority dimensions. Table 1 shows that the Gen Y and Gen Z were significantly different on one out of three aspects of the assertiveness-responsiveness dimension examined. There were significant differences between the two groups on whether they talked more than they listened at p = 0.04 (Gen Y, M=2.46, SD=1.06; Gen Z, M=2.76, SD=1.09). Both groups listened more than they talked, but the mean values indicated that Gen Y participants expressed greater disagreement with the statement, that is, Gen Y listened more than Gen Z. According to Hartman and McCambridge (2011), talking more than listening reflects assertiveness whereas listening more is a responsive communication style. Both groups were responsive, but Gen Y talked less than Gen Z. Gen Y and Gen Z participants were similar on the other two aspects of the assertiveness-responsiveness dimension. When they met for projects, they usually took the lead and started the discussion. This is a characteristic of assertive behaviour, and reflects a need to be in control. They were also emotionally expressive, characteristic of a responsive behaviour (Hartman & McCambridge, 2011). Taken together, both groups reported both assertive and responsive behaviour in communication (Raisle-Ting, 2021)

3 Results

Author came to the conclusion that assertiveness, as an important competence for youth to be a successful entrepreneur, playing an important role in communication individually and in the society too, did not appear at the forefront of the answers given by secondary school teachers. Our research also contains a contradiction at this point, since assertiveness appears as an important element in the international and domestic literature when we examined the competencies of becoming an entrepreneur. However, it was not among the competencies rated as the most important by secondary school teachers. However, this phenomenon is not unique when examining becoming a successful entrepreneur or being a successful entrepreneur, since as a study (Lukovszki, 2011) points out, research has revealed quite a large number of qualities that are necessary for entrepreneurial success. At the same time, different authors consider different traits or combinations of traits to be important. (Lukovszki, 2011) The authors therefore came to the conclusion that assertiveness is far from the only and most important element of the self-confidence of Generation Z, the components of self-confidence.

Table 2.: Competences developed in the context of education, according to secondary school teachers (% of mentions; relative frequency, more than one response was possible)

Competences	teacher's opinion (mentions in %)
1. Logical thinking	57,0
2. Effective problem solving	50,5
3. Creativity	46,0
4. Group work	40,5
5. Building good relationships with clients, partners	36,5
6. Communication skills	35,5
7. Leadership skills	34,5
8. Openness	19,0
9. Computer skills	18,5
10. Negotiation skills	16,5
11. Time management skills	15,0
12. Ability to perform under time pressure	11,5
13. Assertiveness	6,0
14. Implementation of initiatives	4,0

Competences for young people to become successful entrepreneurs - as seen by teachers, N=200

Source: Garai-Fodor et al. (2022)

Logical thinking, creativity, effective problem solving and group work are those competences were the highest mentioned by teachers. They are key competences which help and support students according to teachers's opnion. This presents that teachers consider it important that students' thinking is logical thinking, they have to able for effective problem solving, their creativity is the third in the importance level and it is followed by group work.

Kwon-Fardale (2020) developed a multilevel conceptual framework as presented in Fig. 1, in which authors posit that organization norms for voice channels signal to employees about voice consequences in terms of safety and effectiveness, but that these norms are established at least in part by societal-level cultural values.
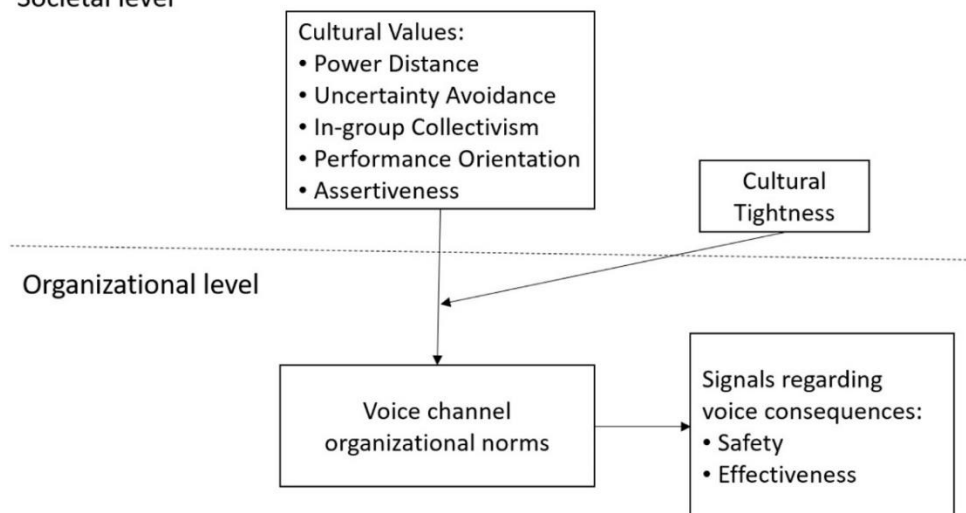
Figure 1: Multilevel conceptual framework of employee voice signals

Source: Kwon-Fardale (2020)

4 Conclusion

Author came to the conclusion that the concept of assertiveness is one of the first concepts to be clarified and taught. The meaning of assertiveness and its areas of applicability are not necessarily widely recognized in the middle school age group. Among the students participating in higher education, there was no question about the applicability of the concept. Analyzing the answers received, it can be stated that the students interpret the concept correctly and broadly.

The results of the research clearly show that, in the case of business education, there is a strong emphasis in secondary education on the development of the key competences that are most needed to start and run a successful business according to today's market expectations. The importance of financial and labour law skills, as well as business planning and negotiation skills, is seen by both teachers and students as unquestionable today when it comes to starting a business.

Author believe that the results show that there is a growing emphasis in secondary education on so-called 'life education', on imparting knowledge dictated by real market expectations and circumstances, which is welcome. However, we believe that the way in which such knowledge is imparted should be tailored more to the needs of the students and that generation-specific, differentiated solutions, rather than standardised solutions and methods, are absolutely the most effective way to achieve this.

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European Union and Globalization. A data-mining analysis using KOF Globalization Index

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Abstract

Research background: The phenomenon of globalization is making its presence felt more and more in various fields and aspects of life, this influencing in a positive way the lives of all.

Purpose of the article: In the present paper, the authors describe the main factors that determine the phenomenon of globalization, identifying for each the main characteristics. They create also cluster groups the for the EU countries based on data provided by the KOF Swiss Economic Institute regarding the main factors.

Methods: The data provided by this institute cover a number of factors such as trade, financial, interpersonal, cultural and political to determine a general index at the country level in terms of the degree of globalization for each. Based on the main factors, a data mining analysis is proposed to identify a grouping of European Union (EU) countries.

Findings & Value added: Following the analysis, the clusters that group the EU countries that are similar in terms of the factors considered were identified. At the end of the article are presented the main findings and the discussion section.

Keywords: *globalization; globalization factors; European Union; cluster analysis*

JEL Classification: *F01; F63; I31*

1 Introduction

In the last few years, the technological process has known a very high development (Alpopi et al., 2018; Popescu et al. 2021). This has allowed people to travel abroad more easily and to exchange ideas, information and to create stronger connections in order to develop new and more complex businesses (Burlacu et al., 2021a, b). In this context, the globalization appears as a consequence and it can be define as a process inside of which goods, services, information, knowledge, know-how and ways of improving the quality of life are identified, designed and developed using people and resources from all over the world (Sarbu et al.,

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2021). Although, globalization has improved very much the economic growth for many countries, providing consumers with a lot of products and services choices and also with lower prices (Pisani, 2009).

Also, according to Kolb (2021) and Obstfeld (2020), globalization may be used to describe and to identify the growing interdependence of the world's economies, cultures, and populations, brought about by cross-border trade in goods and services, technology, and flows of investment, people and information.

In EPS (2022), there is described an evolution of the globalization process, meaning that the today's process has undergone changes to process that took place a few years ago. Some trends that are changed for the globalization process and become more predominant would be: tangible flows of physical goods are overcome by intangible flows of services and data; the demand for more and more diverse services and goods is replaced with demand for more fair and equitable trade, sustainable and local products (Radulescu et al., 2020); flows mainly between developed economies replaced by greater participation by emerging economies and big cities (Bran et al., 2020); the flows that were driven by multinational companies and countries now have a greater participation of the small enterprise and companies, start-up business, non-state actors and individuals, etc. (Profiroiu et al., 2020). Papers like (Banks et al., 2019; Padhan et al., 2022; Liu et al., 2022) are also debating these aspects.

2 Factors of globalization

With the removal of barriers through technological and informational development, the growth and transformation of the globalization process took place. This growth is due to factors such as (IqualifyUK, 2022; Moghadam, 2021): increased international trade, international economic integration, socio-cultural similarities, cross-border political influence, financial freedom degree, global education sources, digital evolution, need for economies of scale, represented in Figure 1. A short description is offered for each one, respectively:

- increased international trade - due to the easy collaboration between companies located in different parts of the world, business and international exchanges are much easier. Also, the image of some products has come to be recognized worldwide, without necessarily having to adapt to the specifics of the country in which they are sold (egg. Pepsi, McDonald's);
- financial freedom degree - the degree of digital interconnection between countries has allowed financial processes and transactions to be carried out much more easily, regardless of the currency of the countries. For example, an employee in the USA can easily access a training course in France in a certain field, the payment being made online, the conversion from one currency to another being done automatically;
- socio-cultural similarities - Due to the access to information from sources that are accessible globally, the culture of one country begins to resemble that of other countries, the information to which they are exposed being the same. For this reason, elements that in the past were inconceivable to be made or worn are now accepted and adopted;
- cross-border political influence - the strategies and policies of many countries tend to support trade and increase influence in other countries. For example, in one country, certain services of interest to the population are actually offered by a company that is from another country. Over time, the influence of the country that owns the company will increase in the country where the service is offered;
- international economic integration - some countries tend to emphasize the use of their own services and products to encourage their own economy, while others, through the strategies and policies they pursue, try to integrate their economy into the international

system, thus becoming part of a much larger and more complex which leads to the loss of national identity.

- global education sources - increasing access to online courses, as well as their acceptance on an ever-widening scale, makes it possible for a student to be able to attend a course in another country. Once in the field of work, this student will have a series of skills, while also confronting colleagues from various other cultures with whom he must collaborate;

- digital evolution - through the Internet you can access products and services from anywhere in the world. With the help of mobile devices and using dedicated platforms you can view and purchase a wide range of products and services from around the world. The facilities offered regarding the price comparison, the consultation of product reviews, their return, all these make the transactions, regardless of the country and the distance, to be possible in an easy way;

- need for economies of scale – due to the growing competition, many companies to cut costs end up making products to sell on the global market. Thus, for a product, a similar promotion is made at international level, reducing the costs.
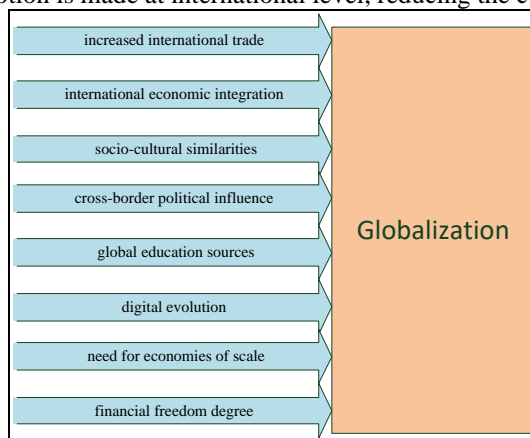
Figure 1. Factors that influence globalization

Source: own processing

All these factors, and not only, have the role of realizing and supporting the process of globalization as a whole. For this reason, it can be said that globalization is a dynamic process, in a continuous transformation, adapting to the needs of the participating countries.

3 Methodology

In order to identify the clusters, a data set was used offered by the KOF Swiss Economic Institute. The main value, the KOF Globalization Index, is computed on a period between 1970 and 2019. All data from the dataset were normalized, meaning that the data were transformed to an index with a certain scale which has numbers between 1 and 100. The value 100 represents the maximum value of a specific variable over the whole data about the countries and the entire period of time. It must to be mentioned that this procedure is named panel normalization, which is different to the one called annual normalization. The overall description of the method and how the data were obtained are described by the authors in (Dreher, 2006) and the dataset can be downloaded from KOF Globalization Index (KOF Globalization Index, 2022). The KOF Global Index for the main regions of the world is mentioned in Figure 2.
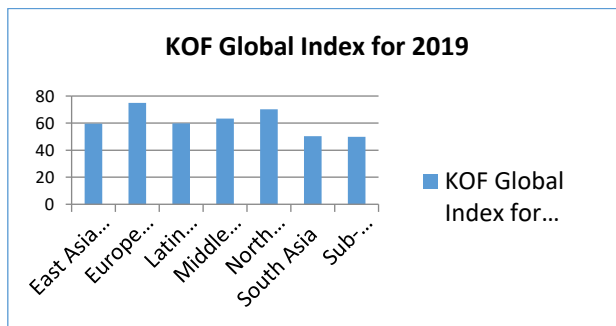
Figure 2. KOF Global Index for 2019

Source: KOF Swiss Economic Institute, (2022)

For this study, there were selected only the countries from the European Union and there were analyzed the KOF Globalization Index and the KOF indexes for trades, financial processes, interpersonal, cultural and political aspects for the year 2019 (the last known values).

After selecting the European Union countries there were selected the factors that are known that have a big impact over the globalization phenomena. These factors are regarding the trades, financial, interpersonal, cultural and political aspects of our daily live.

After the data were selected, the WEKA data mining software was used in order to apply clustering algorithms, namely Simple K-Means and EM (Expectation Maximization). The first algorithm that was used was EM in order to identify more accurate the number of the clusters for the dataset with the countries from UE. After running several times this algorithm, nu identified number of clusters was 4. Using this number of clusters, the K-Means algorithm was used in order to identify the characteristics for each cluster and each country from UE in which cluster belongs.

The meaning of the factors used in order to determine the KOF global index are described in the Table 1 (KOF Globalization Index, 2022).

Table 1. The meaning of the factors comprised in the analysis

Factor name	What takes into account
KOF_GI (Global Index)	All the other factors.
KOF_Trade	Trade in goods and services (%of GDP), trade partner diversity.
KOF_Financial	Foreign direct investment, portfolio investment, international debt, reserves and income payments. All are determined as percent of GDP.
KOF_Interpersonal	International voice traffic, transfers, international tourism and students, migration. All are determined as percent of population.
KOF_Cultural	Trade in cultural gods and personal services. All are determined as percent of population.
KOF_Political	Embassies, UN peace keeping missions, International NGOs.

Source: own processing

Based on these factors, the KOF Swiss Economic Institute has determined the KOF global index for the most important areas from the world for the year 2019. The values for the index are mentioned in the Figure 2.

4 Results

In order to obtain the results, specific data-mining algorithms were applied, respectively EM and Simple-KMeans to determine the number of clusters (groups) in which it would be indicated to divide the EU countries based on the general KOF index and the indexes specific to the analyzed factors, respectively trading, financial, interpersonal, cultural and political. The role of the EM algorithm is to determine the number of clusters in which it is recommended to divide the instances within the data set and this number was four. Then the Simple KMeans algorithm was used having as input parameter the value four (the number of clusters identified by the EM algorithm) to identify the characteristics of each cluster. The results are shown in Table 2.

Table 2. Cluster centroids based on the globalization factors

Attribute	Cluster 0 – 22%	Cluster 1 - 26%	Cluster 2 – 33%	Cluster 3 – 19%
Most representative country for the cluster	Belgium	Austria	Bulgaria	Croatia
KOF_GI (Global Index)	*88.8333*	*86.2857*	*81.6667*	*80.8*
KOF_Trade	77.3333	61.5714	75	77.2
KOF_Financial	92.3333	85.2857	76.3333	84.4
KOF_Interpersonal	85.5	78.1429	72.3333	81.6
KOF_Cultural	90.5	87	77.2222	82.6
KOF_Political	92.5	92.5714	81	62.4

Source: own processing

Regarding the analysis of the obtained clusters, the following can be mentioned:

Cluster 0 (red color in Fig. 3): in this cluster were distributed the countries with the highest general KOF index, this representing the fact that the degree of globalization in terms of factors analyzed is the highest. The global index has a value of 88.8333, the maximum being 100. It can also be seen that the financial factor is one with a very good quotation (92.3333), which means that the ease of making a financial transaction is very high. This is also due to the fact that the euro is used in most countries but also to the fact that the financial systems of those countries are very well interconnected. Countries for this cluster: Belgium, Germany, Denmark, Ireland, Netherlands, Sweden.

Cluster 1 (dark blue color in Fig. 3): in this cluster were distributed the countries that were identified as having a slightly lower degree of globalization than those in cluster 0. However, the general index has a value very close to 86.2857 and also the financial transactions can be done with ease in relation to other countries. From a political point of view, it can be said that cluster 0 and cluster 1 have similar approaches, the score for this factor being 92.5 for cluster 0 and 92.5714 for cluster 1. The biggest difference between these two clusters appears at the factor KOF_Interpersonal. Countries for this cluster: Austria, Czech Republic, Spain, France, Italy, Portugal.

Cluster 2 (green color in Fig. 3): although it has the third global score of 81.66667 largely influenced by the policy of globalization, for the other factors the scores are the lowest in relation to all other clusters. The factors with the lowest values for this cluster are those that concern the financial and interpersonal aspects. For the countries that are part of this group,

it can be stated that they are taking important steps in order to increase their importance on the international market. Countries for this cluster: Bulgaria, Cyprus, Estonia, Greece, Hungary, Poland, Romania, Slovak Republic, Slovenia.

Cluster 3 (open blue color in Fig. 3): is the cluster with the lowest score for the global index, respectively 80.8. However, the countries in this cluster score relatively well in financial, interpersonal, and cultural terms. The scores obtained for the political and trade aspects are lower, and it can be stated that from these two points of view there are still things to improve in view of the globalization process. Countries for this cluster: Croatia, Lithuania, Luxembourg, Latvia, Malta.
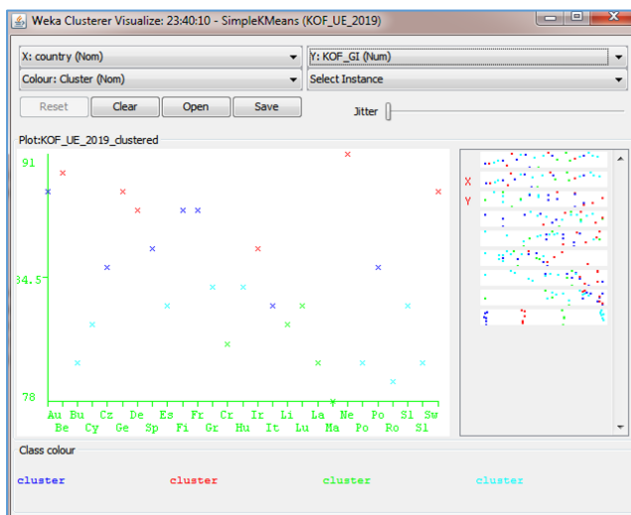
Figure 3. Cluster assignment based on globalization factors

Source: own processing

Figure 3 shows the distribution in the four clusters. Depending on the color code, the cluster to which a country belongs can be identified, respectively the cluster 0 - red, the cluster 1 - dark blue, the cluster 2 - green, the cluster 3 - open blue. The Ox axis mentions the countries and the Oy scale values for the KOF Global Index (KOF_GI). The software used offers the possibility to visualize for each country the values related to each analyzed factor.

5 Discussions

Following the data-mining analysis, four clusters were identified and the countries of the European Union can be grouped taking into account the main factors that influence the globalization process. Although there are differences in these clusters, it can still be said that the values obtained for the global index KOF_IG are relatively high compared to the values for other states in the world. The policies pursued by the EU member states as well as the common desire for close cooperation make the globalization process unfold quickly, in a dynamic manner. The values offered by the KOF Swiss Economic Institute refer to the opening of globalization that a country has in relation to all other countries in the world, not only in the EU.

The process of globalization has created, without a doubt, the context of economic growth in many of the countries around the world. It is based on several factors, some of the most important being analyzed in this paper. However, it can be noted that not all countries are positively influenced and have the same measure of globalization. Some end up having

certain advantages and benefits and others feel effects that they do not want (Woo, 2020; Rudra et al., 2021; Bergh et al., 2021; Flew, 2020). One of the negative effects is that of losing the national identity in the conditions in which a country ends up having nothing specific, to include everything that was traditional with products, services, customs, traditions that are the same everywhere in the world.

6 Conclusion

Globalization is a process that has helped the development of many countries around the world, this being reflected in the variety of products to which buyers have access, payment methods, product comparison, exchange of ideas, experience and technology, giving many people the opportunity to develop a business. However, as a result of globalization, not all countries benefit equally, some being more advantaged than others.

In this paper, a data mining analysis based on clustering algorithms is performed, which has the role of identifying the number of groups into which EU countries can be divided according to the factors influencing the globalization process, as well as the characteristics of each group. Data provided by the KOF Swiss Economic Institute were used for this analysis. The paper described the concept of globalization, the main factors that affect and determine it, described the working methodology and performed data mining analysis for selected data. The data focused on information on the values of the indices of the main factors, namely the global index, for trade, financial, interpersonal, cultural, and political. The paper also contains a section in which the results were presented as well as a discussion section.

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Studying the stakeholders behaviour on internet regarding Electric Cars Post, during COVID-19 Pandemic and during Military Conflict in Europe

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Abstract

Research background: The attractiveness of electric cars is increasing World Wide. More and more drivers choose to purchase hybrid but especially car engines that are propelled by electricity. The rise of attractiveness for such cars, can be explained by the Green Pacts adopted and enforced especially in Europe. Also other factors can influence the embracement of adopting electric cars. Although, due to the military conflict, many countries are switching back to produce electricity by burning coal and use nuclear electric plants, which can pollute in higher degree on the long term if accidents occur.

Purpose of the article: The paper wants to reveal how electric cars are perceived and seen by both actual car owners and potential customers. The cost of purchasing an electric car is high in comparison with the cost of cars propelled by gas, benzene and bio-diesel. We want to discover what kind of feelings different brands of cars, that produce electric automobiles, arouse.

Methods: We appealed to the Zelist Monitor Engine in order to observe the interaction and also the percentage and number of mentions on social media platforms, press, forums, aggregators, blogs, comments and so on.

Findings & Value added: We discovered that Tesla brand is the most powerful brand regarding the appearance on the internet and this can be due also to the fact that their CEO is very well known. What is even more interesting is the fact that Tesla put very little emphasis on ads and especially on marketing in comparisons with the budget that other car brands allocate.

Keywords: *electric cars; social media networks; stakeholders behavior; Tesla*

JEL Classification: *M30; M31; M37*

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1 Introduction

The world is changing and not always in the wanted direction for future generations. Although we have almost overpassed the Corona-19 virus pandemic, with heavy economic losses in many sectors, a new pandemic is on the rise, called Monkeypox, which has been declared to be highest alert over outbreak by WHO. Another important threat is the conflict in Europe, that can lead not only to human life losses due to the war, but also to world hunger, subsequent to the dwindling of exporting grains, gas, electricity and other raw materials by the countries that are in conflict.

Choosing (Shi et al, 2022) electric propelled automobiles, which are less polluting to the environment on the long term, must be necessary, as immediate steps and measures must be taken as quickly as possible. The high time is here, and "now or never" to take action (McGrath, 2022) and not to pass the no turning point to diminish the global warming. The global emissions of CO2 have to peak in three years to avoid (Timperley, 2021) the worst effects of climate change. Even then, technology would have to be developed to remove the greenhouse gas from the atmosphere by mid-century. Clean energy technology has evolved (Plumer and Zhong, 2022) significantly faster than anticipated. Solar panels and lithium-ion batteries for electric vehicles have dropped about 85 percent since 2010, while wind turbines have dropped by more than half.

Electric vehicles are becoming more appealing all across the world. More and more drivers are opting for hybrid vehicles, particularly those powered by electricity. The increased desirability of such vehicles can be attributed to the Green Pacts created and enforced, particularly in Europe. Other variables may also influence the adoption of electric vehicles: cost reduction with charging the car, the "right thing to do", become (Beattie, 2020) an example for the community, relatives and colleagues. Despite (Barbarossa et al., 2017) the fact that other issues might appear like the: lack of infrastructure for charging (Mutarraf et al., 2022) an electric car, charging an electric car takes a longer period of time in comparison with fuel, during winter the consumption of the electricity is higher, so on and so forth. Other important concerns are (Yang et al, 2015) how ecological and environment friendly is an electric car? If sometimes the process of mining the main important chemicals used for the batteries, can (Gebhardt, et al, 2022) pollute much more than extracting petrol. The recycling of the battery may arouse (Suvarnamma et al., 2021) other big issues, like Reduce, Reuse and Recycle, as for the time being, the electric cars batteries cannot be reused and recycled. A distinct matter and probably the most important, is the way and manner the electricity that the electric car uses is produced. As in the case of burning coal or gas and even nuclear plants can mean a more increase in possible pollution, and in this case, can we still consider those cars environmentally friendly on the long term? Of course, other solutions were discovered and we can enumerate few, like the use of Thorium, which is a radioactive element that can be found near tin the surface of earth, oxygen propelled cars, hydrogen propelled engines, etc. The company Laser Power Systems is conducting studies regarding the use (Beissmann, 2011) of Thorium, and their studies demonstrate that with only eight grams, a car can be driven around 1,6 million kilometres.

The article aims to demonstrate how electric vehicles are (Giansoldati et al, 2020) regarded and viewed by both current and future costumers, additionally, all the stakeholders, being a matter of concern (Thogersen and Ebsen, 2019) for everyone. Even delivery companies praise about using electric automobiles (Globisch, et al., 2018) in consideration to nature. We put little emphasis on the classical advertising (Shen et al., 2019). The cost of buying (Larson et al., 2014) an electric automobile is considerable when compared to the cost of cars powered by petrol, benzene, or biodiesel. We want to find out what kind (Barbarossa et al., 2015) of emotions different car manufacturers, which make electric vehicles, elicit.

2 Methods and results

We used the Zelist Monitor Engine to track the engagement as well as the proportion and quantity of mentions on social media platforms, press, forums, aggregators, blogs, and comments, among other things. The brands that we took into analyse were Dacia, Ford, Toyota and Tesla. We have chosen not only the brands, but as well as the electric models as follows: Dacia Spring, Ford Kuga and Toyota Corolla. In figure one, we can see that Tesla has an overwhelming 88,4%, followed by Dacia with 8.6%. Toyota Corolla has 1.7% while Kuga only 1.3%. This can be explained through the fact that Dacia is the national and most popular car in our country. While Tesla is new on the market in comparison with the other brands and due to this fact it is also very intriguing.
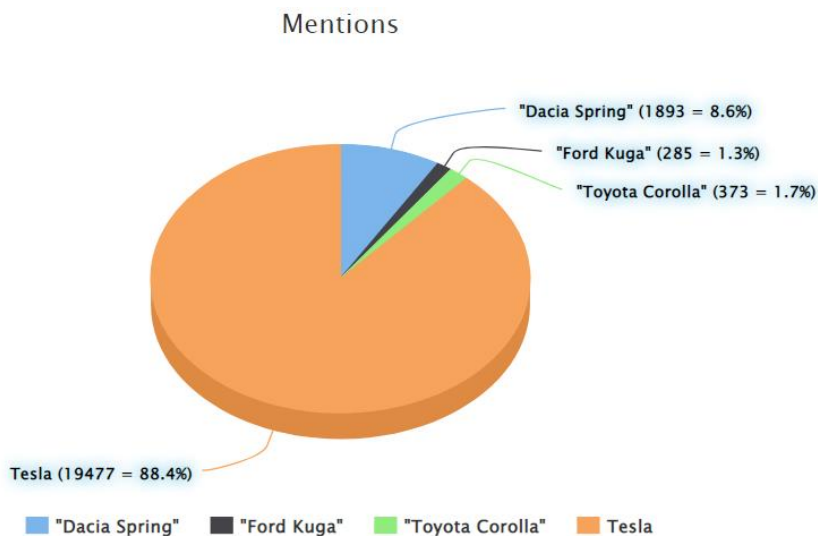
Figure 1. Percentages of Mentions on Internet

Source: own processing

The time line that we took into account was between January to April in comparison with April to July. We can notice that the only significant increase can be seen in the case of Tesla. While the other cars manufactures are constant.
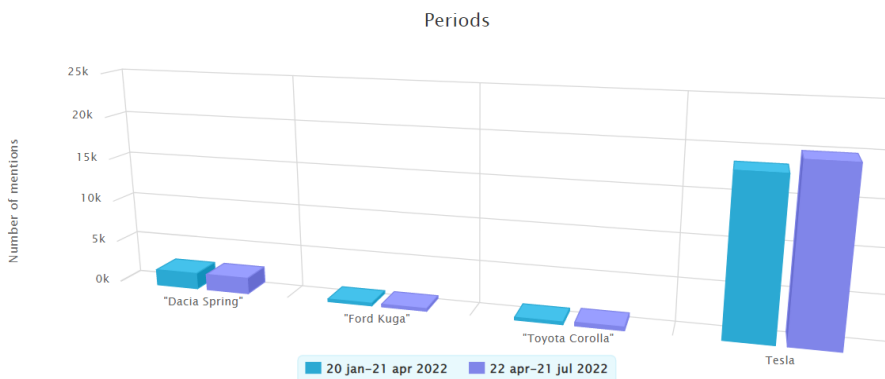
Figure 2. Comparison regarding two analysed periods

Source: own processing

This can be due to the fact that more and more influencers and VIP's did not limit themselves only to the purchase (Kannchen, 2021) of a Tesla vehicle but as well as promoting them on different social media networks which lead to an increase of mentions and comments.

In figure, three we can observe during the entire period analysed how the evolution of mentions have advanced. On the 25th of April was the peak of Tesla mentions which can be explained not due to the performance of Tesla cars, as for the announcement of Elon Musk to purchase the Twitter social media network.
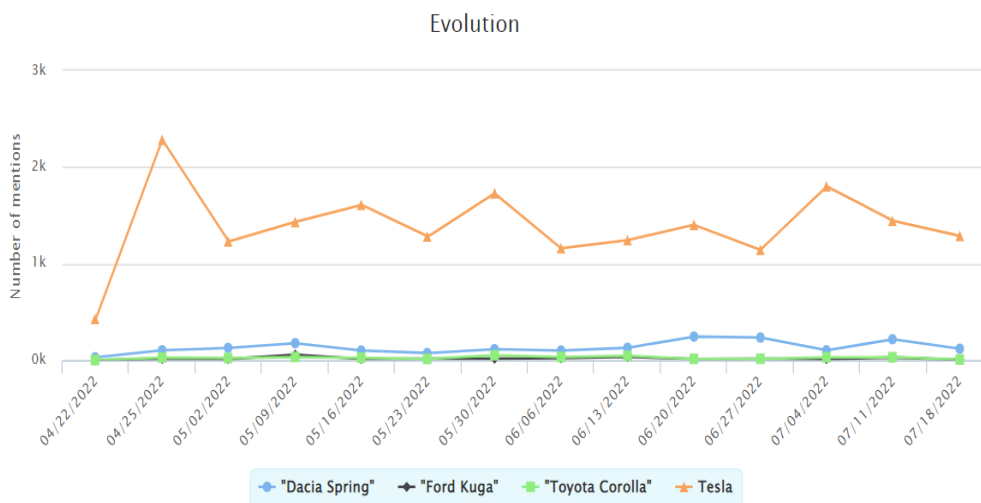
Figure 3. The Evolution of mentions

Source: own processing

In the last figure are presented the feelings generated by the content and comments regarding the four electric car model analysed. In the case of Dacia Spring the feelings dropped from 0.5 to 0.2, in the meantime Toyota Corolla had an increase from almost 0 up to 1 positive attitudes regarding not only the brand as well as for the automobile model.
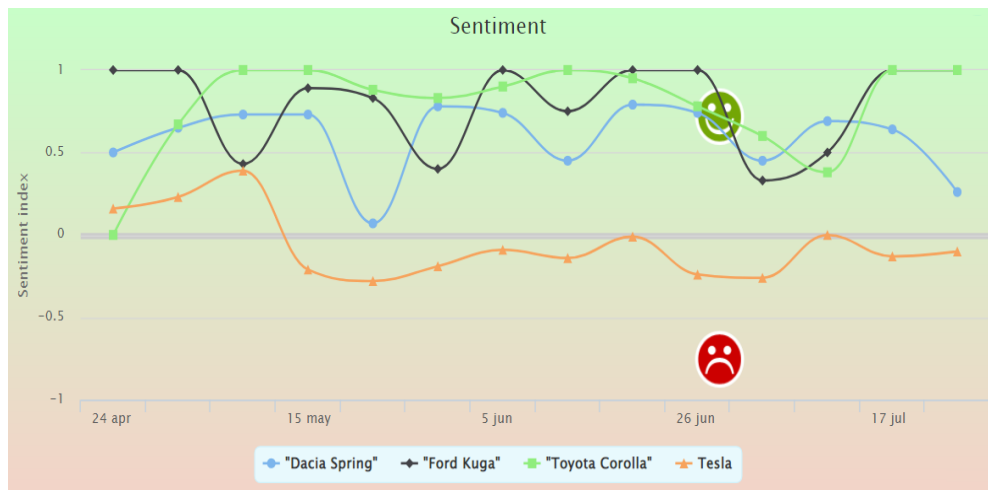
Figure 4. Feelings regarding the four model cars

Source: own processing

Although Ford Kuga had some fluctuations in the analysed period, starting in a positive way it also ended positive. The only car brand that had a down-crease regarding the feelings ,can be observed at Tesla car, as future research can demonstrate if this was due to the statements and news regarding the tumultuous acquisition of Twitter.

3 Conclusions and future discussions

The way companies communicate (Danilecki et al., 2021) with their stakeholders have radically changed in the last years. The best example is the Tesla Company that does (Thomas and Maine, 2019) not put emphasis on marketing, and even furthermore does not allocate budgets for ads in traditional mass media channels like TV, radio and written press; its success proves that things can be done differently. The Tesla Company could not fulfil the demand and it would have been illogic to put emphasis on advertising. The strategy was (Pedros-Peres, et al, 2019) to use social media, either VIP's or influencers, in order to get their products known, but without spending money, or being sponsors for their cars. In 2019, Hyundai Motor Company spent around 2.000$ per each vehicle sold, in comparison (Sun, et al, 2022) with Tesla company that spent around 14 cents for each car sold, but for promotional activities instead of using traditional advertising. The launch of the Tesla cars were conducted flawless, although, when the Tesla Cybertruck was launched, during the event a glitch in the resistance of the windows that were manufactured to be bulletproof, both windows were hit with an iron ball and cracked during the show. Although some said that it was a publicity stunt, as even "bad publicity, is good publicity". Someone stated that marketing for Tesla company is actual their CEO, Elon Musk who has (Pom, 2021) 50 millions of followers, while Ford has around 1.2 million followers, followed by Honda with 1 million and Toyota with 828,000 followers. Future research must be conducted, both quantitative and qualitative in order to discover the degree how the consumer and stakeholders behaviour is influenced (Junquera, 2016) by the traditional advertising versus the social media networks. These kinds of studies should not be limited only to electric cars, as well as for other goods, services, and products and even political parties, NGO's and politicians. The discovery (Franzo et al., 2022) of even less polluted powers to drive cars like Thorium or hydrogen, represent the future.

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E-Government in the Face of New Challenges and Risks: Comparative Approach

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Abstract

Research background: Modern global challenges that have affected the most technologically advanced countries in Europe, North America and Southeast Asia have actualized the task of determining the content and main directions for the digital technologies' development. The digital transformation of government processes in the face of growing strategic uncertainty and global risks has made serious changes to the political and administrative system, modifying, among other things, the processes of providing public services to citizens.
Purpose of the article: The article is devoted to the analysis and evaluation of international experience in the transformation of the world's e-governments in the face of new challenges and risks. The UN e-government survey is the fundamental document on the basis of which this analysis will be built.
Methods: The main research methodology is a comparative approach that allows the author to review the distinctive features of modernization and the problems of e-governments' development in the world under the influence of digitalization in the face of new challenges and risks.
Findings & Value added: As the main result of the study, the author highlights the main trends, problems and risks of digital e-government development, as well as the current strategic initiatives of the UN leading countries in this direction.

Keywords: *E-government; digitalization; public services; digital transformations; risks*

JEL Classification: *O38; O29; L38*

1 Introduction

Digital transformation is one of the national development goals of the Russian Federation until 2030. According to the decree of the President of the Russian Federation of July 21, 2020, as part of this national goal implementation, it is planned to achieve the so-called «digital maturity» of key sectors of the economy and the social sphere, as well as public administration.

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At the same time, mass digitalization also reveals negative consequences for the culture and social image of the country. Thus, the dominant image of culture is radically modified, in which not creativity, but use dominates; erased individual memory. The methods and quality of communications have changed, and network interactions have taken on a new form, integrated with the public Internet space. As a result, the formation of non-institutionalized, virtual forms of political activity took place. This trend contributed to the emergence of new subjects of civil society - network communities with enormous potential for self-organization and mobilization. Political subjectivity, thus, began to make the transition from the institutional/personal principles to the communicative one. The digitized state becomes transparent - open to all sorts of cyber attacks. In turn, a citizen today is not the subject of actions, due to his own will, but, first of all, the object of control - the carrier of an individual cuar code. The picture of the traditional political world, where the elites exercise control over the masses, today turns into an anachronism: the representatives of the elites themselves are objects of control. Thus, it is no longer the state, as a community of citizens, that controls technological programming, but technologies program culture, public consciousness, and with them the social order.

The main research questions of this article are the following: What challenges and risks do e-governments face in the world? How do the world's leading e-governments deal with new threats? What are the specifics of e-governments successfully coping with this task? What effective mechanisms can be used by states, including Russia, to maintain stability and develop e-governments in the face of new challenges and risks?

2 Methods

The basis of this study methodology is a comparative approach, which allows us to identify current trends in the world e-government development, to analyze the successful experience of implementing digital technologies in public administration. As the main source of secondary information, we used the 2020 United Nations E-Government Survey (https://www.un.org/en/desa/2020-united-nations-e-government-survey), which provides a large amount of information regarding the problem being analyzed. The study also used the websites of e-governments of 10 leading countries in the E-Government Development Index (EGDI) ranking and the Open Government Partnership website (https://www.opengovpartnership.org/collecting-open-government-approaches-to-covid-19/#examples), where policies and strategies on digital government strategy are presented.

3 Results

According to the 2020 United Nations E-Government Survey, E-Government is focused on providing accessible, reliable, fast, personalized, secure and inclusive services, and empowering citizens through open and participatory mechanisms.

To date, the leaders in the e-government development are Denmark, the Republic of Korea and Estonia. The top 10 countries also included Finland, Australia, Sweden, the United Kingdom, New Zealand, the United States and the Netherlands. The main evaluation criteria were the adequacy of the telecommunications infrastructure, the human potential for using ICT, the availability of online services and content.

According to the Survey's results, there is significant progress in the use of digital technologies in public administration in the world. A number of countries are implementing improved digital transformation approaches focused on the widespread use of data and increasing the level of citizens' e-participation. The COVID'19 pandemic contributed to the optimization of the processes for providing state and municipal services in electronic form.

Moreover, the pandemic has acted as a trigger for the development of digitalization, causing a surge of initiatives based on digital solutions and cross-industry collaborations.

So, the Open Government Partnership website provides examples of specific digital initiatives aimed at combating the pandemic and its consequences. For example, in China, an open data news platform was created at the initiative of the central and local governments (https://ncov.dxy.cn/ncovh5/view/en_pneumonia). The chatbot eliminates misinformation, updates news in real time, and provides scientific material on the COVID-19 and SARS-COV-2 viruses. Croatian IT companies, in cooperation with epidemiologists, have developed the Andrija application - a digital assistant and online health self-assessment tool - «Virtual Doctor» based on artificial intelligence (https://andrija.ai). A virtual COVID19 hackathon has been launched in Germany, officially supported by the federal government and civil society (https://wirvsvirushackathon.org/). In Singapore, the government created TraceTogether, the world's first social contact tracking mobile app (https://www.tracetogether.gov.sg/). Its implementation has contributed to the development of similar applications in other countries. A significant innovation in this digital age is the Civic Space Guardian (CSG) COVID-19, an initiative by the Directorio Legislativo (CSO) (Argentina) designed to monitor health care regulations and regulations affecting civic space in Latin America and the Caribbean. This is about the ethical component of COVID-19 restrictions. The initiative aims to protect the right to access information, civic participation and freedom of expression.

The study made it possible to identify several trends in the digital technologies development aimed at combating new global challenges to which we consider it necessary to include, first of all, the pandemic, the instability and uncertainty of the international economy and international relations, and the problems of sustainable development:

- Governments around the world have implemented dedicated open data portals or sections on e-government websites dedicated to COVID-19 issues. A number of governments have launched smartphone applications, ranging from information and news to interactive and navigational applications. The main goals in creating such initiatives were to ensure information openness and transparency of the activities of the authorities during the pandemic, increase the level of civic participation, and prompt response to emergencies.

- The importance of interlevel and intersectoral collaborations, cross-regional and cross-border cooperation has increased. Of particular importance in this context is the cooperation of public authorities, business, civil society, scientific schools and technology companies in order to carry out joint actions aimed at combating new global challenges and risks. The practice of sharing successful cases of effective digital solutions has also reached a new level of implementation: initiatives have become more large-scale and centralized.

- The introduction of restrictive measures in the context of a pandemic has actualized the ethical issue of the digitalization process: innovative technologies, on the one hand, create significant potential for improving the quality of life of citizens, on the other hand, help to reduce the amount of personal freedom and strengthen digital control. In this vein, a number of countries have initiated the development of an institutional environment based on a new «digital» ethics and the principle of self-limitation of the introduction of technologies into personal space.

As digital development intensifies, e-governments are also facing other challenges: cybersecurity and data privacy, digital divide, lack of adequate digital infrastructure, limited resources for implementing large-scale digital initiatives, etc. In order to quickly respond to emerging problems, governments are developing strategies for digital modernization and

transformation. Table 1 presents the current strategic initiatives of the leading countries in the UN ranking in the e-government development.

Table 1. Strategic initiatives of the leading countries of the UN e-government rating.

Country (Strategy)	Target orientation	Key Features
Denmark (A Stronger and More Secure Digital Denmark: Digital Strategy 2016-2020)	Provision of basic infrastructure centrally (it links the national government agencies, local government and municipalities to common services and a range of initiatives, projects and solutions such as digital infrastructure, data reuse, data security, digital welfare and digital business solutions.)	The pragmatic approach combined with an ambitious digital agenda for the public sector and a very high degree of trust in authority
the Republic of Korea (The e-Government 2020 Master Plan)	The global leader in online services provision (OSI) and has the highest EGDI value in Asia. Focus on blockchain, AI and big data. The proactive provision of citizen driven services designed to accommodate the specific needs of people, especially those of the most vulnerable groups. Protection of personal data and information, as well as digital security and digital identity.	Data classification and standardization.
Estonia (National Digital Agenda 2020)	Recorded the most significant EGDI increase. Providing a wide range of services online using secure digital IDs, including making payments, accessing full health records, and internet voting.	The development of the information society and increasing cyber security. Orientation to the user (accessibility for all categories of citizens, ease of use, speed of service, minimum of requested information, no payment for services) and effective information exchange (openness of the solutions used, standardization of data exchange procedures, unification of models for describing data and services).
Finland (The Artificial Intelligence Programme, **AuroraAI** program, III Finnish Open Government Action Plan, Programme of Prime Minister Antti Rinne's Government 6 June 2019 Inclusive and competent Finland – a socially,	Building a human-centered digital society in a safe and ethical way with all public services available digitally. Improvement in all three subindices of the EGDI.	Trust as a pivotal factor for successful digital government. High level of citizens' digital skills. Cross-sectoral collaboration. Rapid adaptation of the Government to new circumstances.

economically and ecologically sustainable society)		
Australia (Digital Transformation Strategy (Vision 2025), the Digital Strategy Toolkit)	The highest EGDI value in Oceania. Emphasis on approaches that involve people in the design and implementation of public policies, programs and services. A strong focus on making public agencies user-centric and widening the accessibility of digital services to ensure their availability for all.	National Governments and local-level authorities cooperation (The Strategy and the Roadmap). The integration of Sustainable Development Goals (SDGs) into national policies, strategies and programmes. Strong legal framework.
Sweden (A Sustainable Digitalised Sweden - A Digitalisation Strategy, Putting the Citizen at the Centre,).	Significant expansion of the technical infrastructure. The five priorities are digital skills, digital innovation, digital security, digital leadership and digital infrastructure.	The focus on the government's digitalization policy. A user-centric way of digital services development: simple and secure to use, and easily accessible to everyone. The Nordic-Baltic cooperation on eID.
the United Kingdom (Government Transformation Strategy 2017 to 2020)	Access for all citizens to e-government services with personalized digital IDs, as well as data privacy protection through the Data Protection Act 2018 and the EU GDPR. «Simpler, clearer, faster».	The «gov.uk» portal based on the «build once and re-use» principle, a concept that has become one of the most popular whole-of-government conceptual frameworks for service provision in the world. Reliable legal base. Technology Code of Practice (TCoP), which establishes criteria to help the Government design, build and buy technology; all government departments are required to comply with the mandatory points of the TCoP in the implementation of their technology projects or programmes and are advised to comply with as many of the optional points as possible in order to achieve maximum benefit.
New Zealand (the Strategy for a Digital Public Service)	4 key outcomes: Better results through a digital public service; New Zealanders' experience with government improves; A modern, agile and adaptive public service; A strengthened Māori–Crown relationship 5 digital focus areas: Integrated services for citizens and businesses; Leadership, people and culture; Foundations; Investment; New ways of working	The Government attaches great importance to integrating non government stakeholders in the discussion on the future of the digital economy and digital inclusion. A solid leadership and governance structure for e-government.

the United States of America (Digital Government Strategy, 2016 Open Government Plan)	The Open Data Policy, which aims to increase operational efficiencies at reduced costs, improve services and support mission needs, to safeguard personal information and to increase public access to valuable government information. Achieving efficiency, transparency, and innovation through reusable and open source software	Mobile-first strategies whereby the compatibility of service delivery with mobile devices is given priority (to reduce the digital divide).
the Netherlands (The Dutch Digitalisation Strategy 2.0)	Privacy protection, cybersecurity, digital skills, fair competition.	Own Digital Strategy focusing on ICT development and management of Public Sector, and a common ICT infrastructure that streamlines digital solutions across all institutional levels. A centralized one-stop-shop portal, which provides information about services from all areas of the government. Collaboration between the Ministry of the Interior and various municipalities to create a blockchain coalition to design smart cities with an emphasis on increasing public values both in the society and within political system.

Source: Author's own work

An analysis of the current strategic initiatives of the leading countries in the UN e-government rating development made it possible to identify the following trends in the e-government digitalization:
• Computer literacy and information culture of civil servants and citizens (Denmark, Sweden)
• Widespread digitization (Estonia)
• E-citizen (Estonia, Sweden)
• An ethical way of digitalization (Finland)
• Security (Finland, Sweden, the Republic of Korea, the United Kingdom)
• Centralized multi-channel e-government portal (the United Kingdom, Finland, the Netherlands)

• Digital innovation (Sweden, the United Kingdom, Netherlands)
• Scientific collaborations (the Republic of Korea)
• Strong legal framework (the United Kingdom, Netherlands)
• Interstate cooperation (Denmark, Finland and Sweden)
• Interagency cooperation (Netherlands, Iceland, Singapore)
• Investment strategies (Australia)
• Inclusive Digital Government (the Republic of Korea)
• Usability approach (the United Kingdom)

4 Discussions

An analysis of publication activity for the current year 2022 allows us to conclude that there is a high degree of scientific and practical significance of works on the topic of e-government.

In particular, contemporary researchers are paying considerable attention to the problem of the digital divide, identifying the determinants of existing ICT inequalities and highlighting how the role of new trends in ICT affects the e-government development (Lněnička and Máchová, 2022), as well as exploring the reasons for the reluctance of digitally vulnerable groups (primarily the poor and the elderly) to use various public electronic platforms and ways to overcome this problem (Wong and Ho, 2022).

It is obvious that the COVID-19 pandemic had a significant impact on the e-government development, as well as on other areas of the state and society. Although a number of authors reasonably note that COVID-19 has become an impulse that has accelerated technological development, including in the field of public administration (Grinin et al., 2022; Morte-Nadal and Esteban-Navarro, 2022), an event that highlighted the importance of e-government and the availability of the necessary digital infrastructure in the country (Uwizeyimana, 2022), its other consequence has been a deepening of the digital divide, as the poor cannot access up-to-date information and other electronic resources (Wong and Ho, 2022). Researchers also point to tensions that government officials have faced in implementing e-government policies to support entrepreneurs during the COVID-19 pandemic (Cruz et al., 2022).

Another group of studies published in 2022 is devoted to examining the problem of corruption in relation to e-government. Thus, improving the efficiency of public services through the e-government implementation is seen as a way to fight corruption and promote sustainable development (Castro and Lopes, 2022; Sadik-Zada et al., 2022; Shareef, 2022). The provision of online services is supposed to reduce corruption on the part of both bureaucrats and citizens themselves by limiting the frequency of their interaction (Kalesnikaite et al., 2022).

Other aspects considered by modern researchers include: managing the risks associated with budgetary problems by focusing on improving the effectiveness of e-government in complex financial systems (Lulaj et al., 2022) ; citizen-to-citizen (C2C) e-government (Saylam and Yıldız, 2022) ; application of e-government tools and mechanisms to facilitate and expand civic participation (Tejedo-Romero et al., 2022) ; factors that can influence the intention of citizens to use e-government services (Alomari, 2014; Shayganmehr et al., 2022).

Conclusion

To conclude, it should be noted that a human-centered approach, a developed infrastructure, a dynamic information technology industry, a rich scientific and technical potential, a solid and standardized legal framework, attracting additional investments and strengthening various forms of cooperation contributed to the dynamic development of e-government among the leading countries of the UN rating.

Particular attention in this vein should be paid to increasing the level of citizens' trust in the state and public e-services, as well as strengthening cybersecurity. These measures can guarantee an increase in the level of citizens' digital skills, a reduction in the digital divide, as well as a significant increase in the civil e-participation degree (the case of Denmark, Estonia, Finland).

The results of the study can be used by public authorities to optimize the e-government; however, it is necessary to take into account the nature and territorial features of the state that needs digital changes in the field of public administration. Given the successful experience of the leading countries in the UN e-government ranking, the importance of a comprehensive and permanent digital modernization of all public services should be emphasized.

Acknowledgements

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The importance of risk management for small and medium-sized enterprises in connection with the impact of the COVID-19 pandemic

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Abstract

Research background: The COVID-19 pandemic has affected the entire world, affecting people's way of life and the functioning of enterprises as a whole. The effects of the pandemic disrupted the operational capabilities of SMEs worldwide. Supply chains were interrupted, which affected the operation and development of the world economy. The pandemic can be seen as a global challenge.
Purpose of the article: The essence of the article is to point out the importance of implementing risk management in enterprises. The aim of the authors is also to present the results of their nationwide survey focused on the area of risk management in enteprises, the impact of the COVID-19 pandemic on SMEs in Slovakia and to compare them with the results of other surveys from abroad.
Methods: In the preparation of the article, scientific methods aimed at the analysis and synthesis of knowledge from domestic and foreign scientific and professional sources in the field of risk management were used. An analysis of data from the statistical survey Allianz Risk Barometer, Identifying the Major Business risks for 2021 was carried out. As part of the Grant project of UNIZA, a nationwide survey was conducted.
Findings & Value added: Enterprises were not prepared for the emergence and effects of the pandemic. Enterprises lacked prevention, which can be ensured by implementing risk management into enterprise management. By implementing risk management, it is possible to achieve alignment of the enteprise's management.

Keywords: *business environment, SMEs, impact, COVID-19 pandemic, risk management*

JEL Classification: *L21; L26; M51*

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1 Introduction

In 2019, there was a pandemic of COVID-19, which affected the whole world. It influenced people's way of life, the perception of security, but also the functioning of every state. Each state adopted individual measures that should contribute to limiting the spread of the virus. These measures affected the movement of people, but above all the world economy, as it significantly affected and limited the business environment (Belas et al., 2021). As the pandemic lasts for a long time, the measures were also of a longer nature. The measures caused SMEs, in particular, to have their operations interrupted for several months, as they either had no choice or were unable to meet the set requirements for functioning during the pandemic. Enterprises were not prepared for the emergence of a pandemic and also the persistence of the aforementioned restrictions. Insufficient enterprise resources and lack of prevention have caused several enterprises to disappear (Pedauga et al., 2022; Rodrigues at al., 2021; Wieczorek-Kosmala et al., 2021).

The pandemic can be seen as a global challenge that individual countries are trying to deal with, at the same time they are looking for ways to ensure the operation of society even in the event of another adverse event. However, enterprises will have to deal with the effects of the pandemic for a long time, and not every enterprise is ready for the next change in the environment (Kryeziu et al., 2022; Schepers et al., 2021).

Wysokińska-Senkusa and Gorna (2021) state that risk management is a key process that contributes to improving the efficiency of the enterprise, thus influencing the achievement of objectives. Risk management methods and procedures integrated into the enterprise will enable risks to be identified, analyzed, and evaluated promptly so that the enterprise is then able to propose measures to manage them to an acceptable level. By implementing risk management, it is possible to achieve harmonization of the enterprise's management, which would contribute to its resilience and to ensuring operability even during undesirable situations (Fekete, 2022).

2 Methodology

Several scientific methods were used in the preparation of the article, for example, scientific methods focused on the analysis and synthesis of knowledge from domestic and foreign scientific and professional sources in the field of risk management. Furthermore, an analysis of data from the statistical survey Allianz Risk Barometer, Identifying the Major Business risks for 2021, which focused on the most significant threats in the world and the most important global business risks for 2021 - created by Allianz *(Allianz Global Corporate and Specialty)* (Allianz, 2021).

As part of the UNIZA Grant project entitled: *Risk management model in connection with the impact of the COVID-19 pandemic on the business environment in the Slovak Republic*, a nationwide survey was conducted focused on the interruption of business operations due to the COVID-19 pandemic and the identification of the impact of the pandemic on SMEs in the Slovak Republic. The results of the survey were obtained using a questionnaire distributed among SMEs in the Slovak Republic. The questionnaire consisted of 22 questions, which were oriented to the issue of risk management and the current situation associated with the COVID-19 pandemic, which mainly affected the business environment of SMEs in Slovakia.

The questions can be divided into 3 main areas covered by the questionnaire, namely:
- general questions (aimed at classifying respondents into individual groups according to the business sector, number of employees, duration of business),
- questions related to the current situation associated with the COVID-19 pandemi

- questions focused on risks that enterprises may encounter during their activities on the market (questions focused on risk management within the enterprise).

3 Results

In this chapter, we would like to present the results of our nationwide survey, which we will compare with the results of surveys from abroad.

359 enterprises/respondents from 1145 questionnaires sent out during the ongoing COVID-19 pandemic in 2021 took part in the nationwide survey. In terms of the number of employees in the enterprise, the following participated in the survey: 179 (50%) micro-enterprises, 122 (34%) small enterprises, and 58 (16%) medium-sized enterprises. Considering the sector in which the enterprises operate, the following participated in the survey: 67 (19%) enterprises from the business services sector, 38 (10%) from construction, 12 (3%) from agriculture, 28 (8%) from transport and information, 36 (10%) from industry, and the largest representation had businesses from the field of accommodation and catering 75 (21%) and other services 103 (29%).

Recently, the external environment of enterprises has been disrupted by various factors that have affected the business environment of enterprises. As part of a nationwide survey, we found out which of the listed factors of the external environment enterprises consider being the most significant influencing their operability in 2020. Given this question, respondents could choose from options such as Cyber incidents, Political risks, and violence, Business interruption, Changes in legislation and regulation, Pandemic, Natural catastrophes, Climate changes, Market developments, Fires, and explosions, Macroeconomic developments, or they could give their answer. The selection of options was processed according to Allianz Risk Barometer, 2021 (Figure 1).
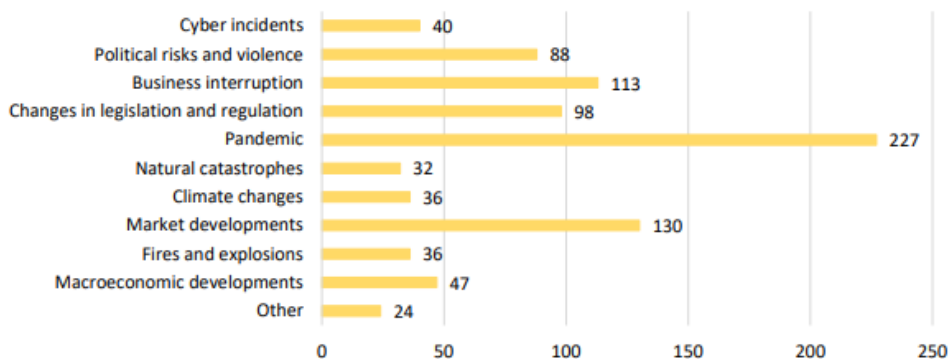
Figure 1. Answers from a nationwide survey to the question: Which of the listed factors of the external environment do you consider to be the most significant influencing the operability of enterprises in Slovakia for 2020 (Please give a maximum of three answers

Source: author (2022)

For the most significant factors of the external environment that affected the operability of enterprises, the respondents evaluated the Slovak Republic (TOP 3) for the year 2020 as follows: Pandemic, Market developments, and Business interruption.

The largest number of 227 respondents said that the current situation associated with the COVID-19 pandemic is for them the most significant factor that affected their operability. Significantly higher numbers were also represented by answers such as Market development selected by 130 respondents and Business interruption by 113 respondents. The least significant factors were identified as Natural catastrophes with 32 respondents, Climate changes selected by 36 respondents, and Fires and explosions with the same number of

respondents. In the case of other answers, several businesses also gave answers such as poor construction, lack of offers on the market, and health status of the population (Figure 1).

Summary: The COVID-19 pandemic has significantly affected the business environment in Slovakia. SMEs in Slovakia perceive the pandemic as one of the most significant factors that affected their operability in 2020.

A similar survey was conducted between October and November 2020. It is an annual survey of Allianz customers focused on business risks. 2,769 respondents from 92 different countries and territories (enterprises from 22 industries) took part in the "Allianz Risk Barometer" international survey. As a result of the survey, the most important global business risks for 2020 were identified. In Table 1, we can see the 3 biggest threats (3 most frequent answers) within the individual countries participating in the survey (Allianz, 2021).

Table 1. TOP threats around the world

Selected countries	TOP threats around the wolrd		
	1st place	**2nd place**	**3rd place**
Australia	Pandemic outbreak (45%)	Business interuption (42%)	Changes in legislation and regulation (38%)
Brazil	Cyber incidents (47%)	Business interuption (46%)	Pandemic outbreak (29%)
Canada	Business interruption (47%)	Pandemic outbreak (41%)	Cyber incidents (37%)
China	Pandemic outbreak (36%)	Business interuption (33%)	Changes in legislation and regulation (33%)
France	Cyber incidents (50%)	Business interuption (44%)	Pandemic outbreak (42%)
Germany	Business interruption (50%)	Cyber incidents (48%)	Pandemic outbreak (35%)
India	Cyber incidents (56%)	Business interuption (39%)	Pandemic outbreak (38%)
Italy	Cyber incidents (54%)	Business interuption (45%)	Pandemic outbreak (28%)
Japan	Cyber incidents (47%)	Natural catastrophes (47%)	Business interruption (37%)
Nigeria	Pandemic outbreak (38%)	Cyber incidents (32%)	Macroeconomic developments (31%)
Russia	Pandemic outbreak (53%)	Business interuption (40%)	Changes in legislation and regulation (33%)
Singapore	Business interruption (53%)	Cyber incidents (47%)	Pandemic outbreak (43%)
South Africa	Cyber incidents (48%)	Business interuption (39%)	Pandemic outbreak (29%)
Spain	Cyber incidents (58%)	Pandemic outbreak (43%)	Business interruption (42%)
Uk	Pandemic outbreak (44%)	Cyber incidents (42%)	Business interruption (41%)
USA	Business interruption (46%)	Pandemic outbreak (41%)	Cyber incidents (33%)

Source: according to Allianz Global Corporate and Specialty, 2021

The three most significant business risks include Business interruption, Pandemic outbreak, and Cyber incidents (Figure 2).
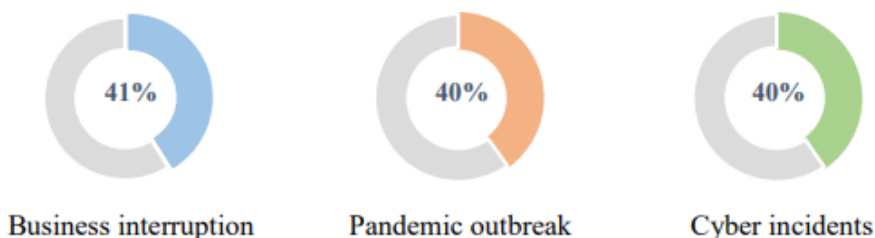
Figure 1. Three the most important global business risks for 2021

Source: according to Allianz Global Corporate and Specialty, 2021

Summary: Based on the presented surveys, we can conclude that Pandemic and Business interruption are ranked in the first 3 places as the most significant threats affecting the business environment of enterprises in 2020 in Slovakia and abroad. The COVID-19 pandemic was and is global. We could see its effects in every environment, with the main impact being on the business environment. The adopted anti-pandemic measures caused the very interruption of business operations (Sarker et al., 2022).

The perception of the pandemic as well as the measures taken related to it can be individual depending on the nature of the enterprises, the number of resources, and the ability of the enterprises to deal with an unexpected situation (preparedness of the enterprises for an unwanted change in the environment) (Gregurec et al., 2021). As part of a nationwide survey, we found out how businesses perceived the COVID-19 pandemic and the measures taken by the government, and restrictions on doing business within SMEs in Slovakia. Of the 359 respondents interviewed, 96 enterprises answered that the pandemic had a rather positive character, and up to 239 enterprises (respondents) perceive the pandemic and the measures rather negatively (Figure 3). Based on these answers, we can evaluate that SMEs in Slovakia perceive the COVID-19 pandemic predominantly negatively.
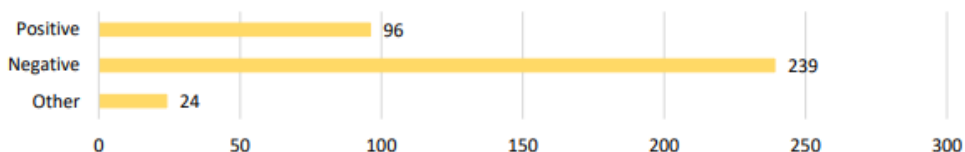
Figure 2. Answers from a nationwide survey to the question: How do you perceive the effects of the COVID-19 pandemic and the measures taken by the government, and restrictions on your business?

Source: author (2022)

24 respondents gave other answers, which are rather such a supplement to the answers. In the case of other answers, the enterprises responded as follows: they stated that the pandemic did not affect the enterprise; they added that the measures were and are chaotic; some also stated that they had to introduce their own internal rules, as the state ones were not sufficient; globally, they are evaluated more positively, but the measures were presented chaotically, unconceptually and often late; the measures did not affect them.

Summary: Among 359 respondents, 66% of SMEs in Slovakia perceive the COVID-19 pandemic and the measures taken to mitigate it as negative. At the same time, 27% (respondents) of SMEs in Slovakia perceive the COVID-19 pandemic positively. 7% of respondents gave other answers.

In Figure 4, we can see the answers to a question from a nationwide survey aimed at identifying the readiness of enterprises to manage the COVID-19 pandemic. Respondents

could choose from 5 options, where 1 meant that they were prepared for the pandemic, and in the case of 5, they were not at all prepared to handle the pandemic.
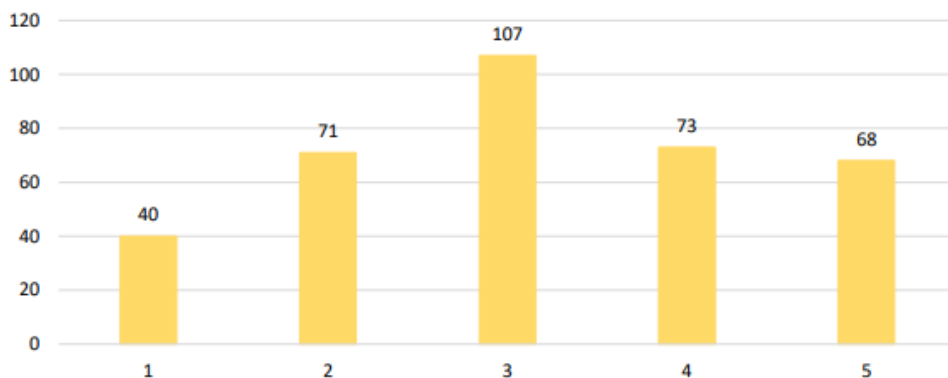
Figure 3. Answers from a nationwide survey to the question: Were you prepared for handling the COVID-19 pandemic (1 - definitely yes, 5 - not at all)?

Source: author (2022)

68 respondents assessed that they were not at all prepared to manage the COVID-19 pandemic, and 73 respondents rather did not manage the situation. 107 enterprises did not favor either option, rather yes or no. 71 respondents said that they managed the situation rather well and 40 respondents say that they managed it.

Summary: Enterprises did not expect the emergence of such a situation associated with the COVID-19 pandemic and the measures that were taken to mitigate it affected the functionality of enterprises' operations. On the other hand, it is necessary to think about managing such a situation and managing an enterprise during a pandemic. It follows from the answers (Figure 4) that SMEs in Slovakia were not prepared to manage the pandemic and coping with the impacts will be difficult for them.

4 Discussion

The survey shows that enterprises were not prepared for the emergence of a pandemic and the pandemic caused negative impacts on the business environment, especially on SMEs in Slovakia and abroad. The process of building and implementing risk management in enterprises includes the possibility of solving identified problems in the area and at the same time ensures the readiness of managers for these problems. The need to implement risk management is directly demanded by the current situation associated with COVID-19. By introducing risk management, it is possible to harmonize the management of the enterprise, as well as to contribute to the creation of its resilience and operability during undesirable and negative situations. The role and purpose of risk management are to ensure the continuity of all operational processes of the enterprise. By implementing them, the flexibility of the enterprise to respond to various changes in the environment, as well as the continuity of the enterprise's activities, would be achieved (Caballero-Morales, 2021).

The advantages of implementing risk management into enterprise management (Al Qubtan et al., 2021; Crovini et al., 2021):

- emphasis on prevention, planning, and preparedness – preventive measures, improving response to crises – crisis management,
- improving the coordination of the enterprise's activities - communication between individual interested parties and customers,

- continuous monitoring of activities - evaluation of the correctness, timeliness, and implementation of activities, such as monitoring the development of sales,
- overall improvement of the organizational structure of the enterprise - effective preparation of the enterprise for any type of crisis.

Risk management can be implemented in enterprises through the ISO 31000 Risk management - Guidelines standard, which contains guidelines for risk management for enterprises. It is a document that provides guidance on effective risk management and supports the integration of risk management into significant business activities and functions (ISO 31000).

5 Conclusion

At present, enterprises are exposed to a lot of pressure caused by the COVID-19 pandemic, which is why many enterprises are still in existential danger, and that is why we would like to draw attention to the importance of implementing risk management in enterprises. At the same time, enterprises should try to educate their managers and employees in the field of risk management. Risk management is a suitable tool for ensuring the operability of enterprises and the very efficiency of processes in enterprises. By systematically applying management procedures and risk management practices, it leads to an improvement in the process of establishing the enterprise's strategy, an increase in the probability of achieving economic, social, and environmental goals, as well as an improvement in the decision-making process. Risk management is a prerequisite for the sustainable development of the enterprise, as well as the improvement of economic, social, and environmental security (Fekete, 2022; Przetacznik, 2022).

Acknowledgements

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Global impact of the COVID 19 pandemic on the marketing communication of companies

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Abstract

Research background: The COVID-19 pandemic is affecting everyone around the world and from a business perspective, it has put everyone in a difficult situation. In times like these, it is a priority for organizations to create strong relationships with both employees and consumers. Every crisis situation forces companies to make significant changes in their corporate cultures or interactions with customers. One of the successful strategies is the use of marketing communication in connection with empathy. Advocacy of common interests and understanding of a difficult situation are perceived by customers as help to get out of difficult times of crisis together.

Purpose of the article: The main aim of the article is to determine the global impact of the COVID 19 pandemic on the marketing communication of companies. This also includes providing the theoretical background and analysis of the marketing communication during COVID 19 pandemic from the viewpoint of Slovak and foreign authors.

Methods: General scientific methods were applied for the processing of the data as well as mathematical-statistical methods to evaluate the data collated from the results of the questionnaire survey and to statistical hypothesis testing. The important source for secondary data was scientific researches, annual companies reports, statistical databases, published professional publications. In order to found out the impact of the COVID 19 pandemic on the marketing communication of companies, a questionnaire survey was conducted.

Findings & Value added: Based on the analysis and results of the questionnaire survey, measures for effective marketing communication during crisis are proposed in the context of sustainable business.

Keywords: *marketing communication; COVID 19; global impact; sustainable business*

JEL Classification: *M31; F60; Q01*

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1 Introduction

A crisis is a present and significant social phenomenon that can threaten the existence of a company or its goals, regardless of the will of a person. A period of crisis for a company usually represents a type of illness that is not easy to predict, and it is up to the company to resolve these unexpected changes, either in social or economic conditions. The normal operation of the company is disrupted, and extraordinary means must be used to eliminate them. Not only the material condition of the company is at risk, but the impact on the interests and goals of the public and the parties involved is also uncertain. However, a crisis is also a moment that can be followed by a fundamental change in the development of the company, and precisely the crisis communication taking place both within the company and outside it, can be a means of healing for the company (Telang and Deshpande, 2016).

Terms such as global, economic or financial crisis are known worldwide, and each crisis has its own special development, which is mainly influenced by the type of crisis, different conditions, but also by the country where it occurred. The causes of a crisis in companies can be different, influenced by the internal or external environment. Accordingly, the response of enterprises is divided into passive macro-reaction and active micro-reaction. The passive reaction represents waiting for the establishment of regulatory rules or financial assistance from the state, while the active reaction is aimed at managing the company even during a crisis situation and looking for possible alternatives for application. Businesses with an active micro-reaction gain a competitive advantage over businesses that do not show themselves on the market in any way and try to attract potential customers to their fearlessness and adaptability.

Already, Kotler and Caslion (2010) responded to market turbulence and began to challenge businesses that wanted to succeed to accept new emerging ways, strategies, and changing market conditions. And thus, the optimal reaction for companies that find themselves in a crisis is to adapt to the situation and change the strategy related to the mere survival of the company on the market – going concern.

The COVID 19 pandemic has become a crisis that none of us certainly expected. It affects everyone across the globe and from a business perspective, it has put everyone in a difficult situation. In times like these, it is a priority for organizations to create strong relationships with both employees and consumers (Bishnoi & Singh, 2021; Omar et al., 2021).

Companies that until now did not have a crisis management system understood the necessity of such a team and due to the goal of ensuring business continuity, incorporated its operation into their part. The basic duties of the crisis team certainly include the development of a strategy responding to the crisis and informing employees, consumers and the media. Another important duty is to ensure work from the comfort of home for positions where it is possible or to ensure the health of everyone in the workplace.

In the era of the pandemic, companies also had to deal with marketing, since it is the most important tool for companies, both for the company itself and for customers.

Everyone was forced to spend some time researching and getting to know their customers in order to target them in the most effective way possible (Hitka et al., 2019; Vrtana et al., 2021). In their strategy, many of them also incorporated several tools of digital marketing communication and through them reached the general public (Kliestikova et al., 2019a).

Based on this situation, several elements came to the fore in marketing communication that can ensure the efficiency and credibility of companies for customers:

- Confidence in one's own mission – in times of crisis, the mission and basic value of the company is precisely communication. It is through it that individuals should get enough information and learn effective mutual friendliness.
- Using the right tone – businesses that are used to communicating with customers more benevolently are advised to adopt a more serious and appropriate brand tone.

It will bring added value for consumers in the form of understanding and showing that they are in the same situation. In this case, empathy can be more than just the face of the brand.

- Clarity – in times of uncertainty, it is important for people that company communications are not subject to the chaos surrounding them but provide clear and concise information that has real benefits.
- Honesty – more than ever before, customers trust their safety and health, which also affects the information provided by businesses. Basic compliance with hygiene procedures and countermeasures has an impact on the overall perception of companies and affect their purchasing behaviour.
- Timely updates – in times of crisis it is important to follow the right interaction with the customer. Fast communication, for example, when closing or reopening establishments is more than useful for consumers nowadays, and this information is a real benefit for them (Goyal and Srivastava, 2021).

The ever-developing digitization has a huge impact on the penetration of e-shops, especially during a crisis (Kliestikova et al., 2019b). The pandemic offered businesses an opportunity to develop faster and consider current approaches. The trend of online shopping was also supported by the digitization of retail stores, and during the pandemic, people were forced to buy life-important necessities or food in this way.

Companies thus joined the competitive battle for customers through the online space (Podhorska et al., 2017). Every crisis situation forces companies to make significant changes in their corporate cultures or interactions with customers. One of the successful strategies is using marketing communication in connection with empathy. Advocacy of common interests and understanding of a difficult situation are perceived by customers as help to get out of difficult times of crisis together. (Gurkaynak et al., 2011)

2 Methods

The main aim of the paper is to determine the global impact of the COVID 19 pandemic on the marketing communication of companies. This also includes providing the theoretical background and analysis of the marketing communication during COVID 19 pandemic from the viewpoint of Slovak and foreign authors. The important source for secondary data was scientific researches, annual companies reports, statistical databases, published professional publications. In order to found out the impact of the COVID 19 pandemic on the marketing communication of companies, a questionnaire survey was conducted. Based on the analysis and results of the questionnaire survey, measures for effective marketing communication during crisis are proposed in the context of sustainable business.

General scientific methods were applied for the processing of the data as well as mathematical-statistical methods to evaluate the data collated from the results of the questionnaire survey and to statistical hypothesis testing. The important source for secondary data was scientific researches, annual companies reports, statistical databases, published professional publications.

The aim of the questionnaire survey was to analyse the perception of marketing communication of companies during crisis by Slovak consumers, while we focused on retail chains operating in the global market. The sample size was determined using the Sample Size Calculator that forms part of Creative Research Systems´ survey software and which is provided as a public service. The calculator determines how many respondents need to be interviewed in order to get results that reflect the target population as precisely as possible. This is necessary to avoid any distortion in the survey information. The process requires a base file to work from, which in this case consisted of population data for the Slovak

Republic. The confidence interval was set at 5%, with a confidence level of 95%. This means that for the questionnaire survey a 5% margin of error is assumed. The sample size calculated by the calculator was determined to be 384 respondents. In total, 562 respondents participated in the questionnaire survey.

The questionnaire survey was conducted in January 2022. The selection of the respondents in the sample set took place at random and was based on the number of Slovak inhabitants aged 18 and more. The quantitative assessment method was applied to the processing of the information obtained from the questionnaire survey. The data were processed empirically in the form of percentages, with additional written comments and comparisons.

In order to achieve the main aim of the article, based on the theoretical background and survey results, research hypotheses are formulated:

- Hypothesis 1: More than 50% consumers were satisfied with marketing communication of retail chains during crisis.
- Hypothesis 2: More than 50% consumers followed their favourite retail chains on social networks during crisis.
- Hypothesis 3: More than 50% of consumers gained information from the online leaflets on the website or mobile application during crisis.

Marginal rate 50% was set as the expression of the simple majority (Macfie and Nufrio, 2006).

Statistical hypotheses testing is defined as a statement of the assumption of unknown parameters in the basic set, which is formulated as a statistical hypothesis and its validity is verified by statistical procedures based on selection characteristics. The role of statistical hypotheses testing is to decide whether to accept or reject the hypothesis regarding the basic set-in accordance to the information from the available choice. In verification of the hypotheses, the methodology of statistical hypothesis testing consisting of the following steps was met (Rimarcik, 2007):

1. Formulation of the null hypothesis (H0).
2. Formulation of the alternative hypothesis (H1).
3. Determining the level of significance (α).
4. Calculation of test statistics and probability.
5. Decision.

The test statistic for hypotheses 1 – 3 we calculated by using the method testing a single proportion by one-tailed testing because it is commonly used (Ruxton and Neuhauser, 2010; Lombardi and Hurlbert, 2009). Significance level α was determined at 0.05.

3 Results

Of the 562 respondents in the sample set, 321 (57%) were female and 241 (43%) were male. The results of the questionnaire survey show that 58% respondents were satisfied with marketing communication of retail chains during crisis. 53% respondents followed their favourite retail chains on social networks during crisis, especially on Facebook and Instagram, less on YouTube. The results of the questionnaire survey show that the most common source of information about retail chains offer during crisis were the online leaflets on the website or mobile application (57%), printed leaflets (15%), advertising on TV or radio (12%) and online advertising (8%).

To verify the statistical hypotheses 1 – 3, we used the method testing a single proportion. Results of verification these statistical hypotheses are shown in Table 1.

Significance level α was determined at 0.05. The test criteria were calculated according to:

$$T = \frac{p - \pi_0}{\sqrt{\frac{\pi_0 * (1 - \pi_0)}{n}}} \tag{1}$$

By using the tables of the normalized normal distribution, we find the critical value for the right-tailed test (2) for hypotheses 1 – 3.

$$T > z_{2\alpha} \tag{2}$$

Table 1. Verification of statistical hypotheses

Calculation of the sample proportion: $p = \dfrac{m}{n}$	Satisfaction of the condition $n * \pi_0 * (1 - \pi_0) > 9$	Test criteria	Critical field	Inequality	Acceptance or rejection of the hypothesis
Hypothesis 1: H_0: 50% consumers were satisfied with marketing communication of retail chains during crisis. H_1: More than 50% consumers were satisfied with marketing communication of retail chains during crisis.					
p = 0.58	140.5 > 9	3.79	1.645	3.79 > 1.645	H_0 rejected
Hypothesis 2: H_0: 50% consumers followed their favourite retail chains on social networks during crisis. H_1: More than 50% consumers followed their favourite retail chains on social networks during crisis.					
p = 0.53	140.5 > 9	1.42	1.645	1.42 < 1.645	H_0 accepted
Hypothesis 3: H_0: 50% of consumers gained information from the online leaflets on the website or mobile application during crisis. H_1: More than 50% of consumers gained information from the online leaflets on the website or mobile application during crisis.					
p = 0.57	140.5 > 9	3.32	1.645	3.32 > 1.645	H_0 rejected

Source: Own processing.

Table 1 shows, that in hypotheses 1 and 3 the inequality applies, so we reject the hypothesis H_0, i.e., accept the alternative hypothesis H_1. In the contrary, in hypotheses 2 the inequality does not apply, so we accept the hypothesis H_0.

4 Discussion

Communication during a crisis is a process by which companies try to find the most appropriate strategy and tactics to manage a crisis situation and at the same time maintain a good reputation and post-crisis image of the company. All available public relations tools are used to strengthen the company's name and help the company cope with a difficult situation. The purpose of crisis communication is to protect the organization from threats to its reputation and from various environmental influences that affect both the company and

everyone around it. At the same time, the effective marketing communication during crisis can help to underline the sustainable business of the company.

Nowadays, thanks to social media, we can also talk about the purpose, which is the greater good and the provision of relevant information. (Chalupa, 2012; Swoboda & Sinning, 2021).

Choosing the right media for conveying information to consumers and guiding them in their purchases is a very important step of the marketing department (Majerova, 2020; Esses et al., 2021).

The company's options include the above line (advertising through primary media) and below line media (addressing through secondary sources). However, crisis situations required more attention and definition of crossline media - TTL (Towards the Line), which were largely influenced by the development of communication media. TTL can be classified as innovative media affecting the general public in a very fast and efficient way.

According to Gurkaynak et al. (2011), recommendations for marketing departments in times of crisis are:

- Focus of crisis management on activities that will be carried out after the end of the crisis.
- Promotional activities aimed at soft (soft) and not at hard (hard) sales - most consumers look for information about products on the Internet via social networks, without being influenced.
- Use of digital marketing.

When compare previously realized research with our survey results, we can find several identical characters.

Based on the analysis and survey results, it is obvious, that the majority of Slovak consumers were satisfied with marketing communication of retail chains during crisis. Primarily, they used the online leaflets on the website or mobile application when gaining information about retail chains offer during crisis. However, the social networks were not used and monitored by consumers to the extent we expected.

5 Conclusions

Marketing communication is the most visible part of the marketing mix and it is important that it is set up to meet the needs of the customers. It is not only in times of crisis that consumers find it necessary to easily access information and to be able to participate in the company's activities, at least to some small extent. We live in an era of innovation, and the development of every area is remarkable. It is increasingly necessary move with the trend and be part of a community with the same interests.

Awareness of sustainable business in retail chains built through modern options that are increasingly being offered today will also bring people who preferred other forms of sales into business operations. The mentioned forms of marketing communication can ensure customer loyalty, as well as the fact that they will feel part of the brand, and they themselves can spread their experiences to others. By increasing promotion and using the right methods, the image of the company will be built even more, which will ensure a sufficient position in the market and the attention of the competition. In this case, we can talk about the achieved goal, which is to keep your customers and reach new ones.

The outcomes of the research provide the overview of the perception of marketing communication in companies during crisis, which can be considered as a main theoretical benefit of the article.

The issue of global impact of the COVID 19 pandemic on the marketing communication of companies has the potential for deeper research in the future - both qualitatively and quantitatively. To obtain statistical relevance, it would be appropriate to investigate the

findings of qualitative research quantitatively. For expanding knowledge and in order to gain a better overview in this issue, it would be appropriate to examine and compare the impact of the COVID 19 pandemic on the marketing communication of companies in different countries, possibly its perception by different generations of consumers.

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Industry 4.0 and lean manufacturing techniques in global value chains

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Abstract

Research background: In the context of global value chains, we have chosen this topic for a more in-depth analysis of the relationship between lean production processes and the most recent trends of Industry 4.0. This relationship has significant implications for many countries, particularly the Slovak Republic, which has been dotted with automakers for many years.

Purpose of the article: The study's objective is to examine the prospective synergy between I4.0 technologies for production management and lean manufacturing concepts. Each of these words' definitions has been given, and the relationships between them have been theorised about. The guidelines for integrating I4.0 equipment into lean manufacturing processes were then explained.

Methods: Two fundamental research components were employed in addition to a variety of analyses, syntheses, comparisons, and analytical approaches: statistical analysis and visual analysis. The effort contains data from the Bosch corporation in addition to data from the automakers Toyota and PSA.

Findings & Value added: The previously described fusion of these two principles is what gives the work its significance and additional worth. It is feasible to make this connection and doing so can greatly improve both the output's quality and speed. Several actions that are also part of this task must be followed in order for this production to go well.

Keywords: *globalization, Industry 4.0, lean production, global value chain, automotive industry.*

JEL Classification: *A11; C10; O32*

1 Introduction

All prior development processes, such as the deepening of internationalisation and integration, the expansion of interdependence and transnationality, as well as the international specialisation and cooperation, have led to globalisation becoming a determining factor in the expansion of national economies. This trend has been accelerated by recent advances in science and technology to the extent that a new economic structure is

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required to effectively utilise them. The topic of globalisation is related to a number of worries. Global industry and value chains are crucial to global trade because they enable deeper integration of developing nations, the eradication of poverty, and the emergence of new opportunities for manufacturing, innovation, and employment (Balaz et al., 2020). As was already stated, the overall effects of globalisation are positive for ecological cooperation, enhanced working conditions, and long-term economic prosperity. But due to its incredibly convoluted structure, lack of transparency, and diminished commitments, there may be an increase in violence, risk of political violations, legal and environmental crimes, and tax fraud (Minarik et al., 2022). A new era of rapid advancement in robotics, autonomous vehicles, and huge digitization of the production and logistics processes has begun for humanity. There has never been a greater rate at which new technologies are developed and integrated into daily life, which inevitably raises the crucial question of what place man will hold in such a society. Will it continue to function in the future production system, or will a mechanically superior gadget that can solve issues more effectively, more affordably, and more quickly based on the analysis of production data replace it? The position of Industry 4.0 in the prevalent lean production methodology utilised by most automakers will be covered in the paragraphs that follow (Kolberg et al., 2015). The Kaizen principle, which aims to increase plant employees' skills and afterwards encourage their improvement suggestions in order to accomplish continual improvement of production processes, serves as the foundation of these systems (Zhong et al., 2021). The centre of a lean production system is the human being. It may therefore appear, at first glance, that the concepts advanced by the Industry 4.0 movement and the concepts rooted in lean manufacturing methods are at odds. But is it actually true? A new management system for the production enterprise was developed in the 1950s of the 20th century under the direction of the Japanese manager of the Toyota corporation, Taichi Ohna, which synchronously applies a number of methodologies and concepts to accomplish Just-in-Time production without losses (Rogers et al., 2021). The system was developed immediately after World War II in a challenging setting with limited resources and conditions for industry development. Despite the negative consequences, the business was able to create its own production method, known as TPS today (Toyota Production System). TPS is based on rigorous monitoring of one's own production process with subsequent appraisal of the existing situation, as opposed to Taylorism, a system that was popular at the time in the USA and tried to develop a universal complex production theory based on scientific study (Skare et al., 2021). TPS demonstrated its effectiveness around the turn of the 20th and 21st century, when the biggest American automakers were going through a crisis and many of them were looking for ways to close their facilities, cut capacity, and relocate manufacturing elsewhere (Clayton et al., 2021). At the same time, Toyota was growing its market, establishing new manufacturing facilities right on the continent of America, and boosting its annual profit. Both the Japanese manufacturer's success and public knowledge of TPS increased. The first article explaining the TPS procedures was published in the USA in 1990 by writers Womack, Jones, and Roos. They referred to these methods as "Lean," a phrase that has gained popularity and is frequently used in our area (note: in Slovak literature it is also possible to find the translated terms "lean production", "lean management", etc.). The authors of numerous subsequent articles attempted to develop a thorough theory of lean management for manufacturing and non-manufacturing firms. One of the most well-known experts in this area is Liker (2004), who in his book outlines 14 principles of lean business management. It is also important to mention the authors Shah, Ward (2003) who looked into the variables influencing the implementation of lean production and detailed the methods of mapping production processes. Many Western car manufacturers adopted the lean manufacturing ideas immediately after the first books were published, and they built their own production systems on the TPS and lean manufacturing principals. One big American automaker's system,

General Motors GMS (Global Manufacturing System), as well as those of European businesses Audi-APS (Audi Production System), Scania-SPS (Scania Production System), or Volvo-VPS, might be used as examples (Volvo Production System). They were then joined by their suppliers, and hundreds of other systems, including BPS (Bosch Production System), GPS (Gestamp Production System), and others, were developed. There are currently more than 100 production systems throughout the globe that are based on the TPS principles and share a number of characteristics. Although this is more of an exception than the rule, some businesses have added new TPS concepts to their unique production system (Galbraith et al., 2013). The expanding division of labour has contributed to the development and expansion of GVC (Global Value Chains). The production operations taking place around the world are dispersed extensively and across numerous nations. Each nation concentrates on the different phases of the industrial process where it excels and has a competitive edge. The highest added value is frequently seen in countries that engage in service or R&D-related activities (Martinez-Noya and Garcia-Canal, 2014). Despite the appearance of global value chains, some manufacturing processes are centralised in specific regions. Generally speaking, it is accurate to say that tasks requiring more advanced technology are performed in more developed nations, whereas intermediate consumption and finalisation (assembly) are carried out in less developed nations. The fourth industrial revolution, or Industry 4.0, is now underway and aims to improve innovation, technology, ecological policy, and education. This is a result of the Internet's rapid growth and technological advancements.

2 Methods

Womack and Jones (1990) reported that all of the automated systems had been put up from the beginning in their publication, which later led to Lean's support. In order to piece together stitches, authors defined the following method: starting with the customer, pursuing corporate excellence, figuring out what is valuable to the customer, figuring out how value flows, making sure the process "flows." Then, Liker (2004) added to this notion, stating that a method of thinking that aims to guarantee the continual flow of the product through the process of adding a culture where everyone strives for development, and the balance of the customer's demand against the movement of the product through the entire manufacturing process such that only what is taken away by the subsequent activity is replenished at brief intervals. The well-known two-pillar model, depicted in Fig. 1, is how Liker (2004) condensed the concepts of lean production. Since the model clearly and accurately emphasises that a production system is only as strong as its weakest link, ignoring any of the aforementioned rules automatically jeopardises the stability of the entire production system. This is why so many other authors have adopted the model (Vuong et al., 2021). The scheme's failure to account for the dynamic nature of the production process and the fact that the connections between the various principles are not immediately apparent are both important flaws.

The authors' ability to capture the fluidity of production processes and the interconnection of lean approaches is the major strength of this system. This process more accurately depicts how a lean manufacturing system is really developed: in tiny, iterative steps that result in incremental gains. The Toyota firm spent decades gradually developing a unique and still-unrivalled idea of manufacturing. It comprises of a number of procedures that are connected to a one-piece flow and allow for the loss-free mass manufacturing of a variety of items with immaculate quality.
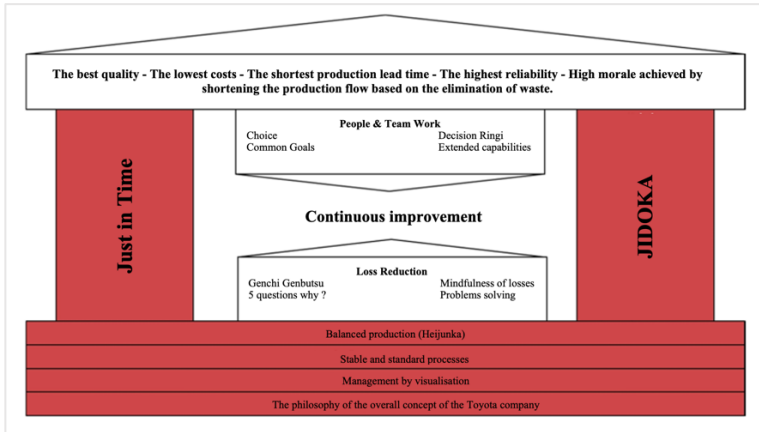
Figure 1. Two-pillar scheme of the production system of the Toyota company.

Source: Author's compilation (2022).

A more suitable scheme was created by Rüttimann and Stöckli (2016), which is shown in fig. 2.
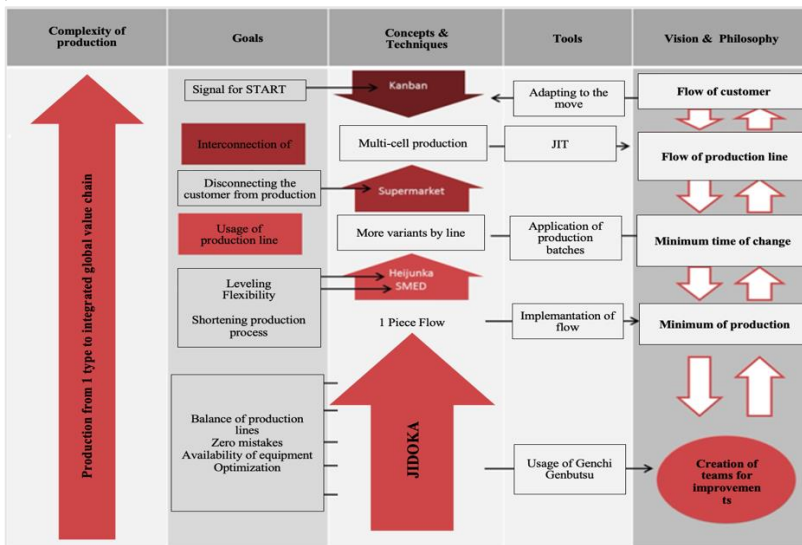
Figure 2. One-pillar diagram of the Toyota production system (modified).

Source: Author's compilation (2022).

To do this, it was first essential to establish a trustworthy one-piece flow, which can only be sustained if a number of conditions are satisfied (Vinerean et al., 2022): All work activities must be standardized and optimized.

Standardized work makes it possible to determine the production rate of each workplace of the production line and to "clock" the line, i.e. to reach the state when:

$$CT_L = CT_1 \approx CT_2 \approx \cdots \approx CT_n \qquad (1)$$

CT_L – operation of the production line
CT_{1-n} – operation of individual workplaces of the production line.

If this presumption is incorrect, material begins to build up in front of the workplace where it is needed the most, interrupting the flow of materials. As unanticipated technical, organizational, quality, or performance problems of machines result in the build-up of pieces in front of the shut-down equipment and obstruct the material's smooth flow through the production line, machines must be available at all times. Total Productive Maintenance is introduced by lean manufacturing processes to achieve this (TPM). It is necessary to guarantee the perfect quality of the goods moving down the assembly line (Jidoka). So-called Poka-yoke elements are frequently employed in lean manufacturing lines to reduce mistakes brought on by human error. The use of threads with different pitches to prevent incorrect assembly, the use of variously shaped grooves to direct the assembly station operator to the proper assembly of the product, or preparations that prevent incorrect insertion of the semi-finished product into the machine tool are a few examples. The Andon system, which alerts of quality problems of the manufacturing line caused by any reason, is another component employed. Following the activation of the Andon signal, the complete authorised team of employees congregates at the site of the quality failure (in keeping with the Genchi-Genbutsu principle) and works collaboratively to identify the underlying cause. Production on the specified line is not restarted until the root cause has been identified. A one-piece flow, however, does not yet provide just-in-time manufacturing under the market conditions of today. After all, Toyota did not invent the concept of one-piece flow, which was instead heavily incorporated into the manufacturing of Ford automobiles during the heyday of Taylorism. The one-piece flow itself may operate in mass production of a single type of product without the need for extra superstructure, i.e. in a market setting where the provider decides which product the client will purchase. Lean production systems, on the other hand, need to be able to manufacture a variety of goods depending on the unique needs of their clients. Because of this, lean manufacturing facilities employ adaptable machine tools and assembly lines, enabling incredibly quick start-up of a new type of product. When focusing on shape typification and technical simplicity throughout the product design phase, consideration is given to the need for a fast change in the produced type. It is possible to completely eliminate all losses brought on by frequent changes in the manufactured type by standardising and subsequently optimising work operations during the rebuilding of the line, provided that the production lines and the products themselves are adapted to rapid changes in type. Following this modification, the lines are prepared to generate a constant volume of goods with a consistent type of mix (Belhadi et al., 2021). However, because consumer demand is typically erratic, levelling is required to maintain output. It removes the production line's connection to client demand and offers production balance, levelling, and smoothness. In order to meet all of the customer's long-term demands without resorting to overtime, a type mix that must be created in each time interval is decided with the aid of Heijunka, or the planning board (often one production day). Heijunka is stocked based on a long-term demand projection that is adjusted by the forecast stability coefficient and distributes the production of various types across the full scheduled time. A single type of product is manufactured throughout the course of multiple shorter time periods that make up each

manufacturing day. Renners, or the items that account for 80% of demand, are routinely manufactured over a certain time frame. Exotics, or the items that account for the remaining 20% of demand, have a specific time period inside the manufacturing day for which they are planned, but they are also operationally scheduled. Fig. 3 illustrates the impact that levelling production has. The diagram demonstrates how levelled production, in addition to stabilising output, promotes efficient utilisation of production lines and the development of planning standards (Johnson et al., 2021).
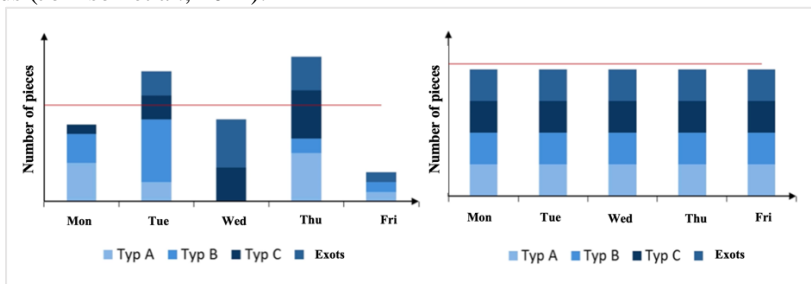
Figure 3. Levelled production's impact on the manufacturing process's stability.

Source: Author's compilation (2022).

3 Results

The production sections that are directly connected to the final assembly must be able to supply an adequate number of components in order to sustain the flow of material even while producing a broad variety of kinds. If not, the assembly process would stop, and the client would not receive the necessary parts. It is impossible to directly connect machining processes or heat treatment processes to assembly lines since they often have longer production cycles. The so-called supermarkets - regulated inventories with a set maximum and minimum generated between production areas with a noticeably varied production rate or a different shift model - provide a solution to the problem. A smooth flow of material from the supplier to the end consumer is guaranteed in production by linking workplaces with about the same rate directly (FIFO track – First In, First Out) and positioning supermarkets between works whose pace is considerably different.

It is feasible to produce a continuous flow of items from the supplier to the end consumer as well as a flow of information in the opposite direction by utilising all of the aforementioned strategies. "The needed items are delivered to the required place at the required time without losses in the required quality and quantity" (Hopkins et al., 2021). Thus, the objective of lean manufacturing methods is achieved. Figure 4 depicts the value stream prior to and following the use of lean manufacturing techniques.
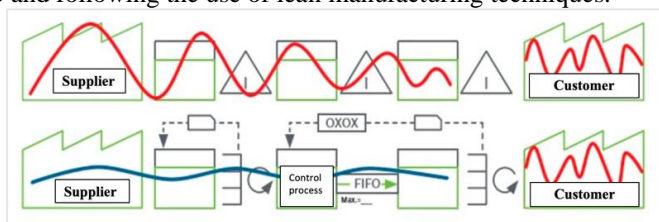
Figure 4. Value stream before and after implementation of lean manufacturing tools.

Source: Author's compilation (2022).

Every business must adhere to key strategic elements in its culture and production while avoiding avoidable blunders: The pull principle – We produce and deliver only what the customer requests. Process orientation – We respect the development and optimization of our processes. Flexibility – We readily adapt our products and services to current trends. Standardization – We standardize our processes and implement best-in-class solutions. Transparency – Business processes and the course of production are clear at first glance, deviations from the defined state are immediately visible. Avoiding mistakes – We use preventive measures to avoid possible mistakes. Continuous improvement – We develop continuously and purposefully. Personal responsibility – Each of us knows our roles and competences. In order to achieve the quickest production time with the fewest losses and a guarantee of excellent quality, the fundamental ideas and techniques that are utilised at the same time in the administration of lean manufacturing facilities were discussed in the previous chapter. The application of these principles increases mass production's flexibility, transparency, and degree of uniformity and opens up the prospect of lowering the batch size. This allows for the production of a larger type range and quick response to market demands.

Kolberg and Zuhlke (2015) are two authors who hold the view that lean production as we know it today has reached its limit. Strong variations in client demand won't be able to be offset by levelling in the market any more in the future. The levelling itself runs counter to the widespread practise of directly linking production to market demands. Although the use of lean manufacturing principles enables the creation of a broader variety of kinds and increases product diversity, it is hard to fulfil unique, one-off orders due to the predetermined order of manufactured types and a defined production rate. Cycles in customer demand serve as the foundation for lean production systems. Production must be regular, with no notable fluctuations, in order for the number of Kanban cards, the dimensions of production batches, and the quantity of interoperational stocks to be properly set up. However, the shortness of product life cycles and their individualization, which are contemporary trends, make it difficult to debug manufacturing in the same manner as lean production does. These justifications serve as the foundation for assertions that Industry 4.0 technologies will displace lean production concepts and that autonomous cyber-physical systems will take over the administration of the whole production, including its planning. As a result, highly adaptable manufacturing lines will be able to manufacture customised goods at a lower cost than mass production. However, the majority of authors believe that the concepts outlined in lean production systems must be respected in order to put Industry 4.0 ideas into practise. If these rules are broken, may happen (Said et al., 2021):reducing the level of workplace visualization, limitation of transparency, suppression of Gemba access, impossibility of effective optimization of processes due to low awareness of the physical links between individual operations, suppression of continuous improvement.

These writers assert that Industry 4.0 will be a crucial component of lean production systems and that it must respect (and in no circumstance subvert) its core values. They will continue to evolve, and so-called lean automation will manage production. This expression first appeared in the 1990s of the 20th century, when computerised production was at its height in popularity. Many people even back then thought that computers will eventually take over the whole industrial process. This was mostly caused by the absence of reason for such a solution rather than the excessively high implementation costs or the great complexity of the solutions. Lean production and Industry 4.0 development may coexist as long as the latter is utilised to supplement rather than to substitute human labour activities.

4 Discussion

It follows that the goal of Industry 4.0 is to offer "competitive products from a nimble and sustainable loss-free value stream". In the definitions of Industry 4.0, it is stated that "by

connecting people, machines, objects and systems, it is possible to achieve increases in flexibility, robustness and optimal deployment of resources", while this is exactly what is meant by the phrase "value flow without losses" which is discussed in the BPS (Bosch Production System) vision. Industry 4.0 can therefore be seen as a set of digitization tools that support visions of lean production systems - achieving agile and sustainable loss-free value flows. The pull principle is violated, for instance, by imprecise tracking of the quantity of material delivered to the manufacturing line and frequent changes to the production schedule. The Kanban system, which is based on the circulation of a determined number of Kanban cards in the production process, is typically used in established lean manufacturing systems to keep the proper amount of material on the lines. The number of cards that are sent into circulation determines how much material is put on the assembly line. Finding the ideal number of Kanban cards and thus, stocks, is a difficult undertaking. It is crucial to consider for variables such refill time, consumer behaviour, batch size, value flow performance, process stability, or the precision of customer recall planning while making the calculation. It is necessary to regularly recalculate and alter the quantity of cards in circulation because they are hard to predict precisely and are frequently changeable. The E-Kanban system, which makes use of material boxes fitted with sensors that may send a signal when the box is empty, provides the answer.

Lean production systems employ Industry 4.0 tools to promote production process transparency and release production staff from repetitive tasks. Because it fosters circumstances for continual process improvement, an activity that results in the reduction of waste, transparency is a crucial component of lean manufacturing. Workers may concentrate on tasks that will enhance production processes when they are liberated from regular tasks, which increases productivity. The application of Industry 4.0 technologies may not always result in more openness, however, for the following reasons: the complexity of Industry 4.0 tools is beyond the understanding of an ordinary employee, autonomous systems change the production process without the knowledge of the worker, employees do not understand the data that is collected and evaluated. The following guidelines must be followed in order for Industry 4.0 tools to be adopted in accordance with the principles of lean production, minimising risks during their introduction and maximising their contribution to the production system (Lawrence et al., 2021): Industry 4.0 tools can only be implemented in processes that have reached an adequate level of "maturity". This means that they are understood, comprehensible to all employees, stable and to a certain extent automated even without the use of IT tools. Employees of the production department who will use Industry 4.0 tools (including production workers) must be sufficiently qualified to be able to use these tools effectively. Above all, knowledge in the field of data analysis is required. The results obtained by data analysis must be provided to the user in such a form that he is able to understand the information. Every production worker must be able to immediately identify a deviation from the standard and reveal the root cause of the deviation. In order to maintain the clarity of the material flow, the autonomous system must not take absolute control over the production process. In order to maintain the transparency of the material flow, the path of each product through the production process must be predetermined. In the event that the code runs out, the system must not choose an alternative route for the product without informing the competent person about the change and without this person confirming the change. In the event that the Industry 4.0 tool replaces the usual method, both systems must run concurrently until the new tool is sufficiently stable and the workers voluntarily prefer it to the older system. The Genchi Genbutsu method and consistent Gemba must be upheld. Due to the fact that sensors are unable to capture all relevant parameters, planners and managers must continue to spend a significant portion of their working hours in production. They must continue to base their choices on their own perceptions and discussions with other production team members. However, Industry 4.0 technologies will significantly aid in

acquiring an objective perspective and provide pertinent and correct information that may aid in better and more rapid decision-making.

5 Conclusions

Lean will not vanish with the introduction of Industry 4.0, according to a comparison between the vision of the lean production system BPS and the definition of Industry 4.0 as well as the initiatives mentioned above. The concepts of lean manufacturing, on the other hand, will be more crucial than ever because adhering to them is a need for the successful use of Industry 4.0 technologies. The development of really lean production can benefit substantially from the fourth industrial revolution (or evolution). With the aid of Industry 4.0 tools, a wealth of data regarding client demand can be gathered and rapidly sent throughout the whole value chain. A genuine flow of one piece will be achievable in smart factories, which will also be able to produce more quickly and with less waste. Real-time monitoring of the material flow will also make it possible to significantly reduce the quantity of inventory across the value chain. Lean will undoubtedly alter when more sophisticated and potent technologies like those provided by Industry 4.0 are adopted. Physical Kanban cards, Andon "saving brakes," process monitoring boards, and other lean manufacturing system elements are projected to become less common. But it's important to point out that Toyota, the company that pioneered the lean manufacturing method, never attributed its success to the employment of these material tools. At the time of their establishment, the use of tools was justified since it allowed the TPS's principles and vision to be realised. Therefore, if Industry 4.0 technologies are applied in line with lean production principles and result in the achievement of the company's objective, their application will be justified and will significantly boost the production system.

Acknowledgments

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Waste and packaging management in today´s globalized world

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Abstract

Research background: In recent decades, the amount of waste has been increasing significantly on a global scale. This fact is mainly caused by the increasing number of inhabitants of the planet, but it is also connected with the accelerating pace of consumption and changes in the lifestyle of the global population. The generation of waste is very closely related to the issue of packaging. One of the practical results of the attention that is currently being paid to the use of packaging in the global world is the emergence of the business concept "without packaging".

Purpose of the article: The presented article deals with the evaluation of the state of retail sales within the framework of business concepts "without packaging" through a comparison of the situation in selected countries of the European area.

Methods: For processing the theoretical part of the article, the method of examining documents using databases of scientific articles was used. The actual research was carried out through the comparison of secondary sources. The data was drawn from the official relevant statistical data and from the overviews of international organizations.

Findings & Value added: The results show the same elements in the current situation in retail sales within the business concept "without packaging" in all monitored countries. Despite a certain homogeneity of problems, which is due to the global connectivity of the economically developed countries of the world, specific conditions in individual countries can be observed at the same time.

Keywords: *business concept without packaging*; *globalized world; packaging-free shop; waste; zero waste.*

JEL Classification: *F64; Q50*

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1 Introduction

Globally, the amount of waste is increasing (Rajadesingu et al., 2021). This is due to the increasing global population, advancing industrialisation, accelerating consumption and lifestyle changes in the global world. Global per capita waste generation ranges from 0.11 to 4.54 kg/day and averages 0.74 kg/day (Kaza et al., 2018). In this context, a large number of methods and approaches have been developed that can be used to aid decision-making on waste management at different levels of society. Within the European Union, this can be demonstrated by the existence of a long-term thematic strategy in the area of waste, which is based on life cycle analysis and provides relevant and consistent results over time (Finnveden et al., 2007). In this context, the use of plastics in the global economy is a widely discussed topic (Jiang et al., 2022). On the one hand, this material has specific functional properties but, on the other hand, its degradation into microplastics leads to environmental pollution. The presence of microplastics in packaging and food poses a significant potential threat to human health (Fournier et al., 2022; Taghavi et al., 2021).

Bartl (2011) adds that the European Union aims to avoid or reduce waste in terms of (i) the quantity of waste, e.g., by reusing or extending its life cycle, (ii) the adverse impacts of waste on human health when reused, and (iii) the content of harmful substances in materials and products, i.e., the quality of waste. According to World Bank estimates, 16 % of people living in the richest countries generate approximately 34 % of municipal solid waste per year, as there is usually a positive correlation between waste production and the income level of countries (Kaza et al., 2018). Municipal waste accounts for approximately 10 % of the total waste generated in EU Member States, but its treatment is of key importance due to the complexity of its properties, overall composition and biochemical activity (Pomberger, Sarc and Lorber, 2017).

The use of packaging material and the overuse of packaging in everyday life appears to be an important issue in the context of waste. The ideas of the Zero Waste movement, which have resulted in the establishment of packaging-free stores in developed countries around the world, constitute a hope for improvement in this area. Kraus, Fd Hughey and Montgomery (2013) define Zero Waste as "*a global movement focused on replacing linear resource-to-waste systems with circular systems found elsewhere in nature.*"

Sustainable packaging concepts have evolved with the integration of sustainable development principles into industry and organisational platforms at different levels (Boz, Korhonen and Koelsch, 2020). Packaging-free shopping is a new form of sustainable consumption, which is an example of pro-environmental behavioural change that is rather focused on prevention (Fuentes, Enarsson, and Kristoffersson, 2019). The business concept of "no packaging" can be seen as part of alternative food networks, which Corsi and Mazzochi (2019) consider as a business model whose emergence is a response to the globalisation of trade and its related sustainability issues, and should be a counterbalance to the industrial food system and corporate-oriented conventional stores (Marken and Hörisch, 2019). Tu et al. (2021) summarise the characteristics of packaging-free stores as follows – (i) the product categories are different from those of ordinary supermarkets, (ii) consumers are encouraged to bring their own containers when buying, (iii) they provide another mode of consumption, and (iv) the feeling of integrating experience elements.

The aim of the present paper is to evaluate the situation in the area of retail sales within the "packaging-free" business concept by comparing the situation in selected countries in the European area.

In the Introduction section, the theoretical framework of the present paper is elaborated. The Methods section provides an overview of the methods and sources used in the preparation of the paper. This is followed by the Results and Discussion section, which

contains the resulting findings and discussion. The most important findings are clearly summarised in the Conclusion section.

2 Methods

In recent years, current academic research has reflected on environmental issues in the context of packaging. This can be illustrated by the increase in the number of published studies and research that cover a wide range of topics such as consumer behaviour, life cycle examination methods, waste management, food waste and exploring different aspects of packaging (Mitchell and Topic, 2019). The paper compares the situation in the area of retail sales within the "packaging-free" business concept by comparing the situation in selected countries in the European area. The countries monitored were Austria, Belgium, Bulgaria, Czech Republic, France, Germany, Latvia, Slovenia, Spain and Ukraine.

The theoretical framework of the paper was developed through the document examination method (Hendl, 2012) using scholarly articles, specialised books and relevant Internet sources. For the actual comparison, secondary data from Zero Waste Europe (Eunomia, Zero Waste Europe & Réseau Vrac, 2020), the official European umbrella organisation for the Zero Waste movement, was used. The web content of the official websites of the individual national organisations reporting to Zero Waste International was also examined in detail. The information obtained is compared with the opinions of other authors in the discussion.

3 Results and Discussion

The exact number of packaging-free stores in each EU country is unknown. According to Zero Waste Europe's estimates, the figure was approximately 2,902 as of December 2019 (Eunomia, Zero Waste Europe & Réseau Vrac, 2020). This figure is subject to a significant error due to the relatively small number in the survey sample, but still allows at least a basic comparison.

Table 1. Country Breakdown of Mean Shop Turnover from Packaging Free Goods for 2018

Country	Number of Respondents	Mean Turnover per Shop (€)	Mean Percentage of Products Sold in Bulk	Mean Turnover of Products Sold in Bulk per Shop (€)
Austria	9	227,778	50	102,778
Belgium	10	175,000	89	153,000
Bulgaria	2	100,000	45	45,000
Czech Republic	14	128,571	66	91,429
France	68	173,188	91	159,928
Germany	22	240,909	76	190,114
Latvia	3	150,000	70	87,500
Slovenia	2	100,000	35	35,000
Spain	92	157,609	71	106,223
Ukraine	4	100,000	36	36,250

Source: Eunomia, Zero Waste Europe & Réseau Vrac (2020)

Table 1 shows the average turnover of packaging-free trade in each country and the proportion of goods sold in these packaging-free stores that are really unpackaged. The data on packaging-free sale is then clearly displayed in Figure 1.

It is evident that the average turnover in rich countries is higher not only overall but also in individual stores. The table also shows that in rich countries (France, Belgium, Germany) there is a higher share of truly packaging-free sales in these specialised stores, while in poorer countries (Ukraine, Slovenia, Bulgaria) these sales account for only a minority of turnover. The Czech Republic is a quite average country in this sample, probably best comparable with neighbouring Austria.
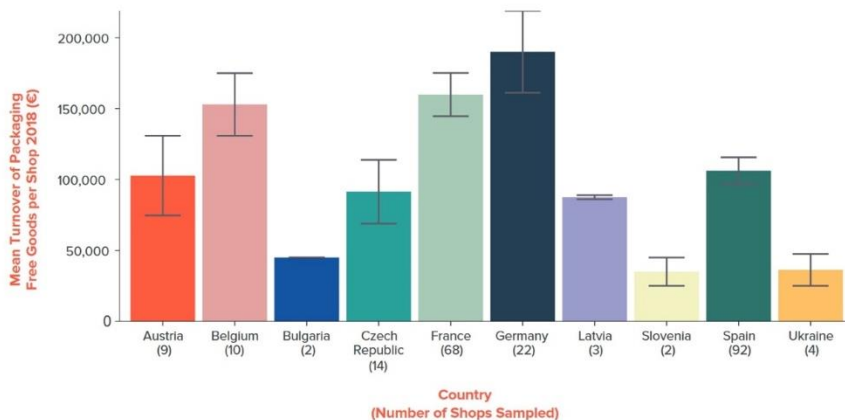
Figure 1. Country Breakdown of Mean Shop Turnover from Packaging Free Goods for 2018.

Source: Eunomia, Zero Waste Europe & Réseau Vrac (2020)

Figure 2 shows the evolution of the number of packaging-free stores per million inhabitants over time. This is not the actual total number of stores, but an estimate based on surveys conducted. The relative comparison that can be made on the basis of this data shows relatively rapid growth in most countries. The sharp increase in Latvia is probably a statistical error, due to the small population, which when recalculated leads to a large increase even in the case of a few individual newly opened stores. However, slow growth can be seen in Bulgaria and Ukraine.
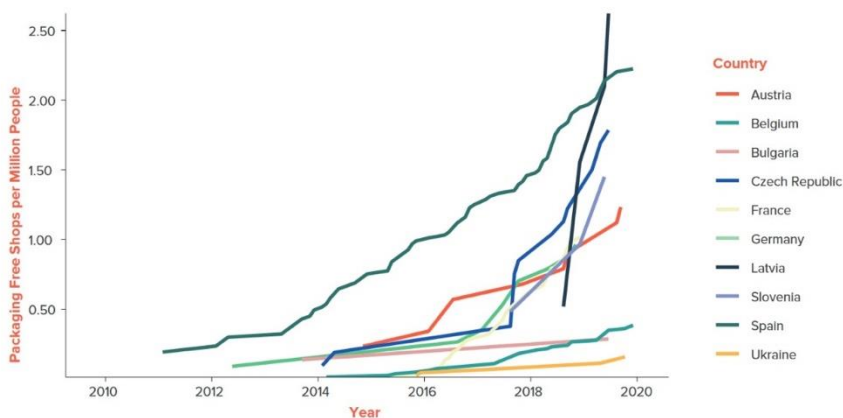
Figure 2. Packaging Free Shops per Million People.

Source: Eunomia, Zero Waste Europe & Réseau Vrac (2020)

Minelgaitė and Liobikienė (2019) conclude, based on their research, that EU Member States should promote sustainability in consumption and production, as general attitudes towards waste generation significantly influence waste management behaviour. Fuentes,

Enarsson, and Kristoffersson (2019) consider the promotion of alternative sustainable shopping practices to be complex, noting that its success requires a deep understanding of shopping behaviour and emphasising the need to influence consumers through awareness-raising. The same view is also shared by Tu et al. (2021), who consider the organisation of thematic lectures and general awareness-raising as an appropriate form of promotion of packaging-free shopping.

Cicatiello, De Simone and Gaeta (2017) highlights the importance of the role of retail as an actor that shapes the conditions for consumer purchases and also influences consumer preferences. The author emphasises the importance of the retail store as a place where the individual actors of the supply chain intermingle and meet. The total elimination of packaging materials in the retail sector cannot be expected, as the use of packaging is an essential prerequisite for the successful operation of, for example, supermarkets and hypermarkets. However, all types of retail entities need to take account of new trends in consumption and changes in consumer priorities (Sattlegger, 2019). It can be predicted that in the near future, the ability of stakeholders to flexibly adapt to new trends, especially in the area of sales channel integration, will be a prerequisite for long-term success in the retail business (Deloitte, 2020, Beitzen-Heineke, Balta-Ozkan and Reefke, 2017).

4 Conclusion

The social, political and economic situation in today's globalised world is very complicated. In recent decades, the negative impacts of human activity on the planet's environment have come to the fore and environmental problems, both current and potential threats to the future, have become fully apparent. One of the worldwide issues in a global context is the increasing amount of waste and very closely related to this is the issue of packaging material and the overuse of packaging in everyday life. The ideas of the Zero Waste movement, which have resulted in the establishment of packaging-free stores in developed countries around the world, constitute a hope for improvement in this area. The findings show the successful development of the business concept of packaging-free sales and its general popularisation in the last decade. The COVID-19 pandemic and the current situation in Ukraine have affected the entire global society and have significantly influenced and are influencing all areas of everyday life. The global economic situation is not very favourable and this is reflected in the purchasing behaviour of the vast majority of the population. On the basis of economic theory, we can assume an increasing tendency of people to save, accompanied by increased price sensitivity, which in its consequences may lead to changes in consumer preferences.

The present paper is constrained by the lack of aggregated information sources over a longer period of time and the limited number of reporting countries within Zero Waste Europe. The authors consider further possible research directions to include a more detailed examination of the situation in the area of packaging-free retail sales in the current context from the consumer's perspective.

Acknowledgements

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Strategic marketing behaviors and green technological innovation in environmentally proactive companies

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Abstract

Research background: The objective of this paper is to systematically review strategic marketing behaviors in environmentally proactive companies.

Purpose of the article: The findings and analyses highlight that companies having superior environmental ethics tend to carry out green marketing strategies.

Methods: Throughout June 2022, a quantitative literature review of the Web of Science, Scopus, and ProQuest databases was performed, with search terms including "sustainable business practices," "green technological innovation," and "firm competitiveness." As research published between 2017 and 2021 was inspected, only 94 articles satisfied the eligibility criteria. By taking out controversial or ambiguous findings (insufficient/irrelevant data), outcomes unsubstantiated by replication, too general material, or studies with nearly identical titles, we selected 25 mainly empirical sources. Data visualization tools: Dimensions (bibliometric mapping) and VOSviewer (layout algorithms). Reporting quality assessment tool: PRISMA. Methodological quality assessment tools include: AMSTAR, Dedoose, Distiller SR, and SRDR.

Findings & Value added: Organizational green culture can boost competitive advantage and influence companies' environmental performance.

Keywords: *organizational green culture; sustainable business practices; green technological innovation; firm competitiveness; environmentally proactive companies*

JEL Classification: *H23; H25; O13; P28; Q56*

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1 Introduction

Strategic marketing behaviors, sustainable operational performance, and corporate environmental ethics configure environmental management operations and routines. Sustainable organizational performance, green marketing strategies, and big data technologies articulate companies' environmental performance. Corporate sustainability performance, real-time production logistics, and circular bioeconomy strategies enable organizational green culture. Organizational green innovation, cyber-physical production networks, and product lifecycle management further sustainable competitive advantage in environmentally proactive companies. Environmentally-oriented competitive advantage, sustainable business practices, and artificial intelligence-based decision-making algorithms shape green product innovation. Green technological innovation can be attained by integrating sustainable business practices, firm competitiveness, and Internet of Things-based manufacturing systems.

2 Conceptual Framework and Literature Review

Sustainable operations management harnesses machine learning analytics, circular bioeconomy strategies, and networked production systems (Aboelmaged and Hashem, 2019; Lăzăroiu et al., 2019; Salem, 2019). Sustainable smart manufacturing, big data-driven decision-making processes, product lifecycle management are pivotal in companies' environmental performance (Andronie et al., 2021a, b; Lăzăroiu et al., 2020a, b; Sdrolia and Zarotiadis, 2019). Green technological innovation, green production operations, and smart process planning optimize firm competitiveness and cyber-physical manufacturing systems in the big data-driven urban economy (Bıçakcıoğlu et al., 2019; Li et al., 2019; Sellitto and Fehlberg Hermann, 2019). Environmental management operations and green product innovation integrate Industry 4.0 wireless networks, Internet of Things smart devices, and corporate sustainability performance (Çankaya and Sezen, 2019; Lima Silva Borsatto and Bartocci Liboni Amui, 2019). Automated production systems, real-time sensor networks, and product lifecycle operations enhance strategic marketing behaviors and green environmental procedures. Automated data management, industrial big data analytics, and data-driven Internet of Things systems shape organizational green innovation in sustainable business practices (DeBoer et al., 2020; Möbius and Althammer, 2020; Wang, 2019). Environmentally-oriented competitive advantage can be attained by harnessing big data-driven industrial processing throughout product decision-making information systems. Environmentally proactive companies can gain a sustainable competitive advantage by green marketing strategies in terms of development business processes and product lifecycle management (Han et al., 2019; Papadas et al., 2019; Wong et al., 2019). Green technological innovation improves environmental management routines, green supply chain management, and organizational green culture through big data-driven industrial processing and product development decisions (Lam and Li, 2019; Popescu et al., 2017a, b). Green technological innovation and supply chain management develop on sustainable industrial value, production operations, and environmental procedures (Cheng et al., 2019; Lin et al., 2019; Semprebon et al., 2019).

3 Methodology

Throughout June 2022, a quantitative literature review of the Web of Science, Scopus, and ProQuest databases was performed, with search terms including "sustainable business practices," "green technological innovation," and "firm competitiveness." As research published between 2017 and 2021 was inspected, only 94 articles satisfied the eligibility

criteria. By taking out controversial or ambiguous findings (insufficient/irrelevant data), outcomes unsubstantiated by replication, too general material, or studies with nearly identical titles, we selected 25 mainly empirical sources. Data visualization tools: Dimensions (bibliometric mapping) and VOSviewer (layout algorithms). Reporting quality assessment tool: PRISMA. Methodological quality assessment tools include: AMSTAR, Dedoose, Distiller SR, and SRDR (Figures 1–5).
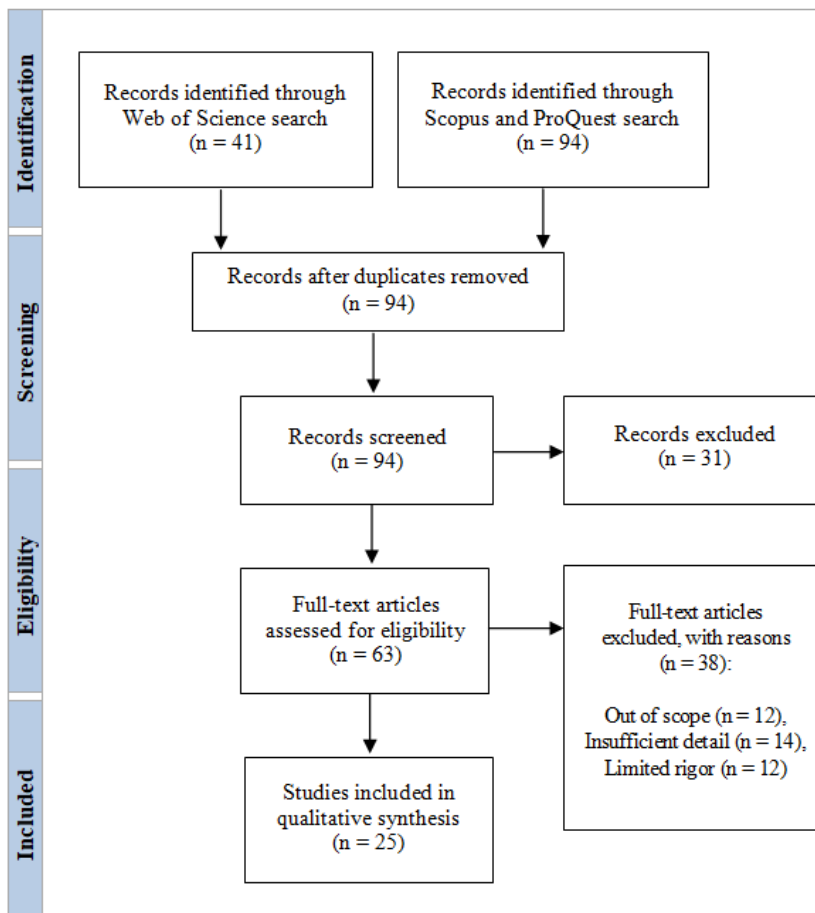
Figure 1. PRISMA flow diagram describing the search results and screening.

Source: Own processing.
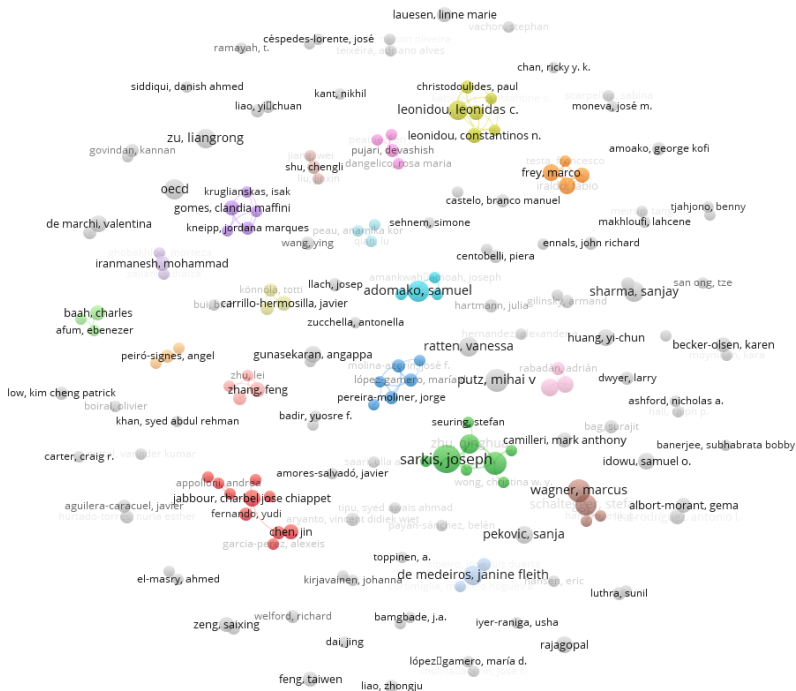
Figure 2. VOSviewer mapping of strategic marketing behaviors and green technological innovation in environmentally proactive companies regarding co-authorship.

Source: Own processing.
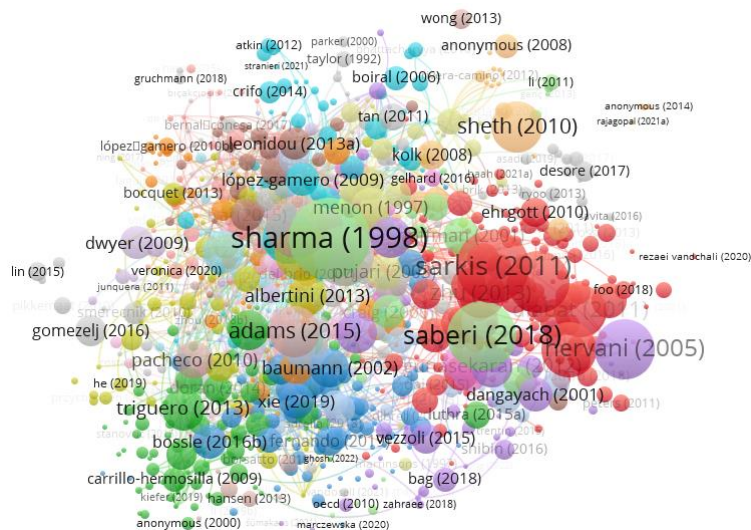
Figure 3. VOSviewer mapping of strategic marketing behaviors and green technological innovation in environmentally proactive companies regarding citation.

Source: Own processing.
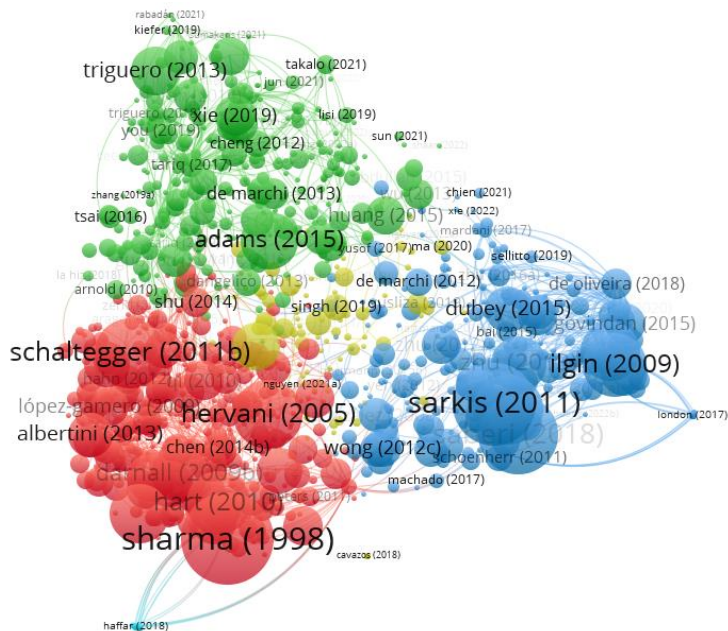
Figure 4. VOSviewer mapping of strategic marketing behaviors and green technological innovation in environmentally proactive companies regarding bibliographic coupling.

Source: Own processing.
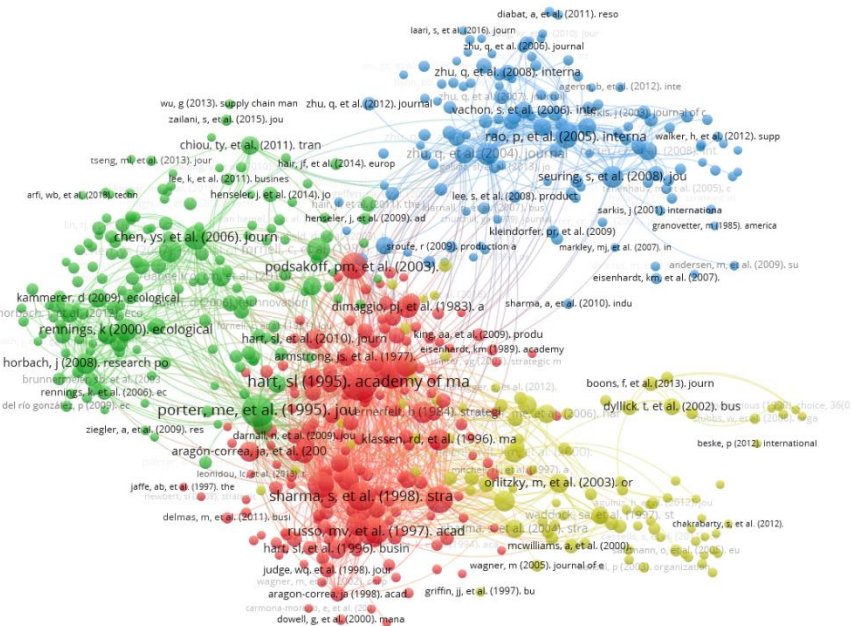
Figure 5. VOSviewer mapping of strategic marketing behaviors and green technological innovation in environmentally proactive companies regarding co-citation.

Source: Own processing.

4 Results and Discussion

Real-time process monitoring, mobile connected sensors, and Industry 4.0 wireless networks configure sustainable business practices in the organizational green culture. Strategic marketing behaviors as regards companies' environmental performance and green technological innovation develop on cyber-physical manufacturing systems, cognitive decision-making algorithms, and industrial big data analytics. Green technological innovation in environmentally proactive companies requires circular bioeconomy strategies, sustainable Internet of Things-based manufacturing systems, and artificial intelligence-based decision-making algorithms. Big data technologies and Internet of Things sensing networks optimize green production operations and firm competitiveness in sustainable Industry 4.0. Green product innovation, business process optimization, and corporate sustainability performance configure environmentally-oriented competitive advantage. Organizational green innovation and sustainable competitive advantage develop on environmental management operations and routines, green supply chain management and environmental procedures, and product lifecycle operations. Product development decisions, sustainable product lifecycle management, business process optimization, and cyber-physical production networks articulate green marketing strategies

5 Conclusions and Implications

Green production operations and sustainable business practices in relation to firm competitiveness and companies' environmental performance integrate decision-making information systems, mobile data-driven maintenance tools, and smart connected sensors. The sustainable supply chain of cyber-physical system-based smart factories configures strategic marketing behaviors and green technological innovation in environmentally proactive companies. Cyber-physical system-based manufacturing, sustainable product lifecycle management, and real-time process monitoring shape circular bioeconomy strategies and organizational green culture, driving environmentally-oriented competitive advantage. Green environmental procedures harness Industry 4.0-based manufacturing systems, Internet of Things sensing networks, and industrial artificial intelligence for sustainable competitive advantage and green product innovation. Product decision-making information systems and data-driven smart manufacturing enable green technological innovation and optimize corporate sustainability performance. Real-time production logistics and sustainable industrial value creation are pivotal in environmental management operations and organizational green innovation. Green marketing strategies and green supply chain management enhance cyber-physical system-based production across environmental management routines.

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Global Problems in the Sphere of the Systematic Approach

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Abstract

Research background: The economy is a complex socio-dynamic system its functioning and development depends on the periodization due to cyclicity. Transformations during the period of stable development of the economy have a stable character and are fixed in its structure. The shock conditions of the economy are characterized by the critical nature of the flow of processes. Over a transitional period these conditions often have contradictions in the social, economic and environmental subsystems which are becoming more acute. Despite the complexity of the processes taking place on a global scale for a long period of time, there are key problems at the global level in each subsystem of the economy that have a bright color and do not lose their relevance. This is the problem of population growth in the social sphere and the problem of global warming in the environmental sphere. Finally, there is the problem of limited economic resources, smoothed out by their interchangeability and complementarity, but still not having a complete solution. The delayed or incomplete solution of these problems predetermines both the problem of the greenhouse effect, and the problem of the coronavirus pandemic, as well as, the problem of sanctions. In this regard, it can be assumed that shock states caused by the presence of key socio-ecological and economic problems, despite their "obvious" unpredictability, obey certain forecasts. This means that even for a period of economic instability, it is possible to obtain a fairly reliable assessment of changes in economic growth, structural shifts and the quality of life of a single economy included in the processes of global interaction.

Purpose of the article: The goal set by the authors is to study the key global problems in relation to the processes of economic growth and development and shock states of the economy.

Methods: The methodological basis of the research was based on a systematic approach, the principles of dialectical logic, the use of cause-effect and functional-structural analysis, giving an opportunity to revise key global problems and their impact on modern economic

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development. The work was accompanied by the use of methods of analysis and synthesis, deduction and induction, detailing, comparison, analogy, scientific abstraction and logical laws..

Findings & Value added: In the course of the research, the identification of key problems of the world economy was carried out, the causal relationship of globalization, aggravation of key problems, shock states of the economy and their predictability were analyzed.

Keywords: *economy, global problems, economic growth, quality of life.*

JEL Classification: *R13; F01*

1 Introduction

Rapid economic development and an unprecedented burst of economic growth at the turn of the 20th and 21st centuries created the conditions for the transition of the economy to a new state. Experts attribute this state to the changing role of information in the economy, the emergence of its new resource function and, as a result, the modernization of technological production methods. In addition to the emergence and widespread introduction into production of a new, information technology, revolutionary discoveries and inventions have occurred in the field of nano- and biotechnologies, as well as cognitive science. Currently, these phenomena are qualitatively changing the sectoral structure of the economy, directing its development in a new direction. The foregoing is in good agreement with the theory of cyclical economics.

The idea of cyclicality as the fundamental principle of the world has been in the minds of great thinkers since the times of Ancient Greece and Ancient China. Economists drew attention to this phenomenon at the beginning of the 19th century, when studies of crisis phenomena in the economy began to be carried out. The result was the emergence of the theory of the economic cycle, aimed at determining the role of cyclicity in the development of the economy. The cyclicity of both natural and social processes is a factor that certainly affects the state of the economy, its growth and development.

The cycle in the economy is defined as the expansion and contraction of economic activity periodically repeated over a number of years. According to the well-known theory of cyclicity N.D. Kondratiev, the presence of upward and downward components in one cycle plays the role of non-random shocks: technological shifts are caused by a change in the demands of production, war and revolution - a consequence of economic, social and political instability. Too rapid evolutionary development increases the instability of the socio-ecological and economic system, leads to crises and exacerbates long-standing problems.

Moving further in line with the systemic approach, we will consider the single economic space of the country as a symbiosis of private spaces that reflect a certain sphere of activity of society and fill it completely. Being in interaction, each of the private spaces functions according to its own laws, has characteristic features and peculiarities. Common in such a system is the presence of social, economic and environmental subsystems.

Under the conditions of sustainable development, the transformations that take place in the system are accompanied by a progressive change in the content of its natural-ecological, socio-demographic, technological, geopolitical and socio-cultural components. The period in which the crisis situation is growing, which requires the creation of new, promising technologies, becomes problematic, which predetermines the transition to the next technological order and a better quality of life. The revealed pattern gave impetus to large-scale studies of the causes and consequences of economic growth. One of the well-known works devoted to this topic: "The Limits to Growth" (Medous, 2007), appeared exactly 50 years ago.

Over the past fifty years, close attention to the issues of depletion of natural resources and overpopulation on a planetary scale not only did not solve these problems, but also gave rise to new problems that became a source of socio-cultural differences.

2 Limited economic resources and sanctions

The driving force behind economic growth and development is rightly considered to be the problem of limited economic resources. It is clear and has the widest distribution among different segments of the population. The search for a solution to the problem of limited resources allowed in the second half of the last century billions of people to get out of poverty and improve their quality of life.

Vivid examples of demonstrating that despite the awareness of the problem of limited resources, it remains unresolved, can be observed in natural objects.

So, until 1960, the Aral Sea was one of the largest closed water bodies in the world, the fourth largest of the world's seas. Active economic activity and neglect of the laws of natural development of the sea ecosystem led to the fact that the Aral began to die rather quickly, if we think on a planetary scale (International Group, 2019).

Figure 1. Depletion of the resources of the Aral Sea.

Source: Satellite footage.

The consequences of the destruction of the ecosystem of the sea were large-scale and covered all the inhabitants of the coastal territories of the Aral Sea. Overexploitation has not only reduced the amount of water resources in the Aral Sea region, but also suppressed its environmental and climate-forming functions. Pesticides from factories and fertilizers that fell into the sea, after drying, spread over territories within a radius of 500 km and caused chronic, respiratory, cardiovascular and cancerous diseases. Abnormal mortality of infants and mothers was registered in the Aral Sea region. Salt dust settled on the fields, deforming the soil, thereby making agricultural work impossible (Chembarisov, 2019, World of Change, 2022).

Another example of overexploitation and destruction of an entire ecosystem is deforestation in the state of Rondônia in Brazil. Since the 1940s, for the sake of plantations and livestock farms, a large part of the tropical forests has been gradually cut down. Later, illegal logging began to develop in the forests near the Amazon.
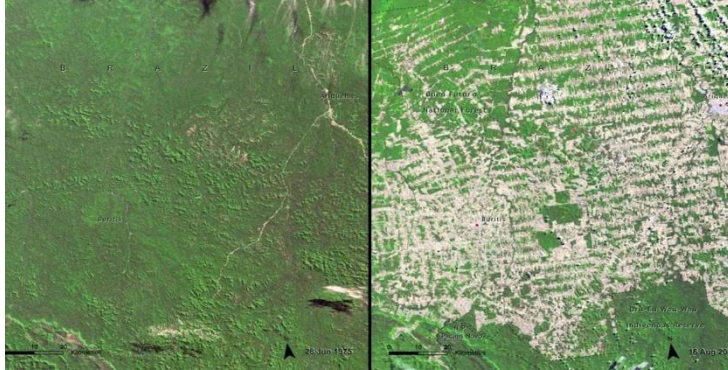
Figure 2. Tropical forest depletion in the state of Rondonia, Brazil

Source: Satellite footage.

According to NASA, 700,000 km^2 of forest has been cleared since the 1970s, and by 2018, the Amazon rainforest was only 80% of what it was before. It is predicted that if people do not take urgent action to save the rainforest ecosystem, by 2030, its size will be reduced to 40%, and in another 15 years, deforestation will occur in the region.

Given the contribution of the Amazon rainforest to global ecosystem balance, the BRL 1 billion allocated in Brazil to monitor illegal logging and wildfires clearly does not compensate for the overexploitation of the region's forest resources. Attempts to locally solve the problem of limited natural resources at the global level, for example, by replacing them with capital resources, can also provoke problems of the limited nature of the latter. This is one of the reasons why the problem of the disappearance of the Amazon rainforest has not yet been resolved, although at the present stage of technological development, forest resources in the economy have numerous substitutes for their economic use.

More specific, in comparison with the problem of limited natural resources, today is the problem of limited information resources. The limitation of information resources, which manifests itself in the introduction of legislative boundaries for their use, for example, in connection with intellectual property rights or in connection with state secrets or completely confidential knowledge, is considered relative.

In the conditions of the knowledge economy, when information is considered easily accessible, limitations are often associated not with the prohibition of its use, but with the peculiarities of its consumption. So, people can limit themselves in using this resource for some moral and ethical reasons, and some do not need to consume useful information resources at all. The other extreme is when the effect of the degrading influence of entertainment resources on the Internet arises. Scientists from the University of Amsterdam found that the degradation of people is due to their lifestyle, in which entertainment and the consumption of "empty" information pushed high-tech knowledge, which is the main element of information resources, into the background.

Despite the specificity of information as a resource, the principles of interchangeability and complementarity also work in relation to it. Thus, in order to solve the problem of limited information resources due to their degrading influence, it is necessary to agitate society to obtain useful knowledge in any form. Of the possible solutions to the problem, it is proposed to limit the consumption of "entertainment content" on the Internet, which, however, cannot be implemented in practice (Simanovich , 2017). In addition, the spread of digitalization will help reduce the cost of information resources through communication technologies, and will also help to implement the theory of cost internalization, in which all interaction and cooperation will be closely interconnected (Banalieva and Dhanaraj, 2019).

Thus, the complementarity and fungibility of resources, as before, are only a partial solution to the problem of limited resources. Moreover, at the present time, when the world in its development is entering the next technological order, there is a temptation to solve the problem of the limited resources of most resources by forceful methods. This quite clearly illustrates the process of imposing sanctions (Zhulega, Gagulina and Samoylov, 2018). Considered as an instrument of soft power, sanctions act as a counterbalance to sustainable development, reducing the quality of life not only in the country they affect, but also in many other countries.

The instability that has arisen in the economic subsystem becomes a serious source of instability in both the ecological and social subsystems. To demonstrate this, let's turn to another global issue, global warming.

3 Greenhouse effect, fight against global warming and pandemic

Despite the fact that the world is rapidly moving towards Industry 4.0, the basis of climate change today, as well as more than a century ago, is the intensive burning of fuel for human activities.

One of the main manifestations of climate change is the change in the temperature of the Earth's surface. Thus, according to NASA data, the average annual temperature of land and ocean, from 1880 to 2020, despite annual fluctuations in temperature indices, increased by 1°C (Data.GISS, 2022). However, the consequences of global warming are much more serious than just rising temperatures.

Warming changes the pattern of precipitation, increases coastal erosion, lengthens the growing season in some regions, changes the distribution area of some infectious diseases, and also causes glacier thawing. So, the NASA website contains a huge amount of materials on natural disasters that are the result of global warming. These include: sea level change - sea level has risen by 10.1 cm since 1993 (Sea Level, 2022), a significant increase in extreme weather events (floods, landslides, hurricanes, drought), which occurs everywhere (Extreme Weather, 2022).

Of course, such large-scale changes carry risks to ensure security, sustainable development and quality of life. Humanity has already faced the consequences of global warming: the fires in Siberia in 2019 are one of the largest fires in the last 20 years, forest fires in Australia in the 2019-2020 season. It is important to note that fires entail not only the depletion of forest flora, changes in the physical, chemical, and biological properties of soils, financial costs, and human losses, but also the loss of the Earth's vegetation cover, which prevents the greenhouse effect (Agbeshie, Abugre, Atta-Darkwa & Awuah 2022).

The relationship between climate change and human economic activity has already been identified, and there is a range of scientific evidence recognized by the international community. Global warming and climate change have occurred primarily as a result of the release of huge amounts of greenhouse gases into the Earth's atmosphere, which led to the development of the greenhouse effect, respectively. Therefore, since the moment the global nature of the problem of planetary warming was realized, since the end of the last century, actions have been actively taken, including by international organizations, including the UN, aimed at its joint solution by the countries of the world. A number of forums were convened and documents such as the Framework Convention on Climate Change (FCCC) (concluded in New York on May 9, 1992) (United Nations Framework Convention on Climate Change, 2022), the Kyoto Protocol of 1997 (Kyoto Protocol, 2022) and the Paris Agreement of 2015 (United Nations Paris Agreement, 2015) were adopted.

Countries participating in the Kyoto Protocol committed themselves between 2008 and 2012 to reduce the total amount of emissions into the atmosphere of six gases that accelerate the greenhouse effect. It was assumed that gas emissions should be reduced by 5.2%

compared to 1990 levels. However, the "Kyoto Protocol", which ended in 2020, is considered by most experts to be unsuccessful, since the results achieved within its framework did not allow any significant impact on the climate system.

Greenhouse gas emissions around the world as a whole by 2011 increased by about 41.9% (Global Energy Review, 2022), and according to the International Energy Agency (IEA), global carbon dioxide emissions in 2021 reached a record high level: 36.3 billion tons. The coincidence in 2021 of a 5.9% jump in global economic output from lockdowns in 2020, a 6% increase in carbon dioxide emissions and abnormal weather in many regions of the globe this year, some climate change experts believe, highlight the close link between growth and GDP and global warming.

According to data provided by the US Environmental Protection Agency, the sectors of the economy that generate the largest amount of greenhouse gases are: electricity generation (25%), agriculture, forestry and other land use (24%), industry (21%) and transportation (14%) (Global Greenhouse Gas Emissions Data, 2022). It is also important to take into account that the "dominant sectors" in terms of greenhouse gas emissions change depending on the economic situation at the international and regional levels. For example, during the pandemic, carbon emissions in the transport sector dropped sharply, but in 2021, emissions in the electricity sector reached their peak.

The crisis caused by the COVID-19 pandemic made it possible to obtain data on changes in world GDP production, greenhouse gas emissions and weather anomalies over a comparable time interval, which was almost never possible before. This once again confirms the hypothesis that man is a kind of "catalyst" and the cause of global warming, since it is due to human activity that such a colossal emission of greenhouse gases occurs, accelerating the process of the greenhouse effect. However, further we come to the conclusion that the coordinated adoption of a number of documents on a planetary scale and the fulfillment of the conditions prescribed by them is insufficient to achieve results that contribute to the prevention of climate change.

In addition, socio-economic problems and unforeseen changes at the political, economic and social levels, such as the pandemic in 2020, the global economic crisis in 2022, are exacerbating other urgent global problems. In this regard, the question arises: are there natural mechanisms that can affect the critical situation in the world? It is expedient to search for an answer to the question posed in line with the analysis of natural growth processes.

4 Natural growth and economic growth

Natural growth is a phenomenon that can be observed quite often in nature: in any combination of living beings, provided there is an abundance of food, a vast territory and the absence of enemies that threaten life. A characteristic feature of the processes of natural growth is the increase in the considered object in the same number of times for equal periods of time. Thus, from a plant called kuroslep, which produces 15,000 seeds three times a year, $15000^3 = 3375$ billion plants could be produced. From time to time, due to the formation of extremely favorable conditions for reproduction, disasters occur in one or another region of the planet, such as the invasion of locusts on the African continent, the reproduction of rabbits in Australia, etc.

The projection of natural growth processes onto the human population has forced us to take a fresh look at the demographic changes taking place on the globe. Thus, the problem of the growth of the Earth's population and the related problem of the depletion of resources necessary for existence was posed.

Despite the fact that the differential equation for predicting the growth of the Earth's population was proposed by Malthus T.R. in 1798, this problem was raised loudly in the 20th century, when, in a relatively short period of time, the growth rate of population increased

sharply from less than 1% to 2% or more. The doubling trend has been tracked since 1950, when the population was 2.5 billion, and in 1987 it was already 5 billion. Thus, it took about 37 years to double the population. Current data show that it took 48 years to jump from 4 billion (1974) to 8 billion (2022) (Countrymeters. Dannyye, 2022). According to the UN forecast, the next doubling of the population from 5 billion inhabitants of the planet (1987) to 10 billion people by 2050 will take more than 70 years (Fig. 3).
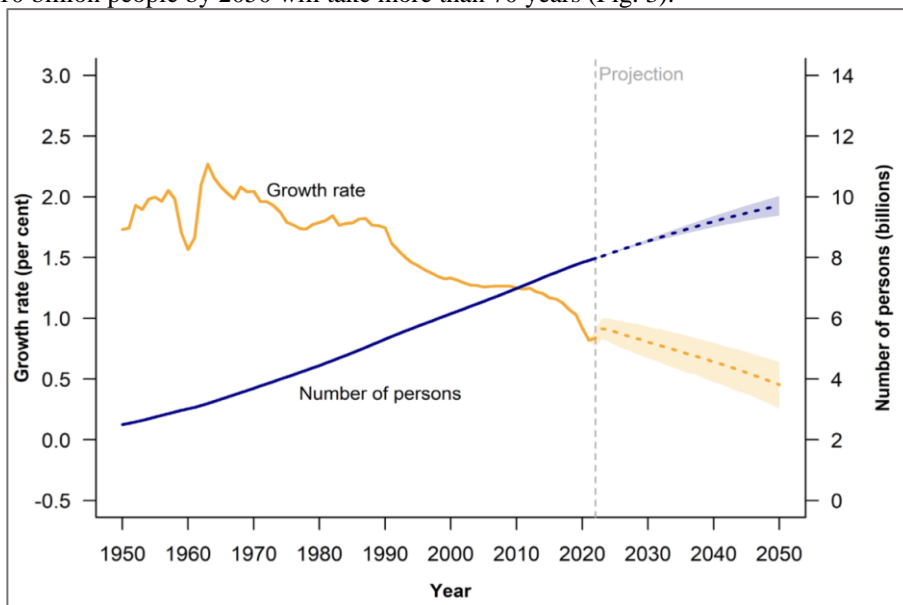
Figure 3. World population and annual growth 1950-2022, forecast up to 2050 (United Nations Department of Economic and Social Affairs, 2022)

Source: Own processing.

Over a hundred years: from 1950 to 2050, the world's population grew fastest between 1962 and 1965, when the growth rate averaged 2.1% per year. Gradually, the population growth rate slowed down, and eventually slowed down to 1% due to declining birth rates and economic crises. However, even with a critically low growth rate for our time: less than 0.5%, the mark of 10 billion people, according to experts, will be reached by 2050.

What threatens the overpopulation of the Earth and is it possible?

Thinking about the problem of overpopulation, scientists are divided into two camps. Some believe that the problem will lead to the collapse of the Earth, others argue that there is no problem, and the observed population growth is only a temporary phenomenon.

Indeed, if you look at the graphical representation of the dynamics of the growth of the Earth's population (Fig. 4), you can notice the similarity with a hyperbole and accept as true the problematic nature of the current situation.
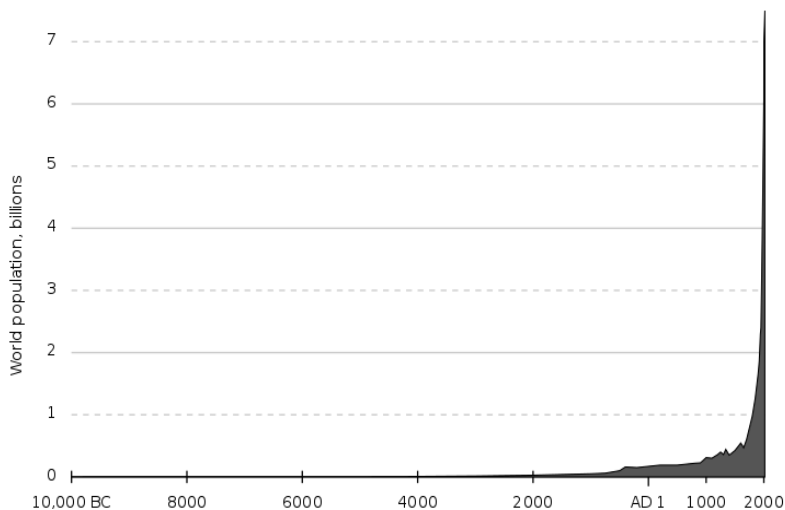
Figure 4. World population and annual growth 1950-2022, forecast up to 2050 (United Nations Department of Economic and Social Affairs, 2022)

Source: Own processing.

At the same time, keeping in mind the law of natural growth and considering that a person, like all living things on the planet, is subject to its action, one should not oversimplify the observed picture. Indeed, the growth rate, initially described by an exponential function, subsequently slows down and a period of saturation occurs, which is described by the P.F. Verhulst logistic curve. An "explosion" is thus not something inevitable due to the operation of natural limiting factors.

With the emergence of the problem of the spread of coronavirus infection in December 2019, more and more people began to think that the Earth was already overpopulated, because the virus was actively spreading and continues to spread by airborne and contact routes. In 2022, it is hard for us to believe that there are still people somewhere who have not been ill with the coronavirus.

The increase in mortality during the pandemic was not offset by an increase in the birth rate. A similar picture has developed throughout the world: by 2020, global population growth is falling from 1.1% to 1% (Fig. 5).
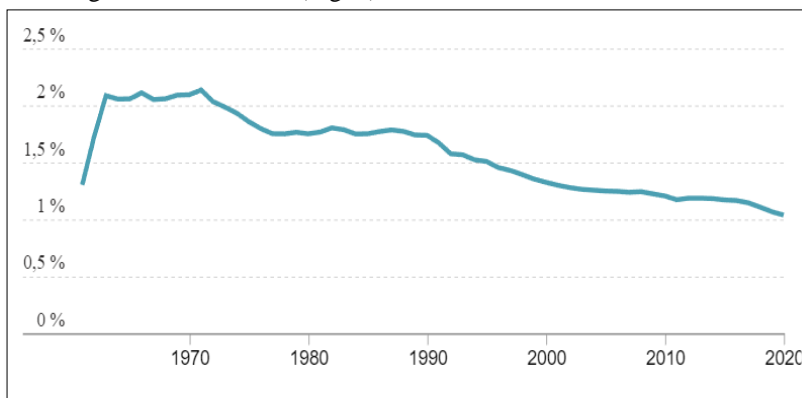
Figure 5. World population growth rate by 2020 (Russian Statistical Yearbook, 2022)

Source: Own processing.

In the Russian Federation, according to Rosstat, in 2020, population growth became negative and amounted to (-0.4)%. The birth rate in 2019 was 10.1, and in 2020 it dropped to 9.8. The death rate rose to a record 14.6. The lockdown, which had to be introduced to solve the problem, limited the population in social and family needs, because of which people did not get to know each other, they created fewer families.

The coronavirus pandemic thus showed humanity's vulnerability to threats that acted as natural mechanisms for limiting the planet's population. Against the background of the problem of limited economic resources and global warming, the pandemic has become a serious destabilizing factor for the entire global economy.

5 Results and discussion

Summing up, let's compare the obtained results.

The global socio-ecological-economic system is currently experiencing maximum stress in each of its subsystems. The consequence of this is not just the presence of urgent unresolved global problems, but also their aggravation due to the operation of the law of natural growth, which, in turn, limits the sustainability of economic growth.

Due to the crisis nature of modern economic development, the pressure of global problems is disproportionately large compared to the measures taken at the regional and global level. Therefore, measures to maintain the stability of the global socio-ecological and economic system do not bring the expected results.

We have considered only some of the limitations that impede economic development at the present stage of scientific and technological development. To overcome them, a technological breakthrough or a new resource niche is needed, which is in good agreement with the theory of cyclicity and the current phase of the economic cycle.

6 Conclusions

The identification and study of global problems of the socio-ecological and economic system in a single bundle made it possible to identify their relationship with the processes of modern economic growth and development, to look at the ideas of cyclicality from a new perspective.

The latest technologies, created on new principles of operating information as a resource, are already making the world unrecognizable today. This is most noticeable in the financial sector, which is the most globalized and virtualized of all sectors of the economy. The widespread use of the latest information technologies promises to radically change the role and functions of money in the very near future.

If we assume that information has become the very resource that provided a new resource niche, then this is the bifurcation point that can bring the economy out of the crisis. The resource potential of information is enormous. This includes saving many types of resources, and reducing the anthropogenic effect on the environment, and expanding the cognitive and other capabilities of people.

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Implementation of Local Corporate Partnerships Can Support Indonesia's Development in the Era of Globalization

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Abstract

Research background: This study aims to determine the implementation of the partnership principle between Regional Companies and the Regional Government, to find out how the implementation of regional company partnerships in increasing Regional Original Income, and to determine the factors that contribute to the implementation of regional company partnerships.

Purpose of the article: The important role of regional timber companies for the government and regions is that regional companies play a role in encouraging the acceleration of local revenue for the region, regional companies play a role in accelerating the growth of the business climate and investment in the region, regional companies play a role in boosting the social economic climate and regional business actors and Regional owned enterprises (BUMDes) by way of partner with them and open distribution and marketing channels for MSME products..

Methods: This type of research uses qualitative research. Data collection techniques were carried out by observation, interviews, and documentation. Data validation techniques and data analysis techniques used consisted of data condensation, data presentation and conclusion drawing.

Findings & Value added: Meanwhile, the existing bureaucratic structure in the central region actually becomes an obstacle for regional companies in carrying out international cooperation, resulting in sanctions and losses.

Keywords: *Public Policy, Partnership, Local Revenue, Local Company*.

JEL Classification: *E24; F62; J21*

1 Introduction

The philosophy of regional autonomy is to realize regional independence in all aspects of life, which is measured through the element of Regional Original Income (Sumarajaya et al., 2020; Trisakti & Djajasinga, 2021). In the implementation of regional autonomy (Badrudin & Siregar, 2015), local governments in this case starting from the provincial government, district/city regional governments, have broad authority in developing and managing their regions and are required to be independent, especially in

efforts to improve the quality of regional income. In terms of income, successful regional finance is if regional finance is able to increase regional income in a sustainable manner, in line with regional economic development. Without worsening the allocation of production factors and a sense of justice in public financing by obtaining regional income effectively and efficiently (Brittain et al., 2019).

Regional original income is the backbone of regional financing, therefore regional financial capacity is measured by the contribution of regional original income to the total Regional Revenue and Expenditure Budget. The greater the contribution that can be made by regional revenues to the regional revenue and expenditure budget, the less dependence of regional governments on central government assistance so that regional autonomy can be realized (Ravindra et al., 2018). One of the financial benchmarks that can be used to see the readiness of a region in the implementation of autonomy is to measure the extent of its financial capacity. Meanwhile, regional financial capacity is usually measured by the size of the contribution of regional original income to the regional revenue budget.

However, in subsequent developments, among the components of regional original revenue, regional taxes and levies are the largest contributors to regions, both provinces and districts/cities, so that the assumption arises that Regional Original Revenues are only identical with local taxes and levies. The source of local revenue comes from retribution and local taxes . The sources of local revenue can be explained as follows:

Table 1. Source of Retribution 2022

No	Income Type	Target	Realization	Percent
1	Health Service Fee	2,013,248,329	1,515,185,900	75%
2	Clean Water Fee	80,194,196	-	
3	Retribution for the Use of Regional Wealth	562.815.000	562.815.000	100%
4	Parking Fees On Public Roads	55,000,000	32,500,000	59%
5	Testing Fees (KIR)	100,000,000	-	
6	Market Service Fee	246.600.000	178,547,000	72%
7	IMB levy	538,976,000	201.451.850	37%
8	Public Service Retribution	386.400.000	1.025.555.244	265%
9	Partnership Program Claim Fee	15,386.400.000	11,394,865,383	74%
10	Retribution for the Use of Regional Wealth	525,000,000	143.100.000	27%
11	Waste Service Retribution	60,000,000	149,305,000	249%
12	Telecommunication Tower Monitoring and Control Fee	105,923.991	104,889,456	99%
13	Retribution for the Use of Regional Wealth	86,385,000	77,527,938	90%
Amount		**20,146,942,516**	**15,385,742,771**	76%

Source: Observation Results (2022)

Table 2. Tax Sources 2022

No	Income Type	Target	Realization	Percent
1	Mining Tax C	1,650,300,000	2,108,561,665	128%
2	Restaurant Tax	345,750,000	562,039,116	163%
3	Hotel	21,000,000	34,511,337	164%
4	Street Lighting Tax (PPJ)	5,562,175,567	6,270,497,433	113%
5	PBB P2	1,750,000,000	1,565,826,908	89%

6	Board Advertising	72,500,000	153,458,000	212%
7	Swift's nest	9,000,000	8,600,000	96%
8	BPHTB	385,200,000	455,913,825	118%
9	Entertainment	2,000,000	-	
10	Underground water	7,000,000	8,090,000	116%
Amount		**9,804.925.567**	**11,167,498,284**	114%

Source: Observation Results (2022)

Currently, regional companies are partnering with the Pasangkayu Regency government in an effort to increase regional original income by looking at the huge potential of the region. The role of the government is very necessary in supporting cooperation in the form of partnerships which are very important to carry out effectiveness and efficiency. Sharing skills in collaboration is needed to build a network. Cooperation is crucial for achieving the goals that have been set, and making the public sector work more effectively. The results of the research above state that partnerships provide benefits that can affect the operating system, increase productivity, potential for local economic development , decrease training costs, and the element of profit. Another advantage is competition in changing the dynamics of life and better community relations by involving several partners, the agreement becomes more complex and the benefits are far reaching (Dereli, 2015).

(Miller Singley & Bunge, 2018) revealed that the reasons why they should partner are; to be able to achieve the goal, namely the goal of mutual welfare (economic, social welfare, and maintaining mutual security), because several parties often cannot do it individually. The reason is the limited resources (physical-geographical, social, and economic) owned by each group so that it forces each other to share their resources and collaborate to achieve common goals because each partnering party may have its own goals. alone, but the most important essence is resource sharing and mutual benefit (Lane, 2017; Mkansi et al., 2019; Scheer, 2013).

Problems that have arisen in the ongoing partnership (Minshall et al., 2010; O'Regan & Oster, 2000; Regan et al., 2011), where the partnership pattern is essentially a relationship between the government as the program maker, National Owned Enterprise or BUMN, as the executor and an extension of the government and small industries as objects to be assisted. The idea is very good and prospective if implemented properly. It's just that there are indications that show that the program implementers work half-heartedly, too assuming this is their secondary business so that the results so far have not been optimal (Brown, 2011). However, along the way, the Regional Company in Pasangkayu encountered problems. Where the Regional Company of Pasangkayu Regency whose purpose is as a source of regional income but in fact Regional Companies so far have not been able to make a significant contribution to Regional Original Revenue, in fact there are more injections of funds from the regional government than the profits earned. so that this condition becomes a separate burden for the regional revenue and expenditure budget. In addition, the management of the Pasangkayu Regency Regional Company so far has not run in a professional, accountable and transparent manner so that in its journey Regional companies often find it difficult to develop and more fatally always lose money in their management (Basalamah & Mawardi, 2022; Leonard et al., 2020; Polii et al., 2021).

Based on this problem, since 2010 the Regional Company in Pasangkayu has been inactive until 2019. It has started to be active again in 2020 since the transition of the old Regent to the new Regent. Currently, regional companies run without capital participation, this is to encourage regional companies to cooperate with investors as a countermeasure unavailability of capital, the step taken is to partner with the private sector. The important

role of regional timber companies for the government and regions is that regional companies play a role in encouraging the acceleration of local revenue for the region, regional companies play a role in accelerating the growth of the business climate and investment in the region, regional companies play a role in boosting the social economic climate and regional business actors and Regional owned enterprises (BUMDes) by way of partner with them and open distribution and marketing channels for MSME products.

2 Methods

This research includes qualitative descriptive research. The research was conducted to clearly describe what is the focus of research which only describes what is in the research place. Descriptive research aims to describe the nature of an ongoing situation at the time the research was conducted, and to examine a particular symptom. An in-depth study consisting of a unit, in order to obtain a complete picture of a particular unit in this case is the implementation of a partnership with reference to the partnership principle of regional companies in increasing local revenue in Pasangakayu, West Sulawesi, Indonesia.

To analyze the data obtained, the authors used descriptive qualitative analysis, namely analyzing several explanations or discussion descriptions based on research data obtained from interviews, observations and documentation. (Malterud, 2012) said that qualitative analysis was carried out through four stages, namely data collection, data reduction, data presentation and conclusion drawing. Furthermore, by Tjetjep Rohendi Rohidi simplified into three, namely data reduction, data presentation and drawing conclusions

3 Results And Discussion

Pasangkayu Regency is one of the Autonomous Regions in the province of West Sulawesi which was born during the reformation period, previously this area was still under the name Mamuju Utara which was part of the Mamuju Regency which was formed based on Law number 7 of 2003 then changed its name to Pasangkayu Regency based on Regulation No. Government Number 61 of 2017 concerning Changes in the Name of North Mamuju Regency to Pasangkayu Regency in West Sulawesi Province which was promulgated by the Minister of Law and Human Rights Yasonna H. Laoly on December 29, 2017. One of the articles reads "The name of North Mamuju Regency as an autonomous region within the province West Sulawesi was changed to Pasangkayu Regency".

The name Pasangkayu comes from the words "Vova and Sanggayu", according to the Kaili language (Central Sulawesi) the word "Vova" means a type of mangrove wood that grows on the beach or sea, and the word "Sanggayu" means one trunk or one tree (a tree). the two words when combined have the meaning of "a stick of wood" or "a mangrove tree". The initial name "Vova Sanggayu" slowly changed and was pronounced with the word Pasanggayu" and finally changed to "Pasangkayu". The name Pasangkayu is a name that has long been known in the people of North Mamuju Regency in particular and West Sulawesi Province in general, which has welfare values, strengthens identity, enhances dignity, and is loaded with local wisdom.

Central Bureau of Statistics of Pasangkayu Regency, Pasangkayu in Figures 2020 page 6: Geographically, Pasangkayu Regency is located at coordinates between 40' 10" – 10 50' 12" South Latitude and 1190 25' 26" – 1190 50' 20" East Longitude from Jakarta (00 0' 0", Jakarta = 1600 48' 28" East Longitude from Green Wich). The area of Pasangkayu is in the form of a land area of 3,043.75 km2. By Region boundary:

    a)   In the north it is bordered by Donggala Regency, Central Sulawesi Province

b) On the south side, it is bordered by Central Mamuju Regency, West Sulawesi Province

c) Bordering the West with the Makassar Strait

d) In the east it is bordered by Donggala Regency, Central Sulawesi Province.

In the economic field, Pasangkayu relies on the agricultural sector. The contribution of agriculture to the gross regional domestic product (GDP) of Pasangkayu in 2002 was recorded at Rp. 238.67 billion. This value is equivalent to 78.32 percent of the total economic activity of the RP. 304.72 billion. In the agricultural sector, plantations are the main driving force. Economic activities in the plantation sector generate no less than 195.62 billion. Pasangkayu owns about 4,100 hectares of smallholder coconut plantations. At least 4,200 farmers are employed in this plantation. Of the 4,158 trees that produce, 4,794 tons of deep coconuts are produced. The marketing area is Surabaya. The coconut is sent to the capital of East Java Province through the Seradu People's Port. The total land area is not less than 200,000 tons

Besides being suitable for plantation crops, Pasangkayu soil is also good for citrus plants. This plant grows well in the subdistricts of Pasangkayu Sarudu and Baras. The land area is 1,026,250 hectares, with the widest area of one million trees producing 94,942 tons of oranges. Samarinda, Surabaya and Manado are the main marketing partners for oranges. The resulting oranges are then shipped through the Striped Port in Mamuju Regency. Based on considerations of history, culture, customs and social factors, the people of North Mamuju Regency changed the name of North Mamuju Regency to Pasangkayu Regency. For this reason, the Pasangkayu Regional Government, in this case the Regent of Pasangkayu, sees the need for BUMD to support Regional Original Revenue. With this, the Pasangkayu Regional Government cooperates with the Pasangkayu Regional Company. Where the Regent of Pasangkayu gives the task to explore the potential of the area in Pasangkayu for regional progress and development. Alternative BUMD Management Model

According to Muryanto and Djuwityastuti (2014), alternative models for managing BUMD in order to realize good corporate governance are:

1. The concept of non-Persero BUMD management using self-management. The authority of the local government as the authority holder can intervene in policies in a positive context related to the performance of BUMD through the supervisory board. The policy intervention is carried out to achieve the objectives of BUMD as a regional business entity that has the aim of carrying out social missions, public benefits, community welfare, and controlling the livelihoods of many people, by issuing Regional Head regulations, both Governor/Mayor/Regent regulations which substantially regulate about the strategic plan of the BUMD.

2. The concept of managing state-owned enterprises (BUMD) can be carried out with the concept of a group company with a holding company model with several types, one of which is a programmed procedure with a combined business group, the selection of a holding company model with a programmed procedure type based on various considerations, including:

3. The type or character of the type of business in the local government, There are several considerations for the implementation of the programmed procedure model with a variety of business combinations, because with the program procedure model it is possible for the emergence of new types of businesses that exist in local governments or types of businesses that already exist in local governments which will later become a holding company (holding company) in accordance with the

concept of the procedure. program that aims to form a new business that will serve as a holding company.

4. Based on business classification, In accordance with the type and characteristics of a pluralistic regional government with various kinds of potential and types of business, it is suitable to apply a combination business. This is of course to anticipate the various potentials and types of businesses that exist in the government.

Objectives and Functions of Regional Companies, The objectives and functions of regional companies according to the 2006 North Mamuju Regency regulations are:

a) The purpose of Regional Enterprises is to participate in implementing Regional Development in general, and Regional Economic Development in particular to support and increase Regional Original Income (by being oriented to the interests of the people, peace and enthusiasm for work in Regional Companies towards a just and prosperous society.

b) In carrying out its objectives, regional companies can cooperate in the form of business partnerships with state companies, other regional companies, cooperatives and national private companies.

c) The function of regional companies is to try to provide public services to the community by always paying attention to business development to gain profits.

Based on the results of the analysis and discussion on the partnership of Regional Companies in increasing local revenue in Pasangkayu Regency, it has implemented:

1. The partnership that exists between the Regional Government and Regional Companies contains three principles, namely 'the principle of equality, the principle of openness, and the principle of the principle of benefit. This principle is used as the basis so that this partnership can run well according to what is expected by all partners.

2. The implementation of the partnership has gone well in accordance with the indicators described by Edward III, namely communication, resources, disposition, and bureaucratic structure. The results of the partnerships that have been established since 2020 have had a positive impact where Regional Companies previously did not have businesses, now they have collaborated with several companies in the Pasangkayu Regency. The results of the collaboration have produced profits that can meet operational costs, but the profits have not been deposited into local revenue because they are still used as business capital so that they can work together with other companies in Pasangkayu Regency and are still used to continue to explore regional potential.

3. The contribution of the implementation of the partnership between regional companies in Pasangkayu is to uphold the principle of partnership in the implementation of partnerships with regional companies. The determinant factors that greatly affect the partnership are communication, resources, and disposition so that they need to be optimized. However, the bureaucratic structure in the central region actually becomes an obstacle for regional companies in conducting foreign cooperation, resulting in sanctions and losses.

4 Conclusions

The implementation of regional company partnerships in increasing local revenue has implemented three partnership principles, namely the principle of equality, the principle of openness, and the principle of benefit. The local government should supervise the performance of regional companies, so that the previous incident where regional companies were frozen doesn't happen again because currently regional companies are one of the supporting parts of regional original income.

Regional companies should not be fixated on only doing business in two business segments, but regional companies should explore the potential of the regions Regency so that they can generate profits which can later be deposited in Regional Original Income. In addition, the company remains consistent in always supporting all efforts made by Regional Companies to increase Regional Original Income.

Finally, regional companies must be prepared to face global challenges with various unexpected changes and conditions in cooperation between foreign countries, because the central bureaucracy sometimes changes temporary policy rules that have an impact on the losses of various parties, including regionally owned companies.

Acknowledgements

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Socio-economics factors affecting operational costs of operating production lines

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Abstract

Research background: The focus of article is introduction of the highly competitive environment on the Slovak market forces entrepreneurs to come up with measures that increase their competitiveness. One of the areas of major manufacturing enterprises where there may be weaknesses and at the same time an opportunity for improvement is the production process. We live in a time when society is changing thanks to technological progress. Technology is advancing in all industries.

Purpose of the article: The production process represents a set of activities that lead to the production of the desired output. With a more detailed look, we could divide this process into individual parts, analyze them, find flaws. Subsequently, with the help of appropriate methods, it is possible to optimize activities and the overall process.

Methods: Methods which are used in article are analysis, synthesis, deduction and comparison. The production process represents a set of activities that lead to the production of the desired output. With a more detailed look, we could divide this process into individual parts, analyze them, and find flaws. Subsequently, with the help of suitable methods, it is possible to optimize activities and the overall process. In this way, the company may be able to increase its capacities, possibly reduce costs, or improve the quality of products, and thus gain a competitive advantage.

Findings & Value added: In the article we are focusing to the production processes are different depending on the type, size, geographical location of the business and can create the impression that there are countless of them. However, all types of production processes have several common characteristics.

Keywords: *Production processes. Optimize. Reduce. Cost.*

JEL Classification: *M48; G30; F60*

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1 Introduction

The basic characteristics are the volume of production and the variety of products. One way of dividing production processes is based on the volume and variety of products. In general, businesses produce from uniform products in large quantities to specialized products in small volumes. Based on these characteristics, we distinguish project production, custom production, batch production, mass production and continuous production. (Greasley, 2009)

To operate production efficiently, the company must have not only optimal planning, operating rules, but also a well-designed layout. Layout can be translated as distribution in this context. The optimal distribution of individual workplaces, not only in the plant but in the entire company, enables a smooth flow of information and material, which can contribute to increasing efficiency. We will consider as optimal the layout that reduces the time required to complete the product. As an example of a problem that results from a non-optimal arrangement, we can mention the chaotic movement of material, which increases the production time. In this case, damage to the material may also occur, which leads to a further increase in costs. (Kumar, et al., 2006)

People have been informally dealing with the issue of layout since around 4000 BC, when the pyramids were built in Egypt, which were built based on astronomical calculations. Another example is the Romans and their famous colosseum.

Formally, the layout began to be dismantled during the industrial revolution. Since the Industrial Revolution, layout design has moved into the form of algorithms that can design layouts as efficiently as possible based on relationships. (Singh, et al., 2006) Before the actual presentation of these techniques, I will first discuss the layout and the plant as such on a theoretical level. The Facility Layout Problem (FLP) or workplace layout problem deals with the layout of elements (workplaces) in a plant so that multiple requirements are met. A well-planned layout can positively affect production capacity, overall productivity and efficiency. A bad layout can cause, for example, an increase in the production time. (Hosseini-Nasab, et al., 2018).

Spatial layout design can be understood as the physical distribution of resources such as machines and materials. The layout is designed to allow efficient material flow in the manufacturing process.

2 Methodology

In this section, we focus as optimal the layout that reduces the time required to complete the product. Layout design is important from a cost perspective because it can reduce production time and thus save costs.

Layout planning is the process of deciding the physical location of all resources that occupy space within a plant. These resources can include desks, worktops, staff, the entire workshop or even the entire workplace. Spatial layout planning takes place at any time, even if the plant is already built. This can happen when a new machine is added to the plant, or it needs to be moved, when a new workplace is created or when a new workforce is hired.

The layout of the workplaces in the plant can significantly affect the productivity of the company. Effective layout contributes to shortening material flow times in the production process. (Reid, et al., 2010)

Workplace layout planning determines the location of workplaces in order to reduce workplace costs for the performance of activities. (Heragu, 2016) According to Tompkins, 15-70% of process costs are related to the organization of workplaces, and with the help of their optimization, these costs can be reduced by at least 10-30%. (Tomkins, 1996)

The production process can run efficiently if the physical relationships between the building, equipment and production operations are optimized. These relationships are given by the spatial arrangement. (Hurley, 1953)

According to Russel (Russel et al., 2011), the effective distribution of workplaces in the plant meets the following requirements:

• Minimizes movement and costs associated with material handling
• Uses space efficiently
• Uses efficient workers
• Eliminates production bottlenecks

Facilitates communication and interaction between workers, between workers and their superiors, and between workers and customers

• Reduces the time needed to produce the product
• Respects safety standards
• Allows flexibility to adapt to changes
• Increases capacity
• Supports product quality
• Enables visual control of activities

Like Russel, Kumar and Suresh (2006) list the characteristics of a suitable plant layout:

• layout brings employees satisfaction, comfort and ensures safety
• improves material flow and thus facilitates the production process
• minimizes material handling and transportation
• efficiently uses resources (space, equipment, employees)
• reduces the total production time
• ensures the flexibility of production processes

The physical layout of workplaces means determining the exact location of individual machines, workstations, worktops, and the like. By distributing, we want to achieve such assignment of location to individual workplaces, which minimizes the transfer of executives and material between individual workplaces, and thus reduces the costs of material handling, increases efficiency and productivity. But, we have to take into account other factors than just transfers between workplaces, and they are:

• Reduction of workplace congestion with the aim of smooth flow of material and workers
• Effective use of available space
• Enabling communication and supervision (controls)
• Establishment of a safe and pleasant working environment for employees (Heragu, 2016)

The authors present various procedures that lead to the design of the optimal layout of workplaces. However, the basis of all procedures is goal setting, problem definition, information acquisition and proposal generation.

According to Heragu (2016), this procedure has 7 steps, and he calls it a design solution. The disadvantage of this procedure is its lengthiness:

1. Identification of the problem
2. Obtaining the necessary data
3. Formulation of a mathematical model for the problem
4. Developing or selecting an algorithm and using it to solve a problem
5. Generation of alternatives, their evaluation and selection
6. Implementation of the selected alternative
7. Continuous control after implementation
8. When identifying a problem, it is important to distinguish between a real problem and a symptom, which results from the problem. At first glance, it may not be clear

that the problem is inefficient organization of workplaces, the manager may believe that the problem is inept employees. (Heragu, 2016)

When collecting data, it is important that this collection is effective, that the appropriate range of information is determined, and that this information is correctly interpreted. Nowadays, the problem is not with a lack of information, but on the contrary, with too much.

Currently, there are several algorithms for solving the problem of workplace layout. Their use depends, for example, on whether the plant has more floors, what relationships exist between individual workplaces, and so on. An example of such algorithms is CORELAP, ALDEP, and others, which will be discussed in the next chapters of the theoretical part.

When collecting information to solve a layout problem, it is necessary to determine what information we need. Hegaru (2016) states that product and equipment analysis is needed. The analysis of the product determines for us the procedure of its production, transfer from one production point to another. Analysis of plant equipment will provide us with information about what machines are in the plant and what are the possibilities of moving them.

Reid and Sanders (2009) define the procedure for designing a new layout in three main steps, and that:
1. Obtaining information
2. Development of a block or schematic plan
3. Development of a detailed layout

Figure 1. Business layout
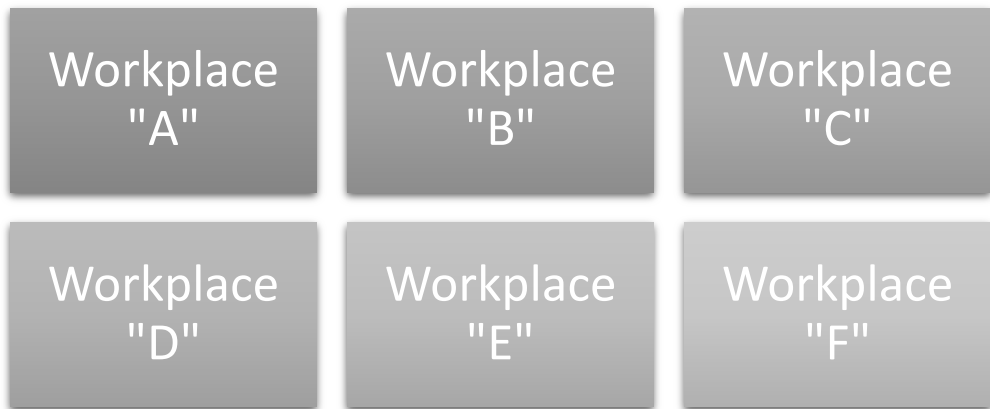
Source: Reid, R. Dan a Sanders, Nada R. (2010). Operations Management: An Integrated Approach. New York: John Wiley.

3 Results

3.1 Obtaining information

Determining the required space. In this step, it is necessary to focus on larger units, for example individual departments or workshops and their spatial needs in terms of the size of the machines, the number of employees at the workplace and the space required for movement.

Finding available space. A floor plan is suitable for obtaining this information. If the space meets the requirements we determined in the first step, we can continue. If not, it is

necessary to consider expanding the available space, or reducing the requirements of individual workplaces where possible.

Determining the degree of closeness. In order to determine which workplaces will be in close proximity, it is necessary to find out the relationships between these workplaces. There are two methods of recording. The first of them is the From-to matrix – a matrix that indicates the number of transfers (in both directions) between each pair of workplaces.

The second method for determining the degree of closeness is the REL chart - relationship chart. The values in the table are the subjective opinion of the manager, who determines the strength of the relationship between individual workplaces based on a predetermined scale. This procedure is suitable when it is necessary to take into account other aspects than the number of transfers, for example security. The following table provides an example.

3.2 Development of a block plan

In this step, the Trial-and-Error technique is used. Depending on the complexity of the problem associated with the current layout, it is also possible to use available software. These programs are based on heuristics that use a logic similar to the Trail and Error technique.

Trial and Error. The goal is to create a layout that places workplaces with a strong relationship next to each other based on the REL chart or From-to matrix. In order to increase efficiency in the plant, it is recommended to minimize the number of transfers between individual workplaces. We will use the information from the From-to matrix to determine those workplaces that absolutely need to be close to each other.

3.3 Load – distance model

Based on the information found, a layout is proposed that meets the conditions as accurately as possible. However, in order to compare the previous and newly designed layout, we need a quantitative way of comparison. The solution is the Load - distance model. Load can be translated as a batch; it can be either the volume of material moved or the number of moves between two workplaces. The goal is to calculate an ld score that we want to be as small as possible.

$$ld = \sum lij dij \qquad (1)$$

Legend:
  lij = allowance between workplaces i and j
  dij = distance between workplaces i and j

We define the distance between workplaces as a straight-line distance, which is defined as the shortest possible distance between two points measured by movements from point A to point B in the up/down and left/right directions. In the case of a block layout design, we count the number of blocks that separate individual workplaces.

Because plants can consist of several workplaces and the relationships between them can be complex, there are programs that suggest a more optimal arrangement of workplaces based on the REL chart or From-to matrix. The two most popular are CRAFT and ALDEP. (Reid, et al., 2010).

3.4 Algorithms used in layout optimization

The principle of determining the location of individual workplaces lies in the relationships between them, whether it is the number of transfers of material or personnel between these workplaces, or the importance of their proximity, which is determined by managers based on the progress of the production process, safety, subjective opinion and other factors.

There are several algorithms that can create an optimal plant layout based on available information. The best known is CRAFT (computerized relative allocation of facilities technique), we also know ALDEP (automated layout design program) and CORELAP (Computerized Relationship Layout Planning). CRAFT is used when modifying an existing layout, ALDEP and CORE-LAP are used to design a completely new layout. (Reid, et al., 2010)

We can divide these algorithms based on several criteria, for example according to the logic they use or according to the way they are used. For the needs of this work, I chose the division according to use, when the algorithms are divided into those that modify the existing layout, and those that propose a completely new layout.

As a result of optimizing the spatial arrangement of workplaces, both time and financial savings are achieved.

4 Conclusion

The use of dealt with the analysis of the production process, the spatial arrangement of workplaces, its optimization, and the tools that can be used for optimization, and partly with the material flow.

In the article, the basic concepts of production and enterprise were introduced, and the typology of production processes was described. The article focused on the layout of the plant, problems with the arrangement of workplaces, and the tools that can be used to eliminate the problems.

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Current trends and future perspectives of sustainable Industry 4.0

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Abstract

Research background: With the advent of the fourth industrial revolution, the view on the use of technology has changed and human-machine interaction. In addition to production, the elements of Industry 4.0 affect service areas. Their introduction affects the competitiveness of companies, as well as they become more attractive to potential customers. Thanks to the advent of digitization, the fourth industrial revolution is coming, which brings new requirements for the course and structure of business processes, qualitatively changing methods and approaches in management will affect changes in existing business models, it causes the emergence of new professions and the change of existing ones, it will require enormous change and expansion education, abilities and skills of the human workforce, will bring a shift in the economy, can albeit an accelerator of various significant social phenomena

Purpose of the article: The aim of this paper is to bring readers fundamental theoretical knowledge regarding to the Industry 4.0 as a new concept of industry which brings benefits but also risks.

Methods: Analysis method, Synthesis method, Deduction.

Findings & Value added: The result of this paper is the analysis of current trends, risks, and benefit, but also the future perspective of sustainable Industry 4.0.

Keywords: *Industry 4.0, trends, risk, and benefits.*

JEL Classification: *P23; L16*; *L60*

1 Introduction

The world around us is constantly changing and more and more new technologies are appearing, having an impact on practically all sectors of human activity. Major technological breakthroughs are often referred to as industrial revolutions. They do not have a well-defined beginning and end. The processes occur gradually with the development of the entire company; however, their emergence can at least be roughly defined. (Zvarikova, et al., 2021) The industrial revolution occurred at the end of the 18th century, when coal (or steam) as an

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energy source began to be used a masse. That is why the steam engine became her symbol. There was a transition from manual production to machine production. The key term is industrialization, during which agricultural and craft production decreased and machine (industrial) production developed. (Dalenogare, et al., 2018) The following period is referred to by some as the period of oppression of the workers. Trade unions were formed to protect workers from harsh working conditions in factories. These movements achieved different levels of success and influence in different countries, however, the prerequisites for the secularization of society were created, which entailed taking over previously ecclesiastical competences (education, healthcare) by the state. The Second Industrial Revolution marked the introduction of electric power and mass assembly lines and brought about the rapid development of mass production at the end of the 19th century.

The American Henry Ford significantly changed the process of automobile production. (Galbraith & Podhorska, 2021) On the production line, the cars were produced step by step at the assembly points to eliminate all unnecessary movements and increase work productivity. However, the revolution also brought negative psychological effects. Obschonka et al. (2018) drawing attention to the psychological difficulties of persons living in the industrial areas of England and Wales. Partial automation through programmable memory controllers and computers was behind the third industrial revolution that began in the 1970s. However, due to its political closedness, numerous discoveries, patents and innovations did not reach Czechoslovakia, which led to the gradual backwardness of machines and low productivity of production and work. We are currently experiencing the 4th industrial revolution characterized by mass the expansion of the Internet and its penetration into many human activities. In addition to people, devices also connect to the network (Internet of Things, IoT), (Grant, 2021). Therefore, for the development of this revolution, large expenditures on infrastructure investments are necessary. It is not possible without continuously increasing technical and technological readiness implement the innovative principles of Industry 4.0. Although the industrial revolutions created a modern lifestyle, in which we have various conveniences at our disposal (not everyone on Earth, however), but because of them, the devastation of the planet began on a large scale. Production was based on mineral raw materials such as coal and oil. Factories spewed a large amount of waste into the air, which affected the health of the population, especially in cities (Dalenogare, et al., 2018). They are currently set up for industrial production numerous restrictions in terms of emission production, however, these limits are respected in developed countries and developed economies (but not in all), but in the so-called developing countries, environmental protection is outside the main attention of governments. CO_2 emissions, felling of trees, pollution of drinking water, all this, and not only these externalities of production, burden environment of the entire planet. And every state also struggles with these facts when creating its economic policy.

The inexorable transition from simple digitization in the third industrial revolution to innovations based on the combination of technologies in the fourth industrial revolution company to rethink the way of doing business and the entire economy. Business managers and owners they must understand the changing environment and thus face its changes through continuous innovation. (Cohen & Macek, 2021). Offering products and services with high added value is essential for functional a digital economy built on connectivity, integration and better accessibility. Companies that have adopted the view that development is made possible by knowledge and innovation have a competitive advantage and creativity. Other perspectives on the current economic reality are also emerging. According to the American economist and sociologist Jeremy Rifkin, the Internet of Things will increase productivity so much that procurement and the production costs of many products and services will be essentially zero and can become free of charge. Gradually, in his opinion, property rights will disappear, and the economy will begin operating on the principle of

sharing. (Frank, et al., 2019) The shift in human knowledge, as can be seen, entails not only new scientific ideas and discoveries, improving the quality of life, raising the standard of living, but it is determined by the political situation and the "mood" of society. It depends on each country how it adapts to new research, whether it will be able to accept them at all, and whether the innovation will somehow be able to implement into your course. After all, British society at the beginning of the 18th century and the combination of its resources and needs created the necessary conditions for successful diffusion innovation (Ejsmont, et al., 2020).

2 Methods

The name industry 4.0 refers to the previous technical "revolutions" that have already taken place on discoveries that had an impact on society. Dynamic method reference development known from the field of informatics is placed after the decimal point. After the third industrial revolution, machines were able to perform semi-automated tasks activities. The fourth industrial revolution represents a superstructure enabling automation of the entire production process thanks to the superstructure computer system equipped artificial intelligence and sensors that together will control this process, and even and optimize (Dawson, 2021). The term industry 4.0 was first used in 2011 by Wolfgang Wahlster on fair in Hannover at the so-called Hannover Messe 2011, which specializes in industrial automation. Professor Wahlster, Director of German Research Center for Artificial Intelligence (Deutsches Forschungszentrum für Künstliche Intelligenz) in 2014 at the same fair at its opening, he spoke about how companies in the region with high wages can be successful thanks to Industry 4.0 controlled by the Internet (Hawkins, 2021).

According to the Implementation Strategy Industry 4.0 report by the author collective Ejsmont, et al. (2020) the term Industry 4.0 represents the fourth industrial revolution, i.e., the next stage in the organization and management of the whole value chain across the product life cycle. This cycle takes more into account and more individualized customer wishes and ranges from the idea of production development to end customer, including recycling and related services. The essential is here availability of all relevant information in real time thanks to the networking of all entities involved in the value chain and the ability to extract useful data from the available data information at any time. Connecting people, objects and systems leads to creation dynamic, self-organizing, crossing organizational boundaries, in real time of optimized value networks that can be optimized according to the broad range of criteria such as cost, availability and resource consumption (Durana, et al., 2012).

Kamble et al. (2018) considers education to be an accompanying phenomenon of Industry 4.0: (i) connecting people, services and things via the Internet (Internet of Things), which will lead to a large amount of generated data (big data), (ii) big data will need constant real-time analysis, (iii) cloud solutions, (iv) the advent of autonomous robots, (v) 3D printing, (vi) augmented reality.

The Internet of Things enables remote monitoring, control of various devices e.g., in the home (Hopkins & Siekelova, 2021). It is already possible to control, for example, a home via a mobile phone electrical appliance, air conditioning or apartment lighting. Industry 4.0 is a very complex phenomenon that builds or can build on a row technological component. Among them we can include mobile devices, various platforms for the Internet of Things, positioning technology, advanced human-machine interfaces, authentication and abuse detection mechanisms, 3D printing, smart sensors, advanced algorithms and tools for big data analysis, multi-level interaction with users and their profiling, augmented reality and electronics embedded in clothing or various accessories, computing technology such as cloud computing, data visualization and training in real time. According to the authors Stehel, Bradley, Suler & Bilan (2021) within the framework of modular structured of smart factories

of Industry 4.0 cyber-physical systems (English cyber physical systems, hereinafter referred to as CPS) monitor physical processes, create virtual copies of the physical world and make decentralized decisions. CPSs communicate and collaborate with each other and with people in real time through the Internet of Things. Through the Internet of Services (IoS) (Smith & Machova, 2021) are offered by and participants of the entire value chain both internal services of organizations and services extending across multiple organizations are used. Pierrer et al. (2020) under the slogan Industry 4.0 record machines augmented with sensors combined into a system that can visualize the entire production process and can itself to decide. Industry 4.0 is built on automation, data exchange in production technologies and processes, which includes the Internet of Things or Industrial Internet of Things, cloud computing and artificial intelligence and cognitive computing. The term is very often replaced by the phrase "smart factory".

Rogers & Kalinova (2021), Smith & Machova (2021), Perrier et al. (2020) or Shaw et al. (2021) point out to define the technologies and approaches making up Industry 4.0: *(i) Connectivity* – wireless communication technologies and IoT capabilities can thanks to the new connection of production, sensors, other devices with people to say thanks constant monitoring of increased efficiency. *(ii) Information transparency* - a large amount of collected data makes it possible in real time, making the relevant decisions leading to the improvement of production. *(iii) Decentralized decision-making* allows making decisions on based on both local information regarding the given production plant and global ones involving the surroundings (e.g., the traffic situation will cause the non-delivery of one necessary raw material for production, but thanks to the information about the traffic jam it is possible reorganize production temporarily to another product in which the raw material is not needed). *(iv) Technical assistance* - Industry 4.0 changes the role of people from those who drive machines (operators) to those who operate the machines and make production decisions.

The term industry 4.0 first appeared in the document Industry 4.0 Working group (2013), where, in the most concise form, this term is characterized as Industry 4.0 serves to create horizontal value networks at the strategic level, provides integration of business and engineering processes across the entire value chain and enables the design of vertically integrated and networked manufacturing systems. The basic features of Industry 4.0 are therefore: - horizontal integration across value networks, - vertical integration and network availability of production systems within smart factories, - digital integration of engineering processes across the entire value chain (Ejsmont, et al., 2020).

3 Results and discussion

Based on the literature review, we can conclude that the industry 4.0 includes the following eight key areas: *(i) Standardization and reference architecture:* industry 4.0 will include networking linking and integrating many different companies through value networks. This cooperation will only be possible if they are developed jointly standards. A reference architecture illustrating these will also be needed standards and facilitating their implementation (Frank et al., 2019). *(ii) Management of complex systems:* products and production systems become more and more complex ones. Appropriate models can enable this increasing complexity to be managed. Engineers should therefore be equipped with the methods and tools to develop such models (Ejsmont et al., 2020). *(iii) Powerful industrial communication infrastructure:* a key requirement industry 4.0 are reliable broadband global communication networks (Novak et al., 2021). *(iv) Safety and security:* safety and security are another key point for the success of smart production systems. Specifically, it is important to ensure so that production equipment and products themselves do not endanger people or their surroundings (Durana et al., 2021). At the same time, it is necessary to protect both

production equipment, products, and data and information with them combined against misuse and unauthorized access. This will require using integrated architectures for safety and security together with appropriate improvement in education (training of employees at school), so also in the lifelong education of employees (Kamble, et al., 2018). *(v) Organization of work and workplaces:* roles will change significantly in smart factories employees. Management increasingly implemented in real time will change the content of work, work processes and work environment. The new organization will offer work employees the opportunity for greater responsibility and personal development. To, for this to be possible, it will be necessary to involve workers more in the designs work processes (Kovacova, & Lăzăroiu, 2021) *(vi) Education and subsequent continuing education of employees:* industry 4.0 radically changes the required competencies of employees. With that in mind it is it is necessary to adjust the training of future employees in education and subsequent one's lifelong learning (Obshonka et al., 2018). *(vii) Legal framework:* Industry 4.0 must of course comply with the law; of course, existing legislation will need to be modified regarding its specifics. This concerns, for example, the protection of corporate data, issues of liability and disposal with personal and business data. *(viii) Efficient use of resources:* industry 4.0 should enable responsible use of all types of resources, financial, material and human. For this it is necessary accordingly consider the resource trade-offs needed for new smart factories and the possible savings that Industry 4.0 can generate (Watkins, 2021).

Ejsmont et al. (2020) states the challenges associated with Industry 4.0: *(i) Economic area:* high cost of implementation, need to adapt business model and unclear economic benefits of investment. *(ii) Social area:* the abolition of many occupations due to the automation of processes controlled by information technologies (especially refers to the so-called workers with a blue collar, i.e., workers working manually), emphasis on protection of personal data, reluctance of stakeholders to change, threat of redundancy department of information technology. *(iii) Political area* – non-existence of standards, regulations and certifications and unclear legal questions and the issue of data security. *(iv) The organizational area within the company is focused on*: IT security issues that are magnified by the fact that previously for the Internet and its threats to closed production components (parts of the production line) are new connected to the internet. Reliability and stability are essential for communication between machines incl. short one's reaction times. It is essential to avoid any IT problems because would cause very expensive downtime in production. The need to protect industrial intellectual property now and in place in automated industrial units). Lack of adequate skills necessary to accelerate the transition to the fourth industrial revolution. Vague commitments of the companies' top management. Insufficient qualification of employees. (Durana, et al., 2021).

4 Conclusion

Every new concept of industry brings benefits but also risks, in the concept of industry 4.0 they could be summarized as follows. Benefits of Industry 4.0: higher competitiveness, minimization of costs, low inventory, economy, efficiency, flexibility and increased production, personalized products, elimination of errors, waste and delays, educed production time, efficiency, flexibility, variability in control, flexible responses to fluctuations in demand, profitability, advantages of mass production, sensors protecting safety, possibility of immediate reaction, renewable energy sources. (Schmueckle, 2014), process optimization, quality improvement, reducing the amount of waste, ability to intervene more quickly in case of production problems, digitization of paper documents, better possibility of maintenance, real-time monitoring, better working conditions and sustainability, increased protection in case of accidents, quick detection of the presence of

dangerous substances, better possibilities of communication and cooperation, focus on ergonomics, ecology, use in building maintenance, equipment management, etc. (Oesterreich & Teuteberg, 2016). In addition, in a risky and very dangerous work environment, Industry brings 4.0 potential to significantly improve the health and safety of workers but also better control supply chains. The changes brought about by Industry 4.0 also mean benefits for small and medium-sized enterprises, hires for suppliers of equipment, technology and services thanks to the connected industry production. Risks of Industry 4.0: risks associated with terrorism, hacker attacks, IT security costs. Questions related to data security have increased significantly with the integration of new systems and larger access to these systems. Problems with achieving and maintaining a high degree of reliability and stability of communication, data security, protection of sensitive information and trade secrets, protection against viruses and early detection of their penetration. Integrity of the production process with respect to less supervision of the human factor, loss of high paying jobs, systematic lack of experience and manpower to create and implement these systems, necessary encryption, server protection using a firewall, automatic scanning (Helbich, Wahlster, Kaggerman, 2013). Assumption of an increase in spending on virtual reality and augmented reality, investments in education, research, development and infrastructure, investments to create a favourable business climate.

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Financial performance and globalization tendencies in Industry 4.0 era

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Abstract

Research background: The current global economy faces a number of challenges, from the consequences of the Covid-19 pandemic, through the raw material crisis to the application of necessary innovations through the onset of Industry 4.0. The principles of this industry model are gradually being applied in various industries and have a positive effect on financial performance.

Purpose of the article: The aim of the paper is to examine the impact of industry structure and country affiliation on the financial performance of companies in the V4 countries.

Methods: A suitable research method was a two-way analysis of variance, where the factors were Country affiliation and Sector structured according to NACE rev. 2. the explained variable was financial performance, the gross return on assets was the proxy variable. The net sample covered data on more than 41,000 enterprises from Central Europe (V4 countries) for the year 2019.

Findings & Value added: The results showed a strong influence of the industry on the financial performance of the investigated companies, on the other hand, the macroeconomic conditions of the countries (country affiliation) had little influence on the variability of profitability. This points to the globalization of the macroeconomic environment on the scale of the Central European area. From the point of view of the comparison of sectors, the leading sectors of the industry such as information services show above average performance, on the contrary, agriculture is underperforming.

Keywords: *financial performance; industry 4.0; globalization*

JEL Classification: *G31; G32; H43*

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1 Introduction

Financial performance is a broad term that encompasses many definitions; it can be a subjective measure of how the business uses its assets to generate revenue, or the term includes a view of the overall financial health of the business. Regardless of the definition, the financial performance of the company has recently received several blows such as the Covid-19 pandemic, raw material, or energy crisis. On the other hand, the current industry faces long-term challenges such as the Internet of Things and other elements of Industry 4.0.

From the point of view of financial health, financial performance was evaluated by many authors: Kovacova, et al. (2019) focused on the evaluation of prediction models and pointed out that each country uses different predictors of financial performance and financial health. Platt and Platt (2006), on the other hand, point out that low financial performance does not necessarily mean bankruptcy, but can only be associated with a state of financial distress. Valaskova, et al. (2020) monitored the financial stability of agricultural enterprises and note that the prediction of financial health should be monitored by tools that were primarily created for the given sector. Otherwise, results may be underestimated or overestimated. Kliestik, et al (2020) examined predictors of the financial health of 10 European countries and found that the most frequently used financial ratios are the current ratio, total liabilities to total assets ratio and total sales to total assets ratio.

Profitability is a more traditional measure of financial performance, Svabova, et al. (2020) analysed different profit rates and found that differences arise in the V4 countries: Czech and Polish companies have several times higher profit rates than Slovak and Czech companies within the monitored period 2013-2017. During the monitored period, these differences did not change significantly. Kliestik, et al. (2020) investigated the development of EBIT during 2009-2018 in Central European countries; their results indicate that 2013 (2014) was a breakthrough year in the operating profit of Czech (Slovak, Polish and Hungarian) companies. Kliestik, et al. (2021) adds to this that profitability in these countries is smoothed in accordance with upward earnings management techniques. Gajdosikova, et al. (2022) investigated the dependence of earnings manipulations on company size, legal form and industrial classification. the results show that only large enterprises from the K sector of the NACE classification do not manipulate earnings, i.e., their reported financial performance is consistent with real performance. Durana, et al. (2022) found a positive trend in the profitability of transport companies in the V4 and add that, depending on the country, the years 2013-2015 were breakthrough years in the profitability of these countries. Jia and Li (2022), on the other hand, point to a positive relationship between the sustainability of business performance and the quality of reported earnings. Wang and Huang (2014) published similar results and found a non-linear relationship between profitability and earnings manipulations. They add that companies strengthen the application of earnings management techniques in the event of economic downturns.

The application of the elements of Industry 4.0 already has a significant impact on businesses; persistent globalization tendencies in the economy will further deepen their impact on financial performance. Azadi et al. (2021) investigated suitable financial sources for financing Industry 4.0 technologies in the supply chain context. They point out that mostly the supply chain is financed by traditional external and internal sources, but Industry 4.0 technologies require a different sustainable type of financing. Bilan, et al. (2019) follow up on this topic and add that current businesses use alternative financial raising funds such as loans through online platforms. The scope of application of alternative forms depends on the economic development of the country, and degree of innovation potential. Mhlanga (2020) recalls that artificial intelligence (AI) is also changing digital finance, and the wider application of these technologies may result in the growth of risk-taking behaviour and an increase in the financial fragility of various entities, including small businesses. Hasan et al.

(2020) investigated the impact of big data on finance; they add that big data has a significant impact on financial decision-making, but this topic is significantly new and needs to be investigated in more detail.

Vlckova, et al. (2019) examined 17 financial indicators and note that the impact of Industry 4.0 was noticeable in the value of total assets and intangible fixed assets, on the contrary, long-term receivables, short-term financial assets or reserve funds were almost not affected at all by the onset of Industry 4.0 in Czech companies. Wu et al. (2019) point to the lack of application of Industry 4.0 methods in Vietnamese enterprises, which still concentrate on low labour costs, low-tech and labour-intensive production, which negatively affects financial performance. Yang et al. (2020) investigated financial performance in an intelligent manufacturing environment. They concluded that technologically intensive industries have better short-term financial performance in line with higher innovation performance, on the contrary, this connection is not clear in labour intensive industries. Durana and Valaskova (2022) revealed that V4 enterprises did not have a negative trend in profitability during the years 2016-2021, which should be caused by the increased resistance to bankruptcy due to the adaptation of Industry 4.0 principles in the studied industries. Chen (2021) notes that financial performance is influenced by internal business process performance. Hedvicakova and Kral (2021) looked at the long-term performance of companies and point out that efficient investment in capital that replaces labour creates room for relatively higher profits. Other industries, despite higher investments, could not achieve the required performance due to non-compliance with the principles of Industry 4.0.

It follows from the above that financial performance represented by profitability, or earnings is affected by the onset of Industry 4.0, and these tendencies are not only local in nature, but a global trend. The aim of the paper is to examine the impact of industry structure and country affiliation on the financial performance of companies in the V4 countries. The V4 countries were selected due to their innovation potential and readiness for Industry 4.0 as stated in the Readiness for the Future of Production Report 2018 by World Economic Forum (2018).

Two-way ANOVA was chosen as the appropriate method, where the explanatory variable was financial performance, and the explanatory variables were the dummy variable Industry broken down by NACE classification and the dummy variable Country. The gross return on assets given as a proxy for financial performance. The data covered the year 2019 and information on more than 40,000 businesses.

2 Methods

The previous chapter pointed out the significant variability of financial performance due to various qualitative factors, including the onset of Industry 4.0. Within this study, two factors were analysed: the first was Country affiliation, which should include all qualitative and quantitative factors associated with the macroeconomic environment, including specifics associated with the whole economic elements of Industry 4.0 support. This factor has four variations: Slovakia, the Czech Republic, Hungary and Poland. The second factor is the branch affiliation, where the NACE rev.2 classification, which is a pan-European standard, was used. The investigated variable is financial performance given as gross return on assets, i.e., as the ratio of EBITDA to assets. This ratio enables better comparability between companies in different countries.

Two-way analysis of variance was chosen as an appropriate method to investigate the effect of country and industry affiliation on the value of financial performance. An indisputable advantage of the method is the possibility of investigating the mutual interaction of factors, i.e., to answer the question whether the average financial performance of the company is different between industries depending on the country where the company

operates. ANOVA assumptions were tested using Kolmogorov-Smirn test and Levene test for equality of variances. In case the assumptions are not met, an ANOVA model with robust standard errors is estimated. If the factors were significant at the 0.05 level, then between group differences can be tested using Scheffé test or Games-Howell test for heterogeneous variances at the 0.05 level.

ANOVA model in regression form is given in Eq.1.

$$FP_i = \mu + Country_j + Industry_k + Country \cdot Industry_{j \cdot k} + \varepsilon_{ijk} \qquad (1)$$

Where: FP – financial performance proxy, $i = 1,2,\ldots,41\,520$ – number of cases in net sample, $j = 1,2,\ldots,4$ – number of countries (1 – the Czech republic, 2 – Hungary, 3 – Poland, 4 – Slovakia), $k = 1,2,\ldots,19$ – number of industry categories (1 - A. Agriculture, forestry and fishing, 2 - B. Mining and quarrying, …, 19 - S. Other service activities), $Lifecycle \cdot Direction\ of\ EM_{j \cdot k}$- interaction term ($j \cdot k = 1,2,\ldots,76$).

The sample was obtained in the Amadeus database based on three criteria:
- registered office in Slovakia, the Czech Republic, Hungary or Poland
- value of total assets in four consecutive years (2016-2019) at least EUR 2 000 000
- value of Turnover in 2019 at least EUR 100 000.

The rough sample included 43 692 businesses that met the criteria. The financial data covered the year 2019. The pure sample was created in two steps: first, by removing missing data, and second, outliers were removed by wisorizing at the 1% and 99% levels.

3 Results and discussion

The net sample consists of 41 520 observations, which are divided into four groups according to country affiliation, as shown in Figure 1. The largest group consists of Polish companies; more than 53% of enterprises met the condition of turnover of more than 100 000 €. Conversely, the fewest companies come from the Czech Republic, only 10%. Hungarian enterprises make up more than a fifth of the sample. This distribution of enterprises points to the different size structure of enterprises in individual countries; considering the size of Poland's economy, the sample contains the largest number of Polish large enterprises. The Slovak economy is smaller than the Czech one, but the share of Slovak companies is 3% higher in favor of Slovak companies. This fact may be due to the variability of the value of the total assets of Czech companies in the monitored years 2016-2019 (selection criterion 2).
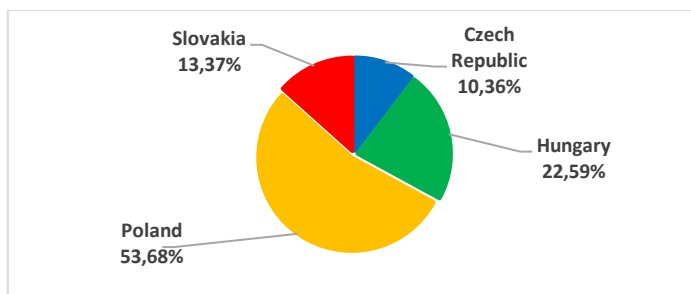
Figure 1. Proportions of enterprises by country affiliation

Source: author

Table 1 provides an overview of the descriptive statistics of the financial performance of enterprises represented by gross profitability depending on the country of origin. Hungarian companies show the highest performance on average, more than 6.5%, but with high variability in the sub-sample. On the contrary, Slovak companies have the lowest performance, only 3.3%. Similar to other sub-samples, the gross profitability of Slovak companies is subject to high variability. These values, together with the median values, indicate a high degree of variability with respect to the industry structure, i.e. significant influence of the Industry factor on financial performance. Overall, Central European large and medium-sized enterprises achieved an average gross return of 5.35% in 2019 with a variability of almost 10%.

Table 1. Descriptive statistics of financial performance according to country affiliation

Variable	Financial performance (FP)			
Country	Mean	Std. Dev.	Median	N
Czech Republic	0,0564	0,0881	0,0397	4301
Hungary	0,0660	0,1007	0,0449	9378
Poland	0,0528	0,0992	0,0348	22289
Slovakia	0,0329	0,0848	0,0186	5552
Total sample	0,0535	0,0971	0,0352	41520

Source: author

The next step of the analysis is testing the conditions of the ANOVA model. Figure 1 indicated an uneven abundance of subsamples. High variability of subsamples from descriptive statistics indicates a non-normal distribution of values, which is the second condition of ANOVA. The normality of the subsamples tested by the Kolmogorov - Smirn test at the 0.05 level was rejected. The last condition was the homogeneity of the variances of the subsamples in terms of the factor Country and Industry. The Levene test demonstrated that the alternative hypothesis of subsample heterogeneity holds. Ultimately, rejecting the aforementioned conditions meant rejecting the application of a standard two-way ANOVA in favor of an analysis of variance with robust standard errors, which is robust to the existence of type I error.

Table 2. Summary table of two-way ANOVA results

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	19,195	74	0,259	28,860	0,000	0,049
Intercept	7,410	1	7,410	824,380	0,000	0,020
Country	0,625	3	0,208	23,194	0,000	0,002
Industry	8,203	18	0,456	50,700	0,000	0,022
Country * Industry	3,440	53	0,065	7,220	0,000	0,009
Error	372,515	41445	0,009			
Total	510,481	41520				
Corrected Total	391,710	41519				

R Squared = ,049 (Adjusted R Squared = ,047)

Source: author
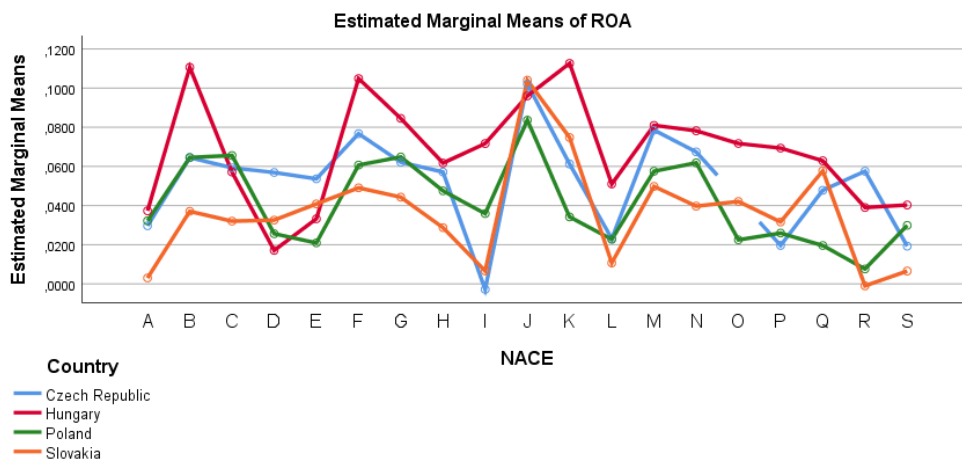
Figure 2. Interaction effect between Country and Industry

Source: author

Table 2 provides the results of a two-way ANOVA with an interaction between the factors Country and Industry. It can be concluded that both main factors and also interaction. The interaction between Country and Industry means that financial performance varies across countries depending on the industry. The highest explanatory power is demonstrated by the Industry Factor, which explains 2.2% of the variability as shown by the Partial Eta Squared. The interaction factor explains 0.09% and the Country factor explains only 0.02%. These show that there are differences in corporate performance across industries, but differences between countries are gradually disappearing. The ongoing globalization of industry is leveling macroeconomic conditions, and countries must offer other added value than cheap labor to attract new investors.

The interaction between the factors is significant despite the low Partial Eta Squared, as shown in Figure 2. Gross profitability in some industries within countries shows similar values, on the contrary, in other industries such as NACE class , D, F or K there is great variability between countries. Given this variability and the existence of interaction between factors and differences between countries, the industry factor was tested as a simple main factor, i.e. in each sub-sample, the differences between the gross profitability of the industries were tested using a post-hoc test (Games-Howell test).

Significant differences between the gross profitability of enterprises between industries in different countries, as shown in Figure 2, were also confirmed by the results of post hoc tests. 62 pairs of industries showed significant differences between profitability, of which in six cases there were significant differences in all analyzed countries. First of all, the analysis points to the significantly low performance of the agricultural sector compared to other sectors. Financial performance in this sector is significantly lower than in construction (NACE category F), retail trade (category G), information services (category J) or administrative services. This indicates a lack of application of modern principles of Industry 4.0 in this sector, such as the use of drones to check the status of crops, in the Central European area. On the other hand, the information services industry (NACE category J) shows excess profit, i.e. high financial performance compared to other industries. The Transport industry (NACE category H), which is often associated with the onset of the so-called Intelligent transport, on the other hand, does not stand out, the performance of this sector is comparable to other sectors or lower than in the sectors Information services or Real estate.

All in all, the analysis confirmed that the agricultural sector has a relatively low performance compared to other sectors and, on the contrary, the Information Services Industry shows an above-average performance in all Central European countries. Among the countries, Poland has the largest profit variability within the inter-industry comparison, on the contrary, the least differences between industries were detected within Slovak companies. This indicates that Slovak companies in certain sectors do not make sufficient use of the potential of Industry 4.0 tools, on the contrary, Polish companies show excessive performance in industry 4.0 leader sectors in both the industry comparison and the country-industry comparison. Similar results were also found by Pistrui and Czako (2018), who point out that Poland, together with the Czech Republic, are also at the top of the Industry 4.0 readiness ranking created by the World Economic Forum (2018).

4 Conclusions

The application of Industry 4.0 principles is the next challenge for the global economy after the Covid-19 pandemic and the emergence of the raw material crisis. The current state and readiness for this challenge are reflected in many indicators, the profitability of the company is from a financial point of view. The aim of the article was to investigate the influence of industry structure and country affiliation on the financial performance of enterprises of the V4 countries. The results of the two-way analysis of variance showed a strong influence of the industry on the financial performance of the investigated companies, on the other hand, the macroeconomic conditions of the countries (country affiliation) had little influence on the variability of profitability. This points to the globalization of the macroeconomic environment on the scale of the Central European area. From the point of view of the comparison of sectors, the leading sectors of the industry such as information services show above average performance, on the contrary, agriculture is underperforming. This study can be helpful in identifying industries that should apply Industry 4.0 principles on a wider scale within the V4 countries. Further studies could deal with analysis of financial performance within industries in more detail, possibly comparing developed and developing economies.

Acknowledgements

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Assembly workshop label – a persistent issue for the many industries in the world of innovation. Is Industry 4.0 a solution?

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Abstract

Research background: We chose to investigate the additional value for the Slovak Republic in the context of globalization, primarily because to its heavy reliance on automakers, which have long been the engine of the country's economy. We made the decision to investigate this area and look for potential solutions to this issue despite the influence of current developments like Industry 4.0 and general electromobility, which indicate to the impending issue with the "assembly" workshop, which SR and many other counties are still.
Purpose of the article: The objective of this paper is to analyse the global value and supply chain development trends of a few high-tech items, specifically the Citroen C3 and Peugeot 208 cars. The aim is to identify each company's and nation's specific involvement in the production of these cars in order to assess the added value going to and coming from the Slovak Republic.
Methods: In addition to a range of different analysis, synthesis, comparison, and analytical approaches, the two core components of the research—statistical analysis and visual analysis—were used. The data from PSA Group Slovakia used in the research are also used to create a case study.
Findings & Value added: However, it also highlighted the nation's undeveloped R&D infrastructure, which could result in a future loss of investment and business as usual. The visual analysis showed that the Slovak Republic gives the second-highest additional value to the selected commodities in this situation. We see the SR ideas as worthwhile improvements that can help the nation produce more valuable added exports, notably by highlighting Industry 4.0.

Keywords: *globalization, value-added, global value chain, Industry 4.0, automotive industry.*

JEL Classification: *A11; C10; O32*

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1 Introduction

Globalization is causing a fundamental shift in the economic environment of the world. It leaves behind a world in which barriers to international trade and limitations on investment transfers brought about by geographical barriers, time zone differences, linguistic barriers, regional variations in governmental regulation, different cultural perspectives, or different business systems kept national economies largely isolated from one another. Trade restrictions are being loosened and in some cases even erased as we enter this new age. The idea of distance is fading away as a result of developments in transportation and communication technology, and global material culture is becoming to resemble one another. National economies are united by an autonomous, interconnected global economic system (Balaz et al., 2020).

Globalization has an impact on every aspect of society, whether directly or indirectly, but an analysis of its root causes also shows two aspects of its development that stand out as particularly important. The first dimension is made up of technological advancements, the expansion of information technologies, communications, and revolutions in industrial techniques. In this way, the tools and physical underpinnings of globalisation are produced. A wide variety of social and economic institutions that enable the fulfilment of globalisation processes make up the second component (Minarik et al., 2022).

Globalization has become a determining factor in the expansion of national economies as a result of all previous development processes, including the deepening of internationalisation and integration, the expansion of interdependence and transnationality, as well as international specialisation and cooperation. Recent developments in science and technology have accelerated this trend to the point that a new economic framework is necessary to fully use them.

There are several concerns that are connected to the theme of globalisation. Global industry and value chains are essential to international commerce because they allow for greater integration of emerging countries, the reduction of poverty, and the creation of new job, manufacturing, and innovation possibilities. As was already said, globalisation as a whole has favourable consequences on ecological cooperation, improved working conditions, and sustainable economic growth. However, because to its extraordinarily complicated structure, lack of transparency, and weakened obligations, there may be a rise in violence, risk of political breaches, legal and environmental violations, and tax fraud (Balaz et al., 2020).

Global industry is currently being impacted by a number of trends, including the global Covid-19 epidemic, some countries' protectionism, the increasing stability of developing nations, the expansion and concurrent decline of commercial services, and the general dynamics of the international economy. International commerce, global value chains, and the adoption of the newest trends are eventually required since the positive impacts outweigh the negative ones (Minarik et al., 2022). The growth in importance of international trade and its long-term changes are caused by the appearance of specific factors, which are commonly referred to as megatrends due to their magnitude and effect on this commerce. We divide these into six categories (Rogers et al., 2021):

1. Interdependence (growing mutual dependence).
2. Inclusion (regional and global).
3. Globalization (transcending national frameworks).
4. Development in science and technology.
5. The collaboration and adaptation of the fundamental players in global commerce.
6. Potential world issues.

Particularly as a result of globalisation, substantial technical-technological breakthroughs and the use of scientific-technical knowledge in all areas of economic activity have emerged

as two of the most significant and essential drivers of the dynamic expansion of international commerce. Due to the exponential increase in the proportion of commodities and services with a high degree of added value (High-Tech) in global commerce, the positions of the largest TNCs (Transnational Corporations) and whole nations are altering swiftly (Said et al., 2021). The complexity of scientific and technological progress is demonstrated by three concurrent processes: the process of improving existing technology, the introduction of radical innovations that qualitatively alter the mode of production, the beginning of great discoveries, and the realisation of scientific and technical knowledge in the secondary (Zhong et al., 2021). Entry barriers are lowered as a result of the aforementioned technologies' introduction, which also virtualizes the global value chain (Porter, 1993). Thanks to this explosion in innovation, more and more edge service providers may now enter the market.

The development and growth of GVC is a result of the growing division of labour (Global Value Chains). The world's production activities are widely dispersed and scattered across different countries. Every country focuses on the various stages of the industrial process where it excels and has a competitive advantage. Nations that do service- or R&D-related activities often have the highest added value (Martinez-Noya and Garcia-Canal, 2014). Although value chains appear to be global, some manufacturing processes are concentrated in various locations. In general, it is true that activities requiring more advanced technology are carried out in more developed countries, whereas intermediate consumption and finalisation (assembly) are done in less developed countries.
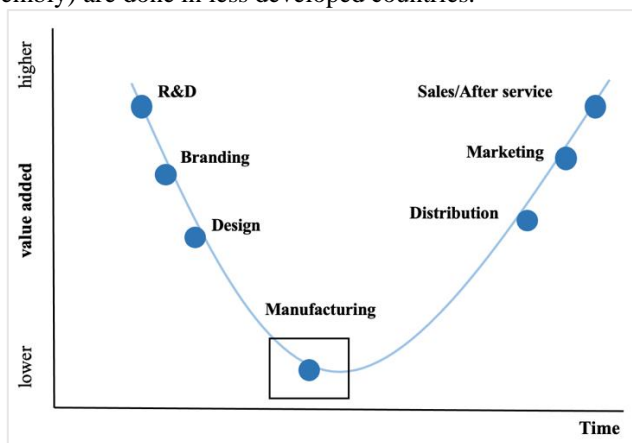
Figure 1. Global Value Chain and value-added (individual processes).

Source: Author's compilation (2022).

The curve depicts possible directions for raising output while boosting value-added (VA). These areas are primarily found at the beginning and end of the value chain (Lawrence et al., 2021).

The fourth industrial revolution (Industry 4.0), which aspires to enhance innovation, technology, ecological policy, and education, is now under progress. This is a result of the Internet's explosive expansion and improvements in technology. By utilising the value and supply chains in the Slovakian automotive sector as an example, it is possible to analyse how this revolution might lead to Slovakia obtaining the desired position of a creative nation rather than the status of a "assembly workshop.".

2 Methods

The development of the automobile industry in the Slovak Republic was attributed to the arrival of the German carmaker Volkswagen AG. The first plant was constructed close to Bratislava. The development of factories by PSA Peugeot Citroen and KIA Motors in Trnava (PSA) and Zilina KIA, respectively, marked the conclusion of the second phase of investments, which started in 2003 and finished in 2006. (KIA). 2015 saw the opening of a brand-new Jaguar Land Rover plant not far from Nitra. After the markets for the end of the production of weapons collapsed, the automobile industry replaced it as the main engine of Slovakia's economy. Its supply chain also began to progressively take shape, bringing in new investments for the country.

Currently, the car sector accounts for a large share of GDP (Gross Domestic Product) (roughly 12 percent). The entry of the Swedish carmaker Volvo, which will establish itself in the east of Slovakia (about in 2025), represents the most current development in AI (Artificial Intelligence). The majority of the commodity export structure for the Slovak automotive sector is made up of passenger vehicles (HS 8703), their parts (HS 8708), and bodywork (HS 8707) (Galbraith et al., 2021).

2007 saw the Slovakian automobile industry's largest year-over-year increase. 2013 had the highest production of cars ever created in Slovakia. Slovakia now tops the world in terms of passenger car manufacturing per person. Significant electromobility tendencies as well as other alterations that are commonly connected to "Sector 4.0" in the automobile sector have arisen in the preceding five years. The overall trend is toward more services, more added value, more comfort, and more safety thanks to technology and connection.

The present industry megatrends, as seen by many experts and even the automakers themselves, point to a transition to the ACES model (from the English A - autonomous driving, C - connection, E - electromobility, and S - shared mobility services) (Durana et al., 2021). These megatrends are influencing how the automotive industry will grow in the future since up to eight out of the top 10 original equipment manufacturers want to create autonomous vehicles. The EU's plan to discontinue manufacturing automobiles with internal combustion engines after 2035 supports this. Zabojnk et al. (2015) claim that factors influencing the development of electromobility include the price of buying electric cars, the rate of innovation in this field, the capacity and price development of batteries, the infrastructure for electromobility, environmental concerns, and legal and regulatory frameworks. The amount of corporate innovation potential, educational attainment, and worker skill levels all have an impact on technical and dynamic growth. According to Hopkins et al. (2021), there will be more strain on the labour by 2020.

Additionally, the employment rate might drop by up to 30% as a result of the Industry 4.0 trend of automation. It's possible that as demand grows, creativity will become a vital talent. A person's ability to be creative and cope with a variety of unanticipated situations will be required by artificial intelligence and information technology, which involve a far wider range of technologies and commodities (Stock et al., 2018).

In order to conduct a more extensive analysis of the added value inside the Slovak Republic, many methodologies that are based on real data obtained from PSA Group Slovakia were used. The most of it will be statistical and graphical analysis. Additionally, the study uses extensive analysis and a synthesis of the results that comes after. The findings of this case study may be applied to almost the whole Slovak market since, as previously said, we are examining the added value at PSA Group.

3 Results

The case study that is the focus of this portion of the work. In this case study, PSA Group
Slovakia TT's supply and value chains for the Citroen C3 and Peugeot 208 automobiles are
analysed and evaluated over the available monitoring years, and the additional value
Slovakia creates during manufacturing is graphically shown.
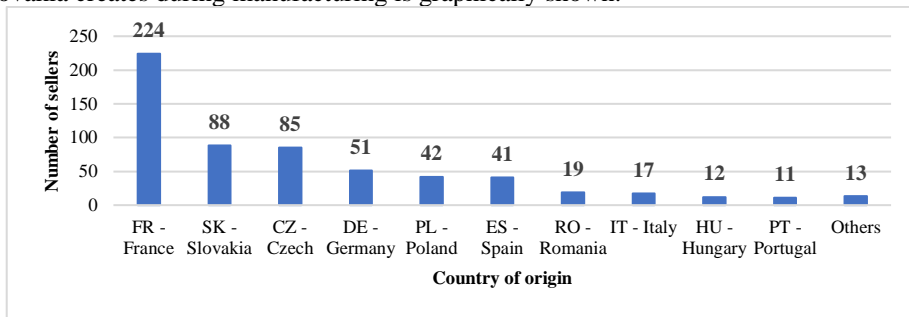
Figure 2. Supply chain for Citroen C3 and Peugeot 208 (2019).

Source: Author's compilation (2022).

2019 will see the results of deploying the PSA TT supply chain in its entirety throughout
all of Europe for the C3 and 208 models. 85 Czech firms and 224 French companies
(companies from FR) make up approximately 37.15 percent of the total (approx. 14.1 percent
). 88 puts Slovak business owners in the front. In 2019, the Slovak Republic ranked second
among suppliers of parts and components for cars (the C3 and 208) to PSA Group Slovakia
TT (about 14.6%). 603 vendors are currently active (PSA, 2022).
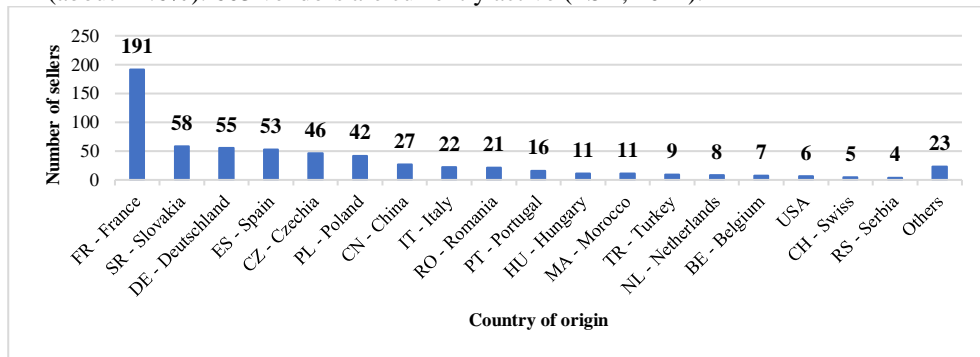
Figure 3. Supply chain for Citroen C3 and Peugeot 208 (2020).

Source: Author's compilation (2022).

The graph covers all PSA TT suppliers for 2020 and displays the total number of vendors
by place of origin for three categories (particular suppliers for the C3, 208, and common
suppliers for both models). With 191 providers, or nearly 31% of all vendors, France takes
the top spot (leader). The Slovak Republic follows, with 58 vendors (or around 9.43 percent),
and Germany comes in third (55, or almost 9 percent).

There is a worldwide supply chain here. Suppliers (dealers) have increased to 615. France
contributes the most to manufacture and import in both years and also generates the highest
added value overall since the automobiles were developed and designed in France. The
Slovak Republic not only makes significant contributions to their production but also
produces, assembles, and ships these cars to the international market. It is the world's second-
largest supplier of these models.

Starting from the fourth row, which is dominated by France, is more efficient since it imports connectors in a volume of 148,793 pieces, as opposed to the first three companies, which only import helixes, according to the largest suppliers by volume of imported pieces. SR occupies the seventh position with the business Adhex Technologies and imports 104,253 foam pieces. The greatest supplier of various components in FR is the business Plastic Omnium Auto Exteriors s.r.o., which imports 1,033 pieces of plastic parts. With the vehicle seat and exhaust system importer Faurecia Automotive Slovakia s.r.o., the SR stands for the fifth place.

One may say that SR focuses on plastic manufacture rather than importing parts and materials that require a lot of technology and innovation. In the table below, together with the quantity of delivered pieces and part types, are the countries with the most sellers from the top 30 suppliers. Import comparisons are shown in the graphs below.

Table 1. The largest suppliers of PSA for 2019 in terms of volume of imported units and types of parts.

Import based on volume		Import based on types of parts	
Country (number of suppliers)	Volume (pcs)	Country (number of suppliers)	Types of parts (pcs)
FR (15)	5,805,554	FR (10)	2,668
CZ (3)	364,377	CZ (6)	905
DE (1)	203,952	DE (1)	80
ES (1)	64,990	ES (1)	194
HU (1)	20,441	GB (1)	319
IT (1)	29,363	IT (1)	98
PL (3)	191,273	PL (3)	325
SK (5)	201,026	SK (7)	902

Source: Author's compilation (2022).

From the perspective of the sheer number of suppliers in both cases, France dominates. 5,805,554 pieces of material totalling 2,668 distinct types of components are imported by FR. The second-placed country, the Czech Republic, yearly imports 905 components and 364,377 volume units. Slovakia is second in terms of the volume of imported commodities, after Germany. When it comes to portion sizes, Slovak ranks in third, followed by Poland. The top 10 suppliers for 2019 in terms of the types of imported parts are included in the final section's content.

Table 2. The most important Slovak PSA suppliers in 2019 in terms of the number of types of imported parts.

Order	Seller	Town (Region)	Products	Parts (pcs)
1.	Faurecia Automotive SVK s.r.o.	Trnava (TN)	Seats for cars	279
2.	Adhex Technologies	Senec (BA)	Parts from foam	158
3.	Lear Corporation Seating SVK	Presov (PO)	Systems for seating	119
4.	Eurostyle Systems s.r.o.	BnB (TR)	Parts from plastic	95
5.	SMRC Automotive Solutions	Nitra (NR)	Modules, cockpits	92

Source: Author's compilation (2022).

The Trnava-based firm, which manufactures vehicle seats, exhaust systems, and other innovations, commands the top spot in the ranking. The organisation imports 279 different kinds of parts for PSA Group Slovakia TT. Adhex Technologies, the second company, manufactures and imports 158 foam pieces. Lear Corporation Seating Slovakia, the third company, is based in Presov and produces and imports 119 seating system parts. In all cases,

the Slovak Republic's supply chain is diverse, with the bulk coming from direct vendors. The Slovak Republic will supply 58 sellers (suppliers), or around 9.43 percent of the materials and parts needed to make vehicles in 2020. The primary imports will be plastic parts and components. The Slovak Republic manufactures cars. The low volume of imported technologically and innovation-intensive components is primarily caused by cheap costs and a limited focus on science and research in the automobile sector. To promote a higher PH and more engagement in the Slovak Republic, it is necessary to implement an adequate and comprehensive creative approach, including higher quality education.

4 Discussion

For all industries to understand and benefit from the concept of Industry 4.0, it must be broadly implemented (Tab. 3). The vision of the Slovak industry is to combine innovation, including broad application, with research and development activities. This will make it possible for industry and businesses in a variety of areas to contribute all relevant technology, information, and skills to society and improve the quality of life in Slovakia (Kovacova et al., 2021; Ruttimann et al., 2016). Thorough analyses must be conducted in order to achieve all of this, and a platform termed "Slovak Intelligent Industry Platform" must be created (Clayton et al., 2021).

Table 3. An extensive table of suggestions.

Areas	Recommendations
Increasing awareness and working together	1. Information campaign
	2. Encouragement of IoT research
	3. I4 Implementation Manual
	4. Increased promotion
Research for Industry 4.0	1. Support for applied research
	2. Research agenda for Industry 4.0
	3. Sector-oriented consortia
	4. Attempts to cut back on rest, R&D expenses, and costs
"Smart" Factory	1. Support for the use of innovative materials and technologies
	2. Standardization (reference architecture)
	3. New models and their entry into supply chains
	4. Use of Big Data
Financing	1. Better funding mechanisms
	2. Address the needs of the research agenda
	3. Innovative public procurement
	4. Implementation of pilot projects
Work force and Education	1. Analysis of the main requirements of the present
	2. Creating predictive curricula
	3. Providing more specialized skills
	4. Following the European agenda (new skills)
E-government and legislation	1. Continuous development of skills in the public sector

	2. Commercial use of data (Big Data)
	3. The government's active involvement in promoting the implementation of I4
	4. A suggestion for a clear VS digitization strategy

Source: Author's compilation (2022).

The main document of this platform would be a "action plan" that is customised for a specific region (Lăzăroiu et al., 2021). The platform would be connected by this tactic, which would also set long-term goals in the areas of various energy, materials, nanotechnology, and robotics approaches. Environmental policy must also be considered and addressed as it is essential for progress.

Environmental policy recommendations:

1. The Slovak government should provide enabling conditions for businesses to go green in order to attract foreign investment.
2. The government must be pressured by Slovakian enterprise to create the required legislative framework for environmental preservation.
3. The headquarters of the car company must cooperate with its Slovakian suppliers to help them retrain staff to take advantage of new technology and production techniques (Skare et al., 2021).
4. To retrain and improve the quality of the workforce in order to meet the employment requirements of the expanding e-mobility sub-sectors, new training programmes and cross-sectoral collaboration between the public and commercial sectors as well as academics are necessary (Sierra-Perez et al., 2021).

5 Conclusions

It is plausible to assume that the Slovak Republic, which is second only to France in terms of added value, has the most suppliers based on the visual analysis and comparative analysis. Both Industry 4.0 and extensive research and development must be prioritised in order to expand the nation's overall industry and provide even more added value. I4 emphasises a lack of governmental assistance, notably in the areas of law, money ("R&D"), and education. This lack of support has a significant influence on the company's product range development with value-added growth. This was consistent with the original hypothesis, but it should be noted that the EU won't be a leader in this field because it will only confront the well-established phenomena of Industry 4.0. The study's concluding portion contains the authors' advice and ideas. Two ideas for recommendations are presented in this section. The first deals with Industry 4.0's requirements for Slovak business in six areas or steps that adhere to Slovakia's need for innovation, the use of cutting-edge technologies, and programmatic changes in schools in order to achieve high value-added in the sector and subsequent exports of goods and services through the Action Plan. The second concept focuses on the importance and results of the environmental policy of the Slovak industry. By putting these ideas and proposals into action, the Slovak Republic can grow into a proactive, inventive country; otherwise, it will remain a "assembly country."

Despite the thoroughness of the investigation, the report has a number of flaws. It is important to note that this study was conducted in a single country by a single company. However, it must be understood that in Industry 4.0, the socioeconomic environment, culture, and in especially the legal environment play a considerable role. As a result, this weakness may also be viewed as an important and positive feature. Our next goal is to analyse and compare I4 and its use in the car sector and other industries where it may be essential.

Comparing the V4 states or Central Europe is also challenging, and it will be our duty in the near future.

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The role of environmentally preferable purchasing for the improvement of companies' competitiveness

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Abstract

Research background: Systematic changes in the economy are conditioned by globalization, which increases the need to ensure sustainability of economic development and competitiveness of enterprises. Social responsibility as a comprehensive concept has a great potential to support permanently sustainable development including economic, social and environmental aspects of the activities of companies, i.e. it promotes sustainable competitiveness. Economic sustainability ensures that activities that strive for environmental and social sustainability are profitable. Implementing environmentally preferable purchasing can improve enterprise's strategic position in the market, whether domestic or international. For environmentally preferable purchasing as for most business practices, the secret of being successful in an increasingly competitive market is to adopt a system of continuous improvement. Environmentally preferable purchasing is simply one of the tools for continuous improvement that can be applied both by enterprise and by their suppliers.

Purpose of the article: The aim of the paper is to examine the effect of implementation of environmentally preferable purchasing on the companies´ competitiveness operating in the forest-based industries in Slovakia.

Methods: The main hypothesis tested in this paper is the positive relation between the environmentally preferable purchasing and improved company's competitiveness. Competitiveness is manifested in an increase on the customer satisfaction index, an increase in sales as well as productivity and employee satisfaction, which leads to an increase in company profits. Using a questionnaire survey the companies operating in all sub-sectors of the forest based industries – wood, pulp and paper and furniture manufacturing, including their suppliers of wood raw material in Slovakia, were questioned with the aim find out whether environmentally preferable purchasing improves the competitiveness of companies.

Findings & Value added: Results obtained are used as a guide for the improvement of companies' competitiveness by using environmentally preferable purchasing.

Keywords: *environmentally preferable purchasing; wood products supply chains; competitiveness*

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1 Introduction

In the academic literature, terms such as 'environmentally friendly purchasing', 'purchasing green products', 'green purchasing' or 'green s purchasing' are used to explain consumers' environmental purchasing behaviour. Green purchasing is a key strategy for businesses to reduce waste generation, increase efficiency and improve competitiveness. Despite the fact that green purchasing is an established concept in the field of purchasing, there is no general definition. One commonly mentioned definition is that green purchasing means buying environmentally friendly products and avoiding products that harm the environment (Chan, 2001). Carter (1996) defined green purchasing as purchasing to facilitate reuse and recycling by reducing resources.

Competitiveness is important for maintaining productivity growth and raising the level, especially in small open economies that are based on international trade and are largely dependent on direct final investments (Chuang and Huang, 2016). Many of the definitions of competitiveness are mainly based on the company's capabilities and offerings in relation to competitors (Yang et al., 2013). Competitiveness is a relative measure that defines how a company, industry or country performs in comparison to the competition (Toppinen et al., 2017). Environmental issues become a source of competitiveness (Rao and Holt, 2005). Based on this, the measurement of competitiveness should include as many dimensions of the company's performance as possible, thus providing a holistic view of the effects of the environment on the economic performance of companies. According to Wagner and Schaltegger (2004), among the factors used to measure competitiveness in manufacturing companies in the EU are e.g. improving the image of the company, increasing sales, increasing market share, improving management and employee satisfaction, increasing profits, saving costs, increasing productivity, etc. Therefore, the examination of the competitiveness of enterprises can, in addition to determining the improvement of the company's image, also include the assessment of the improvement of the quality of services, the increase of customer satisfaction, the increase of productivity and higher profits. It is primarily the ability to respond to environmental or ecological problems that becomes a source of competitiveness (Hitchens et al., 2000; Rao and Holt, 2005). All organizations around the world are working hard to develop new and innovative ways to improve their performance and competitiveness. Bacallan (2000) demonstrated that companies can increase their competitiveness by improving their environmental performance to comply with the increasing demands of environmental regulations. He dealt with this with his customers with the aim of mitigating the environmental impacts of their production and service activities. The integration of environmental issues into management procedures is increasingly important for businesses to gain competitive advantages (Montabon et al., 2007). There is a two-way positive relationship between environmental performance and corporate competitiveness (Rennings et al., 2003; Triebswetter and Hitchens, 2005; Esfahbodi et al., 2017). Montabon al. (2007) states that environmental management can reduce the adverse effects of business activities on the environment and strengthen their competitive position. It can help improve success in solving environmental issues, improve the company's image (Hick, 2000) and provide companies with new opportunities to improve their capabilities (Hansmann and Claudia, 2001). All organizations around the world are working hard to develop new and innovative ways to improve their performance and competitiveness. To achieve environmental performance and increase business competitiveness, companies must implement strategies that include internal environmental practices and external green cooperation parameters.

Improving a company's environmental behavior and complying with environmental regulations can also contribute to a company's competitiveness (Bacallan, 2000). More and more companies are increasing their competitiveness through an operational initiative, one of which is the greening of their supply chain. Green Supply Chain Management (GSCM) has a positive impact on competitiveness. There are many previous researches related to GSCM from large industries and many researches are conducted in developing countries such as in Taiwan (Yang et al., 2013), China (Huang et al., 2012) and India (Jia and Wang, 2019), which confirm that the introduction of GSCM has a positive impact on competitiveness.

The main competitive advantages of the forest-based industries can be attributed to the physical properties of wood. It is important to note that the direct support of one sector within the forest bioeconomy (e.g. energy subsidies) may have an adverse effect on the competitiveness of other sectors due to the pressure to increase prices resulting from the increased demand of both sectors for the same raw material (Kangas et al., 2011; Moiseyev et al., 2014; Toppinen et al., 2017). The woodworking and furniture industry are industries that are closely related to environmental sustainability. Companies offering wooden furniture face challenges to meet the growing demands of consumers related to environmental issues (Djunaidi et al., 2018). The woodworking industry is a labor-intensive industry that uses wood as its base material. Additional materials such as metal, foam, fabric and plastic are used for the production process, mainly in the furniture industry. By applying it in practice, green supply chain management (GSCM) of a company can improve its performance and competitiveness through compliance with environmental regulations (Likumahwa et al., 2019). Modern companies have understood the importance of solving environmental problems through the introduction of green supply chain management in order to maintain competitiveness and obtain an improvement in the performance of their enterprises (Sarkis et al., 2011).

Currently, when operating and material costs are increasing, one of the reasons is to introduce environmentally appropriate purchasing into the business because it can save operating costs and save the environment and thus increase the company's competitiveness on the market. Therefore, this paper discusses benefits of environmentally sound purchasing in the forest-based industries and examines its impact on competitiveness. To find out whether the implementation of green purchasing has a positive impact on competitiveness, a questionnaire survey was used in different sectors of forest-based industry in Slovakia.

2 Methodology

The aim of the paper is to determine the benefits and examine the effect of implementation of environmentally preferable purchasing on the companies´ competitiveness operating in the forest-based industries in Slovakia. Based on the extensive literature review, a main hypothesis that there is a positive relation between the environmentally preferable purchasing and improved company's competitiveness was established and tested. Additionally, other benefits following from green purchasing were determined and examined. The evaluation of the influence of implemented environmental purchasing on the competitiveness in the wood processing sector in the Slovak Republic was carried out through a questionnaire survey. Companies operating in all subsectors of the forest industry were interviewed – furniture production, pulp and paper production, sawmill sector, wood trade and wood production, production of wood-based panels, printing, wood fuel, wooden constructions, including their suppliers of wood raw material. The questionnaire also identified the benefits for the implementation of sustainable purchasing practices in the sector.

The process was as follows:
- development of a questionnaire,

- determination of the required sample of respondents,
- performing a questionnaire survey among companies in the sector,
- analysis of responses,
- identification of the identified benefits following from the implementation of green purchasing.

The basic method of data collection was a questionnaire survey, which is a research, development and evaluation tool to quickly find out information about the knowledge, opinions or attitudes of respondents about the given issue. The questionnaire was developed and sent out in an electronic way (Google forms), proceeded by a telephone call or a personal inquiry. The questionnaire contained questions compiled on the basis of theoretical assumptions about the functioning of the process of green purchasing in companies. These were followed by other information such as awareness, use, reasons for the introduction of green purchasing in the forest-based sector and the benefits including the impact on the improved competitiveness of companies. Due to the qualitative nature of the research, respondents report the answers using a prepared Likert scale on a scale from 1 to 4 (where 1 means complete agreement and 4 complete disagreement). The questionnaire consisted of questions of corporate characteristics (corporate sector) and the introduction of social responsibility and green purchasing (Have you already encountered the concept of green purchasing? Do you have a corporate social responsibility or environmental policy in place?). The general structure of the questionnaire was as follows:

a) business characteristics (size, capital structure, sector, etc.),
b) implementation of social responsibility and green purchasing,
c) for companies with implemented green purchasing the benefits following from its implementation.

To determine the required minimum sample of surveyed respondents, basic statistical procedures were used to calculate the sample size in order to obtain relevant and reliable results. The minimum sample was determined on the basis of the database of forest-based sector companies in Slovakia, considering a margin of error of 5%, a variance of 50% and a confidence level of 90%. There are currently 15,513 entities operating tin the sector, out of which 3,168 production and trading companies. The largest part of the companies (more than 50%) is in the sector SK NACE 16.2 Manufacture of wood, cork, straw and plaiting materials, while the lowest share is in the SK NACE 17.1 Manufacture of pulp, paper and paperboard. Some 85% of companies have less than 20 employees, with the exception of the SK NACE 17.1 branch, where companies with more than 20 employees are dominating. In addition to commercial companies, there are self-employed persons in the sector, consisting of 12,345. The required minimum sample then was 266 companies needed to be surveyed. During the survey, we were able to collect questionnaires from 320 respondents. The evaluation of the questionnaire survey was carried out using statistical analyses of data in MS OFFICE EXCEL (descriptive statistics and frequency analyses) and SPSS (testing relations). Selected differences between two variables were tested using the non-parametric Mann-Whitney U-test, which is based on contingency tables (where the parameters of the independent variables reached two values). The U-test made it possible to determine whether the medians of two independent samples are the same or not, i.e. whether they are statistically significant. Statistically significant differences were tested between the variables related to the established environmental requirements for inputs or supplier and improved competitiveness (as well as other benefits). The U-Test assumed that the investigated variables were measured on an ordinal scale. In non-parametric testing, statistical significance was determined through p-values. Reliability was established at the level of probability $\alpha < 0.10^*$, $\alpha < 0.05^{**}$ and $\alpha < 0.01^{***}$.

Apart from the examination of other benefits, the main aim of the questionnaire was to confirm or refuse the defined hypothesis that the introduction of environmentally suitable purchasing improves the competitiveness of enterprises.

3 Results and discussion

Even if the majority of respondents do not have formal social or environmental policy in place, almost 52% reported that use green purchasing in their processes. The remaining part of the sector reported no use of such measures (48%). Based on their status regarding the implementation of green purchasing the respondents were asked questions about the benefits for its implementation.

Considering the U test results, it was confirmed that there is a dependency between the introduced environmental requirements for inputs or suppliers, as part of the purchasing process, and the benefits resulting from their introduction. The benefits that businesses have experienced in connection with the introduction of environmentally friendly purchasing requirements can be divided into the following three groups: environmental (improvement of environmental performance), social and economic (improvement of economic performance). This categorisation is based on the concept of sustainable development, the main idea of which is the integration of three areas of development: environmental, social and economic (Andhov and Mitkidis, 2017). In examined relations, the distribution of benefits was based on the aforementioned concept. Based on the results of the questionnaire, no social benefits were noted. Enterprises that have established purchasing requirements have seen an improvement in environmental performance, specifically in the greening of processes (U = 10377.000, α<0.001) and in improved (ecological) corporate image (U = 11650.000, α<0.010). From an economic point of view, the benefits were manifested in saving energy, water, waste (U= 6622.500, α<0.001), market expansion (U = 10638.500, α<0.001), increased market share (U = 10833.500, α<0.001) and in improving competitiveness (U = 9686.000, α<0.001) as shown in Table 1.

Table 1. Identified benefits of environmentally friendly purchasing.

Identified benefits n= 171	$\bar{x}$	U- test
Environmental		
greening processes	2.15	10377.000***
improved image	1.78	11650.000*
Economic		
saving energy, water, waste	2.31	6622.500***
market expansion	2.10	10638.500***
increased market shares	2.12	10833.500***
improved competitiveness	1.88	9686.000***

* α<0.010; *** α<0.001

Source: author

The established hypothesis that "the introduction of environmentally suitable purchasing improves the competitiveness of enterprises" was confirmed. Enterprises with established environmentally friendly purchasing experienced an improvement in their competitiveness (U = 9686.000; α<0.001).

Environmentally friendly purchasing includes various initiatives to reduce or minimize adverse environmental impacts for businesses. The aim of this initiative is to improve environmental performance, reduce costs, improve corporate image, reduce non-compliance risks and improve marketing advantage, competitiveness and economic performance. Our

results show that companies operating in the forest-based industry perceive economic benefits in an improvement in their competitiveness, improvement of company image, cost reduction and better entry into new markets. This is in line with the results of other research (e.g. Jia and Wang, 2019; Huang et al., 2012; Chuang and Huang, 2016) that state that for businesses, environmentally friendly purchasing has many benefits, from cost reduction, energy saving, environmental innovation, increased competitiveness, increased profit and many others. Rao and Holt (2005) also found in their research that the implementation of environmentally friendly purchasing can improve the competitiveness and economic performance of a company. Similarly, Hitchens et al. (2000), claims that companies can reduce production costs and increase economic efficiency by applying environmental initiatives.

4 Conclusion

As a result of green purchasing, companies and industries that provide environmentally friendly products and services can receive more recognition for their efforts. Thus, more companies will be motivated to design, manufacture and provide ecological products and services. Green purchasing plays an important role for companies that use it, especially in improving the state of the environment, reducing costs in the area of consumption of raw materials, waste management, improvement of environmental indicators, reduction of energy consumption and overall improvement of the economic and environmental efficiency of the enterprise. The benefits of green purchasing are not only about reducing the direct impact of activities on the environment, but can also bring social and economic benefits, as confirmed by the results of our research. Competitiveness is important for maintaining productivity growth and raising the level of the economy. Companies operating in forest-based sector in Slovakia positively perceive an improvement in competitiveness, in improved image, greening processes, saving energy, water, waste as well as increased market shares and market expansion. Thus, many companies may be motivated to implement environmentally appropriate purchasing to improve their environmental and economic performance.

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Machine learning applications for mobile devices

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Abstract

Research background: This paper explores and compares the possibilities of creating machine-to-machine applications for mobile devices. In today's globalized world, we encounter many areas where machine learning is suitable for various human activities. Machine learning helps organizations in analyzing the reality around us and one of the activities that machine learning deals with is the analysis of digital content and especially digital images.

Purpose of the article: The aim of this paper is to bring new perspectives on the possibilities of creating machine learning applications for mobile phones. Currently, there are a large number of options for creating such an application, and not all of them are easy to understand or usable for practical applications.

Methods: The methods used in the paper are mainly observation and surveys of existing papers. It is possible to use users' local hardware and data to solve machine learning problems on mobile devices and paper show some possibilities, advantages, disadvantages and challenges that are connected with this phenomena.

Findings & Value added: Machine learning applications are currently on the rise, as there are an ever-increasing number of opportunities to use these applications. There is also an ever-increasing number of different libraries and SDKs for creating such applications. The contribution of this paper is then to compare the different libraries and another contribution is to find out how such applications can be used and more importantly created.

Keywords: *Machine learning, mobile device, distributed system, mobile agents*

JEL Classification: *C61; C63; D83*

1 Introduction

Nowadays, machine learning is popular both in academia and business area. The underlying idea for machine learning is to use large amounts of data to train a model, which can then generalize to selected test samples of other data. The problem of the present time is then the increasing amount of any data and hence more load on the individual servers so that the data can be processed in a centralized way. In order to solve the single server problem, a model

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was proposed (Provost & Hennessy, 1996) where several servers were linked to share data with each other to create a fast local area network where data could be exchanged quickly to create a training model. Such an approach is, of course, perfectly scalable and is still used in practical life, even though sometimes it is not necessarily cost-effective. And it can also be an efficiency issue when building a demanding server cluster.

On the other hand, it is advantageous in the case of processing sensitive user data, such as written text in language processing or user profiles for personalized recommendations or medical record processing in medical diagnosis. Of course, when processing in a centralized or distributed manner, machine learning frameworks need access to user data and hence this method is more vulnerable to attacks either from outside or from within (Popa, 2014; Popa et al., 2011). There are a large number of problems with the data, e.g., if the servers are not trusted, they may share the data with unauthorized organizations in order to profit from the data.

With the rapid development of mobile devices, the idea of using these devices just for machine learning purposes has emerged. An example of how this approach can be used in practice is the possibility of facial recognition or speech recognition. Both approaches are addressed by machine learning and can be performed on a mobile device. Of course, it is not possible to train the data on a mobile device first, as it does not have the necessary performance on its own. Hence, the training is first done on powerful servers using large amounts of data and only later the results are delivered to the mobile device whose processors, memory size and disk size are currently powerful enough to handle the various tasks that machine learning offers.

Nowadays, various frameworks can be used to assist the use of machine learning on mobile devices such as TensorFlow (Abadi et al., 2016). These tools can be used by mobile app developers to create apps using machine learning models.

The client-based model has several advantages. Important advantages are cost reduction and even privacy protection. In general, machine learning type problems are distributed to mobile devices and solved locally, thus powerful servers are no longer needed. This also raises the issue of security, as the data is processed on a local mobile device that is personalized to the specific user. The idea of client-based training of data was proposed by (Shokri & Shmatikov, 2015) in such a way that the dataset was not distributed at all between the different parts of the whole model. The idea was further developed and named as federated learning (Konečný, 2017; Konečný et al., 2016). These works can be seen as a specific type of client-based training, which focuses on the use of data without uploading the data to a server and therefore the data is protected.

This paper mainly focuses on the development of machine learning using mobile devices and we also review the capabilities of selected algorithms that deal with client-based machine learning approach.

2 Methods

The process of data processing using machine learning can be divided into two main sections: (1) Designing an appropriate model based on the task at hand, and (2) Testing the model performance and possible optimization (LeCun et al., 2015).

Model design. Currently, there are a number of well-designed models that can be used to solve various given tasks. Examples include linear regression, logistic regression, support vector machine, neural networks or deep learning, etc. There are a number of studies and papers that deal with mapping this issue (Wu et al., 2008). Currently, one of the methods that is widely used is the so-called deep learning (LeCun et al., 2015) in areas such as image processing and language processing. The word deep then implies the use of so-called layers or structures that resemble layers in neural networks. There are a number of concepts usable

in the field such as Convolutional Neural Networks, Recursive Neural Networks, Generative Neural Networks etc. Again the processing of large amount of data has to be taken into account and hence it is done on high performance servers.

Model Optimization. The optimization is performed using machine learning optimizers. These approaches focus on ways to optimize the processes leading to a given goal. Optimizations are often applied to model parameters, for example, where the loss function of the model is minimized. The problem with optimization in general is the high computational complexity, as some models use a large number of parameters. There are a number of approaches in optimization whether they are various stochastic methods (Robbins & Monro, 1951) or methods based on evolutionary algorithms.

3 Results

Client based training is primarily motivated by the strong need to protect user data and to make the best use of user data using mobile phones. Client based training uses mobile devices to solve machine learning problems as opposed to traditional machine learning which requires some centralized dataset. The servers just deliver the trained model and supply the mobile devices with the necessary computations that these devices are not sufficient for. In general, this type of computation tends to move from centrally managed computation to decentralized computation on mobile devices. And as mentioned user data may be too sensitive for the user to upload to a server somewhere, preferring to process it on their authenticated mobile device. These principles allow to improve the accuracy of the model and even speed up the training process and of course this process allows to improve user security.

The motivations for implementing this type of training are several: (1) The mobile device has a shorter update cycle than the server applications and thus better performance; (2) This type of training can better protect the user's privacy and at the same time can fully exploit his data for analysis; (3) There are papers that prove the effectiveness and feasibility of this approach. One of the major problems of the server-based approach is the large cost requirement for computation and communication between servers. Data is generated on the user device and later collected on the servers. In many cases, the data itself is of high quality and detail and requires high overhead for transmission to the server. And of course, processing large amounts of data is very expensive in terms of computational time, electricity consumption, etc. And even if the model itself is well trained and powerful servers are available, it turns out that large amounts of data require long training cycles and the result is then often delayed, which can cause an increase in the performance itself with any change in the behavior of the user. Another concern for server-based training is security. A server for both centralized or distributed training approach needs direct access for clean user data and this is an issue in various attacks (Popa, 2014; Popa et al., 2011).

The only difference between server-based training and client-based training is where the actual training process is performed. Here, of course, several limitations come into consideration, which are consistent with the fact that the computations must be performed on mobile devices. Hardware resources on mobile devices are quite limiting, unlike PCs or servers. Network conditions for mobile devices are often unstable, it is not possible to ensure a solid and quality connection at all times, and communication costs are quite expensive. The servers on which the computations take place are under the control of the data centre itself, the mobile devices are not under any control and cannot be managed in a unified way like the servers. Thus, the reliability of the whole decentralised approach cannot be fully guaranteed. This then entails some limitations that apply to the whole approach.

Machine learning sub-problems that are solved on mobile devices should be simple (Shokri & Shmatikov, 2015; Zhao et al., 2018). This limitation touches on the hardware

complexity of the mobile device. Although the development of mobile devices seems to be steadily increasing, its performance is still not comparable to home computers let alone servers. A key reason why this is the case is the need for mobile devices to be portable and thus have a certain size that cannot be compared to server devices. In general, the problem is chipset cooling, where mobile devices cannot have any additional equipment, and the lower electrical power required to run mobile devices is also limiting for complex computational tasks.

The time required for local training should be short. This limitation is related to the previous one - hardware resources are limited. Applications running in the background can be interrupted by the operating system when memory needs to be freed for some currently running application (McMahan et al., 2017; Yu et al., 2019). Since users generally use mobile applications for a very short period of time, it is more convenient to have a running training process terminate while the application is still running rather than then having it terminate on an application running in the background (Caldas et al., 2018). If the training process is not terminated in time, data updates may not be performed and the process itself may then be delayed and the result useless.

Local private user data may not be uploaded to the server at all (Bonawitz et al., 2017). Although 4G mobile network is very widespread nowadays and 5G network is on the rise, still the data cost for mobile devices is very expensive. Furthermore, local data may contain sensitive data and raw user data should not be uploaded to the server at all. For a well designed model, sending a small sample of data is sufficient and thus can be helpful for the aggregation process on the server.

The data transferred in one round of the training cycle may not be sufficient. If a huge amount of data is transferred to a device that is connected to the WLAN network, this may cause low performance of other applications or their access to the network. Another limitation is the low communication frequency (Bagdasaryan et al., 2020). As the data transmission conditions may be unstable (Fung et al., 2018), the frequent communication scheme is an unsatisfactory concept. However, low communication frequency with long training time is advantageous to reduce the cost for communication. The low communication frequency then leads to one consequence and that is that it is not clear when any sub-problem will be solved at all. The last problem is the high awareness of data reliability. Client-based training may suffer from false updates or low quality updates. Decentralized training is unable to ensure the reliability of the data that arrives at the servers. This problem can be solved, for example, by using some reputation value or introducing some diversity in data updates.

From the above limitations, it is possible to summarize the challenges that need to be addressed. Converting the classical machine learning process to simpler sub-problems that can be solved efficiently on mobile devices, managing with an unbalanced dataset and dealing with the negative effects associated with this problem, compressing the transmitted data between server and client, shortening the communication frequency and ensuring the efficiency and reliability of the data.

There are many challenges in this area that we may face in the future. We will list a few of them. Classical approaches use independent and identically distributed data (IID), which means that the data are randomly independent of each other and all have the same probability distribution. In the future, training sets are expected to be of non-IID type. (Zhao et al., 2018) showed the negative effect of non-IID dataset on model convergence and proposed a strategy for data sharing. However, this can be a big problem for mobile devices because they work with limited data size and it is very difficult to manage data among multiple devices simultaneously. Also, some level of security needs to be considered for information transfer. One way to solve this problem is to develop new machine-learning algorithms that are not sensitive to the distribution of training data.

A pressing issue is the security and privacy of the shared data. Although it is possible to secure the leakage of user data, (Shokri & Shmatikov, 2015) showed the possibilities of attacks on machine learning models. The solution is to use differential privacy - where only the dataset pattern is shared, not the overall dataset -, but this requires additional computational power on the mobile device and can reduce the accuracy of the model. (Bonawitz et al., 2017) show that security aggregation does not bring any harm to the model, but for large-scale client-based training it is not entirely appropriate to use due to the high complexity. On the other hand, malicious clients can modify their updates to benefit themselves and harm the behavior of the final model (Bagdasaryan et al., 2020). Better security and privacy is still an issue to be addressed.

The fifth generation of mobile network (5G) brings high-bandwidth and low-latency network for mobile devices and in the future, better capabilities for communication between mobile devices. The high bandwidth, low latency and good stability of 5G can help mobile clients become more reliable and robust machine-learning devices. With better connectivity also comes a data security strategy, client based training will need to address an issue known as Network Data Analytics Function (Isaksson & Norrman, 2020; Niknam et al., 2020). The combination of a fast 5G network and client-based training will become one of the important future directions to be addressed.

Currently, many of new techniques are being used in mobile application development, but it is still unclear which of the suitable scenarios is applicable as they have still not been tested on many tasks. However, these scenarios can guarantee privacy security for users and abound in training speed and computational efficiency. They are used in data-sensitive areas (e.g., keyboards in mobile devices) or in medical applications. Although the computational speed of mobile devices is increasing, mobile phones do not fully exploit machine-learning functionalities, but only mobile inference and thus, e.g., these frameworks TensorFlow Lite (David et al., 2021) or PyTorch (Ketkar & Moolayil, 2021) are considered mobile inference frameworks. The Snapdragon Neural Processing Engine (Ignatov et al., 2018) is a software development kit developed by Qualcomm for Snapdragon devices and accelerates computations mainly by deep neural networks. If we did not have some general training frameworks, developing machine-learning applications would be very challenging because developers would have to implement all training operations for all tasks. More involvement of developers and the emergence of other testing frameworks is expected.

4 Discussion

In this paper we have tried to bring a view on the possibilities of decentralized machine-learning using mobile devices with all its possibilities, risks and challenges. We have offered challenges and possibilities where the issue can develop. A big area is development using a server-based machine learning approach, but this is an issue we did not want to address. Rather, we wanted to point out the opportunities but also the weaknesses that are present in the client-based problem domain. We have also shown what possibilities lie ahead in the future in the field and what problems will have to be solved. The application of client-based machine learning using mobile devices faces various challenges and opportunities, in any case it is on the rise and will continue to be used as mobile devices develop.

Acknowledgements

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The socio-economic impact of Romanian emigration in the contemporary period

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Abstract

Research background: The migration of Romanians has become one of the biggest problems facing Romania since leaving the communist regime. The analysis related to the migration problem of Romanians presupposes the detailed knowledge of the motivations and characteristics of migrants, of their circulation, but also of some related data, whose influence on the migration phenomenon can be direct or indirect.

Purpose of the article: This paper aims to present the most important theoretical and practical aspects of the importance of contemporary migration in Romania, but also of the socio-economic effects in the medium and long term. Theories that appeared on the topic of migration depend very much on the period in which they were conceived, otherwise we have the classical theories, the "push-pull" model, the neoclassical theories and the contemporary theories.

Methods: Mix research technique has been used. While qualitative research entails in-depth literature readings and reports, quantitative analysis entails presenting data via graphs and tables

Findings & Value added: Following these researches, the connection between globalization and the magnitude it brought to the migration phenomenon was found, both at European level and at national level. The article adds value through the analysis carried out at European and Romanian level and through the interpretation of statistical data related to this phenomenon of great topicality and notoriety.

Keywords: *economy; globalization; migration; Romania*

JEL Classification: *O15; F22; R23*

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1 Introduction

Migration in addition to mortality and birth rate is one of the most important factors when it comes to population evolution, migration can be considered one of the oldest social phenomena, it has an external character because the movement is from one country to another, from one geographical region in another and from one continent to another (Burlacu et al., 2020; Profiroiu et al., 2020).

Due to the fact that the phenomenon of international migration has grown, but also to the fact that international migration is the second most important component of demographic dynamics, migration has been debated from several points of view and over time different formulations have been formulated. theoretical approaches to this phenomenon (Barker, E., Bijak, J., 2020).

All theories about migration are looking for theoretical answers to describe the reality of migration, but contemporary theories are actually a combination of classical and neoclassical theories (Radulescu et al., 2020). Therefore, we live in an age where we need new ideas about migration theories (Negescu Oancea, et al., 2020).

The increase of migration was determined by several factors: the development of production and trade, but also due to the development of technology and communication routes (air, rail) that connect the world (the migrant can travel a long way in a short time), this favoring migratory movements, the main reason for migration being the improvement of living conditions. Also, in most urban areas, neighborhoods have developed in the peripheral areas, therefore, the price being lower, it was occupied especially by newcomers (Bodislav et al., 2020) .

2 The context of migration

2.1 European level

The phenomenon of migration has always existed and was characterized by: invasions, colonizations, crusades, transhumance. It is currently estimated that there are over 200 million migrants worldwide (Chau, H., 2020). Although there are no concrete data on the total number of people who have migrated throughout history, the extent of the phenomenon can be broadly assumed by grouping in several stages, characterized by social and geopolitical changes, the First and Second World Wars, the restoration of Europe after the war and finally the fall of the Iron Curtain.

In 1987, for the first time, there was talk of migrant networks as a form of social capital. Migration is considered a constant in the evolution of mankind, and migratory flows have diversified and expanded in terms of space, reaching its maximum level after World War II due to the evolution of distance transport systems (Kogan, I., Shen, J., 2018).

There are currently an estimated 7.78 billion people on Earth, which favors the process of migration around the globe as the technology used for transportation has begun to become more efficient and cheaper (Manafi I, Roman M.A., 2022). In the contemporary context, international migrations take place on the following routes: Africa - Europe, Asia - Europe, South America - North America and Europe, and especially Mexico - USA.

2.2 Romania level

Romanian migration can be divided into three major stages, characterized by the purpose pursued by migrants: stage of socio-economic migration, which took place before 1944; the stage of political migration, which took place between 1945-1989 and the stage of contemporary migration, which occurs after 1990.

After the fall of the communist regime, migration from Romania became a worrying phenomenon. Most of the Romanian migrants who migrated after 1990 were not only intellectuals, but also people with secondary education (Angheluta et al., 2021; Burlacu et al., 2021).
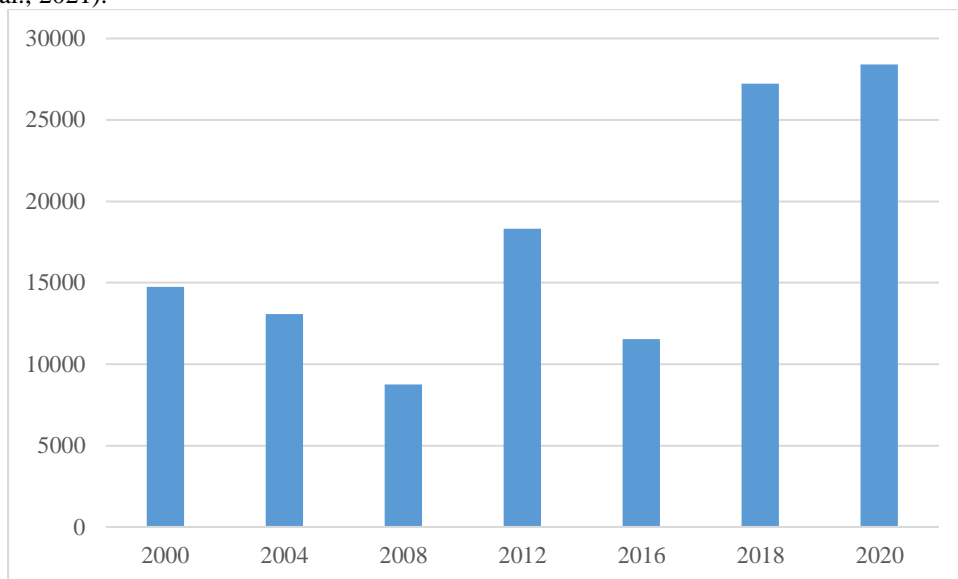
Figure 1. The total number of emigrants from Romania in the period 2000-2020

Source: Own processing according to INSSE data

Romanians have understood that the right to free movement in the world, a right won after 1989 and which differs from the old regime, is one of the most important rights obtained, some studies have identified three periods of emigration of Romanians:

- a first period, between 1990 and 1995, characterized by a total of over 200.000 inhabitants, people who left Romania permanently in favor of other destination countries such as Israel, Turkey, Italy, Hungary and Germany;
- a second one between 1996-2001, the period in which over 96.000 Romanians left the country for good, opting for countries such as Spain, the United States and Canada;
- a third period, after 2001 and until now, amid the emergence of Schengen visas and Romania's integration into the European Union, the emigration rate reached 28 people per 1000 inhabitants, the destination countries being Italy (40% of active migrants on the labor market), Spain (20%), Germany (10%), Hungary (8%) and Israel (6%).

From 2007 to the present: we are witnessing free access to the European labor market, which is favorable both for the creation of a European labor market, but also for the registration of severe slippages in local markets (Pripoaie, R., et al., 2022).

3 The impact of emigration on the economy

Currently, migration is the second cause of demographic decline, after the phenomenon of increasing demographic aging, the natural increase being negative (INSSE, 2019). Migration has led to a reduction in the labor force and an aging population (Ladaru et al.,

2022), and as we know any economic activity involves the combination of factors of production, in order to obtain goods and services that are necessary to meet human needs (Kuzior & Liakisheva, et al., 2020). The population represents the general premise of work, these being:

- a starting point for establishing labor resources (labor supply)
- a consumer of the results of economic activity (demand for goods and services).

In the economic sphere, the effects of the migration phenomenon appear as soon as they begin to manifest themselves (Bijak, J., Disney, G., 2019).

Migration can be seen as a change not only in the life of the individual, family or migrant group but also in the life of the community with which they have contact, both in the country of origin and in the country of destination (Sîrbu, A., Andrienko, G., 2021). People who opt for the migration option, start from the premise that if they carry out this action they will be able to ensure a better life than at the time before the decision (Belostecinic et al., 2022).

In terms of economic effects, migration can contribute to increasing household incomes, providing employment, raising living standards, lowering the unemployment rate in certain sectors of activity, targeting migrants to certain economic sectors where labor is low (Taylor, S. 2016).

3.1 The impact of Romanian migrants at the place of origin

Most often, the phenomenon called unemployment is approached and analyzed as an imbalance of the labor market at its national level: as a meeting place and to face global demand and global labor supply, unemployment is one of the easiest ways to a state can see how it ensures the well-being of its citizens, it being the one that influences domestic and foreign entrepreneurs to create businesses on the territory of the country and implicitly to create jobs (Sarbu et al., 2021; Urbański, M., 2022).

Between the Employed Population Rate and the Unemployment Rate there is a link of interdependence and inverse disproportionality, the fewer unemployed there are the more people employed, but also vice versa, the fewer people employed the higher the degree of unemployment (Carling, J., Schewel K., 2017).

With the beginning of privatization and/ or closure of companies, once owned by the state and to some extent by employees, Romanians began to wonder what will happen to them once they leave work, forced by the context of at that time (Radulescu et al., 2021; Kuschminder, K., 2022).

After the revolution and after the establishment at the head of the country of various political figures of the time Romania seemed to have a promising beginning in terms of economic development, but after a few years lost contact, economically, with former communist countries that Hungary, Poland, Czech Republic.

Figure 2. The ratio between the Active Population Rate and the Unemployment Rate

Source: Own processing; according to INSSE data

The economic crisis of 2009, but also the health crisis caused by the COVID-19 pandemic affected Romania, and against this background many people lost their jobs, the most affected by these dramatic changes in employment were men, so unemployment among men reaching 8.3% in December 2020, while for women it increased to 7.5%. This situation was also influenced by the fact that the crisis affected the productive sectors (construction and metal-mechanics) in which men were mainly employed.

The job crisis has left its most prevalent impact on young people (including college graduates) and 45-year-olds. In areas where the population was smaller, such as in villages and small towns, there were few employment opportunities for these two age groups. The social inclusion barometer showed that both young people and people over the age of 45 faced the greatest difficulties in finding a job.

These weights differ between women and men. Men under 25 or over 40 have a significantly higher risk of not getting a job than men in the 26-39 age group. In the case of women, the refusal of employers is motivated by the age of over 40, by the fact that they have minor children, by the request to commute or by the simple fact that they are women.

In this context, the idea of going abroad for work has become more and more attractive for more and more Romanians.

The places offered by the internal market are insufficient to meet demand, wages are also much lower than in previous years, so moving to countries where wages remain satisfactory and sufficient to maintain a decent standard of living is a solution. (Piper, N., Withers M., 2018).

The crisis turned emigration from Romania into a reliable solution at that time. In addition to those who already have relatives abroad, different people also decide to leave, such as age, training or ethnicity, all the more so as emigration is not only determined by income, but also by distrust in the institutional system (Tyldum, G., 2021).

With Romania's accession to the EU Community Corps. there were all kinds of advantages for Romanian workers who wanted to find a job abroad. The National Agency for Employment (ANOFM), as a public employment service, is a member of the EURES network, being the institution with responsibilities in recruiting and placing Romanian citizens abroad, offering information, guidance and distribution services for both employers, as well as for job seekers interested in the European labor market.

According to the activity report of ANOFM from 2009-2010 and until now, the interest of Romanian citizens to find a job in various states of the European Union or EEA through EURES services is maintained at a high level. Most Romanians have opted for jobs in labor-intensive sectors such as agriculture, construction, manufacturing, hotel industry, food industry, there are exceptions and some require jobs that require a high qualification such as: IT, engineering, health and teachers.

3.2 Remitences

Remittances are those remittances, made by migrants to the country of origin, more precisely to family, friends, seen as a compensation for the "brain-drain" phenomenon, and in general for the outflow of human capital (Strauss, K., McGrath S., 2017).

Accession to the European Union and lifting restrictions on the Western European labor market have facilitated short-term and permanent emigration. The temporary or permanent departure of part of the labor force from the countries of emigration has led to a significant flow of remittances, important at the macroeconomic level insofar as they lead to economic development in the host country. Labor emigration can have a positive or negative influence on a country's economy depending on how remittances are used by people left in the country.

For over 10 years, Romania has been among the first markets for receiving remittances in Europe, with a volume of over 6 billion Euros of remittances per year, according to World

Bank data. According to statistics, approximately 8 million Romanians work abroad, of which only 5.4 million send money to their families in Romania.

Italy is the country that hosts the most Romanians, over 1 million, Spain is the second country hosting over 680 thousand migrants and in third place is Germany which has in its borders a number of 690 thousand Romanian migrants.
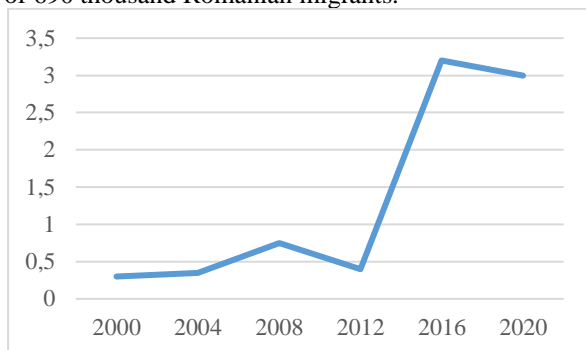
Figure 3. Remittances received as a percentage of GDP

Source: World Bank, 2000-2020

These Romanians participate, as can be seen in Figure 3, to some extent in Romania's GDP, only in 2016 remittances had a share of 3.14%, almost 6 billion US dollars, according to data from the World Bank in Figure 6.

Although in 2016 the largest share of remittances in GDP was registered, in 2018 the gross value of remittances reached a record amount of 7 billion US dollars, money that most of these Romanians used to create new businesses. or for the purchase of construction materials.

Financial remittances often help returnees set up new businesses when immigrants return with new ideas and knowledge. A large part of the emigrants left the villages and most of them intend to start various agricultural businesses on their return.

It seems that this would lead to an extraordinarily positive effect, two of the reasons being: the increase of the level of capitalization of the agricultural potential in Romania and the appearance of new small inventions but which are at least as important as the big ones. and capitalizing on local resources. In addition to capital investments, a large proportion of emigrants from villages tend to use the money obtained to renovate their homes or in some cases build a new one. A lot of newlyweds go abroad to create a future and a place for themselves in their own country.
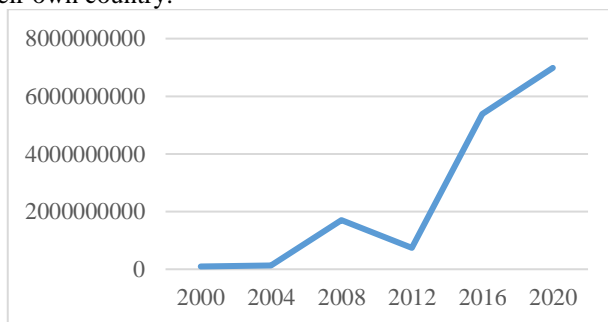
Figure 4. Remittances sent to Romania in USD

Source: World Bank, 2000-2020

4 Impact of Romanian migrants at the place of destination (Spain)

In the second stage of the migration flow, migration was mainly determined by the search for a job, under the pressure of a severe economic crisis, the preferred countries being Italy and Spain; In a climate of traffic bans and restrictions, labor migration has often taken the form of asylum or illegal entry.

The factors of attraction of the Romanian labor force in Spain was mainly due to the diversity of the activity sectors. The primary sector is represented by: agriculture, animal husbandry, fish farming, forestry and hunting. The secondary sector is represented by industry and construction, and the tertiary sector by trade, public services, transport and tourism.

The positive effects of Romanian immigrants were felt in Spain by the fact that they increased the demand for goods and services, consolidated the national production and the share of money brought to the state budget through taxes was higher than the social aids offered by the state.

The negative economic consequences detected at that time were the following: employment of natives, lower wages, the social protection system had to be improved, incurring expenses for the national budget, in connection with the return of illegal migrants. Due to the growth of the informal economy in Spain, labor was needed in sectors such as construction, agriculture, factories, cleaning and childcare, but also for the elderly.

Informal economic activity includes all economic activity, generating income not registered or partially registered and highlighted in the national income account of a country (Van Hear, N., et al., 2018).

Due to the similarities of culture and language between Spain and Romania, it motivated many Romanian migrants to go to work there, although one of the main reasons was that in England Germany and France had become very difficult to regularize their situation. Under these conditions, the migratory flow from Romania, to Spain, experienced a huge and relatively sudden increase, because the Romanian migrants left where there was a job.

Table 1. Workers from Huelva, with original contracts, during 2016-2020

Year	Poland	Romania	Morocco	Bulgaria	Total
2016	8.954	1.970	1.336	-	12.260
2017	7.525	5.178	195	-	12.898
2018	9.488	6.030	359	693	16.570
2019	9.361	13.186	294	804	23.645
2020	10.796	19.153	2.330	1.241	33.520

Source: Viruela, 2021

With the agreement signed between Romania and Spain on the movement of seasonal Romanians, the presence of Romanian workers has been constantly growing in the field of agriculture. These measures taken by the Spanish government were felt very quickly by Romanians, as can be seen in the graph above the flow of Romanian immigrants who arrived in Spain reached the lowest level in the last decade. Because of these obstacles created, many Romanians chose to go to more welcoming countries with foreign workers, most of them chose to work in countries such as Italy, Germany or the United Kingdom.

5 Conclusion

In the geographical landscape, one of the components that registers the strongest dynamics is the demographic one, which is materialized by the natural movement of the population (birth rate, mortality, marriages, divorces) and the migratory movement (emigration and immigration). Over time, migration has been influenced by the push-pull process; unfavorable conditions in one place push people to emigrate, and favorable conditions in another, externally, attract them. Romanians choosing to leave the country in the last three decades in order to obtain material benefits and not for the permanent change of domicile.

Those material benefits are sent to their families so that they can use them either for recurring expenses, food, bills, or for construction and home renovations. Migrant Romanians have been forced to adopt new strategies to deal with a crisis of great proportions, which has taken many of them unprepared. They had the choice between staying in Spain as permanent migrants, bringing their family or returning to Romania and opening their own businesses with the help of money and practical knowledge obtained during the time they left, and another category. of emigrants chose to leave Spain in hopes of getting a job in another EU member state, after Spain limited immigrants access to the labor market.

During this time, Romania's population has decreased and continues to decline at a very fast pace, and statistical data confirm that the increase in depopulation in rural Romania is a visible consequence of the migration of Romanians to other destinations.

Due to the health crisis produced after observing the way in which Western European countries reacted to the massive departure of Romanian, Bulgarian, Polish workers, workers engaged in agriculture, I believe that the phenomenon will continue to be a problem in Romania. because after finding that immigrants are an important link in the economies of countries such as Germany, England, France, these countries will try as much as possible to offer immigrants a higher degree of job security.

If financial bonuses are introduced some young people, who finish the twelfth grade or even the tenth grade, will be more motivated to leave to get that money, money that they can use to buy a car and other objects considered valuable by them. These young people do not consider continuing their studies as a priority for them, some of them not wanting to take the baccalaureate exam, this phenomenon of leaving migrants at an early age can lead either to the social emancipation of the individual or to an accentuation of his gaps in from an educational point of view.

Acknowledgements

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The impact of Globalization on Competitive Advantage of Forest Industry

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Abstract

Research background: The international perspective on the competitiveness of the national economy also directly affects the forest industry, which is closely linked with many other sectors of the national economy.

Purpose of the article: The purpose of the article is to measure and analyse the competitiveness of selected wood products in the field of foreign trade of the Slovak republic compared to the different sectors.

Methods: The research deals with the application of mathematic methods, namely RCA and CTB analysis to compare the competitiveness of different industries of the Slovak republic on global trade. Based on data from the International Trade Statistics Database and the Statistical Office of the Slovak Republic, we measured the competitiveness of selected wood products in the field of foreign trade compared to the different sectors.

Findings & Value added: The results describe the competitiveness of the wood base sector in the national economy on the global markets. We identified, that the forestry sector in some selected products has a competitiveness advantage. However, we have to add that the high export of products with low added value could be a very significant disadvantage for the national economy.

Keywords: competitiveness, forest industry, RCA, CTB

JEL Classification: *M21; O11; Q23; Q56*

1 Introduction

Global competitiveness has been one of the major goals of countries worldwide in the recent years, lately, the concept of competitiveness has become an essential factor in the assessment of countries and regions (Dima et al., 2018). Because of constantly changing critical success factors as well as changing sources of comparative advantage, countries are increasingly interested in evaluating their competitiveness against other nations in order to shape policy actions and business strategies (Epede and Wang, 2022). The forest sector is usually an economically important sector in forest rich countries. The success of that sector to meet the actual challenges depends on improving its performance and competitiveness, as well as on

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developing new products or improved technologies and on the ability to adapt to changing market conditions (Lundmark et al., 2021). Efficiency improvement is important for increasing the competitiveness of any sector and the same is essential for the forestry sector (Kovalčík, 2018). Therefore, it is important to evaluate the performance of the sector to ensure a high efficiency and competitiveness as well as to provide information for future improvements in this sector (Lundmark et al., 2021).

Based on the theoretical basis, the competitiveness is a broad concept with many definitions and research areas. Theories dealing with competitiveness were derived from Adam Smith's theories of international trade, adapting as other influencing factors emerged over time and affected competitiveness at the company, regional or country level (Dima et al., 2018). The concept of revealed comparative advantages was developed by Balassa (1965) in accordance with the Ricardo's theory of comparative advantages and the Heckscher-Ohlin model. The analysis is based on an ex-post assessment of competitiveness by calculating the share of a particular commodity in the export of the certain country compared to other countries.

There have been several indicators developed to measure the competitive situation of a specific sector or country. According to Gries and Hentschel (1994) these can be classified into two groups:

1. Result-oriented indicators: These reveal the realised competitive situation of a sector or country from the ex-post perspective. These include indicators such are terms of trade, revealed comparative advantage (RCA), constant market shares, relative unit values or the presence in high technology segments.

2. Determinant-oriented indicators: These are based on the assumption of a correlation between the determinants and the competitive situation of a country. Typical indicators are the legal and institutional framework of a country, its infrastructure, social security system, private and public expenditure for research and development etc.

Numerous studies are dedicated to the competitiveness assessment of countries, regions and industries (Gordeev, 2020). Many of them address the competitiveness of the forest sector, but a direct empirical assessment of forest sector competitiveness at the national or regional level has received a little attention in the literature. Gordeev (2020) also emphasizes, that it is not easy to choose the methodology to assess the competitiveness of forest products and one of the most convenient approaches to estimate competitiveness at the national and regional level is to calculate the comparative advantage revealed.

Forest industry has a several evident comparative advantages in comparison with the other sectors. For instant, enough inputs based on renewable resources, or the possibility of using recycled material. From the perspective of the national economy, this sector is able to utilise high proportion of input based on domestic resource (Lagana et al. 2008).

There are many different ways to measure revealed comparative advantages in trade. Regarding the forest industry there are some authors that used Balassa and other indexes in their studies. For example Rossato et al. (2018) studied wood pulp competitiveness in USA, Brazil, Canada, Sweden, Finland and China. For this purpose, the authors calculated several indicators of competitiveness, including Balassa index and symmetric version of RCA. Dieter and Englert (2007) assessed the level of competitiveness of the German timber industry in the world market by using RCA indexes. Karpuk (2011) conducted the study of Ukrainian wood products concerning foreign trade and used Balassa indices to assess the competitiveness of forest products in Ukraine and compare the volume of its foreign trade with major trading partners. Gordeev and Pyzhev (2015) studied competitiveness for the timber industry, on national level using Balassa index. However they also noted that the concept of comparative advantage can also be applied on regional level, especially as Russian regions are very heterogeneous in terms of resource endowment, proximity to markets.

The purpose of the article is to measure and analyse the competitiveness of selected products (Wood and articles of wood, charcoal, cork, etc. / Pulp of wood and other fibrous cellulosic material; recovered paper or paperboard) in the field of foreign trade of the Slovak republic by applying RCA and CTB analysis to compare the competitiveness of the Slovak republic on global trade.

2 Methods

The results-oriented-indicators are able to detect the competitive situation in the sector of ex-post perspective. They are used for determining the competitiveness of the forest base sector, to compare the development of export performance and competitiveness of Slovak republic in international markets during the during the observed time period of years 2016-2020.

In the framework of the competitiveness analysis, two groups of commodities were analysed in the article, namely (Parobek et. al 2014):

- Section IX - Wood and articles of wood; wood charcoal; cork and articles of cork; manufactures of straw, of esparto or of other plaiting materials; basket ware and wickerwork (wood base commodities)
- Section X - Pulp of wood or of other fibrous cellulosic material; recovered (waste and scrap) paper or paperboard; paper and paperboard and articles thereof (pulp and paper commodities)

The data related to total export, import and trade balance of these analysed commodities (Section IX and Section X) were obtained as secondary data from (Statistical office SR, 2022)

In the study, two specific indicators were used to calculate and analyse competitiveness of Slovak Republic. First, represents one of the most common method Revealed Comparative Advantages *RCA* designed by Balassa (1965). However, a modified versions of the index *RCA* using a mathematical logarithmic function was applied for the purposes of the analysis. According to Bobáková and Hečková (2007) the modified indicator is calculated as:

$$RCA_{it} = ln\left(\frac{\frac{EX_{it}}{IM_{it}}}{\frac{\sum_{i=1}^{n} EX_{it}}{\sum_{i=1}^{n} IM_{it}}}\right) \tag{1}$$

Where:

EX_{it} is export (in EUR) of analysed commodities from Slovakia in the time period *t*,

IM_{it}, is import (in EUR) of analysed commodities during the time period *t*,

$\sum_{i=1}^{n} EX_{it}$ is total export (in EUR) from Slovakia during the time period *t*,

$\sum_{i=1}^{n} IM_{it}$ is total import (in EUR) to Slovakia during the time period *t*.

To compare the results from RCA analyses, the Contribution to Trade Balance (*CTB*) indicator was subsequently used in the study. According to Melíšek (2012) the index CTB is an alternative indicator to the index *RCA* and is calculated as follow:

$$CTB = \frac{EX_{it} - IM_{it}}{\sum_{i=1}^{n} EX_{it} + \sum_{i=1}^{n} IM_{it}} - \frac{EX_{it} - IM_{it}}{\sum_{i=1}^{n} EX_{it} + \sum_{i=1}^{n} IM_{it}} * \frac{EX_{it} + IM_{it}}{\sum_{i=1}^{n} EX_{it} + \sum_{i=1}^{n} IM_{it}} * 100 \qquad (2)$$

Where:

$\frac{EX_{it} - IM_{it}}{\sum_{i=1}^{n} EX_{it} + \sum_{i=1}^{n} IM_{it}}$ measures the real trade balance of the country for analysed commodities weighted by its share in total trade, representing a cross-sectoral trade.

$\frac{EX_{it} - IM_{it}}{\sum_{i=1}^{n} EX_{it} + \sum_{i=1}^{n} IM_{it}} * \frac{EX_{it} + IM_{it}}{\sum_{i=1}^{n} EX_{it} + \sum_{i=1}^{n} IM_{it}}$ measures the expected trade balance of analysed commodities.

According to the share of all commodities in total trade, the overall trade deficit is split between commodities. The difference between the expected and the actual trade balance of analysed commodities measures specific contribution of the analysed commodities to the overall trade balance. It is positive if the actual surplus exceeds the expected or relative trade deficit is lower than expected.

3 Results and discussion

As follows from the above, competitiveness is a broad concept and numerous studies are dedicated to the competitiveness assessment of countries, regions and industries. In the study, we are dealing with the competitiveness of wood base commodities as well as pulp and paperboard commodities. One of the most convenient approaches to estimate competitiveness at the national and regional level is to calculate the revealed comparative advantage of these investigated commodities.

As was already mentioned in the previous chapter, the starting point for the RCA and CTB calculation itself is the total export, import and trade balance data. The development of these indicators during the monitored time period 2016-2020 for Slovakia is shown below in the following figures (Figure 1 and Figure 2).

Those two figures indicate the development of foreign trade of monitored categories of commodities and products for Slovakia. From the graphs, the decreasing trend of the trade balance for both categories is evident, copying the decreasing value of exports from the year 2018. This year export of wood products reached a value of over 0.9 bill. EUR and export of pulp and paper commodities export exceeded the value of 1.2 bill. EUR. The year 2018 represented the highest values of foreign wood based products and pulp and paper trade.
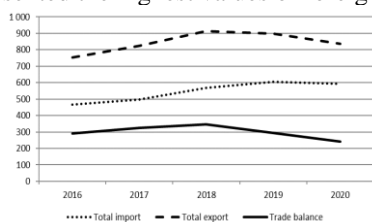
Figure 1. The total import, export and trade balance of Wood and articles of wood; wood charcoal; cork and articles of cork; manufactures of straw, of esparto or of other plaiting materials; basket ware and wickerwork (in thousand €)
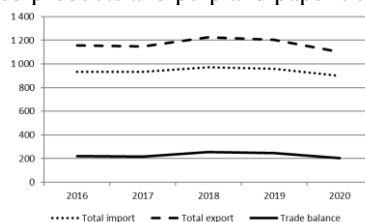
Figure 2. The total import, export and trade balance of Pulp of wood or of other fibrous cellulosic material; recovered (waste and scrap) paper or paperboard; paper and paperboard (in thousand €)

Source: Own processing.

To reveal the competitive advantages of these commodities in Slovakia the RCA and CTB indicators were used. Figures 3 and 4 illustrates the development of these indicators during the monitored period 2016-2020. RCA indicates whether the forest based sector has a competitive advantage in international trade compared to other sectors of the Slovakian national economy. Going by RCA, it is generally established that when the index is greater than 0, this implies the country has a comparative advantage in the production of that commodity, while a value less than 0 implies a comparative disadvantage. The positive RCA during the whole period clearly point to the competitive advantage of wood processing industries and wood products. However, the sensitivity and the ability of competitive advantage are slightly changed.

	2016	2017	2018	2019	2020
RCA	0,4342	0,4608	0,4453	0,3814	0,2989
CTB	-0,0201	-0,0172	-0,0118	-0,0044	-0,0198
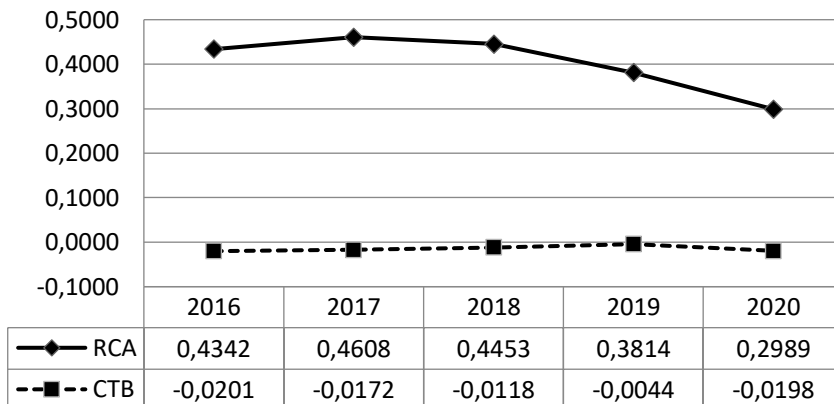
Figure 3. The development of indicators RCA and CTB for Wood and articles of wood; wood charcoal; cork and articles of cork; manufactures of straw, of esparto or of other plaiting materials; basketware and wickerwork in Slovakia (2016-2020)

Source: Own processing.

	2016	2017	2018	2019	2020
RCA	0,16	0,17	0,20	0,21	0,16
CTB	-0,0366	-0,0291	-0,0192	-0,0075	-0,0287
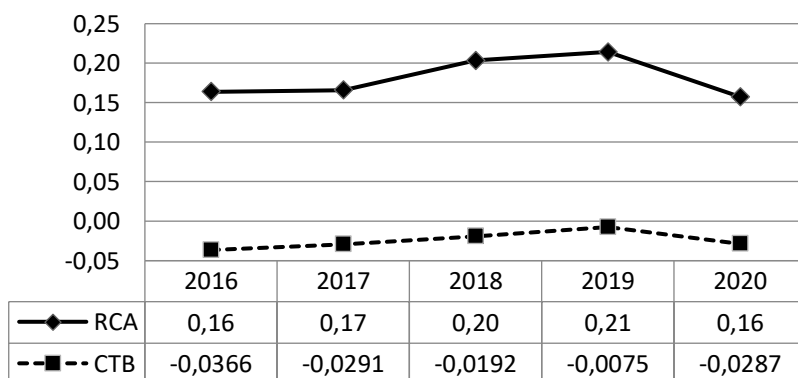
Figure 4. The development of indicators RCA and CTB for Pulp of wood or of other fibrous cellulosic material; recovered (waste and scrap) paper or paperboard; paper and paperboard and articles thereof in Slovakia (2016-2020)

Source: Own processing.

Despite the positive values of RCA during the monitored period and thus the competitive advantage of both categories of commodities in Slovakia, a slightly negative development of

the given indicator can be observed. The year 2018 represents a turning point for the category wood based products with a subsequent slight decrease in RCA indicator values. In the case of pulp and paper commodities, the RCA indicator values themselves are lower, with a decrease since 2019. As a possible warning can be perceived the continuing decline, where with RCA values almost approaching to 0, the Slovak republic might fall in the weak comparative advantage category, even disadvantage category. However, it must be noted that just mentioned categories represent raw materials and commodities with a lower added value. That is why the decrease in the export of wood commodities could be considered as a positive trend. The country is able to process resources in domestic conditions and focuses on increasing in foreign trade in commodities with a higher added value.

In addition, the competitiveness of the sector in foreign markets was analysed by applying the index CTB as an alternative index of RCA. Index CTB compares the competitiveness of wood and wood products of the Slovak economy and identifies the importance of the development of the overall trade balance, depending on its share of the total foreign trade turnover of the country. Contrary to the RCA, the index CTB is an adequate indicator in conditions of economic imbalance of the Slovak republic. In the case of forest based sector, the difference between expected and actual trade balance of wood and wood products is negative during whole analysed time period 2016-2020.

4 Conclusion

The objective of the research was to measure and analyse the competitiveness of selected categories of wood products in the field of foreign trade of the Slovak republic. A set of commonly used competitiveness indicators was adopted to analyse the position and changes in competitiveness in the time period 2016-2020.

The study results points to the decreasing trend of the trade balance for both categories, copying the decreasing value of exports from the year 2018. The positive RCA during the whole period confirmed the comparative advantages of analysed categories. On the other hand, a slightly negative downward trend in the values of this indicator is a reason for caution against a possible fall into a position of competitive disadvantage of Slovakia.

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Development of a model for assessing the socio-economic efficiency of cultural projects in the context of a strong global city brand

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Abstract

Background: Effective cultural projects have a strong impact on the global appeal and brand strength of the city they are associated with. When evaluating the effectiveness of projects, they mainly take into account the factors of financial efficiency, which makes their evaluation methods applicable only to projects with a pronounced commercial focus. At the same time, there is an acute problem of developing a socio-economic efficiency assessment model for non-profitable projects, especially projects that can change the cultural and socio-economic environment of the city. At the current stage of globalization of the cultural sphere at the development stage, it is rather difficult to assess the potential socio-economic efficiency of these projects and, moreover, to identify specific factors that may have a negative impact not only on a specific project, but also on the global brand of the city.

Purpose of the article: Development of a model for assessing the socio-economic efficiency of projects of significant cultural institutions that have a strong impact on the global image and brand of the city.

Methods: method of sensitivity analysis of complex regression dependencies to the isolated influence of selected factors by the Monte Carlo method using a special distribution Delta square(Q).

Findings & Value added: Social projects implemented by cultural institutions with a strong global brand can positively influence the global attractiveness of the city's brand. The article developed a model for evaluating social (including non-profitable) projects and assessed the impact of projects in the field of culture on the global competitiveness of the city.

Keywords: *Global Competitiveness of the Territory, Cultural Projects, Brand of the Territory, Territory Brand Power Matrix, Special Distribution* Δ^2.

JEL Classification: *C46; L83; M31*

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1 Introduction

The negative effects on the global economy and national economies of countries that have arisen as a result of the COVID-19 pandemic have spread widely in modern conditions. There has been a serious aggravation of international political processes as a result of one of the attempts to get out of the hardened economic and financial crisis of the most economically developed countries of the world. Inflation is on the rise in many countries. Under these conditions, the sphere of culture is the first to suffer, since the activities of cultural institutions are never profitable, and even with a high level of commercialization, they require state support to ensure storage conditions, maintain the material base and attract top-class specialists. Therefore, as professor Lambert Zuidervaart of University of Toronto (Zuidervaart, 2010) and Lecturer William Jackson of University of York (Jackson, 2010) note, all projects in the field of culture, both in the field of museum and gallery business, and music, theater, cinema, cultural events, require serious subsidies from the state or major sponsors. However, it is with subsidies and sponsorship in the field of culture that problems arise during the crisis.

At the same time, projects in the field of culture can contribute to the settlement of political instability and the growth of understanding between people. Especially those with a global distribution. Moreover, these projects, even in crisis conditions, can provide direct or indirect profit, as well as contribute to the development of the tourist popularity of the places where these events are held. For example, the brand not only develops the museum, but also performs communicative functions. "The brand is a consistent and affirmative identity that affects all museum operations, including its relationships with visitors, staff, contractors, sponsors and donors." (Stallabrass, 2014) Ultimately, as noted by Gravari-Barbas (2018), such projects can create new cultural brands for territories and even become globally attractive. In turn, the development of a strong global brand of the territory ensures its economic growth, opportunities for the formation of an effective urban infrastructure, which provokes further economic growth of the territory. (Kotler, Gertner, 2002)

One of the serious problems in crisis conditions is the ranking of projects and the identification of those factors that may impede the normal course of the project, its financial and socio-economic efficiency, as well as its impact on the formation or strengthening of the territorial brand. Thus, it is required to develop a mechanism for evaluating the effectiveness of projects in the field of culture and ranking the factors that have a strong influence on the implementation of these projects, their effectiveness and impact on the formation of cultural brands of territories. The difficulties in building a model for evaluating the effectiveness of cultural projects are that most of the evaluation factors are of a qualitative nature, and building reliable dependencies based on available statistical information, as Margaret Pashkus, Natalia Pashkus and Anna Koltsova (Pashkus, Pashkus, Koltsova, 2021) is often difficult.

Modern political and economic conditions bring serious disharmony to the functioning of the sphere of culture and the implementation of major, especially global cultural events. However, if the majority of economically developed countries with already formed strong cultural brands are now experiencing serious problems, then other countries that were previously unable to attract sufficient investment to their cultural events or carry out their global promotion can take advantage of the current situation and receive certain preferences. (Sullivan, Gosling, Schroeder, 2013; Pashkus et al., 2020) Turkey is a prime example of using these opportunities. Initially, the Turkish government began to implement targeted measures to create a positive image and develop a strong cultural brand for one city - Istanbul. And impressive results have been achieved in this field. If back in the 60s and 70s. In the 20th century, the city had a very controversial image; tourists from Europe and the United States, that is, the most solvent at that time, feared the insecurity of the city and the lack of

familiar amenities and developed infrastructure, then by the beginning of the 2000s. attitude towards the city changes diametrically. And already in 2010, in terms of the volume of incoming tourist flows and the level of income from tourism, Istanbul overtook many well-known European cities. Since that time, Istanbul has steadily remained in the top 10 most sought-after territorial brands that are attractive to tourists. An important role in this was played by the use of cultural events and the development of tourism infrastructure.

In relation to the rest of Turkey, there was a somewhat distorted impression that this country can only provide sea holidays on all-inclusive programs. The next territorial brand of Turkey began to form in relation to the unique mountainous territory of Cappadocia. For the development of this brand, the large-scale development of the fashion for air walks in hot air balloons turned out to be very important. Initially, several German entrepreneurs brought balloons here and began to offer this type of entertainment for tourists, however, after the expiration of the initial permit for doing business, the Turkish government bought the business, especially since by that time a captain training school had already been established in Cappadocia balloons and air tourism infrastructure has been developed. Hot air balloon trips or photo shoots against the backdrop of hot air balloons in the sky of Cappadocia are now one of the highly branded tourist activities. Photo exhibitions in different countries of the world (for example, in Moscow in Gorky Park), as well as numerous festivals and art projects that romanticize the image of the Cappadocia Mountains and hot air balloons hovering over them, became an important element in promoting this territorial brand. All these art events were actively covered on social networks, many well-known bloggers talked about Cappadocia and showed photos and videos of balloon trips or beautiful shots against the backdrop of mountains and balloons. It should be noted that in many countries, the territorial brand is usually formed from within, that is, first a domestic brand arises, and then it begins to acquire global significance. In Turkey, everything happened exactly the opposite. The idea of domestic tourism in Turkey was not very common. This was due to the mentality of the population and the existing cultural, and even religious, traditions. For the first time in recent decades in 2015, faced with a sharp decline in external tourism due to political reasons, the Turkish government, as well as representatives of the tourism industry and private entrepreneurs in Cappadocia, began to stimulate domestic tourism in every possible way. Initially, the idea of a wedding photo shoot in Cappadocia began to spread, but gradually the global brand gained a foothold in the country as well.

I would like to give one more example of global brands that are currently only being formed, although they are already well-established in the domestic territorial market. One such example is the Greek Turkish islands. Due to the forced resettlement of Christian Greeks from Turkey to Greece and their exchange for Muslims from Macedonia, Albania and Bulgaria, initiated by Mustafa Kemal Attatürk, which seemed an exceptionally cruel measure, but later saved many lives and turned out to be a very far-sighted political measure, many Greek cities in Turkey were abandoned. However, there are two islands on the border with Greece, which were not affected by the resettlement and an agreement on cohabitation was reached here. These are the islands of Gokceada and Bozjiada, located in the region of the Dardanelles. The population of the islands consider themselves Turks, speak Greek fluently, and are frankly Greek-oriented. Since the heyday of domestic tourism in Turkey, which began in the last 15-20 years, the islands have become a popular holiday destination for the local population. Initially, only the so-called Princes' Islands (Buyukada, Heybeliada and seven smaller islands of the Sea of Marmara, much closer to Istanbul) had a similar status. The resorts of the coast of Antalya, Kemer, Alanya, Marmaris and Bodrum, recognized in the global community, have become too expensive for the Turks to relax. The situation was slightly better in the Kusadasi region, where you can find affordable accommodation facilities that make this region accessible for domestic tourism.

At the same time, the Turks began to get a taste of tourism and strive to visit interesting, historical and atmospheric places. The islands of Gökçeada and Bozciada, already renowned as places of ecological and historical tourism, are gaining more and more popularity. Unlike most foreign tourists who travel as quickly as possible by air, the local population prefers to use cheap public transport, combining buses and ferries, the network of which is well developed throughout Turkey. This transport is available to the public, many car ferries run, which makes visiting the islands affordable, convenient and comfortable. The islands can offer beautiful ecologically clean beaches, which are under the blue flag of the UN. An indicator of the purity of the sea on the islands is the fact that Greeks actively come here to relax. The islands are of volcanic origin, which determines the uniqueness of their flora and fauna and makes the pictures that open to the eye absolutely irresistible. Both islands were actively involved in the long-standing conflict between the Trojans and the Achaeans, written in the Iliad, because Troy is very close, not far from the city of Chennakale on the coast of the Dardanelles. Over the recent period, the Turkish government has made significant investments in the development of the tourism infrastructure of the region, this also applies to the construction of new roads, hotels and the opening of a new modern museum complex near the archaeological zone of Troy.

In addition, both islands are developing their tourism environment, creating a pleasant atmosphere for frequent visits. The ecological possibilities of the islands make them attractive to meet the high demands of gourmets from all over the world. The islands are famous for their agricultural products, wines, excellent Greek-Turkish cuisine. And in the domestic tourist market, the islands are also known for their art projects. In particular, this August, a large-scale project "Music of the Dardanelles" was held here. The venues for performances were organized mainly in cooperation with the most famous local cafes, restaurants and bars. As a rule, seats at the tables for the duration of the concerts were scheduled in advance, but otherwise the events were publicly available and free to visit, since the venues were set up on the street. The festival program included a huge variety of Greek and Turkish classical and popular music. Despite the historically difficult relations between Turkey and Greece, here on the islands between these cultures there was complete mutual understanding. Tourists who have visited these events understand that between all of us, people, there is much more in common than different. We all want and strive for the same thing. To live in peace, to be loved, to see the joy of our children and feel confident in the future. And this is exactly what is so lacking in the modern world. Understanding proximity, not the search for enemies. Thus, the festival "Music of the Dardanelles" can become an important milestone not only in the formation of a strong global brand of territories, the development of the global tourist attraction of the region, but also an example of reconciliation of peoples who have many old strife, but no less in common. And neither politics, nor religion, nor the ambitions and financial interests of the elites can interfere with this process. Continuing the theme of the study, we should move on to the analysis of projects in the field of culture and their impact on the prospects for the formation of a strong cultural brand of the territory.

2 Methodology

Let's consider several territorial brands, the formation of which is based on the implementation of large-scale cultural projects, and determine their relative position on the Y&R brand power matrix modified by the authors (Keller, 2012; Starobinskaya, 2019), determine the strategic prospects of territorial brands, and using the example of some of them, we will study the impact of those implemented to promote them. cultural projects. The Y&R matrix allows you to evaluate the positioning and strategic prospects of the brand, in particular, the branded territory (see Figure 1).

Brand value (understanding and respect)

High	Low
Promising but little-known territory brands	Territories - leaders
Unpromising territories	Territories that are losing popularity

Brand strength (differentiation and relevance)
High
Low

1,5
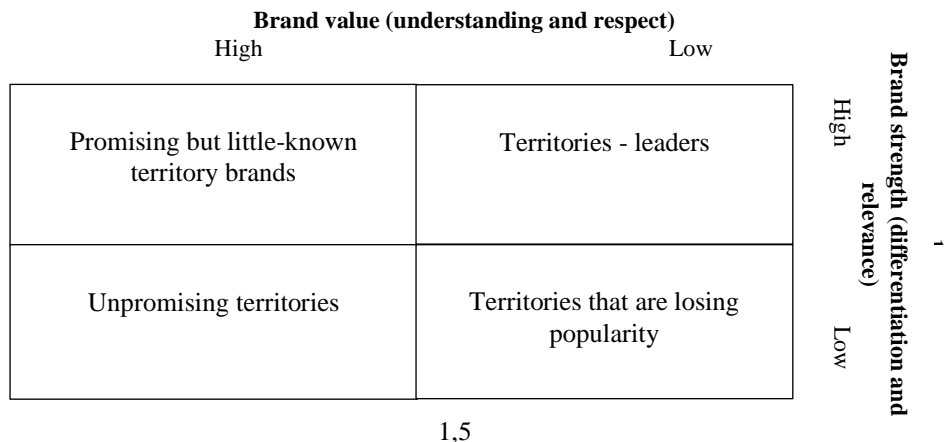
Figure 1. Territory Brand Power Matrix

Source: Starobinskaya (2019)

To determine the parameters of the positioning model of territorial brands by groups, the dignity and strength of the brand, indicators of Kevin Keller's methodology modified for the territory market were used. However, in carrying out research, it became clear that the use of simple multiplicative functions for smoothing parameters, as proposed by Keller, in this case can lead to a high level of errors. Therefore, the authors proposed a procedure smoothing the original functions using a special distribution Δ^2. This distribution has number of attractive properties, which makes it possible to reduce the error rate when using secondary statistical data, especially those obtained through a passive experiment, which does not allow the directed collection of additional observations. (Pashkus, 1998)

Let's consider the situation of smoothing the functions of strength and dignity of the brand, expressed using a linear polynomial: $a_1x_1+a_2x_2+\ldots+a_nx_n-1=0$. We will assume that y= f(x)+ε_1, and x can be replaced by the function $\varphi(x)+\varepsilon_2$ (which is possible due to the presence of a constant in the expression), while $\varphi(x)$ is assumed to be normalized and orthogonal to unity. The errors are given in standard assumptions, that is:

$$E\varepsilon_{ij}=0, E\varepsilon_{ij}\varepsilon_{kj} = 0 \text{ (при i}\neq\text{k)}, E\varepsilon_{ij}\varepsilon_{il} = 0 \text{ (при j} \neq \text{l)}, D\varepsilon_{ij}=E(\varepsilon_{ij})^2=\sigma^2.$$

Next, the normalization constant was calculated. To do this, we considered the square of the determinant of the matrix A, and we assume that the system that determines this matrix is regular.

$$A^2 = \begin{vmatrix} \varphi(x_1) + \varepsilon_1^1 & f(x_1) + \varepsilon_1^2 \\ \varphi(x_2) + \varepsilon_2^1 & f(x_2) + \varepsilon_2^2 \end{vmatrix}^2$$

The normalization factor will be:

$$\iint A^2 dx_1 dx_2 = 2! \cdot \begin{vmatrix} \int \left(\varphi(x_1)+\varepsilon_1^1\right)^2 dx d\varepsilon & \int \left(\varphi(x_1)+\varepsilon_1^1\right)\left(f(x_1)+\varepsilon_1^2\right)dx d\varepsilon \\ \int \left(\varphi(x_2)+\varepsilon_2^1\right)\left(f(x_2)+\varepsilon_2^2\right)dx d\varepsilon & \int \left(f(x_2)+\varepsilon_2^2\right)^2 dx d\varepsilon \end{vmatrix} =$$

K=

$$= 2 \begin{vmatrix} 1+\sigma^2 & \alpha \\ \alpha & \int f^2(x)dx + \sigma^2 \end{vmatrix} = 2\left[\left(\int f^2(x)dx+\sigma^2\right)\left(1+\sigma^2\right)-\alpha^2\right]$$

,

where $\alpha = \int f(x)\varphi(x)dx$ (α – Fourier coefficient). Further $\dfrac{\det\left\|\varphi_i+\varepsilon_i^1,f_i+\varepsilon_i^2\right\|_{i=1}^2}{2\left[\left(\int f^2 dx+\sigma^2\right)(1+\sigma^2)-\alpha^2\right]}$ plays the role of distribution.

To model this distribution, we will use the well-known Neumann method algorithm. The main problem that arises when using this algorithm is the choice of the area within which the simulated coordinates should fall. Here, the straight line corresponding to the maximum modulus of the determinant, estimated from the Hadamard inequality and then corrected by software, is chosen as the upper boundary of this region. And as a border from below - a straight line corresponding to an independent random uniformly distributed number, multiplied by the same maximum. Let us present the modeling algorithm used by the authors to smooth the parameters of the territory brand positioning model.

1. Select a specific area, inside which the simulated points should fall, corresponding to the measurement areas of the Y&R matrix, and having a distribution $\Delta^2(Q)$.
2. Request a random number generator (generally speaking, n times, where n is the number of points) and get n independent realizations of random random numbers uniformly distributed on the interval [0,1] $\alpha_1,...,\alpha_n$.
3. Check that the random points belong to the given area, otherwise repeat the procedure.
4. Request a random number generator and get the number α, this number must also belong to the specified area.
5. Introduce a specific system of functions $\varphi_1,...,\varphi_n$.
   Calculate the determinant $\Delta(\alpha_1,...,\alpha_n)$ using the Gaussian method (in principle, it is possible to calculate the determinant in another way), where

$$\Delta(\alpha_1,...,\alpha_n)= \begin{vmatrix} \varphi_1(\alpha_1) & \varphi_2(\alpha_1) & ... & \varphi_n(\alpha_1) \\ \varphi_1(\alpha_2) & \varphi_2(\alpha_{21}) & ... & \varphi_n(\alpha_2) \\ ... & ... & ... & ... \\ \varphi_1(\alpha_{n1}) & \varphi_2(\alpha_n) & ... & \varphi_n(\alpha_n) \end{vmatrix}.$$

6. Estimate the maximum of the determinant $\Delta(\alpha_1,...,\alpha_n)$ by the Hadamard inequality:

$$M \le \sum_{i=1}^{n}|a_{i1}| \cdot \sum_{i=1}^{n}|a_{i2}| \cdot ... \cdot \sum_{i=1}^{n}|a_{in}|$$

, where $a_{i1},...,a_{in}$ are the rows of the matrix $\{a_{ij}\} i,j=1,...,n$. In this case the elements of the strings are the functions $\varphi_1,...,\varphi_n$ from an independent implementation of random numbers belonging to the area specified above. The estimate for the maximum by the Hadamard inequality, generally speaking, can be replaced by any other estimate.

7. Compare the value of the determinant with the maximum. If the determinant exceeds the maximum, then it must be increased by 1.5 times, after which the procedure starts again.

8. If it turns out that $|\Delta(\alpha_1,...,\alpha_n)| > \alpha M$, where M - maximum determinant modulus $\Delta(Q)$, then set $\alpha_1,...,\alpha_n$ can be taken as an implementation Q, otherwise, you need to repeat the procedure with new α_j and α.

9. Calculate estimates for the parameters of the desired linear polynomial, based on the following relation: $\sum_{i=1}^{n} a_i \varphi_i(x_j) = \zeta_j$, where a_i - regression parameters, φ_i - orthonormal system of functions that are used for smoothing, and ζ_j - implementation of a random function. In this study, we used random vectors with distribution $\Delta^2(Q)$.

3 Results

The application of the above algorithm made it possible to reduce the level of errors caused by random correlation dependences of the data. Using the selection mechanism, regression parameters were obtained that determine the contribution of significant model parameters to the assessment of the strength and power of the territory brand. Individual regression parameters made it possible to rank the factors of the model and compare the strength of their influence on the result of territory advancement. The study has been conducted over the past four years, the first results of the territory brand assessment were obtained in 2019, when a number of cultural projects for the development of territories were just launched. As a result, a re-study conducted in 2022 made it possible to draw a conclusion about the reaction of brands to the projects implemented by the territories in the cultural sphere. The results of the analysis were summarized in Y&R matrices and made it possible to determine the mutual market positions of the brands of the studied territories. By comparing the matrices built in different chronological periods, it became possible to verify the effectiveness of the cultural policy measures implemented by the territories. During the study, the following territories were selected: Istanbul (1), Yalova (2), Dardanelles (3), Princes' Islands (4), Cappadocia (5). All study areas have strong brands that have domestic or global distribution. The Y&R matrix for the period of 2019, using the algorithm presented above, demonstrates the following location of territory brands by matrix areas (see Fig. 2).
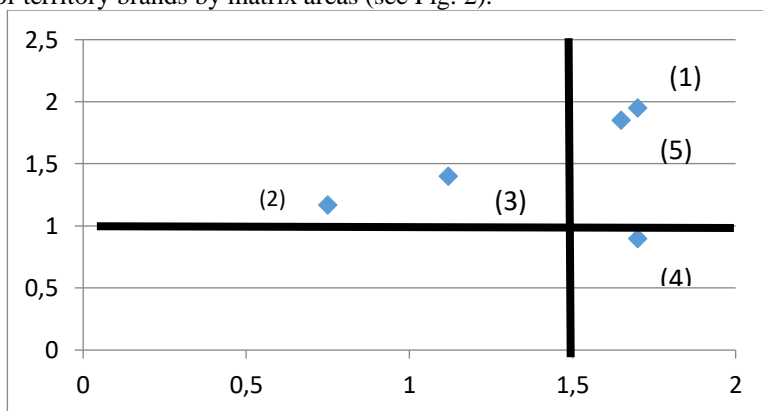
Figure 2. Power Matrix of Turkish Territory Brands in 2019

Source: author's calculations

The territory brand positioning matrix for 2022, which is the result of this study, is shown in Figure 3.
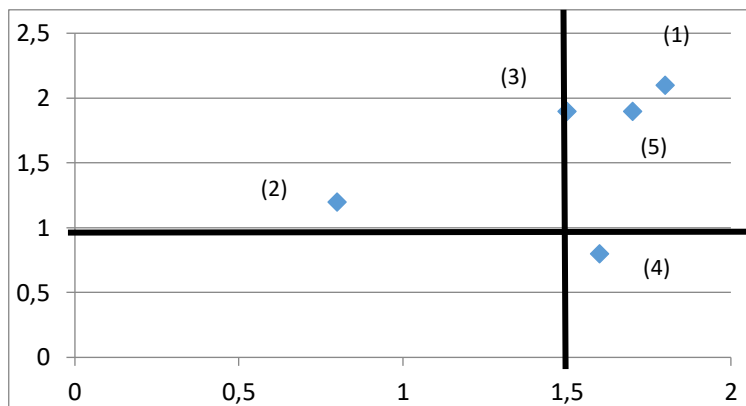
Figure 3. Turkish Territory Brand Power Matrix in 2022

Source: author's calculations

As the analysis of the power matrices of the brands of the territories showed, Istanbul and Cappadocia became the leaders, which is also confirmed by other methods of analysis. These territories are constantly using cultural projects and events to strengthen their position, form an effective tourism infrastructure, open up new cultural sites for visiting or improve the ways of displaying previously discovered ones. The islands of Gokceada and Bozjiada, together with the city of Chennakale and its environs, designated in the study as the territory of the Dardanelles, which until recently were in the category of promising, but not yet established territories (see Fig. 2), have moved to the leading area. The position of this brand may still be unstable, but its transition to the leading category already indicates the success of the brand promotion strategy and the right choice of influencers. Thus, cultural projects implemented in this territory demonstrate a clear socio-economic efficiency. The Yalova thermal resort fell into the category of promising brands with insufficient publicity. It should be noted that the resort is well known in Turkey, the residents of Istanbul love to relax in the thermal pools of Yalova. The resort has been known since the early Roman period and its thermal springs have been used to restore health throughout the history of the city. At the same time, in the global market of territories, the thermal resort is completely unknown and is lost with the popular resorts of Germany, Austria, Switzerland, Hungary and other European countries. And, finally, the Princes' Islands were in the category of territories losing popularity. These islands are a favorite holiday destination for Istanbul residents, primarily because of their proximity to the city. A short walk on the ferry and now you are already spending time on the sea coast. However, no global promotion measures were taken in relation to the territory. Despite the proximity of the islands, only a small proportion of Istanbul tourists get here. The impression is often contradictory, which is associated with a not very clean sea and too noisy and crowded recreation. Currently, the environmental situation on the Princes' Islands needs to be improved, which also negatively affects the popularity of their brand. As you can see, the position of this brand has deteriorated somewhat over the past 4 years.

The procedure developed by the authors for estimating model parameters using a special distribution $\Delta 2(Q)$, demonstrated its full capacity. The use of this algorithm allows us to evaluate the parameters of the model and identify priorities in the promotion policy implemented by the territories.

4 Discussion

The presented approach to assessing the power of brands provides new opportunities for assessing their prospects and pursuing a competent state policy to support culture. However, there are also a number of problems associated with the application of the model.

Firstly, there may be a contradiction between the power and value of brands, and in fact, as Professor of Far East University (Taiwan) Chyong-Ru Liuet al., 2015 notes, "brand value played a full mediate role" when analyzing brand equity and its relevance. Professor of Manchester Metropolitan University Mihalis Kavaratzis (Florek, Kavaratzis, 2014) also points out the problems of brand value assessment in his work. Therefore, the study of this issue can make significant adjustments to the data for the model.

Second, building a strong brand is a complex process that requires ongoing coordinated action to create an image, maintain an identity, and promote the unique characteristics of a place (Kotler and Gertner, 2002; Kavaratzis and Hatch, 2013; Foroudi et al., 2016). Often, the creation of a strong brand is driven by purely financial factors related to the anti-crisis measures of the state (Koshkin et al., 2021) or the tax potential of the territory (Victorova, Rytova, Koroleva, Pokrovskaia, 2020). Therefore, it is quite difficult to isolate the impact of a particular event (or series of events) on the brand power of a particular place.

Thirdly, as noted by Erik Braun, Mihalis Kavaratzis and Sebastian Zenker (Braun, Kavaratzis and Zenker, 2013), the power and strength of a brand largely depends on the mood of local residents and their acceptance of the brand. Therefore, events that are inconsistent or "contrary" to the interests of residents can lead not to an increase in capacity, but to its fall – namely "passive place demarketing", "informational place demarketing", as noted by Dominic Medway and Gary Warnaby (Medway, Warnaby, 2008).

Fourthly, the procedure itself requires the development of specific software and a good command of the mathematical apparatus, which somewhat complicates research. (Pashkus, 1999).

5 Conclusion

Thus, we can conclude that the formation and strengthening of territorial brands is facilitated by the implementation of cultural projects in a given territory. Turning to the cultural sphere, it is possible to influence the existing intercultural problems of society and reduce the level of tension of the potential target audience towards the territory, caused by the stereotypes formed in relation to them.

The research mechanisms used in this article made it possible, using qualitative information, to smooth the initial data and achieve a qualitative assessment of the desired indicators. It should be noted that out of the five examples considered, for one (the territory of the Dardanelles), the ongoing cultural events led to a significant increase in the power of the brand, for two more there was a noticeable improvement (Cappadocia and Istanbul) and for two more regions the situation remained the same. Thus, due to the multiple application of the procedure at different stages of the implementation of cultural projects aimed at promoting the territories and solving their intercultural problems, it became possible to clearly verify the influence of cultural projects on the power of the brands of the analyzed territories.

The smoothing model presented here can be used both to assess the brands of territories, and to assess the socio-economic projects themselves, implemented in the cultural sphere. The use of the model makes it possible to reduce the level of research error and the level of subjectivity of the applied Keller methodology and the Y&R methodology.

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Most Popular Recent Topics and Theories in Family Business Based upon WoS Citation Score

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Abstract

Research background: The presented paper is of the theoretical range and deals with the issue of the most popular recent topics and theories in the contemporary world of family business.

Purpose of the article: The main objective of the paper is to find out the most attractive and popular recent theories of world family entrepreneurship and discover whether there exists any dominant theory in the branch of family business.

Methods: The methodology applied in the paper is based upon the advanced rapid review technique. As the classification criterium the authors have used the citation score of Web of Science (WoS) in the PICOS frame.

Findings & Value added: The most important finding pointed out that, there exists slightly dominant "familiness" theory in the dozen of the most cited papers. Other popular theories in the top cited dozen topical papers are theory of planned behavior, theory of pyramidal ownership, sustainable family business theory, institutional theory, principal agent theory, stewardship theory, the resource-based view and the theory of social systems. The papers are most frequently published in Family business review. All the papers of most cited dozen have been elaborated by different teams of researchers.

Keywords: *Family business, recent theory, citation score, rapid review, Web of Science*

JEL Classification: *D21; D10; L26; M21*

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1 Introduction

Family business is defined as a business that belongs to a family, and in which family members work (Collins Dictionary, 2022). Family business is one of the most important areas of business entrepreneurship and as well as other business management branches is addressing a huge variety of problems and challenges. There arises a question remarkable for students of management, management practitioners and expert public, asking what the most popular and interesting topics and theories in family business discipline in the recent time are and what are they talking about. There are many ways how to analyze and answer this question and we have chosen the rapid review technique as the appropriate tool to provide the answer.

1.1 Aim of the paper

The primary aim of the paper is to find out what are the most attractive and popular recent theories of world family business (evaluated by the citations) and discover whether they exist any dominant theory, regarding the number of papers in the top dozen, focused on it.

1.2 Theory, literature review and research questions

A family business is a commercial organization in which decision-making is influenced by multiple generations of a family, related by blood or marriage or adoption, who has both the ability to influence the vision of the business and the willingness to use this ability to pursue distinctive goals. They are closely identified with the firm through leadership or ownership. Owner-manager entrepreneurial firms are not considered to be family businesses because they lack the multi-generational dimension and family influence that create the unique dynamics and relationships of family businesses (De Massis et al, 2012, 2014).

1.3 Family business theories and trends

Family business phenomenon is touched by many interesting theories such as e.g., theory of social systems, sustainable family business theory, theory of pyramidal ownership, principal agent theory, and other.

The theory of planned behavior is a psychological theory that links beliefs to behavior. The theory maintains that three core components, namely, attitude, subjective norms, and perceived behavioral control, together shape an individual's behavioral intentions.

Pyramidal ownership structure allows controlling shareholders to exercise full control over member firms belonging to the same business group, withholding a relatively small portion of its cash-flow rights (Alucha et al, 2021).

The relationship between the owner (principal) of an asset (for example, a company) and the persons (agents) contracted to manage that asset on the owner's behalf.

Stewardship theory is a framework which argues that people are intrinsically motivated to work for others or for organizations to accomplish the tasks and responsibilities with which they have been entrusted.

The resource-based view (RBV) is a model that sees resources as key to superior firm performance. If a resource exhibits VRIO attributes, the resource enables the firm to gain and sustain competitive advantage (Siebels, JF and Knyphausen-Aufsess, DZ, 2012).

In sociology and organizational studies, **institutional theory** is a theory on the deeper and more resilient aspects of social structure. It considers the processes by which structures, including schemes, rules, norms, and routines, become established as authoritative guidelines

for social behavior. **Systems theory** considers the family business as an overlapping, interacting, and interdependent social system that is made up of the family and the business.

Researchers are focused on many important trends in the study of family business field. Furthermore, new theory building occurs a new theory synthesis as well in multi- and meso-level (Rautiainen et al, 2012).

1.4 Literature review types

Methodological approaches to the synthesis of information from available sources vary, and new methods that meet various research objectives are constantly emerging, including evidence mapping, concept analysis, quick reviews, and more. Choosing the right approach may not be straightforward. In selecting an appropriate approach to the review, researchers may appreciate expert advice from bibliographic methodologists, statisticians, and information specialists to ensure that the chosen methods are appropriate for the objectives of the review (Curtin University Library, 2020).

The table below (table 1) characterizes the differences between a systematic review, literature review, scoping overview, and rapid review in selected parameters. Rapid reviews have proven to be a suitable simplified approach to the synthesis of materials and evidence – usually to obtain information for urgent decisions faced by managers (e.g., in management and healthcare).

Table 1. Comparison of the literature review types.

	Systematic Review	Literature Review	Scoping Review	Rapid Review
Focused on one research question with narrow parameters (PICOS framework)	✔	✘	✘ Broad RQ	✔
Selection criteria are listed before the overview is carried out	✔	✘	✔ inclusion / exclusion post hoc	✔
Explicit search strategy, search performed systematically	✔ comprehensive	✘	✔	✔ limited resources
Clear (qualitative) study results and data synthesis based on high quality evidence.	✔ may include a meta-analysis	✔ inc. different quality of the articles	✔ descriptive summary	✔ descriptive summary / data categorization
Formal synthesis of the finding based on evidence in conclusions	✔	✘	✔ resulting general topics based on facts	✔ interpretation of findings

Source: own processing upon the Curtin University Library (2020)

The following research questions regarding the most attractive and popular recent theories of world family business have been formulated:

RQ1: Does exist any dominant theory in the dozen of the most cited papers?
RQ2: Have more papers in the most cited dozen been published in the same journal?

2 Research methodology

The chapter characterizes the research methodology applied in the paper.

2.1 Research Goal

The primary goal of the paper is to establish the most attractive and popular recent theories of world family business and find out whether there exists any dominant theory in the branch of family business. The secondary goal of the paper is to answer formulated research questions.

2.2 Sample, Data Collection and Analyses

Theoretical data collection is based upon advanced rapid review with application of systematic review principles in following characteristics: protocol, objectives, article selection and evaluation, discussion, and assessment.

❖ Question: Narrow question (can be used PICOS framework)
  ➢ Problem: What are the most attractive and popular recent theories of world family business
  ➢ Investigated condition: Most cited papers in the Web of Science (WoS)
  ➢ Comparison condition: Focus of the topics of the papers
  ➢ Outcome: Synthetic table
  ➢ Study type: Theoretical study based upon the advanced rapid review
❖ Protocol: Includes protocol or peer review plan
  ➢ Double blind peer review is assured by the Globalizácia 2022 conference editorial system
❖ The essence (What is it?): Quick (limited) collection of literature on the field to provide an overview of the type, scope, and amount of available research (resources)
❖ Objectives: Clear objectives are set
❖ Eligibility: Based on consistently applied criteria
❖ Search strategy: Explicit strategy, but resources may be limited
  ➢ Keywords: Family business theory
  ➢ Field: Title
❖ Article selection process: The process is usually clear and explicit, focused on quality resources.
  ➢ 12 most cited papers
❖ Article evaluation process: Study quality evaluation may or may not be included (optional)
  ➢ Database Search: The Web of Science
❖ Results and data synthesis: Descriptive summary / data categorization
❖ Discussion: Written by experts with well-founded knowledge of the issue
❖ Why to choose this method? To address a clearly focused issue by searching for the best available, relevant studies and synthesizing the results
❖ Assessment: Thorough critical evaluation incl. study quality evaluation
  ➢ Critical evaluation of the study is guaranteed by double blind peer review system
❖ Conclusions: Limited / careful interpretation of findings

3 Analyses, results, and discussion

The chapter characterizes the most important research results.

3.1 Citation report

The following figure (fig. 1) characterizes the citation report of the "family business theory" according to the search strategy described above. We can clearly see that the branch has been developing since 1996, the interest is fluctuating with accelerations in years 2008, 2013 and 2020. The total number of papers with the "family business theory" in their title is 57 which are times cited 2 152. The H index of researched sentence is 18. The highest number of annual publications was 7 in the year 2020 and the number of citations exceeded 280 in the year 2021. The branch "family business" is, from the WoS point of view, in comparison to "strategic management theory" younger, not so accelerated in recent years and 0,315 times so much cited and in comparison, to "organizational behavior theory" is significantly younger, and 0,825 times so much cited.
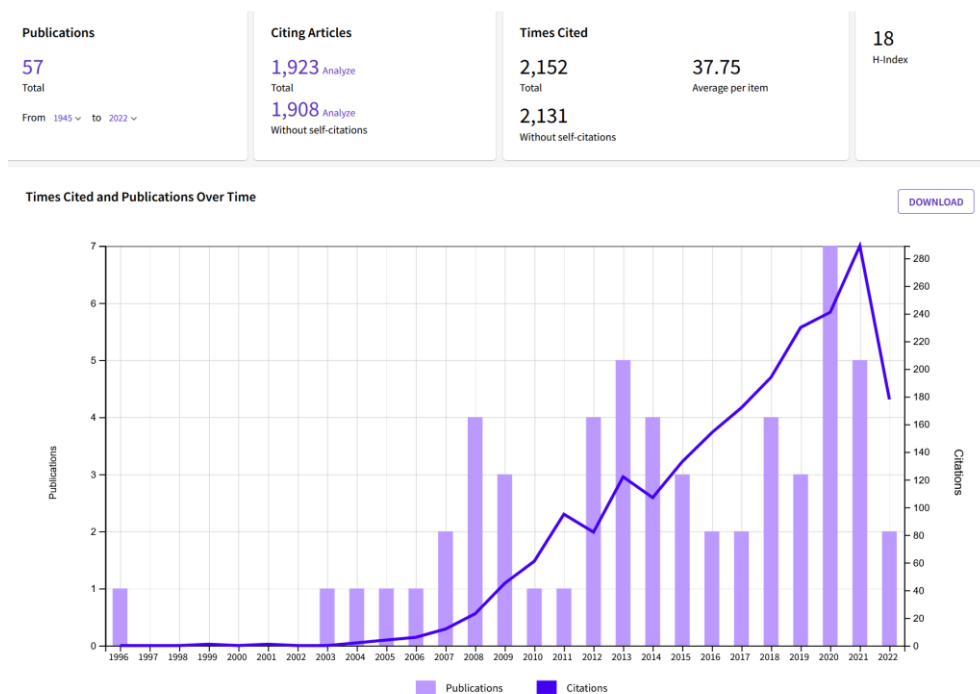
Figure 1. Citation report for family business theory in Title.

Source: Web of Science (retrieved 19.9.2022)

3.2 Twelve most cited papers

The most cited paper by Carr et al indicates that family experiences constitute a powerful socializing influence on the values, attitudes, and behaviors people adopt over the course of their lives. Incorporating theoretical research using the Theory of Planned Behavior (Ajzen, 2002). the mediating effects of attitudes towards business startup, perceived family support, and entrepreneurial self-efficacy (ESE) on entrepreneurial intent are tested using a sample of

308 individuals. Consistent with theory, results suggest significant direct and indirect effects of prior family business exposure on entrepreneurial intent, through the mediation variables of attitudes towards business ownership, perceived family support, and ESE (Carr, JC and Sequeira, JM, 2007).

Almeida et al provide a new rationale for pyramidal ownership in family business groups. A pyramid allows a family to access all retained earnings of a firm it already controls to set up a new firm, and to share the new firm's nondiverted payoff with shareholders of the original firm. Their model is consistent with recent evidence of a small separation between ownership and control in some pyramids and can differentiate between pyramids and dual-class shares, even when either method can achieve the same deviation from one share-one vote. Other predictions of the model are consistent with both systematic and anecdotal evidence (Almeida, HV and Wolfenzon, D, 2006).

Entrepreneurs, as declare Danes et al, have been traditionally epitomized as rugged individuals garnering creative forces of innovation and technology. Applying this traditional, limited, and narrow view of entrepreneurship to ethnic firm creation and growth is to ignore or discount core cultural values of the ethnic contexts in which these firms operate. It is no longer possible to depend solely on human capital theory and household characteristic descriptions to understand the complex and interdependent relationships between the ethnic-owning family, its firm, and the community context in which the firm operates. Danes's paper addresses the complex dynamic of ethnic firms with three purposes: (a) to provide a cultural context for the three ethnic groups composing the National Minority Business Owner Study; (b) to extend the Sustainable Family Business Theory, a dynamic, behaviorally-based, multi-dimensional family firm theory, by clarifying how it accommodates ethnic firm complexities within their cultural context, and (c) to derive implications for research, education and consulting with worldwide applications (Danes, SM; Lee, J; (...); Heck, RKZ, 2008).

Family business research appears to be caught in a "jungle" of competing theories in regard to familiness and performance. Rutherford's study provides a further empirical examination into that relationship. They employ a family influence scale (the familiness-power, experience, and culture scale F-PEC) presented by Klein, Astrachan, and Smyrnios (2005) in an attempt to assess the relationship between familiness and performance in 831 family businesses. The resulting regression analysis adds to the current state of the literature by demonstrating significant and interesting results. Specifically, familiness showed associations with revenue, capital structure, growth, and perceived performance; however, the relationships were both positive and negative, thus casting doubt upon the F-PEC as a vehicle for untangling the jungle. We conclude with discussion and implications (Rutherford, MW; Kuratko, DF and Holt, DT, 2008).

The article by Tokarczyk et al considers the familiness construct within the resource-based view of the firm by examining the manner in which intangible and other unique resources translate into competitive advantages held by family businesses. Specifically, this article, through a case-based approach, questions whether the familiness qualities of a firm contribute to actualization of an effective market orientation thereby constituting a competitive advantage. Analysis of multiple interviews from family owners and managers suggests that familiness qualities, including, but not limited to, strategic focus, customer orientation, family relationships, and operational efficiency, do contribute to a propensity for execution of an effective market orientation (Tokarczyk, J; Hansen, E; (...); Down, J, 2007).

In recent years, increasing scholarly attention has been directed toward the field of family business research. Based on an exhaustive sample of 235 publications, Siebels's article provides a comprehensive review and a critical assessment of the theoretical underpinnings and corporate governance issues in family business research. Three predominant theoretical perspectives, namely principal agent theory, stewardship theory and the resource-based view

of the firm, have emerged and provide empirical evidence that family businesses significantly differ from non-family firms in important dimensions such as agency costs, competitive advantages or corporate governance structure. On their own, none of the aforementioned perspectives succeeds in addressing all complexities associated with family businesses and their corporate governance. Accordingly, joint approaches combining different theoretical frameworks can help to improve understanding of the family business. The article concludes by discussing possible directions for future research that might further contribute to building a comprehensive theory of the family business and its corporate governance (Siebels, JF and Knyphausen-Aufsess, DZ, 2012).

In Shepherd's article he develops a multi- and meso-level theory of grief recovery time from the loss of a family business. The multi-level aspect of the model suggests how primarily micro theories of grief and sense-making can help explain grief recovery time at the family group level. The meso-level aspect of the model provides insight into recovery from the loss of a family business by proposing how grief dynamics interact at the individual level through emotional intelligence and the family group level through emotional capability. By supplementing theories of grief with those of sense-making, the model provides a deeper understanding of the grief recovery process. This model has implications for scholars and practical implications for family business members and the family unit (Shepherd, DA, 2009).

Moores's article argues the bona fides of the study of family business as a standalone discipline. Using a widely accepted evolutionary process for the development of scientific disciplines and an established theory-building methodology, the author introduces a theoretically robust explanation of the domain of business families. Established theories widely acknowledged as having relevance to business families are meshed with the universally accepted three-circle Venn diagram-based paradigm to illustrate both the stage of the discipline in theory building terms and an evolutionary path to further develop a theory of the business family domain (Moores, K, 2009).

The article by Nicholson seeks to show that the ideas of evolutionary psychology have not only a unique contribution to make to the study of family business but have an overarching capacity to integrate theory, resolve empirical debates, and lead research in new directions. The article considers, first, what is different about family firms before outlining the Darwinian framework and its implications, and then moves on to an analysis of kinship dynamics as central to understanding the roots of cooperation and conflict in the family firm. The article concludes with a discussion of the scope for theoretical synthesis, practical implications, and the position this analysis leads us to about the unique performance potential and liabilities of the family firm (Nicholson, N, 2008).

Leaptrott's article discusses the organizational forces common to the family business from the perspective of institutional theory. Both "old" and "new" institutionalism add useful perspectives for the analysis of family businesses. "Old" institutionalism encourages the study of structural change because of environmental pressures. "New" institutionalism focuses on the symbolic nature of organizations. Propositions regarding elements of these theories of institutional theory in a family business context are offered. Parallels between institutional theory and family systems theory are discussed (Leaptrott, J, 2005).

There is a long tradition of systemic approaches in family business research, but recent developments have been widely ignored. Von Schlippe's article gives a brief overview of these approaches and models and then introduces the modern theory of social systems. This theory no longer considers individuals as parts of the system but assumes that the basic elements of a social system are acts of communication. In each system (family, business, ownership), a specific communication pattern evolves, and each system operates within a specific functional logic. Families process relationship communication, businesses process decision communication, and ownership operates based on legally secured communication.

Each of these three structurally coupled systems provides a specific context. The functional logics are context markers and assign meaning to the communicative acts. To understand how a family business functions, it is important to understand the concrete functional logics and the structural coupling of the three systems (von Schlippe, A and Frank, H, 2013).

3.3 Synthetic table

Following table no. 2 synthetically summarizes above introduced most cited papers and characterizes what topics are most frequently focused. There are repeating theories in the topics of the papers. Most mentioned and popular theory in the top cited dozen of topical papers is "familiness" theory connected with performance. Further applied theories are theory of planned behavior, theory of pyramidal ownership, sustainable family business theory, principal agent theory, stewardship theory and the resource-based view, a multi- and meso-level theory, an institutional theory and theory of social systems. We see that no repeating names are in the research teams of different papers. Oldest two papers in the top dozen are from the year 2003 and newest one from the year 2013.

Table 2. Synthetic table of most cited studies focused on different theories of family business.

#	Paper title/ theory	Author	Year of publishing	Times cited	Topic theory focus
1	Prior family business exposure as intergenerational influence and entrepreneurial intent: A Theory of Planned Behavior approach	Carr, JC and Sequeira, JM	2007	386	Theory of Planned Behavior
2	A theory of pyramidal ownership and family business groups	Almeida, HV and Wolfenzon, D	2006	356	Theory of pyramidal ownership
3	The effect of ethnicity, families and culture on entrepreneurial experience: an extension of sustainable family business theory	Danes, SM; Lee, J; (...); Heck, RKZ	2008	153	Sustainable Family Business Theory
4	Examining the Link Between "Familiness" and Performance: Can the F-PEC Untangle the Family Business Theory Jungle?	Rutherford, MW; Kuratko, DF and Holt, DT	2008	142	"Familiness" and Performance
5	An introduction to theories of family business	Chrisman, JJ; Chua, JH and Steier, LP	2003	126	Theories of family business
6	A resource-based view and market orientation theory examination of the role of "familiness" in family business success	Tokarczyk, J; Hansen, E; (...); Down, J	2007	120	The role of "familiness" in family business
7	A Review of Theory in Family Business Research: The Implications for Corporate Governance	Siebels, JF and Knyphausen-Aufsess, DZ	2012	119	Principal agent theory, stewardship theory and the resource-based view

8	Grief recovery from the loss of a family business: A multi- and meso-level theory	Shepherd, DA	2009	106	A multi- and meso-level theory
9	Paradigms and Theory Building in the Domain of Business Families	Moores, K	2009	90	Theory Building
10	Evolutionary psychology and family business: A new synthesis for theory, research, and practice	Nicholson, N	2008	67	A new synthesis for theory
11	An institutional theory view of the family business	Leaptrott, J	2005	61	An institutional theory
12	The Theory of Social Systems as a Framework for Understanding Family Businesses	von Schlippe, A and Frank, H	2013	45	Theory of Social Systems

Source: own processing on the base of Web of Science (retrieved 19.9.2022)

Based on previous table 2 we can answer and clarify the research question (RQ1), does exist any dominant theory in the dozen of most cited papers? Yes, there has been identified one theory mentioned several times in the dozen of most cited papers: the "familines" theory. **Familiness** designates the advantages and disadvantages in terms of resources and capacities that flow from the nature of the family business.

The research question (RQ2), if more papers in the most cited dozen have been published in the same journal, can be answered: yes, four papers of most cited dozen has been published in Family business review and two in Journal of business venturing.

4 Conclusion

The presented theoretical paper deals with the most popular recent topics in the world of family business. The methodology is based upon the advanced rapid review technique. As the classification criterium authors have used the citation score of the Web of Science in the PICOS frame. The main objective of the paper is to find out the most attractive and popular recent theories of world family business are and whether there exists any dominant theory in the branch of family business. Two research questions were set and evaluated. The presented paper includes literature review, applied methodology description as well as the most important research findings accompanied with commented charts, tables and discussion. The most important finding pointed out that, the "familiness" theory is slightly dominant in the dozen of the most cited papers. All the papers of most cited dozen have been elaborated by different teams of researchers. The aim of the paper was fulfilled. The major benefit of the paper for managers is the inspiration what topics are popular and can help family business managements to improve their activities and performance.

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The International Working Team and its Effectiveness in the Emerging trends of Globalisation

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Abstract

Research background: Threats to global stability by the intensification of global problems, the gradual fragmentation of European integration, or the growing importance of the Asian region – these are aspects of globalisation that are increasingly being voiced in international forums. However, let us pay attention as scientists, educators, or managers to the directly influential factors. The attention focused on international teams and their effectiveness, because international teams are very important in any new aspect of globalisation.

Purpose of the article: This paper is focused mainly on task assignment and its effectiveness within international working teams in education. According to Svozilova (2016), a task is the work of a complex activity, we can specify a desired outcome for it, and it has a relatively short duration. Koubek (2010) adds that a task may consist of one or more operations. A manager can choose from two options when specifying tasks and assigning them to specific performers.

Findings & Value added: In February 2022, international teams cooperating members from Egypt, Ukraine, Belarus, Russia, Slovakia, China and the Czech Republic were tasked with developing a Business Plan for an innovative product. The main goal of this paper is to evaluate the process and outcome of the selected international team according to specific criteria for assigning tasks, to present each criterion in relation to the nationality of the team members and to highlight the way in which the task is assigned in relation to the effectiveness of international teams.

Keywords: *Globalization, Aspects of globalisation, International teams, Efficiency of assigned tasks*

JEL Classification: *M54; P13; O15*

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1 Introduction

"Globalization" as such has existed for centuries. Its main purpose, i.e. to develop economic relationships and international trade, has not changed, at least not significantly. However, international trading relations established centuries ago have resulted in wider economic cooperation amongst individual (national) economies (Bencikova et al., 2018).

Globalisation has been discussed since at least the 1960s, when social contradictions finally lost their local character, the 21st century is famous for discussions on new aspects of globalisation. Globalisation has been the subject of discussion among politicians, philosophers, economists and the cause of dissenting protests by various interest groups. The impacts of globalisation are both positive and negative. However the measurability of these impacts is rather problematic. Hence, there are also many views on the very concept of globalization, its manifestations, impacts and the direction of future development. All these impacts have their own impacts on human resources management. HR department is the most important department in any organization because it deals with human resources which are the most important, valuable and appreciable asset of any organization (Sukalova and Ceniga, 2019).

The benefits of globalisation processes assuredly include rising living standards, greater interrelation of national economies and individual states, the existence of multinational companies, and thus increased competition. Another benefit is the broadening of horizons for the individual, who must adapt to all this. Time is speeding up thanks to global interconnectivity. It is no longer needed to take days to move from one part of the country to another. The transfer of information sped up so much that we can now see online what is happening on the other side of the country. Multinational corporations are seen as the engine of globalisation. The emergence of these companies was only possible with the releasing of international trade and the liberalisation of national economies. Multinational corporations operate mainly through foreign direct investment and therefore have a significant impact on the economic development of a given region. It can be said that globalisation processes are directly dependent on the activities of multinational corporations and the organisation of the work of international teams has become their modem operandi. In this regard, organizations had to adopt a global approach in order to survive in the global marketplace and started to seek for a more dynamic cultural model. Hence, organizations began to accept and value the global workforce within the companies' employees who include members of a variety of ethnical, religious, racial and gender backgrounds (Kharroubi, 2020).

International teams are heterogeneous in many dimensions, consisting of members of different nationalities and cultures with different languages, who often prefer to communicate using technology rather than face-to-face. Whether international teams are formed locally, remotely, or both, they can be seen as catalysts for new forms of organizing (Mockaitis et al., 2018)

That is why the article "The International Working Team and its Effectiveness in the Emerging trends of Globalisation" focuses on the work of international teams consisting of students of ŠKODA AUTO Vysoká škola o.p.s. and future employees of multinational companies. The aim of the article is to evaluate the process and the result of the selected international team according to the criteria presented in ch. 3, to further present these criteria in relation to the nationality of the individual team members and to highlight the way the task is assigned in relation to the effectiveness of international teams in performing the tasks.

1.1 International management and task assignment

Assigning tasks is a sub-element of international management. The literature agrees that the basic criteria should be clearly defined when assigning a task include the desired

outcome, time horizon, responsibility for performance, available resources, and specification of what is considered successful completion of the task (Koubek, 2010; Plamínek, 1999 and 2009; Svozilová,2016; Kriek,2019). According to Plamínek (2009), expressing support and creating space for inquiry and discussion is also an important point, as understanding the assigned task is considered the basis for future success, along with its acceptance. A well-managed process of defining the work task and the associated responsibilities can optimize the worker's approach to the assigned work from the very beginning (Kriek, 2019).

Without setting a goal, the task could not exist. And so the question remains, to what extent it is also necessary to determine the way in which it is to be achieved. The preferences of each taskmaster/leader/supervisor, in this case, are radically different (and usually closely related to the chosen management style), as are the preferences of each executor/subordinate/employee. To achieve results, some need fixed structures and roles, the presence of which reduces insecurity, ambiguity and misunderstanding. Others, on the other hand, may be demotivated by this kind of approach.

The taskmaster, leader, supervisor, can choose from two options when assigning tasks and assigning them to specific performers. They can choose either "HOW" assignment or "WHAT" assignment (Plamínek, 1999).

In the case of the "HOW" assignment, or also the process type, it is mainly about specifying the methods and ways in which the executor's work is to be carried out, it contains a list or direct description of working methods, and yet it is burdened with frequent control and consultation, as a result of which the contracting authority can manage only a small number of executors and its work becomes less efficient.

In "WHAT" assignments we encounter a more autonomous approach, only the outcome to be achieved and the evaluation criteria are specified. Both types of assignment have been used in the realization of the tasks of selected international teams and are specified in chapter 3.2.

2 Research investigation methodology

The and of the research investigation is devoted to the characteristics of the teams, the specification of tasks for international teams and the description of the individual methods that led to the achievement of the objective of this contribution.

2.1 Characteristics of international teams

A total of 25 international teams participated in the research investigation during the months of February - June 2022, creating a business plan for any innovative product. Two teams consisted of international students only. Team one consisted of three students from Russia and two students from Ukraine. Team two consisted of students from China (one student), Russia (three students), Ukraine (one student) and one student from Kazakhstan. The other thirteen teams were a combination of Czech and international students. Nine students from Russia, five students from Ukraine, three students from Slovakia, two from Poland, two from Egypt, one student from Macedonia and one from Vietnam. There were only ten Czech teams.

2.2 Task specifications for international teams

The international teams were given 11 weeks to develop a business plan for the innovative product and were given the following sub-tasks, which are always labelled as to how they were given - either a process-oriented "HOW" task or a goal-oriented "WHAT" task. Table n.1 presents the individual tasks of the international teams and their type.

Table 1. Task specifications for international Teams

Task	Assignment type
Choosing a team leader and assigning responsibilities for different parts of the project.	WHAT
Product decision.	WHAT
Creating a brand and CI - creating a brand, colours, slogan and other CI elements for the chosen product.	WHAT
Creating a situational market analysis.	HOW
Graphical product display.	WHAT
Cost analysis of production and sales of a new product in the first year.	HOW
Determining the asking price of a new product.	HOW
Marketing communication of the product in the form of advertising.	WHAT
Presentation to the investor	WHAT
Evaluation of own work on tasks	WHAT

Source: author (2022)

The following chapters will describe the research and and present the results.

2.3 Research investigation

To fulfill the objective of this study, observation method, facilitated discussion and aggregate evaluation of the overall performance of the teams were carried out. The individual teams were evaluated according to their effectiveness in completing the two types of tasks (see ch. 2.2). Subsequently, the effectiveness of the work was evaluated for individual team members by nationality. The results of the comparison are displayed in semantic differentials to clearly show the differences between nationalities, presented in ch. 3.1. Two additional criteria were included when evaluating the work efficiency of individual members and the process or result orientation. Particularly risk orientation and certainty orientation. During the research investigation, it was found that each nationality differed not only in the process or outcome orientation of the task assignment, but also in the attitude towards risk or certainty that was part of the assignment. The nationality that displayed the ability to perform a creative type of task tended to be more risk-taking. The nationality that preferred an objective task tended more towards the certainty aspect. The outcome of the research investigation is therefore not only an assessment of the effectiveness of international teams in relation to the type of task assigned, which is the main objective of this study, but also a diagnosis of the different motivational types by nationality. The diagnosis of motivational types is presented by Jiří Plamínek and is depicted in figure n. 1.
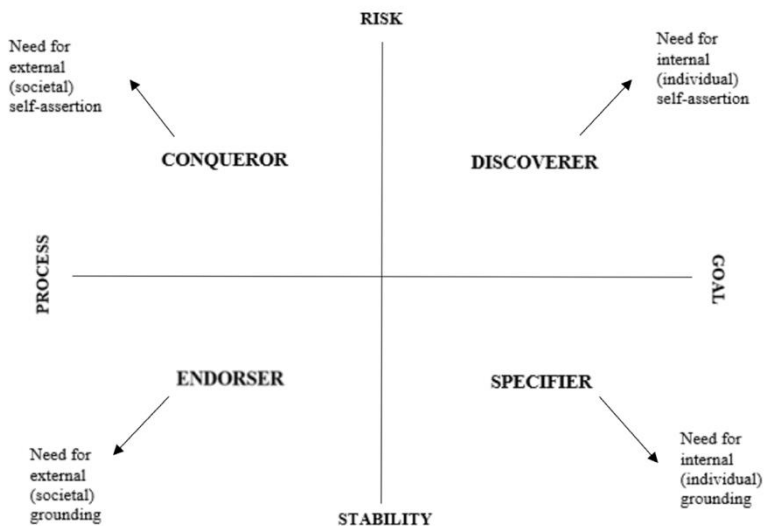
Figure 1. The diagnosis of motivational types

Source: Plaminek (1999, p. 41)

To determine the motivational personality type of the individual team members by nationality, all defined tasks listed in ch.2.2 were first rated on a bipolar scale. The extreme points of the scale were assigned values of 5 (risk) and 1 (stability), as well as 5 (process) and 1 (goal) to respect the matrix format of the theory. The more individual team members took risks in completing the tasks, for example by engaging creativity outside the scope of the assignment, the more points they were assigned, and vice versa. In the latter case, they were then scored according to their compliance with the "WHAT" assignment or the "HOW" assignment. If they needed a clear process to get to the goal, they were scored higher. If they were satisfied with just the task they had thought about, they were assigned fewer points.

The results can be seen in a graphical display in the semantic differential (figure n. 2), in which it is possible to find similarities between team members by nationality. The particular outputs of each international team are archived in the Academic Information System of Škoda Auto Vysoká škola, o.p.s.

3 Results of the research survey

The semantic differential presents the similarities and differences of individual team members by nationality in relation to the orientation to risk or stability (figure n. 2) and in relation to process or goal orientation task assignment (figure n. 3). Chapter 4.2 presents the diagnosis of the motivational personality type of individual team members by nationality.

3.1 International teams and risk or stability orientation whilst task assignment

For clarity, the results have been divided into two graphs, as it is not possible to capture the differences between team members when keeping the full number of nationalities.
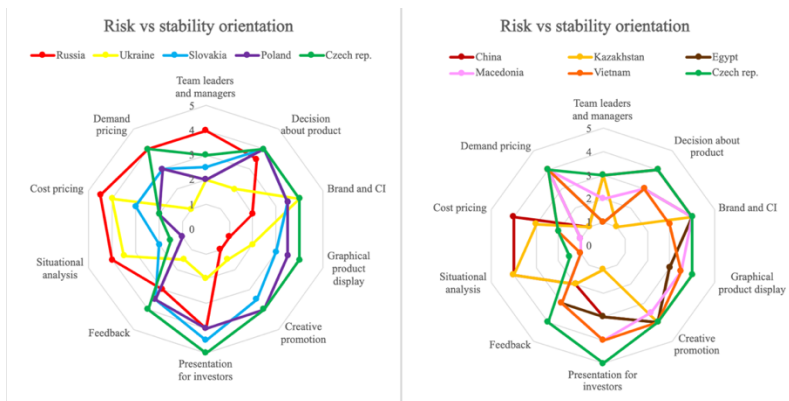
Figure 2. Risk or stability orientation by nationality

Source: author (2022)

The more students of a given nationality took risks in completing the task, the closer their axis is to the value of five. It is evident that Slovaks, Poles and Czechs tend to take risks in solving tasks, whereas Russians, Ukrainians or Kazakhs avoid taking risks in tasks, rather they try to complete them within the framework of stability. That is, to fulfil the task, but without significant intention. In contrast, for tasks that involve exact calculations or analyses, they tend to involve new approaches in the solution. There, for example, the Czechs tend to stay within the boundaries of stability and follow the assignment procedure completely.

Similarly, the preference of tasks by type of assignment was evaluated. If the students of each nationality preferred tasks given in the form of instructions or process, then they were rated with higher scores, while those who preferred a what-to-do type of assignment that left them with a high degree of self-intention were rated with lower scores.

3.2 International Teams and process or goal orientation task assignment

The results of the research investigation within the international teams and their orientation on process or result assignments are shown again in the semantic differential (figure n. 3).
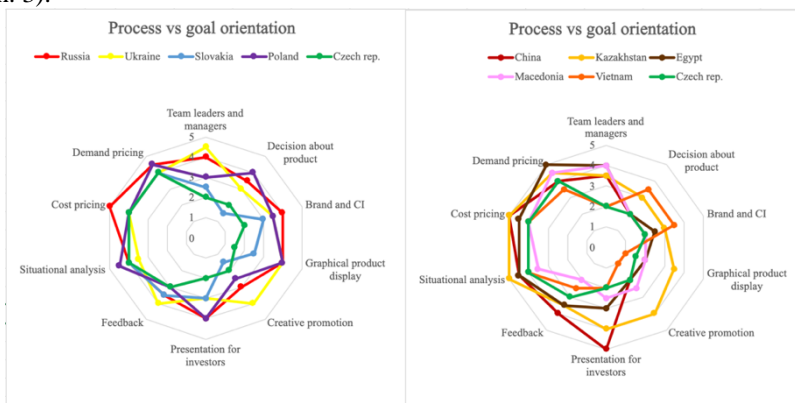
Figure 3. Orientation to process or goal task assignment according to individual nationalities

Source: author (2022)

Here it is evident that Czech, Slovak, Vietnamese or Egyptian students prefer goal-oriented assignments. They need to know what to accomplish, but not how. On the other hand, for objective tasks in which calculations or analyses are involved, they prefer clear instructions. In contrast, for Russian, Ukrainian, Polish or Kazakh students, for creative tasks, they need clear guidance on how to complete it. Here the results from the first comparison are confirmed, that these nations do not prefer creativity, but rather clear procedures.

3.3 International teams and motivational types diagnostics

The values for each of the comparisons (risk vs. stability and process vs. goal) were then averaged to obtain a result for each nationality of students in the international and combined teams in the matrix of motivational personality types. The resulting diagnosis of motivational types by nationality is reported in table number 2.

Table 2. Average value of comparisons for diagnosing motivational types

	Risk vs Stability	**Process vs Goal**
Russia	3,1	3,95
Ukraine	2,35	3,75
China	3,2	3,4
Kazakhstan	2,7	3,9
Slovakia	3,25	2,95
Poland	3,05	3,7
Egypt	2,7	3,3
Macedonia	2,9	2,9
Vietnam	2,85	2,7
Czech rep.	3,55	2,65

Source: author (2022)

Figure 4. Diagnostics of motivational types by nationality

Source: author (2022)

Figure number 4 implies that Czechs are the motivational type that Plamínek refers to as explorers. Meaning they prefer the "WHAT" method of task assignment, are goal-oriented, and perceive the risk associated with the task in a healthy positive way. The Ukrainian and Kazakh, students are the motivational type of Reconcilers, they are more efficient in the process type of task assignment and prefer stability over risk in solving the task. Russian, Polish and Chinese students prefer procedural task assignment and have no strong orientation towards either certainty or risk. Egyptian students prefer to avoid the risk associated with the task and are less process oriented in assigning the task compared to Kazakh, Ukrainian, Russian and Polish students. Slovak students, according to the research, rank second in their willingness to take risks in assigning tasks and are basically the most flexible in tasks assignments, neither process-oriented nor goal-oriented tasks are a problem for them. Macedonian students are similar to Slovak students, with the exception that they prefer to take fewer risks than Slovaks, Russians, Poles and Chinese. Vietnamese students are oriented towards goal-oriented task assignment and are similar to Macedonians in relation to risk.

4 Conclusion

Globalization and the processes of internationalization, development in the field of informatics and telecommunications, together with significant socio-economic changes, place enormous demands on the improvement of management. These are reflected in the search for new, more effective management methods and techniques and in the generalization of practical knowledge. Outdated methods, techniques and tools are being replaced by new ones that meet changing conditions and assumptions (Cambalikova, 2021).

This study focuses on the effectiveness of international teams in assigning tasks and is intended for a target group of managers and leaders who will lead major companies in the future. It is also intended for educators who are preparing this future successful generation of managers and leaders. The specific context that stimulates internationalization may vary across different institutions in different countries at different times. However, one goal of higher education internationalization holds across all circumstances, that is to develop and provide talent that can compete globally and to enable students to work effectively within a diversity of cultures (Aggarwal and Wu, 2020). Managers and leaders of major companies will have to cope with changes in value orientations, diverse aspects of globalization, the need for flexible responses, and pressing environmental, social and political factors in managing and leading international teams. The article "The International Working Team and its Effectiveness in the Emerging Trends of Globalisation" highlights the importance of assigning tasks to international teams in two different ways and illustrates the need for a process orientation in assigning tasks in the form of sub-steps, especially for Ukrainians, Kazakhs, Russians and Poles. It also recommends a goal orientation of the task and more liberal ways of executing it for the Czech nation. Although the study only includes pilot research investigations on this topic, which will continue, it is clear that there is greater heterogeneity in international teams in relation to the risks or certainty associated with task performance. At the same time, the pilot research investigations also confirmed the variety of motivational types of different nationalities and this is a real challenge for managers and leaders in today's globalised world when assigning and performing tasks.

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The formation of trends in the visitation of gastronomic establishments after the global pandemic crisis

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Abstract

Research background: Global tourism has slowly started to return to normal by 2021. Restaurant operators are experiencing a gradual return of guests to pre-2020 levels. However, it is clear that with the Covid 19 pandemic, many customers have adopted new behavioral patterns. Due to the global demographic development, the group of people over 50+ will have a significant influence on the composition of the clientele, this ever-growing segment is still active and has sufficient purchasing power, and therefore should not be neglected by companies in their strategies.

Purpose of the article: The purpose of the article is to analyse the factors that influence the attendance of gastronomic establishments in the 50+ segment, that is, to recognize what motivates the client to repeatedly visit a certain restaurant on the market of gastronomic services in the Czech Republic after the pandemic and to identify the links between these factors and the demographic characteristics of the respondents.

Methods:
The basis of the survey was a search for development trends focused on the issue of customer attitudes and primary research in the field of attitudes. The results of the questionnaire survey were processed using mathematical-statistical analyzes, and links were verified on the basis of a nonparametric test and correspondence analysis.

Findings & Value added:
From the survey results, it is clear that the clients are motivated to make repeat visits primarily due to cleanliness and order, receiving an acceptable price for the service and the expected quality and level of prices. It is suggested that these attitudes are induced by the development of the price level. The conclusions also show that guests in the restaurants in the researched segment are indifferent to the offers of world cuisine.

Keywords: *gastronomy, segment, Czech Republic, trend*.

JEL Classification: *C14; M31; Z32*

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1 Introduction

The demand for catering services is significantly affected by distrust in the economy and rising inflation. Therefore, every restaurant operation must consider all steps to remain competitive, acquire new and "keep" current, loyal clientele.

From the point of view of the number of visitors to gastronomic establishments and with regard to demographic development, the 50+ customer segment is the significant, important segment. This segment is growing, is still active, and has sufficient purchasing power. In my opinion, businesses in the field of gastronomy should focus on them. Diekmann et al. (2020) note that there is no clear definition of the term senior in the literature, nor is there an explicitly defined age limit. Batra (2009) and Leroux (2010) determine the age limits of a senior at the level of 50 years.

Hossain et al. (2003) use the term senior for people aged 55 and over, and non-seniors are people under 55 but older than 15 years. The segment of the population over 50 is not considered as a gap in the market but as a firmly anchored integrated part of it. Product characteristics for this segment are based on elements of quality and environmental sustainability and are variable depending on the season (Alén et al., 2012).

Senior tourism is considered part of social tourism, where participants participate in the implementation of expenses related to travel, accommodation, meals, and leisure activities. These participants are considered financially disadvantaged, and in addition to the elderly, they can include low-income families, people with disabilities, and young people (Minnaert, 2014; McCabe et al., 2012). Minnaert et al. (2009) add that social tourism for low-income population groups, where it is also possible to include senior tourism, increases this family capital in the short term. In the medium term, it is possible to talk about building social capital – deeper social ties, mutual proactive behaviour and self-esteem.

The value of senior tourism in the implication of the active aging process was defined by Qiao et al. (pp. 12, 2022). They pointed to six key driving value elements for active aging. 1) Social Emotional Values: emotional goals, positive emotions, emotional regulation; 2) Spiritual Sense Values: ethics and morality, religious beliefs; 3) Instrumental Support Values: mutual altruistic productive, activities, physical activities, props activities; 4) Preceding Travel Experience Values: skills, cognitive, experiences, events; 5) Tourism Community Values: reframing, integration, trust, transformation; 6) Tourism Well-being Values: emotional communication, social support, psychological values. Identifying the strengths of senior tourism participants mainly helps them to age actively and develop attitudes towards themselves. Last but not least, these key factors and the value orientation of seniors help tourism companies create an individual offer for this segment.

The growing attractiveness of the tourist market of seniors and retirees, who have less and less work and responsibilities and more and more free time, is characterized by three factors of motivation for the consumption of tourism products: 1) to gain new experiences - differences depending on gender and level of education; 2) meeting people and performing physical activities – differences depending on gender; 3) relax and spend time with family and friends – differences according to age group, gender and status, whether the senior is retired or not (Pacheco et al., 2022). Patterson and Balderas (2020) confirm the high level of differentiation and especially personalization of the tourism product for seniors.

The search for an unusual experience is closely connected with self-improvement and self-realization (Patterson and Balderas, 2020).

Seniors as gastronomic tourists are experienced travellers. If they have time and money, they seek and learn about foreign cultures through the consumption of local foods and drinks, despite their current different food preferences.

It is necessary to mention the fact that with increasing age, the smell and taste sensitivity of seniors to food decreases, which leads to a preference for familiar foods, rather than drying

out new, foreign foods and drinks, in order to prevent the emergence of a negative feeling and emotion from the consumption of a gastronomic product. The conservative approach of seniors in tasting foreign cuisine also reflects the fear of new, unwanted health problems and complications (Balderas-Cejudo et al., 2019).

2 Methods

Data for the analysis of customer return analysis were obtained based on a questionnaire survey in the Czech Republic in the period February to June. 2022. A total of 32 questions were asked (Table 1), in the structure of the Likert scale "Definitely agree", "Agree", "Neutral", „Disagree", and "Definitely disagree", a total of 383 respondents answered. After demographic characteristics, the age group and gender characteristics were chosen.

Table 1. Questions

1	An empathetic approach	9	Plenty of space	17	Lunch menu	25	Parking
2	Language skills	10	Music production	18	Seasonal offer	26	Acceptable prices
3	Professional behavior	11	Light, warm, clean	19	Regional specialties	27	Price/quality ratio
4	Service speed	12	News on offer	20	Specific foods	28	Good previous experience
5	Knowledge of the offer, quality of information	13	Wide range of food and drinks	21	Wide range of drinks	29	Recommendations from friends
6	Cleanliness and order	14	Home cooking	22	Traditional and permanent offer	30	Promotion on the Internet
7	Interior design	15	Offer games and entertainment	23	A selection of world cuisine	31	References on the Internet
8	Good transport accessibility	16	Offer for children	24	Accessibility	32	Gastronomic events

Source: Own processing

The questionnaire shows signs of internal consistency, the Cronbach alpha value of the individual items was at the level of 0.93 (total Cronbach alpha = 0.94). The dependence between individual quantitative features can be determined on the basis of the nonparametric Person's chi-square test of independence (hereafter referred to as χ2). The principle is to accept or reject the null hypothesis. We reject independence, that is, the validity of the null hypothesis, if the value of χ2 falls within the critical range (1).

$$C = \left[\chi\big(\alpha; (r-1)\big) * (c-1); \infty\right] \tag{1}$$

where α represents the level of significance, r/s - the number of rows/columns. It is also possible to decide, based on the p-value, that this value expresses the probability that the calculated test criterion will be met or exceeded.

If the p-value is higher than the chosen confidence value α (e.g. 0.1; 0.05; 0.01, Budíková, 2010), then we accept the hypothesis of independence between two quantitative traits. If the p-value was < α, but it was not possible to decide on dependence due to non-compliance with the condition to accept the hypothesis, which says that 20% of the expected observations must not be less than 5, then a decision was made on the dependence of quantitative traits based on the results of correspondence analysis. This enables the analysis of contingency matrices with the occurrence of zero values, due to the fact that it is a descriptive method, it is applicable even if χ2 is not statistically significant, thus it differs from the nonparametric method of Pearson's χ2.

The determination of dependence is based on calculated value of column and row χ2 and also on identified value of total inertia (more information on correspondence analysis Meloun (2017). Meloun (2017) recommends that the total inertia should reach at least 90%, if the cumulative value of the first two dimensions is less than 50%, then the method for determining the relationship is not suitable). Furthermore, it is recommended that the eigenvalues of the ordination axes be higher than the average of all eigenvalues. (more on Holčík, J. et al. 2015, Komenda, M., 2020). In her research, Botlíková (2021) chose values higher than 80% as the limit value of total inertia, which is the usual value of total inertia.

3 Result

With regard to the dependence between individual attitudes towards a repeat visit and gender, no dependence was confirmed on the basis of a nonparametric test. In the case of dependence of age groups and attitudes, we can talk about dependence in the case of questions 2, 3.4, 14, 16, 20, 23, 27, 30, 31 and 32 (see red numbers, see figure 1). However, in all cases, the condition was violated when more than 5% of the expected values were less than the number 5.

Therefore, these relationships were further subjected to correspondence analysis, and identified dependence was accepted based on the above conditions. The results of the correspondence analysis indicate the dependencies between the age group and attitudes 2, 23, 27, and 32 motivating to return to the restaurant establishment (see figure 1, mark ** see figure 1). Individual dependencies are graphically represented in correspondence maps, see Figure 2.

Quest	p-value Age G.	p-value Sex	Quest	p-value Age G.	p-value Sex	Quest	p-value Age G.	p-value Sex	Quest	p-value Age G.	p-value Sex
1	0,52	0,39	9	0,74	0,48*	17	0,40	0,85*	25	**0,03**	0,43*
2	**0,01****	0,69*	10	0,65	0,84*	18	0,05	0,11*	26	0,21	0,37
3	**0,04**	0,07*	11	0,34	0,47*	19	0,31	0,16*	27	**0,02****	0,45
4	**0,00**	0,97	12	0,64	0,97*	20	**0,01**	0,08*	28	0,69	0,63
5	0,14	0,62*	13	0,29	0,66*	21	0,9	0,08*	29	0,05	0,62
6	0,74	0,96	14	**0,00**	0,71	22	0,41	0,79*	30	**0,01**	0,27*
7	0,12	0,05*	15	0,08	0,74*	23	**0,02****	0,39*	31	**0,00**	0,17*
8	0,45	0,32*	16	**0,00**	0,86*	24	0,33	0,94*	32	**0,01****	0,65

Figure 1. Relational analysis

Source: own processing, * fulfilment of the condition of nonexistence of more than 5% of expected values than 5; ** relationship confirmed by correspondence analysis.

4 Discussion

Current trends in the post-pandemic period were identified based on an examination of the 50+ client segment and factors influencing restaurant attendance. However, the motivations change, even in the case of a selected segment. Will further investigation confirm the existing

factors leading customers to repeat restaurant visits? They will again be motivated mainly by cleanliness and order, an acceptable price for the service, and the expected quality and level of prices. With the development of price growth, the view of the offer of world cuisine will also change. I believe that the selected segment of customers will continue to inspire catering establishments to update the product offering with regard to client motivation.

From the point of view of the company, it is therefore necessary to adapt the offer according to age groups, to specifically focus on the pricing policy. The price of services is an even more pressing issue in today's dynamically growing inflation. The prices of gastronomic services increased by approximately 24% year-on-year, which can be problematic for many customers. It is obvious that 70 – 80 old people pay more attention to price-performance. This is a group that is usually retired their income is far lower than during their active life, an attractive price offer can be motivating. Adapting to the 50+ clientele is one of the guarantees of retaining senior customers. There is evidence that if seniors are satisfied with service, they are more likely to remain loyal to a particular restaurant than younger generations (Kim and Jang, 2015).
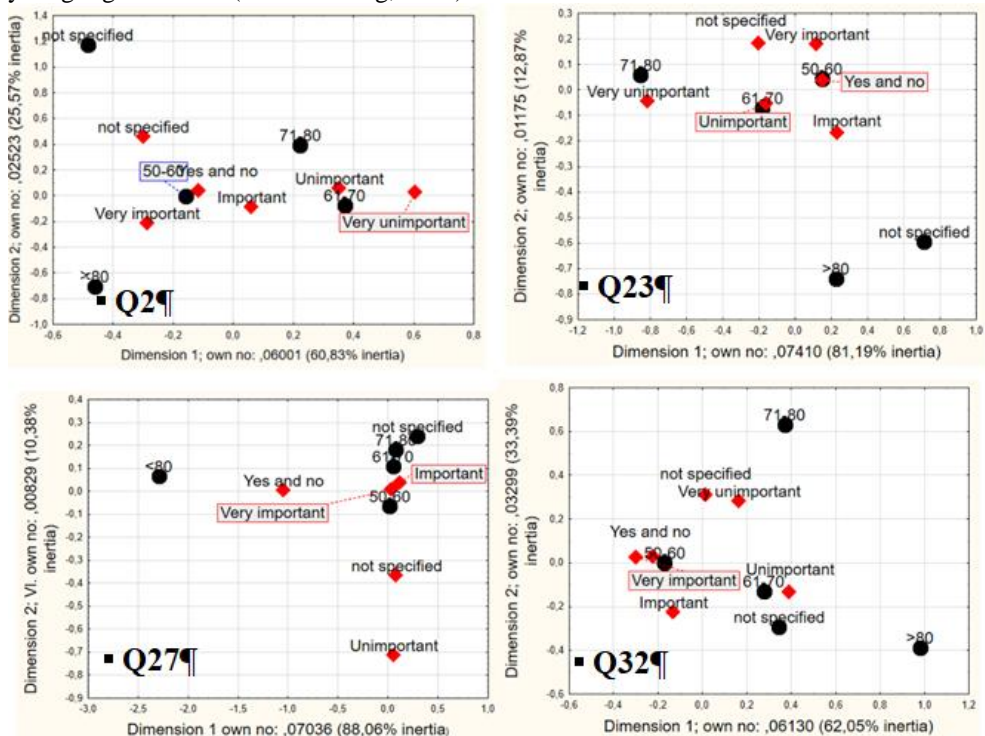
Figure 2. Corresponding analysis

Source: own processing

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The Attractiveness of Global Equity Funds

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Abstract

Research background: International collective investing mostly takes place through global mutual funds. Based on their strategies, investment companies place their investments in different territories. Diversification of risk occurs by spreading investments across different types of assets. At the same time, however, costs associated with fund management also arise. The amount of costs for global funds is mainly influenced by concluded contracts with a larger number of stockbrokers, a larger number of created investment analyzes and also the costs associated with hedging currency risks. All these items are reflected in the total fees of the funds. Thus, global funds usually have higher management fees than funds investing in a single country.

Purpose of the article: The main objective of our article is to evaluate from the investor's point of view the offer of selected global mutual funds offered on the financial market in the Czech Republic, the Slovak Republic, Austria and the United Kingdom of Great Britain and Northern Ireland.

Methods: To achieve the set objective, the description will first be used to process the characteristics of mutual funds. The composition of the portfolio, sector orientation, fund performance, amount of fees and amount of the minimum deposit will be monitored in particular. Fund data will be analyzed and the offer of selected mutual funds on the financial markets of individual countries will be compared according to the selected criteria.

Findings & Value added: In the post, the investment funds will be compared, and an investor recommendation will be made based on the results.

Keywords: *Equity funds, Mutual fund, Charges, Risk, Yield*

JEL Classification: *G11; G15*

1 Introduction

The basic motive of collective investment is the regulated collection of funds from an indefinite number and circle of small savers as well as large institutional investors, such as banks, pension companies and investment companies. Among the advantages of this method of investing are the appreciation of funds, diversification of risk and professional management of savings with a preferred investment strategy and time horizon. Collective

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investing also according to Spuchálková et al. (2015) represents a greater choice of funds, higher liquidity of invested funds, lower transaction costs and possible tax benefits.

1.1 Characteristics and subjects of collective investment

The first modern investment fund was founded in Holland in 1774 by Abraham van Ketwich. The acquired capital was invested by him in an extensive portfolio of securities. The wider development of this method of investing only occurred in the 19th century, when collective investment institutions were founded in Belgium, Switzerland, France, Scotland and England. Similar companies were later established in the USA as well. There, the boom in investing in various funds did not become significant until the 20th century. In Europe, collective investing became more prominent only after the Second World War. France became the main country in this sector, followed by Germany and Austria. In the Czech Republic and other countries of Central and Eastern Europe, collective investing did not emerge until the 1990s (Veselá, 2019).

The specific conditions for a given type of business are always defined by the relevant legislative norms valid within the given economy. Individual laws are harmonized to provide comparable information on investment opportunities. In the Czech Republic, collective investment is regulated by Act No. 240/2013 Coll. about investment companies and investment funds. In this legal norm, a new systematization of collective investment entities was introduced, as well as the possibility of new forms of collective investment. According to *(Zákon o investičních společnostech a investičních fondech, 2013)*, one of the legal obligations for collective investment funds is the publication of key information about the fund. This information contains brief basic characteristics of a collective investment fund, necessary for understanding the nature and risks associated with investing in a specific fund. The basic information needed for the investor includes the definition of the investment objective and investment policy of the collective investment fund (*Zákon o investičních společnostech a investičních fondech, 2013).* Investment funds can be classified according to a number of different criteria.

According to the method of portfolio management, we divid the funds into funds with active and passive portfolio management (ETF). The advantages and disadvantages of these types of investment funds are the subject of expert discussions. For example, Cremers et al. (2016) in their paper compared passively managed ETF funds and equity mutual funds with active portfolio management in 32 countries. Research results show that ETFs create a competitive environment for actively managed funds, forcing them to increase their active share and reduce portfolio management fees. For funds with active portfolio management, information on methods that lead to risk reduction is also important. Management companies must use risk management methods that can identify specific risks at any time. At the same time, the extent of the risk's impact on investment income must be defined. (*Zákon o investičních společnostech a investičních fondech, 2013*).

1.2 Evaluation of mutual funds

For investors and analysts, monitoring the performance of the fund portfolio is one of the most important activities. The performance of the fund provides information about the return achieved and may or may not take risk into account (Veselá, 2019). The influence of the chosen investment strategy, the situation on the market of investment instruments, operating costs and the capabilities of portfolio managers in active investment management are reflected in the fund's performance. One-dimensional performance evaluation methods take into account only the rate of return. A modern variant of measuring the performance of mutual funds are two-dimensional methods, which take risk into account in addition to yield

(Veselá, 2019). Minimizing the risk of investors is, according to Spuchálková et. al. (2015) as a basic starting point for collective investing. As the authors further state, the risk can be minimized mainly by diversifying the fund's portfolio through its active management. According to Klieštik et. al. (2015), there are currently a number of approaches and algorithms for the quantification of securities that can be used for financial instruments.

The performance of actively managed funds has been studied in the academic and professional spheres for many years. An article by Jensen (1968), who examined 115 mutual funds in the period 1945-1964, provided a major impetus. He found that, on average, the funds were not successful enough in their trading activities to recoup their brokerage costs. He further explored that the evidence suggests an urgent need for funds themselves to evaluate the costs and benefits of their research and trading activities much more closely, so as to provide investors with the maximum possible returns for the level of risk they are taking. Other authors concluded that during the second half of the 1990s, when the number of new funds entering the mutual fund industry accelerated, the newly formed fund was likely to be qualified and able to cover its fees. However, with each passing year, the chance that the new fund would not be able to generate a high enough return to justify its fees increased (Fisher and Jensen, 2022).

As stated by (Livingston et al. 2019), the effectiveness of active portfolio management depends on the overall performance of the fund. For investment funds that have good results, a higher degree of active management leads to even better performance. For underperforming funds, more active management exacerbates poor performance.

Choosing a mutual fund portfolio involves a combination of data and judgment. It is not advisable to rely solely on the historical performance of funds, as this may lead to over-investment in certain funds in making decisions. Especially when it comes to newly created funds that have only been on the market for a short time, it is necessary to assess several criteria. Investing in active mutual funds may also be optimal for investors who believe that managers cannot beat passive indexes. Maximizing the Sharpe ratio is only one of many investment goals (Pástor and Stambaugh, 2002). The Spanish authors state that the performance of the funds may be different due to the different competence of the fund management. Independent managers outperform their bank counterparts even when the lower associated costs are taken into account (Matallin-Saez et al., 2011). A number of authors address the issue of how past performance affects net flows to investment funds.

An analysis by Ciccone et al. (2022) point out that flows to global funds are more sensitive to past performance than flows to domestic funds. Flows to domestic and global funds respond similarly to median performance. The sensitivity of flows to extreme performance is statistically significant only for global funds. In addition, flows are more responsive to low- and top-performing global funds than to their mid-performing counterparts. Global fund investors are more sensitive to market performance and react more aggressively to relative fund performance within their investment strategy. The mutual fund industry, where asset managers target investors and seek investment opportunities around the world, is part of growing financial globalization. This globalization observed in recent years has an effect on the movement of international capital.

The positive impact of financial globalization turned out to be much more limited than expected and the assumption that differences in investment and financing between individual countries would decrease or even disappear did not come true, as investors around the world continue to hold large amounts of domestic securities in their portfolios, as Stulz reports (2022).

2 Methods

Within the framework of a globalized economy, collective investment is one of the ways through which free cash resources are valued over time. The advantage of this method of investing is the appreciation of funds, diversification of the portfolio in terms of risk and professional management of savings.

To achieve the set goal, the method of description will be used to process the characteristics of the compared funds. Mutual funds were selected from investment companies that offer them on individual financial markets. This offer is quite broad and, in accordance with applicable legislation, investment companies can also offer funds domiciled in other countries. The selection criterion was the investment strategy. The selected funds are equity, range in risk scale 6 and consist of equity instruments offered on global markets. Their performance, costs and risk scale were monitored. The investment horizon is at least 5 years. The data was drawn from publicly available information on the websites of investment companies, fund statutes and key information.

3 Results

Collective investing offers an appreciation of funds for the general investor public. From a territorial point of view, there is a higher interest in this method of investing in so-called traditional countries such as the Netherlands, the UK or Germany. Based on data from the European Fund Management Association (EFAMA), Table No. 1 shows the ratio of fund assets to GDP of a given EU country together with Switzerland, the UK and Turkey for 2020. Economically strong countries such as Switzerland, the UK, the Netherlands, Denmark and Germany are in the leading positions. Conversely, Eastern European countries such as the Czech Republic, Slovakia and Bulgaria have worse results.

Table 1. Ratio of investment funds assets under management in Europe to the country's GDP at the end of 2020, by country.

Order	Country	Ratio in %	Order	Country	Ratio in %
1.	Switzerland	220	**10.**	Spain	28
2.	United Kingdom	174	**11.**	Hungary	14
3.	Netherlands	126	**12.**	Poland	12
4.	France	117	**13.**	Portugal	9
5.	Denmark	98	**14.**	Slovenia	6
6.	Germany	69	**15.**	Czechia	6
7.	Belgium	42	**16.**	Greece	4
8.	Austria	40	**17.**	Turkey	3
9.	Italy	30	**18.**	Bulgaria	1
			Total for Europe		**90**

Source: Own processing according to *Euro Area Statstics (2022)*

As of 2020, the largest ratio of investment funds assets to GDP in Europe was recorded in Switzerland, at 220 percent. That year, total investment funds assets under management in the United Kingdom reached 174 percent of the country's GDP.

Another analyzed data is the development of assets in funds in the years 2015 – 2019 in the Czech Republic, UK, Slovakia, Austria and the EU as a whole. As shown in Table No. 2, the volume of assets in investment funds has an increasing tendency in all monitored countries.

Table 2. Development of assets (assets) of funds in trillions of EUR in 2015-2019.

	2015	**2016**	**2017**	**2018**	**2019**
Czechia	7.82	9.21	11.67	11.82	14.63
UK	1.479,70	1.465,65	1.646,06	1.492,84	1.751,30
Slovakia	5.70	5.89	6.58	6.60	7.41
Austria	168.24	173,80	182.88	172.90	194.08
EU	13.313,07	14.139,34	15.620,38	15.157,18	17.734,46

Source: Own processing according to EFAMA: European Fund and Asset Management Association, 2022).

The following table shows the number of mutual funds in the period 2015-2019 (European Central Bank, 2022), when a growing trend in the number of funds in the Czech Republic, the UK and Slovakia can be seen. In Austria, the development of the number of funds decreases over the years, by 117, which represents a decrease of 6%. A total of 201 funds were added in the Czech Republic over five years, which is an increase of 65%. In the UK, 347 funds were added, which is an increase of 56%. Data for Slovakia show that the number of funds increased by 7, which means an increase of 8%.

Table 3. Number of mutual funds in 2015-2019.

	2015	**2016**	**2017**	**2018**	**2019**
Czechia	308	349	411	467	509
UK	2 960	2 938	3 105	3 194	3 307
Slovakia	87	86	101	86	94
Austria	2 116	2 073	2 072	2 066	1 999
EU	55 712	55 728	61 445	63 242	65 418

Source: Own processing according to EFAMA: European Fund and Asset Management Association, (2022) and EUROPEAN CENTRAL BANK (2022)

The secondary underlying data for the comparison was drawn from the websites of the selected funds. The basic characteristics of investment funds were analyzed according to the specified criteria, and at the same time the percentage composition of the fund portfolio was determined. The authors focused on global equity funds that invest from the point of view of sector breakdown in various assets. The risk profile of all assessed funds is at level 6, all funds have active portfolio management and the minimum investment horizon is from 5 years or more. The funds are offered on the financial market in the UK, Austria, Slovakia and the Czech Republic. The overview of compared funds shows tab. 4.

Table 4. Basic characteristics of compared funds.

	Characteristics of funds	**Portfolio composition**
Aberdeen Standard Global Innovation Equit (GBP)	The goal of the fund is to achieve a combination of growth and income, investments are divided into shares	International shares, 89.78%,

	around the world, actively manages the portfolio and tracks performance towards the benchmark. It uses financial derivatives to manage risks.	UK Shares, 4.26%, Cash 3.11%, Funds 2.85%
FTF Martin Currie Global Unconstrained (GBP)	The goal of the fund is to achieve long-term growth in the value of the fund, 80% must be invested globally within the whole world, It actively manages the portfolio and tracks performance towards the benchmark. It uses financial derivatives to manage risks.	International shares 95.18%, UK shares 0.51%, Others 4.31%
Blackrock Global European Value (GBP)	The aim of the fund is to maximize the return on investment. It is actively managed and uses fundamental stock analysis to select undervalued titles for the portfolio.	International shares 75.03%, UK shares 21.8%, Managed funds 2.13%, Others 1.04%
Generali Fond nových ekonomik (CZK)	The investment objective is to achieve long-term asset appreciation through investments in global emerging markets. The portfolio is actively managed. That doesn't follow the benchmark.	Global shares 89.04%, Cash 9.77%, Funds 1.19%
Generali fond farmacie a biotechnologie (CZK)	The fund's investment objective is to achieve asset appreciation in the long term through investments in a broad portfolio of securities. The fund mainly invests in shares of companies operating in the pharmaceutical and biotechnology sectors from the USA and the EU. It uses derivatives to hedge currency risk.	Global Shares 73.84%, Cash 5.03%, Funds 3.03%
Sporotrend (CZK)	The goal is the long-term appreciation of share certificates. That includes investments from Central and Eastern Europe. At least 25% are investments in the Czech Republic.	Shares 100%
ČSOB svetový akciový o.p.f. (EUR)	The objective of the fund is to achieve long-term income from growth in the value of shares. It is a global fund with a minimum investment horizon of 8 years.	Shares 89.59%, Funds 5.73%, Deposits 2.71%, Others 1.97%
Fon maximalizovaných výnosov (EUR)	The fund invests in shares traded on stock markets. It is actively managed using fundamental analysis. That is globally and sectorally diversified and actively manages currency risk.	Shares 100%
Erste Stock global	That invests in licensed companies around the world. The selection of titles is based on fundamental analysis and does not follow any benchmark.	Shares 99.63% Cash 0.37%
Erste Stock Vienna (EUR)	The objective of the fund is capital growth while accepting higher risks.	Shares 98.35%, Cash 1.65%

Raiffeisen Sustainability Europe Shares (EUR)	The objective of the fund is capital growth while accepting higher risks. The fund is actively managed without reference to a benchmark.	Shares 100%
KEPLER Value Aktienfonds (EUR)	It invests in shares of international companies. It is actively managed.	Shares 100%

Source: Own processing according to websites of the selected funds (2022)

The performance of investment funds shows the appreciation of the fund's assets over a certain period and on a specific date. Table 5 offers an overview of performance for 3 months, 6 months and 1 year. The 3-year and 5-year performances are annualized (converted to an annual return) and indicate the percentage by which the investment has grown annually. Due to the focus of the funds, high volatility of performance can be seen within one year and the performances are moving in negative numbers. Currently, the reduction in gas supplies from Russia and high electricity prices during the autumn of 2022 have an impact on uncertainty in the markets. One of the important factors that affect the performance of the funds is the currency risk. Among other things, investors monitor the development of the main currency pair USD/EUR. In September 2022, it strengthened the USD/EUR exchange rate to a ratio of 1:1, which is why investors' aversion to risk is also growing. The specific performance development is mainly influenced by the composition of the securities in the fund's portfolio.

Table 5. Fund performance in September 2022 in %.

Fond	3 months	6 months	1 year	3 years p.a.	5 years p.a.
Aberdeen Standard Global Innovation Equit (UK)	0.81	-13.1	-37.65	3.65	8.55
FTF Martin Currie Global Unconstrained (UK)	-2.09	-2.6	-22.26	-1.43	2.8
Blackrock Global European Value (UK)	-7.28	5.05	-7.16	6.20	1.85
Generali Fond nových ekonomik (CZ)	-7.13	-10.96	-17.49	1.26	-2.63
Generali fond farmacie a biotechnologie (CZ)	-3.71	-1.03	-7.38	6.54	3.62
Sporotrend (CZ)	-	-6.76	-19.82	-1.40	-1.90
ČSOB svetový akciový (SK)	-5.26	9.06	-14.26	6.19	5.94
Fond maximalizovaných výnosov (SK)	-4.76	-8.69	-19.16	9.24	7.97
Erste Stock Global (SK)	0.24	-2.49	-2.84	10.50	10.97
Erste Stock Vienna (AUT)	-7.26	-10.88	-11.50	2.78	0.47

Raiffeisen Sustainability Shares (AUT)	4.04	3.77	-11.86	7.7	9.24
KEPLER Value Aktienfonds (AUT)	0.00	0.31	0.06	4.45	2.62

Source: Own processing according to websites of the selected funds (2022)

All analyzed funds have active portfolio management, therefore the managers of these funds, based on stock and financial analyses, try to continuously change the composition of the portfolio and carry out rebalancing in response to market developments. All funds charge fees for portfolio management (management, management). The amount of the fee depends on the riskiness of the funds and is taken into account in the performance of the fund.

In addition, the funds may charge entry fees, which are calculated from the invested amount and reflect the price of the investment advisor. Exit fees are charged less frequently. Through them, frequent withdrawals from the fund can be regulated. Information about fees must be disclosed in the fund statute and key information. An overview of the fees of the compared funds is shown in table no. 6. Entry fees are charged for seven funds out of twelve, management fees are charged by all funds and these fees range from 0.94% to 2.54%, which corresponds to the investment strategy of the selected funds. The exit fee is only charged by the AM SLSP Maximized Income Fund in the case of investment savings.

Table 6. Fund fees in September 2022 in %.

Funds	**Entry fees**	**Management fees**	**Exit fees**
Aberdeen Standard Global Innovation Equit (UK)	5	0.94	-
FTF Martin Currie Global Unconstrained (UK)	-	0.95	-
Blackrock Global European Value (UK)	5	1.07	-
Generali Fond nových ekonomik (CZ)	2.5-4	2.37	-
Generali fond farmacie a biotechnologie (CZ)	2.5-4	2.35	-
Sporotrend (CZ)	3	2	-
ČSOB svetový akciový (SK)	3	2.54	-
AM SLSP Fond maximalizovaných výnosov (SK)	max.2	1.65	max.1.8
Erste stock global (SK)	max.4	max1,8	-
Erste Stock Vienna (AUT)	max.3	max1,8	-
Raiffeisen Sustainability Shares (AUT)	-	1.68	-
KEPLER Value Aktienfonds (AUT)	4	1.74	-

Source: Own processing according to websites of the selected funds (2022)

Statistical data show that in recent years, fees for funds with active portfolio management are always higher than for passively managed funds (ETFs), which are traded on organized markets and set to a specific benchmark. According to EFAMA: European Fund and Asset Management Association (2022), during the period 2017 – 2021, the average costs of actively managed stock and bond funds decreased by 9% and 11%, respectively, as shown in Figure 1. Competition from passively managed funds (ETFs) will also affect in the future on the fee strategy of actively managed funds.
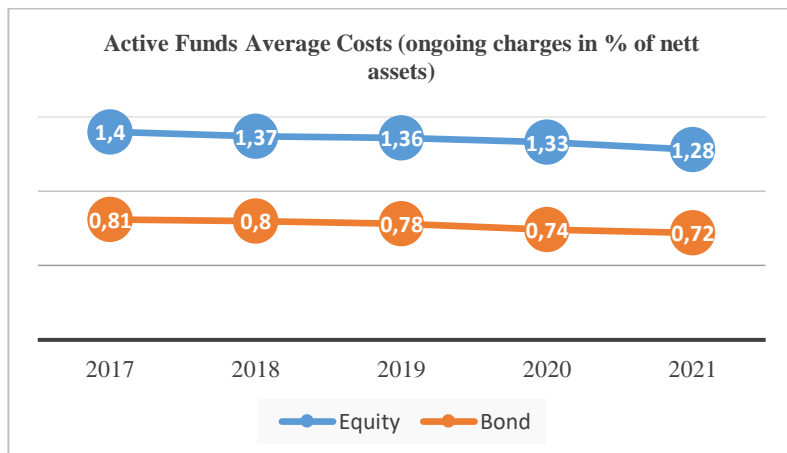
Figure 1. Active Funds Average Costs 2017-2021.

Source: Own processing according to EFAMA: European Fund and Asset Management Association (2022)

4 Conclusion

Saving funds in collective investment funds is suitable for the general investor public. It is a quality investment that has its advantages and disadvantages. If we compare the performance of the monitored funds, they show great volatility in the shorter time horizon, which is influenced by the current economic and political situation. The most stable results are achieved by Erste Stock Global, which also has relatively high entry and management fees. The fund's investment strategy is focused on global shares, and fundamental stock analysis is used during active management. Similar results are achieved by the Maximized Income Fund, which is also offered on the financial market in the Slovak Republic. For funds offered in the UK, one can see falls especially in the annual performance ranging from -37.65% to -7.16%. The portfolios of all three monitored funds contain at least 75% of the shares of global companies, and their currency risk must be actively managed with the help of financial derivatives. The performances of these global funds show high volatility and are therefore suitable for a longer investment horizon of 6-8 years.

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Food security and food self-sufficiency of EU countries: Role of policies

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Abstract

Research background: Globalization is increasing the growth of production efficiency through the specialization of national economies. This also applies to agricultural and food production. On the other hand, ensuring enough quality food for the population is a strategic goal of every country in the world. This is reflected in efforts to maintain even less efficient production to maximize country´s own food self-sufficiency.

Purpose of the article: The paper focuses on the development of production and food self-sufficiency of EU member states in the process of enlargement of the European Union, i.e. since 2004. The process of enlargement of the European Union has a positive effect on the degree of self-sufficiency of the EU. However, the development and contribution of individual member state is significantly differentiated.

The paper provides a comprehensive view on development of self-sufficiency of EU member states in the entire food chain in the period 2004-2019. On the one hand, focus on the development of the degree of self-sufficiency in agricultural commodities, i.e. production self-sufficiency, on the other hand in final food products, i.e. food self-sufficiency.

The entry of new EU member states into the common market had a significantly differentiated impact on the development of agricultural and food production, and thus also on the level of individual self-sufficiency.

Keywords: *agriculture, food industry, production self-sufficiency, food self-sufficiency, EU countries*

JEL Classification: *Q02; Q17; Q18*

1 Introduction

The increasing global demand for agricultural and food products due to accelerating demographic growth raises concerns about the extent to which world population will be able to feed itself from limited resources (Godfray et al., 2010, Foley et al., 2011, Kummu et al., 2017). In this context, the most important role is played by agro-food systems, which are crucial for the interaction between humans and nature in their irreplaceable role in supplying food and ensuring the nutrition of the population (Oteros-Rozas et al., 2019). Short food

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supply chains implemented in local or regional food systems, are gaining popularity as a vision of the sustainability of agri-food systems (Bisoffi et al., 2021; Sonnino, 2013). Regional food systems are in many aspects positive, such as a closed flow of nutrients, local relations between producers and consumers, the production of healthy food due to the availability of fresh and nutritious raw materials, as well as a small carbon footprint caused by short transport distances (Billen et al., 2021; Pradhan et al., 2020; Sonnino, 2013). However, recent estimates suggest that only one third of the global population can be supplied from regional food systems (Kinnunen et al., 2020; Kriewald et al., 2019). Therefore food supplies from other regions, countries or continents are key to ensuring global food security and self-sufficiency (Kummu et al., 2020).

Food self-sufficiency is an often-used term but there is no unified and universal definition. There are multiple understandings of food self-sufficiency that can be applied at different levels (O'Hagan, 1976). In its most basic form, FAO defined food self-sufficiency as "The concept generally taken to mean the extent to which a country can satisfy its food needs from its own domestic production" (FAO, 1999). This definition can be applied at the individual, regional or country level. By applying the basic principle of food self-sufficiency, defined by the FAO, the country would avoid any international food trade and rely solely on domestic food production to meet the food needs of its population. However, all countries of the world rely on food imports. Even large food exporters who produce much more food than they consume usually import at least some food to meet some part of their domestic consumption (Clapp, 2017). For that reason, self-sufficiency, expressed by the ratio of domestic production and consumption, indicates the dependence of a region or country on net imports. National food self-sufficiency has become a key indicator for food availability and a fundamental pillar of food security. Therefore, self-sufficiency is the main goal of agri-food policies, even though often this goal is not explicitly defined (Clapp, 2017). Currently, self-sufficiency indicators, expressed as self-sufficiency rate (SSR), are standard indicators in agricultural and economic statistics measured by energy or protein content, or in physical or monetary units (Beltran-Peña et al., 2020; Godenau et al., 2020; Puma et al., 2015).

2 Methodology

The goal of the paper is to evaluate the degree of production and food self-sufficiency of EU member states in the context of the European Union enlargement process. The self-sufficiency rate is usually calculated for a specific commodity or commodity group. In our paper, we focus on determining the level of self-sufficiency on a global scale for agricultural raw materials and food products. Data on the total agricultural and food production of individual EU countries are from the database published by Eurostat (Eurostat, 2022) - Detailed breakdowns of main GDP aggregates (by industry and consumption purpose) are used to analyze individual indicators of self-sufficiency.

Production self-sufficiency expresses the extent to which agricultural primary production can satisfy the food needs of domestic consumers from its own production. The domestic production of plant agricultural commodities is determined by their harvesting area and the intensity of their production, measured by yield per hectare. In the case of animal commodities, production is determined by the number of farm animals and the achieved production parameters. On the other hand, domestic consumption is influenced not only by consumer preferences and habits, but also by the performance of the food processing industry. It is expressed as a simple share of domestic production and consumption, which we derive from production and data on foreign trade in agricultural commodities:

Production self-sufficiency = agricultural production / (production – export + import)   (1)

Food self-sufficiency focuses on food production and expresses and the extent to which the domestic processing industry can satisfy consumer demand for food from its own

production. Ensuring a sufficient volume of food for population is one of the strategic priorities of all countries of the world. However, the extent to which they can fulfil this strategic goal is determined by the existing processing capacities, structure, as well as performance and efficiency of the food industry. The degree of food self-sufficiency is given by the share of food production, including non-alcoholic beverages, and food consumption, which we derive from production and data on foreign trade in food products:

Food self-sufficiency = food production / (production – export + import)   (2)

Since we derive domestic consumption from production and foreign trade data, the problem is to define the trade in agricultural and food products from the items of customs statistics. The Ministry of Agriculture and Rural Development of the Slovak Republic (MPRV SR, 2021) classifies agri-food trade as the sum of the first 24 chapters of the customs nomenclature (HS 01-24). The European Commission (EC) defines agri-food foreign trade on a broader scale. On the one hand, trade in fish and marine animals, as well as products made from them (HS 03, HS 1603-1605), does not count in the overall agro-food trade. On the other hand, it also extends agri-foot trade to other industrial products on a biological basis (ex HS 29, 33, 35, 38, 39, 41, 43, 50, 51, 52, 53). Since we are focusing on production and food self-sufficiency in the paper, we used the definition of agri-food foreign trade of the Ministry of Agriculture and Rural Development of the Slovak Republic to calculate consumption. O'Hagan (1976) points out that the availability of feed is a prerequisite for the existence of animal production, but it is not reflected in the degree of self-sufficiency in animal production. We take this fact into account since the trade in industrial feed and processed feed (HS 23) is part of agri-food foreign trade. MPRV SR (2021) further divides agro-food trade into agricultural raw materials and food products. Trade in agricultural raw materials includes live animals (HS 01), live fish (HS 0301), liquid milk (HS 0401), live plants and flowers (HS 06), fresh vegetables (HS 0701-0709, 0713), fresh fruit (HS 0801-0810), cereals (HS 10), oilseeds (HS 12 except HS 1208), knitting materials (HS 14), cocoa beans (HS 1801) and unprocessed tobacco (HS 2401). Trade in food products consists of other items of agro-food foreign trade (HS 01-24). Data on foreign trade in agricultural and food products of individual EU countries from the Comext database are used (Eurostat, 2022a). For individual EU member states, we used data on total agri-food trade, but for the European Union as a whole, we only used data on its foreign trade with third countries.

The period covered by the paper is from 2004 to 2019. All data used for the European Union, designated as EU-27, were all 27 member states, i.e. j. already without the United Kingdom. The grouping of old EU member states are labeled as EU-14. The group of states that joined the EU in 2004 are labeled EU-10, and under the label EU-3 are countries that joined the EU since 2007.

3 Results

The process of globalization of the world economy was significant in European Union. Since 2004, the number of EU member states has almost doubled. Access to the EU common market was an impulse for development of new member states. The inclusion of the countries in the Common Agricultural Policy of the EU resulted in obtaining significant financial resources for the development of domestic agricultural and food production. According to Eurostat data (2022), the EU enlargement process positively influenced the development of agricultural production, which is a primary factor in terms of self-sufficiency. From 2004 to 2019, the value of agricultural production in the EU-27 increased by 30.6%, while in the old member states the increase was 26.8%. Despite the significantly higher dynamic of the EU-10 countries (71.7%), their share in the overall growth of the EU's agricultural production

was significantly lower, as they contributed only 13% of its total value. We subsequently derive the value of domestic consumption from the value of agricultural production, by including data on foreign trade with agricultural commodities. The development of domestic consumption copies the development of production. Therefore, the rate of production self-sufficiency of the EU-27 countries is stable and reaches the level of 96% (Table 1). Gradual expansion of the European Union by 13 countries did not have a negative impact on overall production self-sufficiency. The production deficit of the EU-27 countries mainly consists of oilseeds and primarily soybeans intended for the nutrition of animals, which the EU imported from the countries of South America as well as from Eastern Europe (Ukraine, Russian Federation).

Despite the significant increase in the value of agricultural production in the EU-14 countries, their production self-sufficiency rate decreased by 2.2 p.p. during the observed period. All countries, with the exception of Denmark, Spain and Greece, contributed to the negative development. While the Netherlands, Spain, Denmark and France have a surplus in the production of agricultural commodities, the other countries of Western Europe show a significant deficit.

The rate of production self-sufficiency of the EU-10 countries increased by 2.1 p.p. over the same period, which largely eliminated the negative development in the EU-14 countries. The Baltic countries had the biggest share in this positive development and a significant increase in the production and net export of live livestock and cereals, as well as oilseeds (Lithuania, Latvia) and vegetables (Lithuania). The Baltic countries are able to generate a surplus of agricultural commodities after joining the EU.

Only Hungary entered the European Union as a net exporter of agricultural raw materials. Joining EU, Hungary was able to further strengthen its position. Out of V4 countries, only Poland shows a slight decrease in production self-sufficiency. In Slovakia the growth dynamics of agricultural production was higher than the rate of consumption. This led to a gradual increase in the rate of production self-sufficiency up to 115% (2012). The downward trend in animal production and the slowdown in the growth of plant production resulted in the negative decline of Slovak self-sufficiency in the following years. This ultimately led to the fact that after 16 years of membership in the EU, the Slovakia achieves the same level of production self-sufficiency as in 2004.

Entry into the EU common market had a positive effect on agricultural production also in the EU-3 countries, which joined later (2007 and 2013). The specialization of Bulgaria and Romania on the production of cereals and oilseeds led to an enormous increase in their net exports, which was also reflected in the degree of production self-sufficiency. During the 13 years of EU membership self-sufficiency in Romania increased by almost 15 p.p., while in Bulgaria by more than 42 p.p.. This represents an average annual increase of 3.5 p.p.

Table 1. Production self-sufficiency rate in EU (in %)

	2004	2007	2013	2016	2017	2018	2019	2019-2004
EU-27	**97,1**	**96,9**	**98,3**	**96,7**	**96,4**	**96,2**	**96,4**	**-0,6**
EU-14	**97,4**	**96,7**	**96,9**	**95,1**	**95,0**	**94,8**	**95,3**	**-2,2**
Austria	87,8	88,0	85,4	81,4	82,6	81,4	81,4	-6,4
Belgium	81,9	77,3	74,7	69,7	71,3	72,5	75,4	-6,5
Germany	82,1	79,4	78,3	72,7	73,8	72,1	73,7	-8,4
Denmark	98,7	101,2	110,0	110,9	112,2	106,5	110,2	11,5
Spain	108,8	106,4	112,6	114,1	113,4	111,7	113,6	4,9
Finland	90,7	91,3	88,4	86,5	85,8	85,2	86,8	-3,9
France	104,3	104,9	107,6	102,4	101,4	102,9	103,4	-0,9
Greece	96,4	95,4	99,9	100,6	98,9	99,3	98,8	2,4
Ireland	92,2	92,8	92,1	89,1	90,2	88,9	88,9	-3,4
Italy	92,9	93,5	92,8	93,1	93,2	93,0	92,5	-0,4
Luxembourg	70,9	68,3	67,9	57,9	62,6	63,7	64,0	-6,9
Netherlands	135,4	131,2	125,4	130,1	130,9	130,1	129,6	-5,8
Portugal	82,4	78,2	77,8	80,7	82,0	81,5	83,4	0,9
Sweden	86,1	84,5	86,0	84,4	84,6	82,4	83,0	-3,1
EU-10	**97,4**	**100,4**	**103,9**	**101,2**	**100,5**	**98,2**	**99,4**	**2,1**
Cyprus	95,4	88,2	89,0	87,4	85,3	83,8	83,2	-12,2
Czechia	91,2	99,2	102,3	99,9	99,4	97,7	97,3	6,1
Estonia	84,3	94,1	108,2	105,7	106,1	99,6	108,7	24,4
Hungary	105,4	118,3	120,9	115,9	121,0	114,0	116,9	11,6
Lithuania	99,8	108,3	118,6	120,2	117,0	109,2	117,8	18,0
Latvia	87,7	97,2	120,1	124,1	124,9	112,3	127,8	40,1
Malta	67,3	52,4	52,5	49,7	42,6	41,9	45,4	-21,9
Poland	97,8	96,8	98,2	95,4	93,9	93,2	93,6	-4,1
Slovenia	86,2	89,4	92,2	93,9	94,8	95,7	93,9	7,7
Slovakia	95,4	97,7	113,1	101,3	101,3	97,8	95,3	-0,1
EU-3*	**98,5**	**97,8**	**117,6**	**117,0**	**113,8**	**113,8**	**114,7**	**-**
Bulgaria	104,7	103,7	164,6	152,2	134,7	137,4	145,8	42,1
Croatia	90,7	92,7	92,7	98,9	98,2	98,6	94,2	1,5
Romania	98,7	97,6	113,5	112,8	111,7	111,5	112,4	14,7

* The base year for calculating the difference in the self-sufficiency rate for Bulgaria and Romania is 2007 and for Croatia 2013

Source: Eurostat, 2022, 2022a; own calculations

Agricultural production is closely connected with food production, which finalizes agricultural product into food intended for the nutrition of the population. For this reason, there is also a close relationship between the level of production and food self-sufficiency. The European Union was one of the major food exporters in the world. From 2004 to 2019, the value of EU-27 food production increased by up to 42.5%, while in the old member states the increase was 36.5%. Despite the significantly higher dynamisc of the EU-10 countries (up to 94.8%), their share in the overall growth of EU food production was significantly lower. EU-10 countries constituted only about 10% of EU-27 food production. By including data on foreign trade with food products, we derive the value of total food consumption. Since the growth of food production was higher than total consumption, the level of food self-sufficiency of the EU-27 gradually increased by 3.8 p.p. and reached 106% (Table 2). European Union enlargement process has further strengthened its position as an important food exporter.

Table 2. Food self-sufficiency rate in EU (in %)

	2004	2007	2013	2016	2017	2018	2019	2019-2004
EU-27	**101,9**	**101,9**	**103,8**	**104,5**	**104,6**	**104,9**	**105,7**	**3,8**
EU-14	**102,8**	**102,9**	**104,9**	**105,4**	**105,3**	**105,4**	**106,5**	**3,7**
Austria	101,9	102,3	101,3	102,6	103,2	104,7	105,7	3,7
Belgium	117,2	120,0	118,7	124,4	123,7	123,1	126,8	9,6
Germany	98,3	99,1	102,5	101,7	101,1	100,7	101,2	2,9
Denmark	145,5	138,7	135,0	135,0	134,8	132,1	130,7	-14,8
Spain	98,3	98,1	103,5	105,2	105,3	105,5	106,9	8,6
Finland	89,3	87,5	81,4	79,2	79,2	79,2	79,9	-9,4
France	104,1	104,4	103,9	102,8	102,8	102,8	103,2	-0,9
Greece	87,6	87,6	92,1	94,6	93,6	95,2	93,6	6,0
Ireland	121,0	118,7	116,8	121,0	124,5	122,5	126,4	5,5
Italy	96,7	96,5	99,0	100,5	101,3	102,4	104,3	7,7
Luxembourg	65,4	65,4	68,6	74,8	75,9	76,0	77,9	12,5
Netherlands	148,9	154,1	149,3	146,8	144,4	144,7	147,5	-1,4
Portugal	86,7	86,6	90,5	90,5	88,7	88,6	88,1	1,5
Sweden	86,5	82,9	80,7	77,3	77,6	76,9	77,3	-9,2
EU-10	**99,4**	**99,6**	**105,6**	**106,6**	**108,1**	**109,2**	**109,1**	**9,7**
Cyprus	77,5	69,3	67,2	66,3	66,8	68,1	69,4	-8,1
Czechia	94,3	91,6	92,3	93,6	91,7	90,6	90,1	-4,2
Estonia	85,6	81,4	84,0	80,0	80,6	82,3	84,5	-1,1
Hungary	108,3	104,1	123,3	117,3	117,4	117,0	115,3	7,1
Lithuania	100,2	106,9	114,4	113,9	116,2	121,1	119,1	19,0
Latvia	85,2	86,3	90,9	84,7	86,3	88,2	88,0	2,9
Malta	65,8	64,4	63,2	61,8	63,4	70,4	65,2	-0,6
Poland	104,7	107,3	114,5	118,0	120,6	122,9	123,0	18,3
Slovenia	83,8	74,9	68,8	70,1	70,6	72,1	73,4	-10,3
Slovakia	88,5	84,2	77,7	72,7	72,6	71,8	72,2	-16,3
EU-3	**93,3**	**91,8**	**93,0**	**91,0**	**89,9**	**89,8**	**88,7**	**-**
Bulgaria	101,6	94,2	98,2	98,5	98,6	98,4	95,9	1,7
Croatia	92,3	92,1	86,6	85,6	84,1	84,9	82,5	-4,1
Romania	91,9	91,3	93,3	90,5	89,3	89,0	88,3	-3,0

* The base year for calculating the difference in the self-sufficiency rate for Bulgaria and Romania is 2007 and for Croatia 2013

Source: Eurostat, 2022, 2022a; own calculations

In the observed period, efficient food production has developed in Western Europe (EU-14). This led to an increase in food surplus of 3.7 p.p., despite a significant decrease in food self-sufficiency rates in Denmark, Finland, and Sweden. Only 5 countries of EU-14 are unable to fully cover domestic food consumption with their own production. The situation is different in member states that joined after 2004. Only Hungary, Poland and Lithuania entered the EU as pure food exporters. At the same time, only these 3 countries were able to develop food production in the face of strong competition of the common market. This resulted in a significant increase in the rate of food self-sufficiency: in Lithuania by 1.3 p.p. on average per year, in Poland by 1.2 p.p. and in Hungary by 0.5 p.p. The total self-sufficiency rate of the EU-10 countries increased by 9.7 p.p. At the same time, in the other EU-10 countries, except for Latvia, the dependence on food imports increased since 2004. The worst situation is in Slovakia. The performance of the food industry in the Slovakia is not able to cover the growing demand of domestic consumers. While in 2004 the Slovakia accounted for 11.5% of domestic food consumption from imports, in 2019 it was already

27.8%. Slovakia reduced its level of food self-sufficiency by 1.1 p.p. per year. In 2004 8 EU-27 member states showed a lower level of food self-sufficiency than Slovakia, in 2019 it were only 2 member states (Cyprus and Malta).
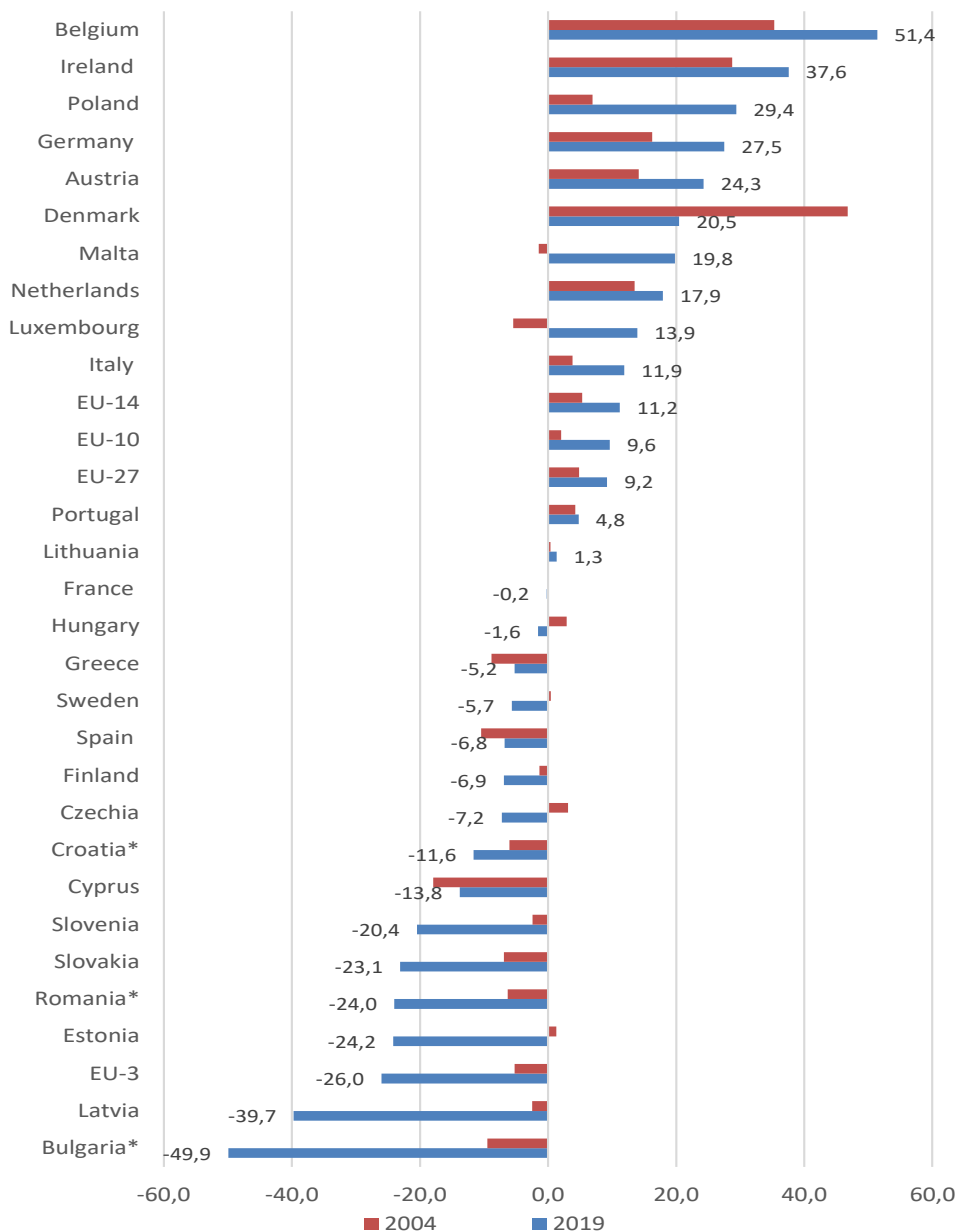
Figure 1. The difference in the rate of food and production self-sufficiency (in p.b.)

* The base year for Bulgaria and Romania is 2007 and for Croatia 2013

Source: own calculations

Figure 1 shows the mutual relationship between the level of food and production self-sufficiency. The difference between the level of food and production self-sufficiency divides EU countries into 3 groups. The first group consists of countries with highly efficient food production with an insufficient raw material production. To maintain and develop food production, they have to secure part of the agricultural raw materials by imports. These are mainly Western European countries and Poland. The second group consists of member states with balanced agricultural and food production. We include Lithuania, France and Hungary to this group. And the third group consists of countries with a significantly higher performance of agricultural production compared to food production. It mainly consists of countries that joined the EU after 2004, but also Greece, Sweden and Finland. This group of countries is the main supplier of agricultural raw materials for member states with high-performance food production, i.e. for the first group.

4 Conclusion

Globalization increases the growth of production efficiency through the specialization of national economies. In our paper we focused on the specialization of agricultural and food production of the EU member states in the process of EU enlargement. We evaluate the development of the level of food and production self-sufficiency. The EU enlargement process enabled the development of the food industry mainly in the countries of Western Europe and the development of agricultural production mainly in the countries that joined EU after 2004. This specialization led to an increase in the production of food in the EU while keeping self-sufficiency in agricultural raw materials.

The entry of new EU member states had a significantly differentiated impact on the development of agricultural, food production and individual self-sufficiency. In Austria, Belgium, Germany, Ireland, Italy, Luxembourg, as well as in Poland, the level of food self-sufficiency has increased since 2004, and production self-sufficiency has decreased. In Spain, Greece, Portugal, Hungary, Latvia, Lithuania and Bulgaria the level of food and production self-sufficiency has increased. In Denmark, Czech Republic, Estonia, Slovenia, Romania and Croatia, the rate of food self-sufficiency has decreased, but production self-sufficiency has increased. In Finland, France, the Netherlands, Sweden, Cyprus and Malta, the level of production as well as food self-sufficiency decreased. There was a specific development in Slovakia. During the 16 years of membership in the EU, Slovakia did not effectively use significant financial resources of the Common Agricultural Policy for the development of agricultural nor food production. The rate of production self-sufficiency has not changed and is at the level of 2004. At the same time, our dependence on food imports has significantly increased and resulted in a significant decrease in the rate of food self-sufficiency.

Acknowledgements

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Disseminating information via information technology use in teaching and learning foreign languages for specific purposes.

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Abstract

Research background: The modern world is characterized by globalization of the information space. The global information society depends on the exchange of knowledge at many levels and in various forms. Information acquisition is one of the dominant dilemmas of the presents. One of the primary goals of science and technology texts is the transfer of information in the form of knowledge.

Purpose of the article: Aim of the article is to put an emphasis on the transfer of information as knowledge by means of information and communication technology during the teaching and learning foreign languages for specific purposes.

The article writer assume that the digital age becomes an era of knowledge providing unmatched feasibility for discovery, exchange of information, communication and exploration in order to strengthen the teaching learning process. Above all, one of the most efficient way to disseminate knowledge across borders is to use information technologies that play a decisive role in the economics and education field.

Methods: The paper, in conjunction with the linguistics and cognitive approach, reveals the specific terms of the technical texts as the process of coding and identification of new knowledge. A professional (technical) text conveys specific information, presents the term as information with the meaning of knowledge.

Findings & Value added: The paper suggests that the analysis of the terminology in the professional (technical) texts might apply to the investigation of terminology of other languages as well as to comparative studies.

Keywords: disseminating *information; knowledge; globalization; information technology; foreign languages for specific purposes*

JEL Classification: *L82; Z13; F69; Z19; 044*

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1 Introduction

The beginning of the 21. Century is considered to be the origin of information revolution, part of which is an information society, i.e. an environment, where information is the primary interest. As a result of this, the quantity of produced and processed information is rising exponentially causing information has become the main value-creating substance. More specifically, the era of information has brought globalization and other radical changes in all aspects of social life, including the humanitarian sector. The principle of globalization as an invective, or even directive tendency in the contemporary era is becoming a vector quantity in the field of communication as well as in the way and content of information mediation. As far as the pressure for releasing an imaginary line of narrow local boundaries limiting the transfer of information to the wide international area, blocking options of intercommunication, development of translation activities, and foreign language teaching as one of the most effective ways of mediating cultural contacts are concerned, broad perception of these issues is of utmost significance for human society.

Aim of the article is to put an emphasis on the transfer of information as knowledge by means of information and communication technology during the educational process. In fact, the cultural globalization affects the intensification of cross-border contacts and communication, and, in turn, it stimulates the desire for knowledge of other cultures. The term intercultural communication consists of two components. It is successful communication drawing on the fulfilment of the communicative aim of senders in discourse with recipient. Secondly, term 'cultural' relates towards understanding the norms, believes, attitudes and habits specific for a group of the same language. [1]

Information technologies impacted heavily this development. In general, information technologies allow us to spread knowledge beyond geographic borders of a state or a country. Moreover, information technologies help us create opportunities to share knowledge all over the world and, thus, they can help teachers and students to acquire the most recent information and knowledge. According to Kelemen [2] this development will further lead to a more efficient use of information. Kelemen points out the fact that useful information is called knowledge significance and value of which will eventually, increase in future research.

2 The period of change from an agricultural society to an information society

Transition from the past to the future enables us to observe a significant shaping of the world through science and technology. After the mechanization and electrification era, industry experiences the Digital Revolution (sometimes also called the Third Industrial Revolution). More precisely, the digital revolution has eventually taken over most of electrotechnical fields and has established itself consequently in all aspects of science by its widespread usage of microelectronics. To a large extent as the industrial revolution in the past, digital revolution has also started a new era of human civilization, i.e. the information age which, in turn, has brought globalization and other radical changes in the field of education as well. The 21st century along with its digital revolution convinces us that science can evolve only thanks to never-ending creation of new knowledge and exchange of information. To put the significance of dissemination information into perspective, Jody Byrne [3] points out the fact how underdeveloped science would be if every scientific breakthrough during the ages happened in cultural isolation without propagating this new knowledge across linguistic and cultural barriers. There is no doubt about the role of cultural openness in sparking off new research, inventions and discoveries.

Nowadays, we dispose of large amount of new knowledge and discoveries in many fields of science, including education, including foreign languages. Development of science and

technology inevitably brings us a huge amount of new information creating the need of language materialization of new terms, which are needed to be documented and further transmitted through language [4]. The case for this is a sort of language work which relies on atomization of elementary terms of communication aiming at information dissemination. Another rationales for information dissemination are knowledge value, new findings in foreign, respectively in other than source communicational environment in terms of peculiarities and perspectives transfer, or spread of information through a social media.
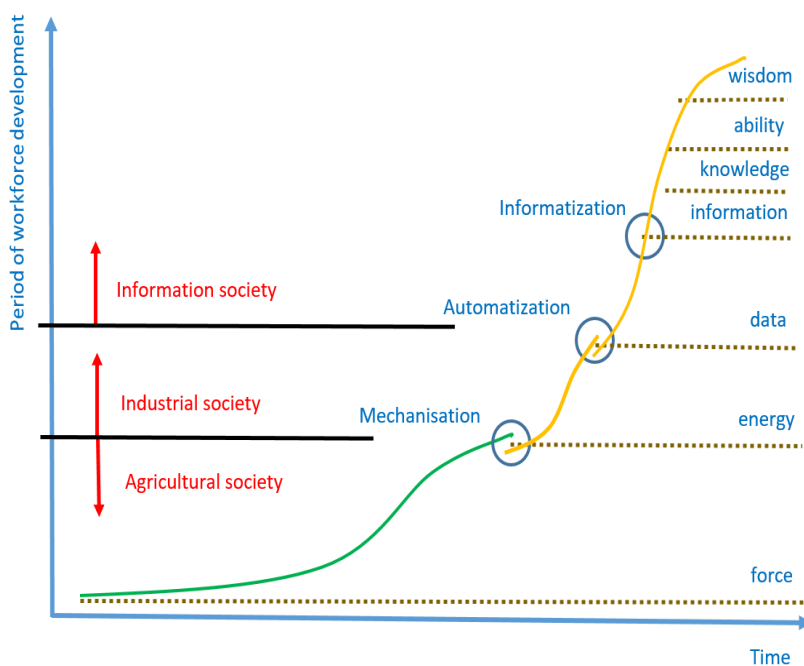
Figure 1. Agrarian society transition into information society

Source: Polakova Silvia, 2017

With the arrival of information revolution, which simultaneously caused a rapid growth of information exchange and intensified the spread of knowledge and technology across borders, education of foreign languages is facing new challenges. Accordingly, the growth of information exchange and intensified spread of knowledge with respect to the international character of science and technology, as well as globalization and diversification of commercial activities, have increased the demand for knowledge of foreign languages.

The scientific-technical revolution changed the entire economy and added new attribute that is in a variety of ways oriented towards information and knowledge. Due to this fact a new term *commodification* occurred. The commodification means that information is a sort of goods, which can be bought or sold. It's monetization changed information into goods, which, in turn, became an important economic commodity. At the same time, there was a salient shift from tangible products to intangible, with an increasing share of information in the total cost of goods and services with regard to raw materials and energy.

3 Information theory

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Presuming that foreign language teaching (particularly English for specific purposes) is a form of information transfer, there arises an important question whether information or knowledge is transferred at all. Although the concept of information has became to great extent "profane" in recent years, it might seem appropriate to use the concept of knowledge. However, on the whole, there is somewhat difference between information and knowledge in relevant scientific works. The two terms differ from each other in the sense that information consists of separate and independent statements, whereas knowledge consists of interconnected and systematized information. More precisely, Kelemen [2] states that information is the result of collection, whereas knowledge is the result of comprehension.

Information theory explores measuring, encoding, transmitting, storing, processing and using information and searching for the quantity of information and it was pioneered by Hartley and Shannon. Wallace [5] attends to the relationship between data, information and knowledge (or wisdom) in more detail stating a hierarchical organization among them. The hierarchical relationship is expressed by virtue of DIKW acronym standing for, data, information, knowledge and wisdom.
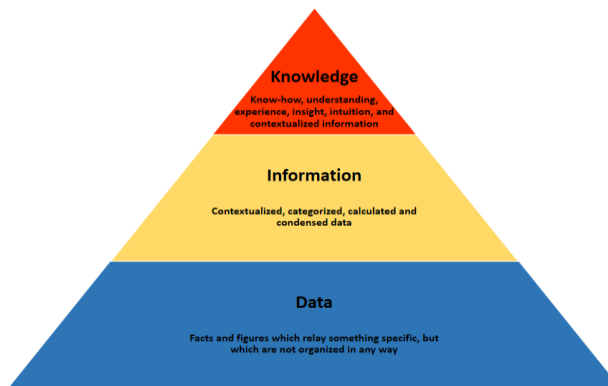
Figure 2. The data-information-knowledge pyramid

Source: Wallace 2007

The hierarchy of informational pyramid can be divided into these groups:
1. data
2. information
3. knowledge

Rowley, following the study of DIKW, characterizes data "*as being discrete, objective facts or observations, which are unorganized and unprocessed and therefore have no meaning or value because of lack of context and interpretation*" [5].

Each acquired knowledge consists of at least one information and each information contains at least some portion of data and, essentially, this relationship is reciprocal. We can transform any information into knowledge to a certain extent.
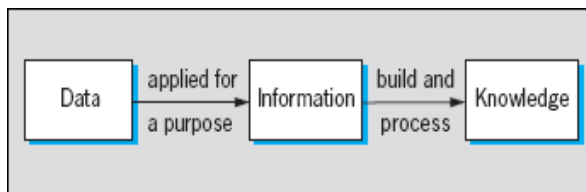
Figure 3. The data-information-knowledge model

Source: Polakova Silvia, 2017

Information is data already with a meaning included. Information involves an answer to questions and it refers to an explanatory power from the data. In terms of basic characteristics, information has several levels:

- *semantic* = content level, in terms of concept and correct interpretation of information (reality = model, information = reflection)

- *pragmatic* = user level, in terms of achieving our objectives when communicating message

- *syntactic* = syntax level, what type of coding the sign and technological methods of information transmission is used

On the contrary, Russian scientist N. N. Moiseev [6] claims, that it is not possible to create an uniform and exact definition of information: "*... there is not only no strict and sufficiently universal definition of information, but it is hardly possible...*". Like knowledge, information belongs to the category of many disciplines, each of which emphasizes the aspect of the concept of information that is necessary for resolving problems and tasks concerning a particular discipline or to create new ones.

Besides that, N.L. Karavaev [7] has come to the conclusion that information is a crucial element of a process of knowing, which emerges in two forms:

a) *primary information*, which is the content of living and non-living nature

b) *secondary information*, which is the content of an entire sociocultural activity and is expressed both in language (verbally and nonverbally), as well as in various artefacts (technology, artwork etc.).

Thus, **knowledge** represents diversity results of a constructive cognitive activity of a subject, which is carried out at the level of empirical experience (feelings, senses), as well as at the level of abstract theoretical thinking (theories, conceptions etc.).

N. L. Karavaev [8] further claims that there arises a cyclical interlinkage between information and knowledge: Firstly, information becomes knowledge, if it is processed by a subject (process of subjectivization), and secondly, knowledge is transformed by a subject through language and other signs into a sociocultural information (process of objectivization). Besides, knowledge is information acquired theoretically or practically (by experiment), that one can use. If there is information that can be used to make a decision, the information becomes knowledge. As far as the hierarchical level of knowledge is concerned, we need to consider these features:

- it represents a general understanding of reality of the surrounding world.

- as opposed to the data, which represent reality only at details level and change quickly, knowledge is relatively more stable, because they represent a higher level of abstraction, generalized processes and states of objects in reality.

- It relates to the definition, categorization, identifying and deriving conclusion from available facts based on hypotheses and specifying procedures (mechanisms).

- it considers a new knowledge is such that can not be derived from the available knowledge by an inference mechanism.

4 Research Methodology

Writers' aims was to point out that foreign language teaching (particularly English for specific purposes) is a form of information transfer, there arises an important question whether information or knowledge is transferred at all. Another important factor, associated with the information transfer is the question of the role of specialized texts – original and translated in order to develop scientific progress through the transfer of information in the form of knowledge. Thus, a necessary element of working with the specialized texts is a thorough study of its terminological component, which leads to an increase in the terminological culture of students, which is a prerequisite for the formation of professional competencies of future specialists. An excessive amount of information is particularly challenging for the recipients 'consciousness.[9]. A burden of information forces the recipient's mind in a variety of ways to choose selectively and stay focused on the content depth of the received information.

Although the concept of information has became to great extent "profane" in recent years, it might seem appropriate to use the concept of knowledge. However, on the whole, there is somewhat difference between information and knowledge in relevant scientific works. The two terms differ from each other in the sense that information consists of separate and independent statements, whereas knowledge consists of interconnected and systematized information. More precisely, Kelemen [2] states that information is the result of collection, whereas knowledge is the result of comprehension.

Therefore, foreign language teachers are facing a set of important tasks like, identifying whether information or knowledge is delivered to students through teaching. Provided that one of the basic functions of education is the students preparation for life, even the role of a teacher of foreign languages is not only the transfer of information, but most importantly disseminating information as knowledge. The case for this (even across borders) is transferring knowledge through social media or educational methods using online learning platforms comprising language apps, virtual tutoring, video conferencing tools, online learning software etc.

5 Discussion and Results

5.1 The importance of Information technologies in education

Currently, information technology has affected every aspect of human activity, including education. What was made clear through the pandemic situation is the importance of disseminating knowledge across borders through learning technology. Therefore, the information technologies play a decisive role in the education field, especially, in distance education when transforming it into an innovative form of experience. One of the most promising and popular information technologies in education are multimedia technologies allowing the creation of various images, texts, data accompanied by sound, video, animations and other visual effects (simulation), including an interactive interface and other control mechanisms. Moreover, the digital age becomes an era of knowledge providing sound and unmatched feasibility for discovery, exchange of information, communication and exploration in order to strengthen the teaching learning process. In terms of teaching efficiency, teachers need to focus on providing the students with accurate and correct information. Thus, the transfer can be realized precisely by virtue of information

technologies, which are "*set of tools that can help provide the right people with the right information at the right time.*" [10].

ICT integration and modern pedagogical technologies stimulates the cognitive interest development among the students, thus creating motivational conditions to study subjects. Moreover, ICTs increase the effectiveness of learning and self-study, and improve the quality of education.

The main roles of ICT in education are [11]:

1.   To develop variety of educational services and medium.
2.   To promote equal opportunities to obtain education and information.
3.   To develop a system of collecting and disseminating educational information.
4.   To promote technology literacy and support distance learning.
5.   To support sharing experience and information with others.
6.   Helps in improving innovative teaching skills and makes classroom teaching effective.
7.   Acts as an assisting tool for teaching and learning itself
8.   ICT helps teachers to motivate students and develop interest in learning.
9.   ICT is store house of educational institution because all educational information can safely store through ICT.
10. ICT helps teachers to communicate properly with their students. So ICT bridge the gap between teacher and students and plays an important role in student evaluation.

Digital and information and communication technologies make it feasible to organize active learning, including distance learning, in which information is exchanged as knowledge from different places. In other words multimedia technology helps make learning more interactive, meaningful, and relevant outside of the classroom world through expanded connections with teachers, students, and courseware. Essentially it improves student performance and enhances teacher knowledge sharing compared to other methods. [12]. For this reason, the need of new technologies in the teaching learning process is constantly growing. This way, the information age is undoubtedly becoming an era of knowledge in the field of education, which further enables discovery, exchange of information, communication and research in order to strengthen the teaching process. Students are able to work in an interactive environment where they perform an effective communication, sharing of information and exchange of ideas and experiences with their teachers and classmates for the sake of building and disseminating knowledge. In other words, information technology allows students to engage more quickly in skills-building activities in multi-group teaching environments. Using digital and information and communication technologies, students can collect, integrate, and present information. To mention a few, programs such as PowerPoint, HyperStudio, Adobe Photoshop, iMovie, Vimperor, iPhoto, and other are used for creating multimedia projects.

Information processes include three elements: the object, technology, and result. The information process needs some tools, i.e technology in order to convert the object to a result. *"Thus, an information process is a process in which an object and/or a result is information….As for any process, the information process needs some tools that convert the object to a result, in other words, it needs a technology…Information technologies, as the technologies of dealing with information, are different means and methods for forming and managing information processes."* [8].

6 Conclusion

Communication and dissemination of science are also great importance for the future of scientific development. An example is given by the digital revolution. Technology has become an important instrument in education. Computer-based technologies hold great promise both for increasing access to knowledge and as a means of promoting learning. Indeed, the digital revolution has transformed the creation, storage and transfer of knowledge also in the field of teaching and learning foreign languages for specific purposes.

Language is an interesting field of research and one of the most important means of information dissemination. It is mainly a work with language (in our case with professional language), the content of which is to atomize the elementary elements of communication with the aim of disseminating information.

To sum up, the paper addresses the problem of the transfer of dissemination information as knowledge to the recipient during the process of teaching and learning foreign languages for specific purposes. Based on the research, we can confirm that the most relevant aspect of professional language is the field of information, the importance of knowledge, the value of knowledge, which must be possessed by a teacher during teaching and learning foreign languages for specific purposes. It means that the cognitive elements of the transfer of information with the value of knowledge through the application of his professional competences are emitted to the recipient from the professional environment.

Moreover, the skill of effective communication with the recipient belonging to foreign culture in his or her mother tongue is, ultimately, a demanding task. Its successful achievement requires the cultural (or linguacultural) knowledge involved in various discourse types. [15]

Due to the particular characteristics of the knowledge transfer process itself, the computerization of education requires careful testing of the technologies used in computerization and the opportunities for wide dissemination. Nowadays, the teachers have to be very comfortable with information and educational technologies and culture transfer as well. Similarly, another useful method appeared in approach identifying culture as knowledge which explores the most frequent forms in culture of specific language. [16] Besides, they are obliged to constantly improve their information culture in order to meet the educational needs of students at acquiring the knowledge. The means and forms of media education give the teacher opportunities for professional growth and self-improvement, and at the same time they might opt for using the latest knowledge of science and information technology in order to disseminate knowledge across borders and thus contribute to the development of education and the economy.

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Proposal of methodology for customers relationship establishing in terms of transport services

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Abstract

Research background: Transport sector continue to grow year after year very rapidly and it is highly competitive evidence by the fact that transport companies operate in the EU common market. Companies that invest in relations choose wisely. The priority here is to build not only casual, but long-term relations and focus on their quality. This produces loyal customers and valuable feedback. The CRM system is customer relationship management software that can be used in virtually any company including a transport company. It is used by large corporations, medium-sized and small companies, and even start-ups starting their business. The most important task related to the selection and adaptation of CRM to the company's operations is the need to define the needs and functionality of the solution. Accordingly, before choosing a system suitable for the company, it is necessary to determine what we expect from the software among hundreds of functionalities, and, in particular, what actions are necessary to increase sales and, consequently, increase the company's profit. It is commonly said that CRM software improves the operation of the company, enabling it to achieve its goals. Thanks to its versatility, the CRM system is perfect for many industries, which means that all companies need CRM solutions to increase business value, efficiency and higher profits. This is the main effect of the benefits of an overall improvement in customer relations, organization and work culture.

Purpose of the article: The benefits of implementing a CRM system are pure practice, not just a theory - the implementation of CRM translates into a significant increase in sales, in some cases by as much as 30%, and therefore - as a consequence - also implies approx. 30% higher profit of the company. The practical aim creating the image of transport companies are: long-term relations integration of the customer environment, relations between transport companies and the environment and activation of own potential of transport companies. The authors proved that partnership activates the will to co-create value.

Methods: The schedule of research works includes several elements that only together will provide an answer to the question whether the company's profit significantly changes as a result of the implementation of CRM. The

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elements of authors current and future scientific activity include: in-depth literature analysis (mainly the latest articles in English), research among at least 20 transport companies. Employees of companies in which CRM has been implemented are surveyed using three types of questionnaires:

Interview questionnaires (3-5 "focuses") – qualitative tests (FGI; 3-5 pieces; group interview; 6-8 people), Survey questionnaires – quantitative tests (PAPI study; 100 to 150 pieces in 20-30 companies), in-depth interviews (20-40 pcs.) - qualitative research (IDI; individual in-depth interviews). When the quantitative data is requires processing, we utilize the resources of mathematical statistics such as mean, dispersion, tables, graphs, etc. By changing one or more conditions (independent variable) we cause changes in other conditions (dependent variable). Experiment enables us to verify results acquired by other methods and it points to the rate of their objectivity. Review of various documents is also necessary in order to gain theoretical perspective of the researched problem. Example of documents to be used in this paper thesis are: analysis of reports on the activities of individual enterprises and procedures used in transport companies. Research method are meetings with experts in the field of CRM systems implementation, who are high-class IT specialists.

Findings & Value added: The research presented shows that the vast majority of enterprises, as much as 87.5%, are satisfied with the implementation of CRM in their own company. The results of 56 questionnaires, 2 in-depth interviews and 4 "focus groups" conducted by the author of the study presented above show that the implementation of CRM resulted in an increase in the number of customers. The study shows that the sum of positive responses is greater than the sum of negative responses and also shows that the sum of the positive responses is greater than the sum of the negative responses. It is true that customer relationship management has positive influence on customer satisfaction and customer loyalty. The survey shows that only a properly implemented system can increase the number of customers. It is true that implementation of CRM increases the company's profit.

Keywords: *logistics; consumer relationship; customer satisfaction measurement; CRM*)

JEL Classification: *L91; L92; K33*

1 Introduction

The literature review shows that only two literature items provide a specific amount of increase in the company's profit after the implementation of CRM and the fact that the implementation of CRM translates into a significant increase in sales, in some cases by as much as 30%, and thus - implies also an increase in the company's profit - therefore, the topic of calculating the company's profit after the implementation of the CRM system compared to the state before the implementation is not yet exhausted.

According to the rules of economics, the goal of every enterprise is to earn a profit. When a company aims to increase profit, the necessary first step is to retain as many customers as possible (Alam et al., 2022). Therefore, methods of customer retention are important (Ottman et al., 2022), as well as the importance and methods of measuring customer satisfaction (Steel et al., 2013).

Customer satisfaction is of fundamental importance for efficient and effective logistics activities in the field of trade in goods. The functioning of enterprises operating in

contemporary global markets without effective logistics is almost impossible, hence the constant search for tools to improve this process.

The subject of interest of business management researchers and business practitioners are ways to gain a competitive advantage in the market, leading to increasing sales and profits of enterprises. Even in the 1960s and 1970s, the main focus was on the tangible product rather than on the related services, and the customers were not the subject of attention. For the company, it was more important what and how it produces than who buys the produce. It was particularly visible on the example of the marketing techniques used, based on a standardized communication message, using mainly mass media and a message addressed to a "typical client".

With the initiation of the deregulation processes of the economy, and hence the increasing competitiveness of the markets of developed capitalist economies, the companies operating in them were forced to improve quality and reduce prices. The generation of the post-war baby boomers, entering the phase of their greatest purchasing power, began to use the new balance of power on the producer-customer line, eagerly taking advantage of the emerging sales promotions, but it did not continue the loyal purchasing attitudes characteristic of their parents' or grandparents' generation, so the stabilized way of doing business began to go into the past, profits began to decline, while the process of acquiring customers began to be more and more expensive. Globalization and popularization of the Internet, additionally intensified these processes. The logical consequence was that the competitive advantage in the market could only be obtained by those companies that manage to attract a permanently sufficiently large and attractive group of customers in terms of purchasing power. It was also soon realized that maintaining customer loyalty depends largely on whether the company's attention is focused not only on products and services it offers, but above all on their recipients.

In the early 1990s, the desire to use institutionalized programs aimed at monitoring and improving customer satisfaction as well as creating their loyalty to the company or brand led to the emergence of a need for tools that would enable the use of these programs on a large scale (Yadavalli et al., 2019). Soon, business practitioners using these instruments were given the name of customer relationship management. Soon after, the acronym was created from the first three letters of the English term for this strategy - Customer Relationship Management – CRM (Navarro-Ligero et al., 2022), it also settled in the professional press and in books on marketing, information technology and management science.

This work is devoted to both practical and theoretical aspects of implementing and applying the CRM strategy and its instruments in enterprises. The research period begins the year 2000, when the first signals appeared that most of the CRM implementations so far (understood in terms of software installation) do not bring the expected results. At the turn of the century, the pioneering period in the history of CRM ends, when it was identified mainly with systems being the development version of ERP software. The main attention in this paper was devoted to the organizational and technical premises for the successful implementation of CRM in the enterprise. Particular attention was paid to the problems and challenges faced by companies with a complex, dispersed organizational structure, operating simultaneously in international markets.

Some authors accuse the CRM strategy of adding nothing new to management theory and economic practice due to the fact that it uses known mechanisms and concepts (Shbool et al., 2022), referring to previously developed solutions (Šebjan et al., 2014). According to critics of CRM, the only significant accent is the use of IT systems that process customer data on an unprecedented scale. Exactly for this reason, they consider CRM to be a "costly toy" which, instead of leading to the improvement of the company's efficiency, wastes its valuable financial resources and employees' energy (Suoniemi et al., 2021). This thesis was confirmed by the first attempts to implement CRM at the end of the 20th century, which mostly involved

large investments in computer hardware and software, and usually ended in failure, without bringing the expected business benefits. These disturbing signals caused that CRM researchers, as well as independent analysts, advisers and consultants representing CRM software vendors, began to spread the thesis that is widespread today that CRM should not be equated solely with information technologies, which are only a tool enabling the achievement of business goals. According to this approach, in the framework of CRM, the main efforts of the company are focused on meeting the current and future needs of customers as much as possible. On the other hand, the organization does not lose sight of profits and, above all, ensuring its own existence and development. Therefore, it cares about customer satisfaction not only by adapting to its recipients, but also by skillfully influencing their needs in terms of current or potential possibilities of satisfying them (Bínová et al., 2021). On the other hand, the processes taking place as part of the interactions with customers are supported by an IT system or systems that enable personalization of customer-company contacts, as well as registering and sharing with members of the organization and using all available information about the customer. More concisely, within CRM we deal with relationship marketing / affiliate marketing, supported by advanced information technology.

In traditional marketing adapted to the needs of mass production, the basic problem is finding recipients for the previously manufactured goods. The entire effort of the company is then focused on looking for solvent clients with the appropriate potential to make a transaction. For these reasons, mass marketing campaigns not only treat all customers as if they had identical needs and desires, but primarily focus on the promoted product, not on its buyers, which means, for example, displaying it on the same shelves in all stores and informing potential customers in the same way . Their number was and is limited, so it may turn out to be insufficient to guarantee the profitability of production. However, if you reverse this assumption 180 ° and start looking for products for good customers, not good customers for products, the cost-effectiveness assessment of activities can be made ex ante, not just ex post. And when the profit-making customers are tied to the enterprise, its development and prosperity will be ensured.

Customer Relationship Management (CRM) is a strategy / business model introduced into business practice since the late 90s of the twentieth century, consisting in building customer loyalty to the company / brand by developing long-term relationships that bring benefits to both parties, using the latest technology achievements information processing. CRM is based on the belief, supported by empirical research, that "acquiring new customers is many times more expensive than keeping loyal buyers ." Additionally, "the conducted research shows a strong correlation between keeping buyers by a given company and the profitability rates achieved" . For example, the benefits of increasing the percentage of loyal customers by just 1% in 2001, in the five largest European markets, were estimated by Audi AG for an additional € 44 million of turnover or 2 thousand more cars sold . For the entire Volkswagen AG group, in Germany alone, each percentage point of loyal customers more means almost € 200 million of additional revenue. On the other hand, the results of research by American scientists indicate that, depending on the industry, increasing the buyers' retention rate improves profitability by 20% to even 85% .

2 Objective, materials and research methods

2.1 Objective

The aim of this study was not to duplicate studies proving the validity of the thesis that has been proven many times over that CRM is a customer relationship management software that can be used in any company. The aim of the work was not so much to describe the model

impact on customer satisfaction, loyalty and profitability of CRM programs and the operational and analytical capabilities of the systems supporting them, but identify the ways of achieving these goals by organizations implementing CRM. This problem appears quite widely in English-language publications, but mainly in the form of managerial guides or specific "manuals" of CRM implementations. Their authors do not always take a comprehensive approach to research problems related to CRM. e.g. general premises and barriers to implementing customer relationship management or failing to draw conclusions at a detailed level of analysis where it would be appropriate - e.g. not presenting a proposal of tools for estimating quantifiable benefits of CRM implementation. Business examples available in the literature are often fragmentary, which makes it difficult to summarize the characteristics and dynamics of long-term processes taking place during implementation, especially in enterprises operating on international markets.

Knowing the theoretical assumptions related to relationship marketing and customer relationship management, and at the same time actively participating in the process of implementing this strategy in practice, you can face technical and organizational problems. Observing the process of transforming the original CRM assumptions in the course of the clash of the needs of individual implementation stakeholders in an international company, you can hear about the unique possibility of drawing original conclusions and almost immediate verification.

The authors of this work, combining the practical experiences of people implementing CRM in enterprises with the conclusions of the publications provided by leading institutions dealing with consulting in the field of CRM implementation and the content of books on the management of strategic changes taking place in organizations formulated the assumption that due to the huge impact on the success of CRM in the process of implementing this strategy and the importance of activities required to ensure long-term positive effects, customer relationship management should be discussed not in two, but three aspects: marketing strategy, information technology and multi-faceted change management. The conclusion that CRM is not only an IT system or a company's strategy to build long-term relationships with customers is therefore not enough to fully explain its importance for the company, and even more so to achieve success in its implementation.

The aim of this paper is to provide arguments, stemming both from theory and economic practice, to support the statement that we can actually talk about CRM as an innovation resulting from rational managerial decisions, continued, controlled and adapted to changing conditions, with the most important change criterion, which is the optimization of the chain of creating benefits attractive from the point of view of customers, taking into account the economic account that guarantees the company's owners the expected return on invested capital. CRM needs to be perceived as a strategic management program with the goal being implementation and then development of a highly effective relational business model.

2.2 Input documents, materials

Knowledge from scientific articles and papers published in scientific journals and conference proceedings published in the Web of Science and Scopus databases, as well as information from web portals focused on issues related to this work, were used as elementary sources of information for that work. Book publications by domestic and foreign authors were also used.

A valuable source of information is also the processed results obtained from the interviews focused on the issue of this work in companies that have implemented CRM.

2.3 Research methods

When doing research it is possible to utilize a range of specific methods that we call research methods. Research carried out within this paper will be executed through the following methods. Methods will be combined and complemented as required.

2.3.1 Statistical method

Statistical method is the collection, organization, analysis, interpretation, and presentation of data. It deals with all aspects of this, including the planning of data collection in terms of the design of surveys and experiments. Statistical data are sets of quantitative values that summarize (Weerawardena et al., 2019), through mathematical operation, or express the parameters that represent a population or some other sample.

This paper will include data collection that will be analysed statistically. When the quantitative data is requires processing, we utilize the resources of mathematical statistics such as mean, dispersion, tables, graphs, etc.

2.3.2 Experimental method

Represents a way of scientific recognition through which we deliberately and with respect to a plan invoke the researched process whereby changing the conditions in which the phenomenon takes place and we monitor and control their influence. Experiment can be carried out in the field or in the laboratory. Prerequisite of every experiment is the knowledge of the conditions that can have an influence on the phenomenon. By changing one or more conditions (independent variable) we cause changes in other conditions (dependent variable). Experiment enables us to verify results acquired by other methods and it points to the rate of their objectivity.

2.3.3 Monographic method

Concentrates on research of one particular case. This method understands the researched object as a whole in contrast to statistical method that selects just one aspect. Object is chosen deliberately and the research is carried out under normal conditions.

2.3.4 Observation

It is the simplest technique of research using which we can derive various data. The weak point of this method is its low level of qualification. Overall advantage of observation is the real environment that it is not possible to duplicate. Observation can be direct and indirect (e.g. through video recordings).

The author due to its current position is able to observe during daily operations the influence implementation of CRM to management carry out by different people. Importantly to mention here is that confidential information is not disclosed and no names will be mentioned due to the restricted character of this type of information.

2.3.5 Documents review

Review of various documents is necessary in order to gain theoretical perspective of the researched problem. Example of documents to be used in this paper thesis are: analysis of reports on the activities of individual enterprises and procedures used in transport companies.

2.3.6 Interview questionnaire, survey questionnaire and in-depth interview

A technique that enables us to obtain information from respondent via answering the prepared questions. It is a controlled interview and it can be either standardised or non-standardised. The first one stems from the upfront prepared and verified record sheet that is similar to questionnaire. Interviewer selects questions from this sheet and then records the answers of the respondent. The second one is an open interview in which the questions are directed on particular area or topic; however, they are not prepared upfront. It is a flexible technique that is very useful when verifying data acquired by other techniques (Rao et al., 2011). Interview can be apparent or concealed i.e. the interviewer is not making any apparent notes.

We have conducted research among at least 20 transport companies: In order to better understand the current situation a number of interviews will be carry out with selected people. As well, a survey (Abramović et al., 2021) is planned to be carried out with members of companies with implemented CRM system (Juránková, 2021). During this survey different variables will be measured being the main topics: increases the company's profit, increases the number of the company's customers and influence on customer satisfaction and customer loyalty.

Examples of interview questionnaire to be used in this paper thesis are: interviews of a strategic nature (addressed to strategists in the organization: Presidents of the Management Board, Members of the Management Board, Directors) and interviews concerning managerial competences (addressed to lower management: Managers).

Authors have already done 4 focus group interview questionnaires for 6-8 people, which provide qualitative insights, while 56 survey questionnaires move quantitative data and 2 conducted in-depth interviews in 21 companies.

3 Results and Discussions

As already mentioned, The literature review shows that only two literature items provide a specific amount of increase in the company's profit after the implementation of CRM and the fact that the implementation of CRM translates into a significant increase in sales, in some cases by as much as 30%, and thus - implies also an increase in the company's profit - therefore, the topic of calculating the company's profit after the implementation of the CRM system compared to the state before the implementation is not yet exhausted (Jiang et al., 2021).

It follows from the conducted surveys, that the respondents worked mainly in the sales department (17.9%), in the operational department (also 17.9%) and in the R&D department (14.3%) and the respondents mainly represented large enterprises employing over 50 people (64.3%), but also medium-sized enterprises employing between 11 and 50 people (25%) and small enterprises employing up to 10 people (10.7%). The authors of the study noted that to the question: Indicate NEGATIVE consequences of CRM implementation, the respondents chosen 3 following negative effects of CRM implementation: activities take me more time (37.5%), the task division is not fair tasks division is assisted (26.8%) and working ambience is worse (17.9%). As is shown in Figure 10 only one negative consequence of CRM implementation is the result: activities take more time than before (35.7%). To the question: Indicate POSITIVE consequences of CRM implementation, the respondents chosen 3 following positive effects of CRM implementation: knowledge about the customers is gathered in one place (51.8%), activities take me less time (50%) processes are automated (46.4%). As a result, most of the respondents (as much as 87.5%) are satisfied with the implementation of CRM in their company (Figure 13), but their satisfaction with CRM implementation would grow if they for example benefitted financially from participating in

implementation (46.4%), they could work with a user-friendly software (21.4%) and felt better work ambience (also (21.4%).

According to the rules of economics, the goal of every enterprise is to earn a profit. When a company aims to increase profit, the necessary first step is to retain as many customers as possible. In chapter 3 of this paper, methods of customer retention as well as the importance and methods of measuring customer satisfaction will be described (Korkmaz et al., 2021).

Customer satisfaction is of fundamental importance for efficient and effective logistics activities in the field of trade in goods. The functioning of enterprises operating in contemporary global markets without effective logistics is almost impossible, hence the constant search for tools to improve this process (Klapita, 2021). Currently, there is a lot of competition in the field of transport services, as evidenced by the fact that transport companies operate on the common market of the European Union. For this reason, in order to maintain existing customers, but also to attract new ones, it is important to build relationships with customers from the position of transport companies. The aim of the author's work is to propose a methodology for building relationships with customers in the specific conditions of transport services.

The authors of the work therefore constructed a tool - a questionnaire for employees of companies in which the CRM system was implemented, to find out if and how the implementation of CRM in the enterprise changed the number of customers and whether and how it affected the company's profits. The main goal of this work was to identify the benefits of CRM implementation and to identify the risks of implementing CRM in companies.

To the partial goals of the article belongs to: identify the relationship between customer satisfaction and the cost of implementing CRM, identify the relationship between the increase in revenues and performance of transport companies and the cost of implementing CRM, identify negative factors resulting from the implementation of CRM and proposal of the procedure of elimination of risk factors from the implementation of CRM in transport service companies.

This paper methodology is application of the latest knowledge from scientific conferences, as well as from foreign literature dealing with the issues addressed (Ahmadi-Javid and Ebadi, 2021).

4 Conclusions

The research presented above shows that the vast majority of enterprises, as much as 87.5%, are satisfied with the implementation of CRM in their own company.

The results of 56 questionnaires, 2 in-depth interviews and 4 "focus groups" conducted by the author of the study presented above show that the implementation of CRM resulted in an increase in the number of customers. The results are shown in detail in Figure 10 - the study shows that the sum of positive responses (the number of customers increased by 5, 10, 15, and even 20%) is greater than the sum of negative responses. Figure 11 shows the respondents' answers to the question whether the company's profit has changed (decreased or increased) after the implementation of CRM. This study also shows that the sum of the positive responses (the gain increased by 5, 10, 15, and even 20%) is greater than the sum of the negative responses.

The survey shows that only a properly implemented system can increase the number of customers. The research shows that not all companies have properly implemented the CRM system. If the company has incorrectly implemented CRM, we have a confirmed hypothesis that such a system does not support the company in its development, does not increase the number of customers and does not increase the company's profit.

Acknowledgements

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Comparison of freight forwarder liability in selected countries

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Abstract

Research background: The continuous flow of movement of goods on the world market forces manufacturers to turn to intermediaries who are able to organize cargo transportation services. At the moment, the most common intermediary is a freight forwarder. The absence of international regulation of freight forwarders' liability creates difficulties in using forwarding services.
Purpose of the article: The purpose of the article to define the understanding of the term freight forwarder, its role in the supply chain, as well as the risks associated with transportation. This article analyses the part of forwarding contract which deals with a limitation of the forwarder's liability. The limitation of the forwarder's liability allows predicting the amount of compensation to the cargo owner in case of damage or loss of goods.
Findings & Value added: The analysis of the liability limit in countries with the current civil law system showed the lack of unification of the activities of the classical freight forwarder. This gives rise to the assumption of several ways of forwarding development – either the creation of international legislation regulating this industry, or a gradual transition to a system of liability borrowed from the common law system – the liability of the forwarder as a carrier.
Keywords: *liability of freight forwarders; transport legislation; forwarding conditions*

JEL Classification: *L91; L92; K33*

1 Introduction

The continuously growing volume of the global market requires from all participants of the logistics chains more maneuverability and flexibility. Due to this, the role of a freight forwarder is gaining more and more popularity in the process of transportation.

Freight forwarding is a service related to the processing of goods, packaging, transportation, storage, consolidation. In addition to working directly with the cargo, the

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forwarder provides services such as customs and tax clearance, work with documentation, etc. Freight forwarding also provides clients with special services, including preparation of documents, booking of ship/plane tickets, movement of goods from the starting point to the destination, customs process, information related to the applicable regulation, insurance process, letters of credit and others (Nurwahyudi, and Rimawan, 2021).

The freight forwarder organizes the transportation of various cargoes, takes liability for timely and high-quality dispatch and provides transport companies with large cargo flows. Reducing the number of delays in cargo delivery and transportation time in general allows to significantly reduce the cost of transport services. This is also facilitated by the forwarder's choice of the optimal transport route and commercial discounts on transport and insurance tariffs (Burkovskis, 2008).

2 The role of freight forwarder

The difference in legal systems and methods of doing business in different countries has led to the fact that the general concept of "freight forwarder" is quite vague. Currently, there is no common legislation regulating forwarding at the international level. Market access, forwarding agreement, rights and obligations of the forwarder – all this is at best regulated by national legislation (Poliak and Simurkova, 2017). The most commonly used concepts in modern logistics are intermediary or agent, classic freight forwarder, multimodal transportation operator and non-vessel operating common carriers (hereinafter — NVOCC's).

The most difficult is to understand the difference between the forwarder and the agent. For example, study says that if a logistics supplier acts as any logistics intermediary in supply chains, it can be classified as a freight forwarder recognized in the market and can join the relevant national or international associations (Stojanovic and Velickovic, 2019). If forwarding activity prevails among many types of activities, this type of company will also be recognized in official NACE classification (Nomenclature of Economic Activities). However, if logistics providers only offer basic transport, warehouse, packaging or other logistics services that require assets (warehouses, vehicle fleet, factories, equipment, etc.), in no case should they be mixed with shippers.

However, from the legislative point of view, this explanation is insufficient to determine the difference between an intermediary and a freight forwarder. Given the lack of international regulation of forwarding, it is necessary to refer to the local legislation of each individual country. For example, in the Slovak Republic, the difference between the forwarder and the intermediary is determined by the interaction of the agent with the carrier and the sender of the cargo. If the agent is an intermediary, he enters into a mandatory contract with the sender, providing a carrier search service. In the future, the contract of carriage is concluded directly between the shipper and the carrier. The freight forwarder enters into a forwarding contract with the sender, after which he enters into a contract of carriage with the carrier, carrying out the process of organizing transportation at his own expense in someone else's name. At the same time, only the freight forwarder has the right to conclude a forwarding contract on the basis of the trade register or an extract from the business register in which the activity of the "forwarder" is indicated. Permission to conduct this activity is granted only upon confirmation of professional qualifications defined by the trade Licensing Act № 455/1991 (Gnap et al., 2021).

Considering the expansion of the geography of transportation, multimodal transportation, which has the following characteristics, is becoming increasingly popular:
- the multimodal transport operator and the consignee are located in two different countries,
- the carriage of goods in international multimodal transport is carried out by at least two different modes of transport or that the carriage is carried out by at least two different transport branches,
- the entire process of international multimodal transportation is covered by a single contract signed between the multimodal transportation operator and the sender of the cargo,
- the entire transportation process has only one shipping manifest.,
- the entire process is carried out and coordinated by one operator – the Multimodal Transportation Operator (hereinafter — MTO), (Zelenika et al., 2011)**.**

The peculiarity of the MTO is that it issues negotiable or non-negotiable bills of lading, such as, for example, the FBL bill of lading created by International Federation of Freight Forwarders Associations (hereinafter — FIATA). FBL - is a combined transport document issued by FIATA for use by international freight forwarders as combined transport agents (Parhammehr and Zeajeldi, 2016).

And finally, NVOCC, which is an ocean carrier that transports cargo without operated vessels. They own their own fleet of containers, and in some situations also operate containers as freight forwarders (Rajeswari et al.,2021). NVOCC operators buy space from ocean carriers for consolidated shipments from a variety of clients. Services such as warehousing, paperwork, logistics planning are also part of their work (Clott, 2000).

3 Liability of freight forwarders

Understanding the status of the forwarder is necessary in the context of considering the limit of his liability. Limitation of liability allows to create forecasts for the amount of compensation to the cargo owner in case of damage or loss of goods, as well as, in some cases, compensation in case of delayed delivery.

The limitation of liability can be specified both in the currency of the country and in units of Special Drawing Right (hereinafter — SDR/XDR). Special drawing rights were created as an additional international reserve asset in the context of the Bretton Woods fixed exchange rate system. The SDR is neither a currency nor a claim on the International monetary fund. Rather, it is a potential claim on the freely usable currencies of the International monetary fund members. SDRs can be exchanged for these currencies (International monetary fund, 2022).

When it comes to the provision of services by an intermediary, there is no question of the liability limit, since the contract of carriage is concluded directly between the shipper and the carrier.

In the case of the provision of MTO services, the issue of limitation of liability is also easily solved – by issuing, for example, an FBL bill of lading, the MTO accepts Terms and conditions FBL they are printed on its back and apply whenever FBL is used. These conditions determine that in the context of this transportation, the MTO acts as a carrier and is responsible for the entire transportation process. The liability limit is also set and states that the liability of the MTO cannot exceed the equivalent of 666.67 SDR per unit of cargo or 2 SDR / kg of gross weight of damaged or lost goods, according to which amount will be greater. In the case of transportation, which does not include sea transportation, the liability limit is limited to 8.33 SDR / kg of gross weight of damaged or lost goods. It is also noted

that in case of detection of the site where the damage to the goods occurred, the liability will be calculated based on which international convention is adopted for the mode of transport used (FIATA, 2019).

NVOCC's activities are licensed. In accordance with § 531, Title 46 of Code of Federal Regulations, NVOCC is a Common carrier, what means a person holding itself out to the general public to provide transportation by water of passengers or cargo between the United States and a foreign country for compensation. Common carrier assumes liability for the transportation from the port or point of receipt to the port or point of destination (National Archives, 2022). NVOCC issues its own house bill of lading or equivalent document (Federal Maritime Commission). The analysis showed that NVOCC operators, offering NVOCC bill of lading/waybill terms and conditions, set the liability limit as follows:

- in the case of establishing the site where the damage or loss of cargo occurred, the liability limit is calculated in accordance with the provisions of the international convention governing the mode of transport used.

- if the area of damage or loss of cargo is not established, NVOCC sets its own limits (LINKEX, INC, 2018), (NVO Consolidation *B.V.)*.

As for the liability of the so-called classical freight forwarder, the definition of the liability limit is complicated by the absence of any common international legislation.

4 The comparison of freight forwarders liability in states with civil law system

Study shows that the liability of freight forwarders in Civil law and Common law systems differs mainly due to different interpretations of the functions and status of freight forwarders (Tushevska, 2014). Whereas the model of a classical freight forwarder is more commonly used to the civil law system, the activity of a freight forwarder in common law systems usually implies the acceptance by the freight forwarder of the status of a carrier with liability for all stages of transportation. An example is the increasing popularity of NVOCC's who are not actually a carrier, but are responsible as a carrier.

To study the liability limit of freight forwarders, a sample of states adhering to the civil law system will be presented. The analysis of national legislations regulating forwarding activities, as well as standard conditions offered by national associations of freight forwarders, is carried out.

Liability of freight forwarders in the Slovak Republic

Forwarding in Slovakia is the most obvious example of the activity of a "classic forwarder". The activity of the forwarder is regulated by the Licensing Act № 455/1991 and the Commercial Code of the Slovak Republic, which define the forwarder as an agent who organizes the transportation of cargo at his own expense in someone else's name. The legislation of Slovakia does not define the liability limit of the forwarder. This means that the limitation of liability is established in each forwarding contract individually.

Most often freight forwarders operating in Slovakia use General Freight Forwarder's conditions of Association of Logistics and Freight Forwarding of Slovakia. Their purpose is to regulate in more detail and supplement provisions of § 601 – 609 of the Commercial Code on the contract of freight forwarding..

These conditions set a liability limit of 8.33 XDR / kg of gross weight of damaged or lost goods, but the limit cannot exceed 20 000 XDR per case of damage.

In the case of warehousing services, the liability limit is limited to 3.925 XDR / kg of gross weight, but not more than 3 925 XDR per case of damage (unit of cargo). 19 625 XDR, if the damage caused to the depositor consists of the difference between the required and the

actual state of the stocks stored. In all other cases, the liability limit is limited to 20 000 XDR. In case of damage caused by late delivery of the consignment, the forwarder's obligation to compensate the damage is limited by the agreed amount of the transport fee. The conditions provide for the possibility to establish a higher limit of liability, with the mutual consent of the forwarder and the client (Association of Logistics and Freight Forwarding of the Slovak Republic, 2019).

Liability of freight forwarders in the Federal Republic of Germany

An example of a state whose legislation explicitly establishes a limitation of liability is Germany. Forwarding activities in this state are regulated by the Chapter 5 of the Commercial Code of the Federal Republic of Germany. The limit of liability is regulated by Chapter 4, where the limit of liability is 8.33 XDR/kg.

The Association of freight forwarders and logists of Germany offers the Standard Terms and conditions of the German freight forwarders, which duplicate and supplement the conditions for carrying out forwarding activities. In accordance with the terms, the liability limit is set as follows:

In the event of damage occurring to the consignment during transport by means of transport or in handling related to transport, the amount of damage shall be limited to:
-   8.33 SDR / kg of gross weight of cargo, except in cases of damage during the carriage of goods by sea;
-   2 SDR / kg of gross weight of cargo, in the case of the conclusion of a forwarding contract involving various modes of transport, including sea transport, and if the place of damage to the cargo has not been identified;
-   2 SDR / kg of gross weight of freight forwarder contracts relating to the carriage of goods by sea or by various means of transport, but including the carriage of goods by sea;
-   max. 1,25 millon € for each case of damage or 2 SDR / kg of gross weight of the cargo, depending on which amount is higher;
-   max. 2,5 million € if there were multiple claims per damage case;
-   During storage, the freight forwarder's liability for lost, damaged or destroyed goods is limited to:
-   8.33 XDR / kg of gross weight of damaged or lost goods;
-   max. 35 000 € per damage case;
-   70 000 € per year if the damage caused to the customer consists of the difference between the required and the actual state of the stocks stored.

In cases of other damages - max. 125 000 € per damage case (Bundesverband Spedition und Logistik, 2017).

Liability of freight forwarders in the Republic of Poland

In Poland, forwarding activities are regulated in accordance with The Act of April 23, 1964 of the Civil Code, Title XXVI.

This section does not define the liability limit of freight forwarders. If the freight forwarder carry on himself he has the rights and obligations of the carrier simultaneously.

The Polish International Freight Forwarders Association offers its members standard conditions, which say that compensation should not exceed the amount of 2 SDR / kg of gross weight of the lost or damaged cargo or the total amount of 50 000 SDR for each case, unless a higher amount is collected from the person for whom the forwarder is responsible.

The freight forwarder can carry out the transportation independently. In this case, he simultaneously has the rights and obligations of the Carrier. When concluding a contract of carriage, the Freight Forwarder becomes a carrier under the contract, even if he does not use his own vehicles.

If the freight forwarder acts as a multimodal transport operator, he assumes liability in accordance with the conditions of the transport document applicable to a particular type of transport (Polish International Freight Forwarders Association, 2010).

Liability of freight forwarders in the Republic of Lithuania

Forwarding is regulated in the Republic of Lithuania by Civil Code of the Republic of Lithuania. The Civil Code includes a chapter on forwarding, which, however, does not define the liability limit of the forwarder. In this regard, the limitation of liability of freight forwarders is agreed with the client in the contract. Where the freight forwarder proves that the breach of the contract of freight forwarding was due to the failure to perform or improper performance of the contract of carriage, the freight forwarder's liability towards the customer (the customer's client) shall be established pursuant to the same rules as are applied to the appropriate carrier's liability towards the freight forwarder.

As well as in other countries the Lithuanian National Association of Forwarders and Logistics, offering general forwarding conditions for its members based on the General Conditions of the Association of Freight Forwarders of the Nordic Countries NSAB 2000, valid as of June 1, 1998. The general conditions of the association define liability as for freight forwarders as a contracting party, so for freight forwarders as intermediary.

The freight forwarder's liability as a contracting party :

For loss, depreciation of or damage to goods the freight forwarder's liability is limited to SDR 8.33 / kg of gross weight of the part of the goods which has been lost, depreciated or damaged.

For delay in pick up, carriage or delivery the freight forwarder's liability is limited to the amount of the freight.

For all other loss the freight forwarder's liability is limited to SDR 100 000 in respect of each assignment.

The freight forwarder's liability as intermediary:

If the freight forwarder provides services – or parts of services – as an intermediary, if the freight forwarder does not provide services on his own behalf or at his own expense and provided that the freight forwarder indicates to the client that the services are provided solely as an intermediary, the limit of his liability is limited to SDR 50 000 in respect of each assignment, and totally in the event of any one occurrence SDR 500 000.

However, in any event compensation shall not exceed:
- for delay a sum equivalent to the agreed payment in relation to the individual assignment,
- for loss, depreciation of or damage to goods, SDR 8.33 / kg of gross weight of the part of the goods which has been lost, depreciated or damaged,

The Intermediary is not responsible for other persons other than its own employees.

Storage:

Unless otherwise instructed in writing by the customer, the freight forwarder shall take out insurance for the risks of fire, water and burglary in his own name and for account of the customer based upon the invoice value at the time of storage + 10 %. In the absence of insurance, the freight forwarder's liability limit cannot exceed 500 000 SDR (Lineka, 2015).

Liability of freight forwarders in Turkey

The provisions concerning the forwarder are regulated by § 917 - 930 of the Commercial Code of Turkey.

In accordance with the provisions of this Code, in addition to the standard status, the forwarder, if desired, can act as carriers, bearing the corresponding liability for carriers. The Commercial Code of Turkey does not set a limit on the liability of freight forwarders.

The Association of International Forwarding and Logistics Service Providers defines its members as the Logistics Service Provider (hereinafter — LSP) - the natural or legal person who has received the authorisation certificates or operating permits, in accordance with the applicable legislation, to have the goods transported on its own or its Customer's behalf and account by using the means, capabilities and capacities deriving from the services contracted on behalf of the Customer in the area of transport, storage, packing, labelling, packaging, order management, Customs, insurance, distribution, etc.

Standard conditions limit the liability limit of the LSP:

- in case of complete loss of the goods or comparable damage, the amount of 2 SDR / kg of the declared gross weight of the goods;
- in case of loss and/or damage of individual items or parts of the goods and if the whole consignment has lost its value, the amount of 2 SDR / kg of the declared gross weight of the goods;
- if only a part of the goods has lost its value, the liability is limited to the amount of 2 SDR / kg of the gross weight of the part that was lost or damaged, or the repair cost, if it is lower.

In the calculation of the compensations specified in this article, the value of the goods to be taken as basis for reimbursement is calculated according to the market value of the goods at the place and time the consignment was received by the LSP for carriage, or, if the information is not available, the compensation is determined according to the current value of goods of the same type and quality in the market where the consignment was made available to the LSP for carriage.

Compensation for delayed delivery of the goods cannot exceed the amount of the transport or service fees payable or paid to the LSP for the transportation.

In all other cases, the liability limit cannot exceed the amount of 2 SDR / kg of the declared gross weight of the goods, provided that this amount does not exceed the actual value of the goods, or an amount not exceeding 1000 SDR per incident (UTIKAD) .

Liability of freight forwarders in Russian Federation

In the Russian Federation, the activities of freight forwarders are regulated by the Civil Code and the Federal Law of 30.06.2003 N 87-FZ (ed. of 18.03.2020) "On freight forwarding activities". Chapter 41 of the Civil Code of the Russian defines the freight forwarding contract, liability, documents provided to the forwarder, etc.. The amount of the freight forwarder's liability in the Russian Federation is determined by the Federal Law "On Freight Forwarding Activities" dated 30.06.2003 No. 87-FZ (latest edition). The freight forwarder's liability is limited to 2 SDR / kg of gross weight of lost or damaged cargo or 666.67 SDR per place or other unit of shipment.

The Russian Association of Forwarding and Logistics Organizations announces the FIATA model rules, and also duplicates information on the limitation of liability of freight forwarders, defined by the law on freight forwarding activities (The Russian Association of Freight Forwarding and Logistic Organizations).

Liability of freight forwarders in Ukraine

In Ukraine, forwarding activity is regulated by Chapter 65 of the Civil Code of Ukraine, as well as the Law of Ukraine on Freight Forwarding Activities of July 5, 2012, No. 5060-VI, which describes in more detail the conditions of freight forwarding, but does not establish a certain amount of liability of the forwarder. The amount of liability can be established in

accordance with the freight forwarding agreement concluded between the freight forwarder and the client.

The International Association of Freight Forwarders of Ukraine offers conditions for freight forwarding activities. In accordance with these conditions, the liability for loss/damage of the goods cannot exceed the equivalent of 2 SDR / kg of gross weight. The liability of the freight forwarding company for losses of any kind should not exceed the total amount of 10 000 SDR for each case. In case of a delay in the delivery of goods, the forwarder returns to the client the remuneration received earlier for the implementation of freight forwarding activities (The Association of International Freight Forwarders of Ukraine, 2020).

Liability of freight forwarders in the Republic of Belarus

Regulation of freight forwarding activities in the Republic of Belarus is carried out by the Civil Code of the Republic of Belarus and the Law of the Republic of Belarus on June 13, 2006, No. 124-ZO of freight forwarding activities.

In the case of using a contract concluded by members of the Belarusian Association of Freight Forwarders, the following limitation of the forwarder's liability is established:

- the freight forwarder's liability is limited to an amount not exceeding 666.67 XDR per piece or other unit of shipment, or 2 XDR / kg of gross weight of lost or damaged cargo, whichever is higher;

  - if the cargo delivery does not include transportation by sea or by inland waterways, the freight forwarder's liability is limited to an amount not exceeding 8.33 XDR / kg of gross weight of the lost or damaged cargo;
  - the freight forwarder's liability for damage resulting from a delay in the delivery of the cargo is limited to an amount not exceeding the freight charges due for the cargo delayed by delivery;
  - the freight forwarder loses the right to limitation of liability if it is proved that the losses caused by loss, damage or delay in delivery were the result of actions or omissions of the freight forwarder committed with the intent to cause such losses (The Belarusian Association of International Forwarders).

Liability of freight forwarders in the Republic of Kazakhstan

The activity of freight forwarders in Kazakhstan is determined by the Civil Code of the Republic of Kazakhstan.

When concluding a forwarding contract with members of the Association of National Freight Forwarders of the Republic of Kazakhstan, the freight forwarder cannot be held responsible for the loss of goods and damage caused to the goods in an amount exceeding the equivalent of 2 XDR / kg kilogram of gross weight of the lost or damaged cargo (Association of national freight forwarders of the republic of Kazakhstan, 2019).

Liability of freight forwarders in the People's Republic of China

Forwarding activity in China is regulated by the Law of the People's Republic of China on Contracts, Chapter 17. The freight forwarding contract is defined by § 317-321, which states that the limit of liability is determined by the relevant international conventions if the transportation site where the goods were damaged or lost is known. If it is not possible to determine the area of damage or loss of the goods, the liability limit is limited in accordance with the limit specified in the contract of carriage. In the absence of this restriction, the amount of damage is determined in accordance with the market value of the goods at the time of its transfer at the delivery point.

The Freight Forwarders Association of China International Freight Forwarders Association indicates that the liability limit of a freight forwarder who has concluded a

contract with the application of standard conditions cannot exceed 2 SDR / kg of gross lost, damaged, misdirected, improperly delivered goods or in respect of which a claim arises. In the case of claims for delay in respect of the transportation or delivery, the Company's liability shall not exceed the amount of the Company's freight for the Goods the delivery of which has been delayed Central Oceans (Central Oceans, 2022).

When considering the liability limit in China, it is necessary to take into account the difference between the legislation of the main part of China and Hong Kong. Considering that the history of Hong Kong is closely intertwined with British colonialism, the common law system and legislation separate from China are currently applied on its territory, which implies different conditions for forwarding (Tu, 2020).

The conducted research has shown the extent of inconsistency in the activities of freight forwarders in different countries. There is not only a difference in the size of the freight forwarder's liability limit, but also a different understanding of his functions and area of liability. In addition, in situations where there is no regulation of the liability limit by national legislation, each forwarding contract may include other conditions. The standard conditions proposed by the associations are nothing more than a recommendation and are valid only if they are accepted by the forwarder and the client.

Despite all the differences, it is safe to conclude that in most cases the freight forwarder's liability limit is calculated on the basis of the liability limits established for carriers under international treaties and conventions. For example, the Hague-Visby Rules governing the International Carriage of Goods by Sea determine the carrier's liability limit in the amount of 2 SDR / kg or 666.7 per package (Su and Wang, 2009). Also an example is the CMR convention, which establishes that the liability limit of the automobile carrier cannot exceed 8.33 SDR / kg (Poliak et al.,2019).

5 Conclusion

The key to transparency of the cargo transportation market and in particular forwarding services is unification. The absence of general legislative regulation creates situations of mutual understanding between customers and freight forwarders, expands the possibilities of fraudulent transactions. At the moment, it is obvious that there is a need to create general conditions for forwarding. Another way of developing the forwarding sphere is a smooth transition to a system in which the forwarder is responsible for all stages of transportation, and acts as a carrier, such as an MTO. In any case, for the development of the forwarding market, cooperation of countries around the world is necessary to find and create joint solutions.

Acknowledgements

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Environmental accounting in accounting practice in Slovak Republic

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Abstract

Research background: Although the environmental policy in Slovakia requires the creation of a system for monitoring environmental costs, a unified methodology for environmental accounting has not yet been created in accounting. It is obvious that environmental accounting should become part of the financial accounting system. The operation of enterprises often causes environmental changes while the effort to reduce these externalities causes increased costs.

Purpose of the article: The purpose of the article is to analyze the existing situation in the field of environmental accounting in Slovakia, to point out the insufficient systemic solution of environmental accounting and, based on cooperation with a subject from practice, to propose concrete solutions for the implementation of environmental accounting in the company's financial accounting system.

Methods: In solving the goal of this article, an analysis of legislative regulations and professional literature was carried out. The solution to the problem was carried out in cooperation with a company, which provided the data necessary for proposals for measures for implementation in financial accounting.

Findings & Value added: According to the information found, there is no system of environmental accounting in Slovakia. We found that business entities compensate for the costs incurred on the environment mainly by applying for subsidies from the Environmental Fund. They do not check to what extent the subsidy covers the costs incurred. It is appropriate for them to implement environmental accounting, which will allow better monitoring of environmental costs and revenues and allow the environmental economic result to be included in the price of their products.

Keywords: *environmental accounting, environmental costs, environmental revenues*

JEL Classification: *M41; Q56; O44*

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1 Introduction

The environment is a complex but at the same time eclectic issue. Environmental policymaking requires treaty-making at the global level, sound national policies, and examining progress in many disciplines(Negash, 2012). The effectiveness of environmental policy is influenced by individuals' personal norms and the costs of environmental behavior (Huang, Wen, & Gao, 2020)

Environmental problems arise at different levels. The global level represents the most serious problems, such as the extinction of rare species of living organisms, climate change and related global warming, population growth, land loss, rising ocean levels or deforestation, and many others. The regional level represents serious problems for the people who live in the given region, such as lack of drinking water, deforestation, smog, waste, and the like (Jurík & Palšová, 2012).

The accounting system of the Slovak Republic is governed by Act No. 431/2002 Coll. on accounting, according to which accounting must provide real data "on the state and movement of assets, income, expenses and the result of the accounting unit's management". The accounting system must also accept other laws related to it, such as tax law, European Community accounting laws, international financial reporting standards and general accounting principles.(Law Nr. 431/2002 Col. of Laws). However, the environmental regulations that businesses must comply with cause increased environmental costs. The effort to protect the environment is confronted with the effort to achieve positive management results.(Wang, Lu, & Zhang, 2021) At the same time, violation of environmental regulations brings additional costs in the form of fines and sanctions, which can lead to the necessity of indebtedness of enterprises. (Ma, Ji, Zhai, & Yang, 2022) (Temiz, 2022)

Environmental economic accounts serve to provide data on the use of natural resources, the number of emissions that arise because of business activity, and provide information on economic activity associated with the environmental environment. These accounts are divided into so-called modules and represent the volume of pollution caused by industrial activity and households, which is evaluated in connection with employment, the value of the outputs of industries and households, and the value of expenses incurred to reduce the level of pollution. (Slašťanová, Paluš, Sulek, Parobek, & Slašťanová, 2021)

Professional literature on environmental accounting focuses on three theoretical perspectives, which are managerial, critical, and medium-term perspectives. The managerial school of thought emphasizes environmental responsibility from a business perspective, with the expectation that this approach will increase shareholder value. Critical theory considers environmental accounting as a tool for creating, maintaining, and adopting political ideologies that ultimately contribute to the interests of society. A moderate approach suggests responsibility for solving environmental problems to which the companies in question have contributed. (Lodhia, 2012)

The following Table 1 presents the individual modules of environmental economic accounts with the identification of what is charged to the given module.

Table 1. Environmental economic accounts breakdown.

Environmental economic accounts	
Module for accounts of air emissions	Emissions of greenhouse gases and air pollutants.
Module for taxes related to the environment	Environmental taxes on energy, transport, pollution, and resources.
Module for accounts of material flows	Quantities of physical inputs and outputs from or to the environment

Expenditure for environmental protection	Expenditures for protection of environment
Accounts of environmental goods and services	Goods and services produced specifically for the protection of the environment
Physical energy flow accounts	Extraction of natural resources, energy production

Source: own processing according (Slašťanová, Paluš, Sulek, Parobek, & Slašťanová, 2021).

1.1 Environmental costs

As with the definitions of environmental accounting, there is no single definition of environmental costs.

Environmental costs represent the costs of taken or necessary actions that compensate for the effects of business activity on the environment within the framework of environmental responsibility (Burnett & Hansen, 2008).

The Organization for Economic Cooperation and Development (OECD) defines environmental costs as "costs associated with the actual or potential deterioration of natural resources as a result of economic activities". Environmental costs are costs related to business activities, investments, waste prevention, waste disposal, which the intention is to reduce the negative impact on the environment (Ding, Appolloni, & Shahzad, 2022). These costs have two basic parts, namely costs related to environmental protection and costs incurred in connection with environmental damage.

- costs related to environmental protection are related to the prevention of pollution or the adoption of decisions that prevent environmental damage,
- costs related to environmental damage are incurred in connection with the removal of damage caused by the company's activities (Hyršlová, Environmentální manažérské účetníctví, 2004).

The differentiation of environmental costs from other costs arising in the company is important for the purpose of evaluating, identifying, analyzing, recording the effects of the economic activity of the given company on the environment, or the use of this information in the financial and decision-making process of the economic entity with the subsequent implementation of an effective managerial decision. Therefore, it is necessary to pay increased attention to current, potential, and future environmental costs.

1.2 Environmental returns

Environmental returns can be determined as an increase in environmental benefits, expressed in monetary form. They are most often acquired from:

- sale of waste that can be further evaluated and subsequently reused,
- recycling of various types of materials,
- from the sale of technologies, products or equipment that serve to protect the environment,
- various subsidies and rewards, tax reliefs or certain benefits such as the remission of the payment of fees (Hreha, 2009).

1.3 Environmental accounting

Environmental accounting differs from the traditional accounting system in that it works with information about materials and energy that is in physical expression, focuses on accounting for environmental costs, and uses the information obtained for further decision-making related to the environment (Jasch, 2006). The need to integrate environmental

accounting into the financial accounting system is dealt with, for example, by Nicholls (Nicholls, 2020).

Environmental accounting is the management of environmental and economic performance through the development and implementation of appropriate environmental accounting systems and procedures (Howes, 2002)

Environmental accounting provides information primarily in natural units about used materials, energy, or produced waste. In monetary terms, it provides data on environmental costs and benefits. This accounting is primarily focused on tracking environmental costs that arise in connection with business activity. The information can be used for various decisions or activities within the company. This accounting type conducting, there is the possibility of reducing environmental costs, thereby increasing profit, or increasing market share (Bednárová, 2008). He deals with the use of waste materials to increase revenues and capture these facts in cost accounting (Bux & Amicarelli, 2022).

2 Methods

We solved the issue of introducing environmental accounting in cooperation with a business entity - a joint-stock company that processes paper and cellulose, while recording the occurrence of environmental costs and revenues.

In its accounting system, the company keeps records of environmental costs through three accounts, namely:
- 518 120 Other services – for waste management,
- 538 110 Other taxes and fees - environmental fees a
- 538 120 Other taxes and fees – for waste management.

Subsequently, there was an actual analysis of the company's environmental costs, which consisted of the afore mentioned accounts for the years 2017, 2018 and 2019. For example, in the monitored periods, the company accounted for the following facts on account 518 120:
- collection of recycled waste - represents waste that is further used. Waste for recycling is divided into paper, plastic, iron, wood, and glass. The analyzed company emphasizes the separation of waste that can be recycled and reused,
- hazardous waste that needs to be disposed of – it can be made up of various oils, filters, chemicals, and electrical waste that must be used in the production process,
- hazardous waste is related to its transportation and handling,
- transportation of bio-sludge for incineration. Biosludge is created during wastewater treatment. These biosludges can be recovered by composting, but the demand for them is very low,
- "spit" represents impurities that arise during paper production. After this dirt collecting, there is a cost in connection with the removal of this spit,
- during the processing of wood, which is necessary to produce paper, waste wood is also produced,
- municipal waste (TAP), represents waste that can be further processed into solid alternative fuel,
- the company also uses rail transport for its deliveries, which represents a more economical and at the same time more ecological method of transport, which is also related to the generation of waste,
- waste tubes are rolls on which the paper is wound during production,
- the company generates waste every year in connection with repairs that are necessary within the company's operation,
- ash is the result of the energy recovery of tree bark.

- during the production of paper, cellulose-paper sludges are formed, which are created during the mechanical cleaning of wastewater, lime sludges are formed in a lime kiln, caustic sludges represent waste that is generated during the production of cellulose. In connection with these sludges, facts related to their collection, handling, transportation, evaluation, or disposal were charged in the given period.

We also analyzed environmental revenue accounts. The company keeps accounting records of environmental revenues through two accounts, namely:
- account number 642 – Revenues from the sale of material a
- account number 648 – Other income from economic activity.

Within account number 648 – Other income from economic activity in the monitored periods, the company reported a subsidy in connection with the environment, to which it was entitled. The environmental subsidy is provided for the purpose of care and protection of the environment in connection with the principles of sustainable development.

The subsidy is provided for the previous period based on a written request. If the application is approved, the withdrawal of funds from the subsidy is possible only after a written contract has been concluded between the applicant and the subsidy provider, after all necessary documents have been submitted. The amount of the subsidy is determined based on specified criteria that are published in advance.

In its traditional accounting, the company records environmental costs and environmental revenues together with other operating costs. As part of the introduction of the environmental accounting system in the selected company, we proposed the introduction of analytical records for cost and income accounts that are related to the environment.

3 Results

During the investigation of the current state of environmental accounting in the Slovak Republic, we found that Slovak companies, although they have an environmental quality system in place, do not have separate environmental accounting in place, although they report environmental costs and environmental revenues.

After reviewing the company's accounting schedule, we decided to introduce environmental analytical records into each cost and income account where environmental costs and environmental revenues arise or may arise.

An example of the introduction of environmental analytical records within the account 501 Material consumption is captured in the following table 2. Within the cost account 501 Material consumption, we added analytical records for the environment department that operates in this company. To this analytical account, the material consumption arising in the environmental department, such as the consumption of office supplies (office paper, packaging, pens, boxes), printer toners, cleaning agents or toilet paper and many others, would be charged.

Table 2. Introduction of environmental analytical records for account 501.

501 100	Material consumption - wood
501 101	Material consumption - pallets
501 102	Material consumption - wood chips
501 200	Material consumption – purchased cellulose
501 300	Material consumption – wastepaper
501 301	Material consumption – purchased paper
501 302	Material consumption – felts and sieves

501 303	Material consumption - boxes
501 304	Material consumption - lids
501 400	Material consumption - fuels
501 401	Material consumption – biomass
501 402	Material consumption - starch
501 403	Material consumption - fillers
501 404	Material consumption - other chemicals
501 500	Material consumption - overhead material
501 501	Material consumption - auxiliary material
501 502	Material consumption - other direct material
501 503	Material consumption - other material
501 504	Material consumption – packaging material
501 505	Material consumption - maintenance material
501 550	Material consumption - promotional items
501 551	Material consumption – books and magazines
501 552	Material consumption – office supplies
501 553	**Material consumption - office material for the environment department**

Source: own processing

In connection with the newly introduced environmental analytical records, the following facts would be accounted for in the management of environmental accounting in a given company as shown in Table 3. We remind you that the accounting cases listed are examples of the application of the proposed scheme of environmental accounting, they are in no way definitive list of possible situations.

In the table 3 above, we used a share of 10% when accounting for costs that have not yet been specified aliquoted for the environment department. This share was determined by estimation, as for a more precise determination of the given share, no necessary data had been recorded in the given company so far. For implementation in practice, we recommend the introduction of a given system of analytical monitoring of these costs, and after the end of the accounting period, calculate the real share of the environment department in these costs and use the newly calculated aliquoted real share.

Within the accounting system, we have introduced a cost centre with the designation 8006 Environmental cost centre, to which the environmental costs arising in the given company are to be charged.

Table 3. Examples of accounting within analytical environmental records.

Nr.	Text of the accounting case	Value		Accounting	
				Debit	Credit
1.	Purchase of office supplies for consumption (10% environmental separation)	Without VAT	288 €	501 552	
			32 €	**501 553**	
		VAT 20%	64 €	343	
		VAT included	384 €		321
2.	Consumption of water for utility purposes (10% environmental separation)	Without VAT	765 €	502 200	
			85 €	**502 201**	
		VAT 20%	170 €	343	321

		VAT included	1020 €		
3.	Repair of a broken printer at the environment department	Without VAT	42 €	**511 301**	
		VAT 20%	8.4 €	**343**	
		VAT included	50.4 €		321
4.	Commitment to the ZC environment, due to a business trip		33 €	**512 101**	333
5.	Transportation and handling of hazardous waste	Without VAT	185 €	**518 121**	
		VAT 20%	37 €	**343**	
		VAT included	222 €		321
6.	Gross salary of environment employee		1200 €	**521 201**	331
7.	Insurance paid by employer:				
	a.) medical 10%		120 €	**524 201**	
	b.) social 8.8%		105.6 €	**524 211**	
	c.) retirement 14%		168 €	**524 221**	
	d.) sick leave 1.4%		16.8 €	**524 231**	
	e.) in unemployment 1%		12 €	**524 241**	
	f.) total (35.2%)		422.4 €		336
8.	Charge for air pollution		66.4 €	**538 110**	345
9.	Sale of waste material	Without VAT	623 €	311	
		VAT 20%	124.6 €	343	**642 100**
		VAT included	747.6 €		
10.	Entitlement to a subsidy from the Environmental Fund		350 000 €	347	**648 400**

Source: own processing (Debit = the account that receives, Credit = the account that gives.)

Creating an environmental cost centre in the company's accounting system means getting a better overview of the environmental costs incurred by the company, comparing planned and actual costs, providing information and reports, and much more.

4 Discussions

We found that when applying for a subsidy, Slovak companies are not able to state the exact amount of environmental costs or environmental revenues. The "environmental" economic result should represent an adequately determined amount of the subsidy that the company is requesting. With regard to the request for a contribution from the environmental fund, in cooperation with a business entity, we created a system for introducing environmental accounting, which is considering the creation of a new cost center - the environment center.

By introducing environmental accounting into the traditional accounting system, the company will obtain a detailed overview of the environmental costs and environmental revenues incurred in the company during the given period.

To compare the values of environmental costs and environmental returns, we have created the following illustrative tables. Table 4 presents the calculation of environmental costs in the company in the monitored periods. We determined the value of individual environmental costs, which are shown in the table, by estimation.

Table 4. Calculation of environmental costs of the selected company.

Account	2017	2018	2019
501 553	24 806 €	26 104 €	29 546 €
(5%)	**1 240.3 €**	**1 305.2 €**	**1 477.3 €**
502 101	62 015 €	65 260 €	73 865 €

(5%)	**3 100.75 €**	**3 263 €**	**3 693.25 €**
502 201	37 209 €	39 156 €	44 319 €
(5 %)	**1 860.45 €**	**1 957.8 €**	**2 215.95 €**
511 301	20 560 €	16 470 €	16 070 €
(5 %)	**1 028 €**	**823.5 €**	**803.5 €**
512 101	62 900 €	107 300 €	108 900 €
(1%)	**629 €**	**1 073 €**	**1 089 €**
518 121	**164 423.91 €**	**162 115.53 €**	**156 939.03 €**
518 122	**755 230.68 €**	**608 123.48 €**	**643 448.72 €**
518 123	**495 758.4 €**	**449 936.53 €**	**334 361.61 €**
518 201	17 250 €	29 220 €	34 370 €
(5%)	**862.5 €**	**1 461 €**	**1 718.5 €**
521 201	**133 344 €**	**138 048 €**	**141 251 €**
521 210	96 900 €	153 400 €	102 300 €
(5%)	**4 845 €**	**7 670 €**	**5 115 €**
521 301	24 600 €	19 000 €	21 000 €
(5%)	**1 230 €**	**950 €**	**1 050 €**
521 311	153 400 €	172 900 €	185 060 €
(5%)	**7 670 €**	**8 645 €**	**9 253 €**
524 201	**13 334.4 €**	**13 804.8 €**	**14 125.1 €**
524 211	**11 734.27 €**	**12 148.22 €**	**12 430.09 €**
524 221	**18 668.16 €**	**19 326.72 €**	**19 775.14 €**
524 231	**1 866.82 €**	**1 932.67 €**	**1 977.51 €**
524 241	**1 333.44 €**	**1 380.48 €**	**1 412.51 €**
538 110	**153 485 €**	**115 713 €**	**104 702 €**
538 120	**703 750.85 €**	**746 825.58 €**	**644 954.88 €**
Total	**2 475 395.93 €**	**2 296 503.51 €**	**2 101 793.09 €**

Source: own processing

Table 5 shows the estimated values of the company's environmental returns in the monitored periods.

Table 5. Calculation of environmental returns of the selected company.

Account	2017	2018	2019
642 100	354 092,27 €	376 711,09 €	405 002,66 €
648 400	1 097 931,05 €	560 109,86 €	369 414,63 €
Total	**1 452 023,32 €**	**936 820,95 €**	**774 417,29 €**

Source: own processing

After calculating the estimated values of total environmental costs and environmental returns in the monitored years, we can proceed to compare these values, which will determine whether the environmental returns compensate the value of the environmental costs incurred by the company. Comparison of estimated values in individual years:
- Comparison of environmental revenues and environmental costs in 2017:
  1 452 023,32 € - 2 475 395,93 € = - 1 023 372,61 €
- Comparison of environmental revenues and environmental costs in 2018:
  936 820,95 € - 2 296 503,51 € = - 1 359 682,56 €
- Comparison of environmental revenues and environmental costs in 2019:
  774 417,29 € - 2 101 793,09 € = - 1 327 375,8 €

From the comparison of individual values, we can see that in none of the monitored periods did environmental revenues compensate for the value of environmental costs. The company should create compensation by increasing the price of production, where the increase will represent the value of the company's environmental behavior.

In case that the company is not provided with an environmental subsidy in the amount determined by the above-mentioned procedure, compensation for the loss that the company achieves due to efforts to behave responsibly towards the environment should be included in the price of the products.

5 Conclusions

The goal of the contribution was to analyze the existing situation in the field of environmental accounting in Slovakia and, based on the information found, to propose a suitable solution for accounting for environmental costs and environmental revenues spent for the purpose of environmental protection for a selected business entity.

In solving this task, we cooperated with a selected business entity that affects the environment through its activities and is an applicant for subsidies from the Slovak Environmental Fund. This fund provides subsidies as compensation for costs incurred for the purpose of environmental protection. We carried out an extensive analysis of financial accounting in order to determine the accounting of environmental costs and revenues. We proposed to the company to introduce environmental cost center accounting.

It was found that the calculation of environmental costs and environmental returns is absent in the practice of Slovak companies. The company is then not able to accurately calculate the value of the "environmental result of management". Environmental subsidies are provided to Slovak companies upon application according to pre-defined conditions. If the company does not keep accurate records of environmental costs and environmental revenues, it is possible that the subsidy received does not cover the negative environmental economic result.

We found that the environmental costs are not fully compensated by the environmental returns, so it can be argued that the company is at a loss due to the effort to reduce negative impacts on the environment compared to the situation when it would not try to reduce these negative impacts. One of the options for solving this economic effect is to increase the prices of your products by the proposed amount.

Acknowledgements

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Corporate culture as a determinant of the performance of a selected enterprise in Slovakia, operating in the era of globalization

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Abstract

Research background: The concept of corporate culture is increasingly mentioned in connection with the efficiency and performance of a company. First, everyone pays attention to customer satisfaction, and this is often reflected in the company culture. If things do not work as they should in society, then, of course, it must be reflected somewhere. A dysfunctional culture manifests itself in the behaviour of individual employees and must be addressed, as sooner or later it can affect financial results. A healthy corporate culture promotes values related to employee and customer satisfaction. The orientation is towards compliance with moral and ethical principles, maximum customer satisfaction, and team cooperation.

Purpose of the article: Corporate culture plays an important role in companies. The interest of companies in it is growing with the interest of guiding the behaviour of employees in accordance with the goals. It is proven to be one of the ways to the success of any company. A weak organizational culture can have a negative effect on a company and cause its growth to slow down, or even its demise. The company's values, which are in the first place, and which are promoted by the entire company, are reflected in the organizational culture.

The aim of the contribution is the analysis of the organizational culture in the selected company and the formulation of proposals and recommendations for its strengthening. In order to fulfill the main goal, we set sub-goals. First, we found out the current situation in the company through an interview, and then, based on a questionnaire survey, we clarified the employees' view of the operation and the current situation in the company in connection with the company culture.

Methods: We will use theoretical and empirical scientific methods in processing the subject. In the first step, we will work with theoretical methods such as analysis, synthesis, induction, and deduction, in which the topic is viewed from a theoretical point of view. In the second step, the article will use empirical scientific techniques that work with specific data and precise

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methods to achieve concrete results. In the end, in addition to explanatory methods, interpretive methods will also be used.

Value added: The aim of the mentioned contribution is to bring closer the proposed methodology for measuring employee satisfaction. This methodology can be used in companies in Slovakia that are interested in maintaining satisfied employees and a good name as a potential employer on the labour market.

Keywords: *culture; organizational; organizational culture; company, employees; typology of organizational culture; values and standards corporate social responsibility*

JEL Classification: *E2; J6; M5*

1 Introduction

In the era of globalization, the concept of organizational culture is gaining prominence not only in the academic field but also in business practice. Corporate social responsibility is becoming an important factor.It is mentioned in connection with performance and efficiency, especially on a strategic scale. A strong organizational culture is a reflection not only of the good informal relations of workers in the organization but also reflected in customer satisfaction. If things do not work as they should in the organization, the strength of the organizational culture decreases, which also results in a decrease in performance and efficiency. A dysfunctional organizational culture manifests itself in the behavior of individual employees and it is necessary to address it, as sooner or later it can be reflected in the financial results. A healthy organizational culture promotes values related to employee and customer satisfaction. The orientation is towards compliance with moral and ethical principles, maximum customer satisfaction, and team cooperation. It represents an unwritten agreement and the identification of everyone in the work team to certain standards of behaviour that are accepted by everyone. The company uses corporate culture to shape its corporate image and spirit, thereby creating an atmosphere for technological innovation and bringing success to technological innovation. (Heng Yang1 and Luqi Wang, 2022) Organizational culture plays an important role in every organization. Companies' interest in building a strong organizational culture grows with the interest in guiding employee behavior in line with goals. It is proven to be one of the keys to the success of any company. A weak organizational culture can have a negative effect on a company and cause its growth to slow down, or even cause its demise. The company's values, which are first and foremost, and which are promoted by the entire company, are reflected in the organizational culture. Under the influence of the dynamically changing business environment, corporate culture is gaining importance and validity. (Lorincova, S. et al., 2022) The aim of the contribution is the analysis of the organizational culture in the selected company and the formulation of proposals and recommendations for its strengthening. We decided to fulfil this goal through sub-goals. The first is to find out the current state of the organizational culture in the selected company by means of an inquiry method in the form of an interview, and then again by means of an inquiry method in the form of a questionnaire survey, to clarify the employees' view of the operation and the current state of the company in connection with the organizational culture. The structure of the paper consists of four chapters. We were able to define conclusions based on the collection of relevant knowledge from available sources, together with the synthesis, induction, and deduction of all acquired knowledge and information.

1.1 Review of the Literature

In today's world, organizations are trying to make huge efforts to survive in a competitive environment that is constantly changing. Organizational culture can influence several organizational variables and affect how we perceive organizational power. The authors, Kizigolu and Kok consider such power to be one of the main variables that guide employee behavior (Kizigolu et al., 2020). Also interesting are the findings of Tian J et al. (2022), according to which heterogeneity results show that the positive effect of corporate competitive culture on environmental investment is more pronounced in firms with larger size, stronger corporate governance, in highly polluting industries and located in less developed regions. Their findings shed light on the importance of corporate competitive culture and provide practical implications for sustainable corporate development. The term "organizational culture" first appears in the literature in the 1960s and earlier. The term began to appear in practice to a greater extent from the 1970s, but it only became a popular subject of interest in the early 1980s (Lukášová et al., 2004). Since the 1980s, organizational culture has begun to emerge as a new aspect within corporate management and is considered a recognized means of proactively coping with the environment, which is currently constantly and rapidly changing (Nam, 2016). Over time, opinions on organizational culture have varied. Prominent authors of the given issue agreed that the term organizational culture represents a set of primary norms, values, attitudes, and assumptions that are shared by the organization and are reflected in the behavior, feelings, and thinking of the members of the given organization and are also reflected in material and non-material artifacts. (Lukášová et al., 2004). In 1952, Kroeber and Kluckhohn came up with a definition that consisted of different approaches. They understand culture as something that is generalized from overall behavior (Dolinská, 2016). P. Brose and J. Hentze (1990) explain that organizational culture can be considered as the behavior, acting, and thinking that is characteristic of the company's employees. It creates a set of social norms and values and certain rules of behavior. Outwardly, it appears as one of the forms of social interaction that occurs between co-workers in society and in the customs, habits, material equipment, and certain rules that are jointly maintained in the workplace. L. Pfeifer et al. (1993) captured organizational culture in a brief definition that explains the concept as a set of all values, approaches, and ideas that are generally recognized and maintained within the organization. In the 1990s, interest in corporate culture began to grow after Japanese companies demonstrated a positive impact on results through corporate culture. When observing the given organizations, the effort on the part of the employees, in the behavior between colleagues, and in the interaction with the client were identified. The behavior was fair and honest, and the intention of the organization was to provide mainly quality work, products, and services (Křivohlavý, 1995). In 1989, Deal and Kenedy defined organizational culture as something that represents a collection of certain rituals, values, symbols, own history, and corporate heroes that operate above the surface and greatly influence how people act in individual workplaces (Kachaňáková, 2010). In 1995, A. Brown defined organizational culture as a formula made up of values, opinions, and learned ways of managing situations based on the experiences of individuals (Kachaňáková, 2010). From the point of view of V. Čihovská et al., (2001), the organizational culture consists of a set of values, symbols, perspectives, attitudes, assumptions, and ethical starting points, which to a certain extent can directly influence the actions of employees, either among themselves or in relation to the environment. Adamková (2006) considers historicity (which means that organizational culture is connected with the history and also the development of the given company), collectively (which is a sign formulated through the formal and informal reactions of individual employees of the given company) as the basic features that are characteristic of organizational culture among themselves, but also by interaction with the environment), diversity (a sign is given by the possible existence of different subcultures, situated in one organizational culture) and

dynamism (which reflects influences from the external environment and competitive advantage in building organizational culture). Hroník (2006) understands the term "organizational culture" as a set of shared expectations, which we are often not even aware of, and which can influence development and education in society. Wolfová (2007) claims that culture arises simultaneously with man, and that, on the other hand, man also arises and changes along with the changing culture. In the same way, organizational culture is created over time and constantly changes. Mohamed and Qin (2008) consider culture as a major determinant of companies' desire and ability to innovate. A highly proactive and innovative culture enables the company to respond better to market signals. It enables better use of the provided opportunities, quick introduction of products and services to new markets and thus gains the advantage of being the first mover. Hrubec et al. (2009) state that there is no unified definition for the term "organizational culture" and several authors agree on the definition of a set of basic attitudes, values, assumptions, and norms of behavior that society shares within the organization. They are most often manifested in the feelings, thoughts, and very behaviour of the company's employees, but also in artifacts, which can be both material and non-material in nature. Just as every person has their own personality, so too do organizations have their own cultures. Ipek (2010) states in his article, as do many other authors, that organizational culture is made up of beliefs, common meanings, and values that influence and shape the behavior of employees. Organizational culture can be, as Armenakis et al. (2011) in their article, also described in terms of cultural elements, which include ingrained beliefs, artefacts, basic assumptions, and values. Aktas et al. (2011) claim that organizational culture increases the adaptability of the organization and the environment in which it is located, and therefore it is considered a strategic benefit for the overall organization. Joniaková et al. (2012) essentially consider that organizational culture is the result of unified collective action, as it acts as a regulator. Organizational culture can influence how employees perceive outcomes and consequences, and thus their behaviour is influenced to act in a certain way (Campbell et al., 2014). In his article, Bashayreh (2014) describes organizational culture as a topic that has been vital in management and business research for several decades. It is the result of potential impact, expected and preferred achieved results, whether organizational or individual. Organizational culture is a complex pattern of certain assumptions about the group's function in the world and place. It is directly related to the performance and efficiency of the company. The stronger the organizational culture, the more efficient the given company is (Lapina et al. 2015). According to Yoel (2015), organizational culture also serves as an indicator that helps distinguish one company from another, the perception of employees regarding practice, policy, recognition, cohesion, innovative style of performance, standards of behaviour and attitudes, and fairness in remuneration. It affects many aspects of the company, such as the decision-making process, organizational functioning, and employee interaction. Korner et al. (2015) describe organizational culture as a prerequisite for teamwork in a company. They are shared beliefs, values, and the overall perception of employees within the company. It is considered the "social glue" that holds society together. For several decades, organizational culture has attracted the attention of researchers because it plays a large role in daily activities and in the long-term development of organizations. According to Klimas, if we look at organizational culture from the point of view of strategic management, then we can consider it as a driving force for competitive advantage because it affects the financial performance and internal organizational development of the company. It can also be used as a source of competitive advantage, which is based on inter-organizational cooperation (Klimas, 2016). Culture shows individuals certain behaviours that need to be modelled. All companies have a culture that is good or bad, strong or weak, but a company that knows how to maintain a presence and overcome the competition has a unique organizational culture that is shared by all employees (Eskiler et al., 2016). When describing the organizational culture, the cultural differences in

the country are also interesting. An example can be found in the study by Xu et al. (2022), who clarify that, unlike most US companies where directors are listed in alphabetical order, the order of directors in China is meaningful and reflects a hierarchy. Findings Empirical results show that a culture of seniority is negatively associated with innovation efficiency. Moreover, the negative association between corporate culture of seniority and innovation efficiency is more pronounced in firms with more male executives and in knowledge-intensive firms. Further analysis reveals that a culture of seniority widens the pay gap between different classes, hinders their enthusiasm to communicate, and ultimately harms the corporate effectiveness of innovation. The corporate culture of seniority is a fundamental factor that can hinder employee communication and hinder the effectiveness of innovation. Therefore, companies should break down the identity barrier at different levels and promote a culture of equality to promote information exchange and knowledge sharing among employees. Another determinant, apart from the territorial one, is the local one, the very workplaces of that company anywhere in the world. They also play a big role in strengthening or weakening the organizational culture The statement of the authors, Nanayakkar et al., is also confirmed. (2022), who point out that the nature of workplace designs has a significant impact on an organization's corporate culture and can be used to harness and change its culture. Workplace designs directly influence culture by supporting organizational and employee systems, symbols, engagement and motivation, and behavior. However, some differences were found between the perceptions of public and private organizations. In conclusion, office layout is an artifact that can support or change an existing organizational culture. Therefore, the critical success factor of workspace design is the integration of organizations' cultures, values, and behaviors to meet their ultimate goals.

2 Analysis of the organizational culture in the selected company

To carry out the analysis of the organizational culture, we proceeded in several stages. We carried out the preparatory phase of the survey in the period from November 2021 to March 2022. We were the first to collect both professional and scientific sources on the investigated issue. After acquiring theoretical knowledge, we conducted personal consultations, based on which we analysed the current situation in the selected company. The information was provided to us during the month of January, based on which we obtained an up-to-date picture for a better understanding of the company's functioning. The acquired information was used in the creation of a questionnaire, which we then sent via e-mail to the company's employees. Based on the established main objective of the survey, we set out five research assumptions (RA):

RA1: We assume that more than half of the respondents consider organizational culture in the workplace to be very important, and at the same time, they consider relationships in the workplace to be the most important element of organizational culture.

RA2: We assume that more than half of the respondents consider ethics and etiquette to be essential, and more than half of the respondents prefer values such as good interpersonal relations, teamwork, dedication, and friendship.

RA3: We assume that more than half of the respondents consider the communication between superior and subordinate to be sufficient, and more than half of the respondents cannot turn to a senior employee in case of ambiguities and problems.

RA4: We assume that, in the event of changes in the company, employees would like to change the superior's approach to subordinates and, secondly, more information about the company's operations.

RA5: We assume that more than half of the respondents do not know the goals and values of the company they work for, and to improve the organizational culture in the company, they would choose a more personal approach to resolving potential conflicts. The survey was

aimed at creating an overview of the investigated issue and providing information about the current state of the issue that we are investigating at the workplace. For data collection, we used the collection method, the study of the theoretical foundations of the researched issue, the method of observation, interview, the method of analysis and synthesis, and the method of inquiry. The investigation focused on a private employee joint-stock company founded in 1993 by 117 shareholders and the city of Ilina. manages residential buildings, apartments, and commercial properties in Ilina and the surrounding area It is also the owner and operator of gas boilers, a system of exchange stations, and secondary heat distribution, which are located throughout the city. The company directly produces and supplies domestic hot water and heat to 21,700 households. It manages around 11,000 apartments and 470 non-residential premises. The services provided also include craft and commercial services such as replacement of wiring, water, heating, gas, elevators (service and modernization), reconstruction of boiler rooms, reconstruction of exchange stations, electrical installation work and revision work (gas, electricity, pressure, elevators). The company is managed by the CEO, who is elected by the company's board of directors. The initial version of the questionnaire included four identification questions about gender, age category, highest education obtained, and length of time the respondent has worked for the company. Respondents also answered 14 questions related to the given issue. The questions were formulated in such a way that we could get the most accurate picture of the situation in society. The questionnaire was anonymous, so the respondents did not have to be afraid to answer the questions truthfully. We collected data through a questionnaire in the month of February. After the preparatory phase, we implemented the phase of the questionnaire survey itself. In March 2022, we carried out the implementation phase, during which we sent a questionnaire to 81 company employees via e-mail. Approximately 150 employees work in the company, but not all of them can fill out the questionnaire. Therefore, we focused on administrative workers, of whom there are approximately 90. The remaining workers are foremen and laborers who work in the field, and therefore their answers would not be full-valued since they stay in the field most of the time and do not work in offices. The return rate of questionnaires was 76.54% (62 completed questionnaires). After collecting the necessary answers from the questionnaire survey, we analysed the results, evaluated them, and then managed them into graphs in the Microsoft Excel program.

3 Evaluation and proposal of recommendation

In the survey, we were interested in the history of the company name. We learned that the name was created in 1992 by accident, as no one attached much importance to the invention of the name. We were also interested in the logo, corporate colours, and why green became the corporate colour. Green was chosen because it represents the color of the city of Ilina, which has previously participated in company events. In the end, the company kept the color. It was also necessary to analyse the building, the interior of the company, and the work environment in the context of the organizational culture. After observing directly inside the company, we found that the company logo in company colors is located both on the building and in several places in it. There was also equipment in company colours. When selecting employees, the company has set certain rules. Applicants should have certain prerequisites based on which they are suitable for the given position. If necessary, the company publishes advertisements based on which applicants send a resume, and the company selects the most suitable applicant after job interviews. Employee training takes place regularly as needed. In the case of changes in legislation, employees are retrained outside the workplace. Training is also held directly in the company, such as occupational safety training. From the findings in the company, we can conclude that communication takes place effectively at all the mentioned levels. If necessary, employees can ask for help from senior staff. The main

method of research in the selected company was the method of inquiry in the form of a questionnaire. It was used in the second phase of the overall survey. The goal was to find out what the organizational culture is at the company and whether the employees are satisfied with it. We also investigated what changes they would welcome in terms of management, organization, and goals for the correct direction of the company in the future for overall satisfaction, which has direct effects on the value-creating quantities, efficiency, and performance of the company. The return rate was 62 questionnaires, which represents 76.54%. By analyzing the data obtained from the questionnaires, we found that organizational culture is important for employees but not very important. In RA1, our assumption was therefore not confirmed, as only 33.9% of respondents marked the answer to the question as very important. 50% of respondents consider it important. Even though we explained to the respondents in the questionnaire what organizational culture means, there were about 16% of respondents who considered it less important or not important at all. The overall approach of the respondents to the issue of the importance of organizational culture assured us that the question in the questionnaire was asked correctly and comprehensibly, even though our assumption was not confirmed. It is therefore obvious that the employees are fully aware of the values, attitudes, beliefs, and traditions as an important part of the proper functioning of the company in which they work. In the second part of RA1, we mistakenly assumed that the most important element of organizational culture for the respondents would be workplace relationships. This assumption was not confirmed for us, and we proved it with a relevant question in the questionnaire. In it, we gave the option of choosing from several answers. Relationships at the workplace were the second most frequent answer with a frequency of 39 times. The respondents chose communication as the most important element of organizational culture, which they confirmed 53 times. The third most common answer was attitudes in the number of 25. The value answer was confirmed by 19, basic beliefs by 18, material elements by 8, and immaterial elements by 2. From the results, we can clearly conclude that the most important thing for the respondents is communication, which forms an important pillar in the progress of every company and organization. When asked whether ethics and etiquette are important in the company where the respondents work, up to 59% of respondents said that ethics and etiquette are important, and thus our assumption RA2 was fully confirmed. However, up to 37.7% of respondents think that ethics and etiquette in society are important only sometimes. It is a rather high percentage representation, but what is important for the company in this case is that more than half of the respondents are convinced that ethics and etiquette are essential in the company, and therefore they can rely on workers with high moral credit. However, it is important that the company in the future creates such conditions for employees that ethics and etiquette are an important element of the company and can therefore create a good and suitable working environment for fulfilling the goals and values of the company. Only 3.3% expressed their position that ethics and ethics are not essential in society. In the second part of RA2, we assumed that more than half of the respondents preferred good interpersonal relations, teamwork, sacrifice, and friendship as the values of the company that they preferred the most. We can conclude that our assumption was fully confirmed and thus up to 74.2% of respondents put these values of the company in the first place. Thus, the values represent and will represent a great benefit for our chosen company. At the same time, the knowledge that the company's employees strive for good interpersonal relationships in the working environment and the need to establish non-work relationships as well they also prefer teamwork, which is essential in this type of company to achieve the company's goals. The dedication of the employees is also a strong motivation for the management of the company to respond adequately and flexibly to any suggestions from the employees. The management can fully rely on its employees to fulfill the company's goals and values, which is of great importance for the company's competitiveness. Many companies want and wish to have

employees who put these mentioned values in the foreground. We think that they also prefer teamwork, which is essential in this type of company to achieve the company's goals. However, there is also a part of the respondents, specifically 25.8%, who prefer competitiveness, competition, and performance. It is not a completely negligible number, but it must be emphasized that in such a large group there are likely to be respondents who have their own goals and want to advance in the job hierarchy to a higher and better-paid job. Such employees tend to be less popular in teams precisely because they prioritize fulfilling their own goals and the desire to be more efficient than others. We think that this type of worker can fully fulfill the goals, values, and attitudes of the company, but on the other hand, his competitiveness and performance can demotivate colleagues who do not share such values. RA3 was another assumption that we established, and we investigated it with the relevant questions in the questionnaire. In the first part, we assumed that more than half of the respondents consider the communication between superior and subordinate to be sufficient, and at the same time, more than half of the respondents cannot turn to a senior employee in case of ambiguities and problems. We made our assumptions because the company has many employees, and therefore we assumed that communication between superior and subordinate would be one of the key problems. Even though we were assured from the interviews with a member of the company's management that communication takes place without problems at all levels, we still wanted to verify our assumption. Analyzing the answers, we found that only 22.6% of the respondents considered the communication between superior and subordinate to be sufficient, and therefore the answer was yes. Rather, yes, 56.5% of respondents gave this answer. This assumption was not confirmed. 16.10% did not give the answer, and 4.8% of respondents considered it insufficient. Here we can state that the company should work more in this area and try to rectify the situation in this case, because communication between superior and subordinate is a very important element for managing daily work tasks. Without adequate and timely communication during work assignments, tasks, and solving problems that arise, the company will have problems managing these difficult situations and eliminating errors that occur in the workplace and that can slow down the achievement of the company's goal. In the second part of RA3, it was interesting to find that despite the less-than-ideal communication between the superior and the subordinate, we found that in the case of problems or ambiguities, the respondents have someone to turn to, and thus up to 62.9% of the respondents indicated this possibility. The assumption that more than half of the respondents state that they have no one to turn to in case of problems was therefore not confirmed. 32.3% of respondents said that they do not solve the problems and ambiguities that have arisen and, therefore, do not need to turn to another person. In the event of such problems, 4.8% of respondents said they have no one to turn to. From the results, we dare to say that this situation is not beneficial for any company. It is important that the employee knows exactly who to contact and who will help him in the event of problems. It is evident that there is a part of the respondents who do not try to solve the problems, which is quite a serious finding. And on the other hand, there is a small part of the respondents who would like to solve the problems that have arisen but probably do not have confidence in their superiors. This is also a significant finding. Due to long-term operation in such a mode, it may happen that the company may end up in an unpleasant position over time precisely because of employees who do not solve the problems that have arisen, who have no one to solve the problems that have arisen with, and finally, also because of workers who could help solve problems, but they are probably not interested in them. By asking what the respondents would like to change in the event of a possible change in the company, we verified the RA4 assumption. Here we gave the option of choosing multiple answers and found that up to 41 answers related to changing the remuneration system. So, our assumption was not confirmed. We assumed that a change should occur in the approach of superiors to subordinates. A change in employees' awareness of the company's operations was the second most frequent

answer, i.e., it was marked 23 times, and we can state that this assumption has been confirmed. Access by a superior to a subordinate was marked 12 times, and a change in the company's staffing 11 times. We were interested in the answers of one respondent who took advantage of the opportunity, and in the other box, stated a change in the company's thinking. Based on these facts, we can conclude that the respondents are not satisfied with the remuneration system and would welcome a change. This is quite a serious finding for the company and needs to be seriously addressed based on these facts. Employee satisfaction means that they will fulfill their work duties conscientiously. However, if workers are not satisfied with the remuneration system, it is necessary to look for the causes and possibilities of changing this state. For the last assumption RA5 we chose, we sought an answer with a question about goals and values from the questionnaire. We assumed that more than half of the respondents do not know the goals and values of the company in which they work, and at the same time, we assumed that the organizational culture of the company could be improved by a more personal approach to resolving potential conflicts. Our first assumption was not confirmed, as we found that up to 75.8% of respondents stated that they were aware of the goals and values of their company. This finding is very positive, even though there are still 24.2% of respondents who are not interested in the goals and values of the company. Here, the question arises whether this group of respondents works in the interest of the company and the fulfilment of common goals, or whether, by their approach, they are included among the employees who do not care about the running of the company. The fulfilment of partial goals leads to the fulfilment of the common goal. We are considering whether this group of respondents is not satisfied with the remuneration system, which would make sense in its essence. Here, it is necessary for the company's management to start dealing with these issues. In the second part of RA5, we assumed that respondents would welcome a more personal approach to resolving potential conflicts as part of improving the organizational culture in the company. For this question, we gave the respondents several options to choose from. The assumption was not confirmed. We found that a more personal approach to solving possible conflicts was indicated 15 times. They put communication in the first place in improving the organizational culture and chose it 23 times. A total of 7 designations received directive management and distancing from conflict situations. They preferred open management six times. The open answers used by 2 respondents were interesting, and they stated that the change should occur in the expertise of the workers and by improving morale and authority. One of them even stated that morale and authority have declined over time. Even though the questionnaire was anonymous, and we gave the option of 3 open answers in the questionnaire, only a very small percentage of the respondents decided to write their personal vision and direction of the company. It is an interesting finding, but anyway, it is up to the company to decide how to deal with these findings, identify them, and try to find solutions to these discovered facts. We found shortcomings in communication towards the management and in the fact that some employees feel that they cannot turn to a competent person in case of problems. For this reason, we took the liberty of proposing several solutions for the company. Communication between a superior and a subordinate is very important in every company, as essential information, orders, or various tasks are transferred in this direction. From personal consultations, we found out that communication takes place on several levels as efficiently as possible. However, from the questionnaire survey, the respondents described such communication as insufficient. It also follows from the questionnaire survey that the respondents do not always solve the problems and ambiguities that have arisen and even have no one to turn to in case of problems and ambiguities. Based on the established facts, we proposed an employee representative to the company, who would deal with comments from employees on a regular basis. Employees would no longer be afraid to express their opinions in front of their superiors, and thus all suggestions, regular comments, or complaints would be directed to their superiors. There

would be no problems in that the employees would have no one to turn to in such a case, since there would be a person authorized to do so. The employee representative would have an email address to which employees could send an email at any time and express either complaints or various suggestions for change. Subsequently, received emails from employees would be dealt with and consulted at meetings. Communication between a superior and a subordinate often gets stuck if the employees do not dare to present their dissatisfaction or their own opinion to the superior. In such a case, we proposed a box for complaints, comments, or suggestions to the company, where employees could write anonymously. A mailbox would be a big plus for employees who are more introverted but creative with good ideas and solutions. At certain intervals, authorized workers would check the mailbox at certain intervals and refer letters from employees to the superior. The employees would write which division the comment is from, and subsequently, at the next meeting, responses to suggestions, comments, and complaints from employees could be discussed and reviewed. From the questionnaire, we found out that there are formal and informal relationships in society. Formal relationships prevail mainly among new employees, and informal ones, on the other hand, among long-term employees of the company, when friendships have already been formed. We suggested that the company organize more company parties, meetings, or teambuilding to deepen working relationships. At social events, new employees should establish closer relationships, which is sometimes not possible in the workplace due to the amount of work. As a last suggestion for good relations at the workplace, we would suggest to the company a questionnaire for ascertaining employee satisfaction, comments, and changes they would like to implement, as we asked in the questionnaire what they would like to change if possible. The questionnaire could be completed once every six months, so that the management also has feedback. The questionnaire would contain both closed and open questions so that employees would have the opportunity to express their own opinions.

4 Conclusion

It can be stated that the building and the interior of the company are modernly furnished, looking pleasant and new. The stairwell contained the necessary information that employees should have at their disposal, such as a fire plan or information related to work safety. The building and rooms are decorated in corporate colors. We were also interested in the education and training of employees. We have conclude that employees are actively retrained either within the company or outside the workplace. We also noticed how the employees were dressed. The company does not have prescribed work clothes for the administrative workers on whom the survey was focused. Workers have prescribed protective clothing. Employees in the administrative building are decently dressed and well-groomed. Communication also went smoothly. Employees communicate with each other amiably and smoothly at all levels. Through a questionnaire survey, we tried to find out whether organizational culture is important for employees, what kinds of relationships prevail in the workplace, at what level communication is in superior-subordinate interaction, whether they consider ethics and etiquette to be essential, whether social activities are held to strengthen relationships, and similarly. The subject of our interest represents the basic determinants for determining the strength or weakness of organizational culture. For example, we discovered that employees would like to improve the compensation system or information about the company's operations. After collecting data from the analysis of observation and personal interviews as well as from the analysis of the questionnaire survey, we analyzed the results and then summarized the current situation in connection with the organizational culture in the company. In conclusion, we recommended the company's proposals for improving the organizational culture in the company.

Awareness of the importance of organizational culture must be intense and not underestimated, because it is in direct consequence to employee satisfaction, higher efficiency, and performance, and last but not least, customer satisfaction in any industry of profit and non-profit companies.

Acknowledgements

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Global impacts of Covid 19 on the labour market of the Czech Republic regarding Industry 4.0

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Abstract

Research background: In 2019, the global Covid 19 pandemic began, which has had an impact on all the states of the European Union and beyond. Although Covid 19 has had an impact on all economic sectors, some have been affected significantly more than others.
Purpose of the article: The Czech Republic is an industrially oriented country. The aim of the article is to analyze the effects of Covid 19 on the main macroeconomic indicators with an emphasis on the unemployment rate, average wages, labor productivity and sales of the manufacturing. Covid 19 had a negative impact on these variables and due to its influence, the speed of globalization can be expected to slow down or even decrease it. Multinational firms are expected to return to their home countries and the resilience of production chains will be more important than production efficiency. At the same time, Industry 4.0 and the emerging Industry 5.0, which will enable labor to be replaced by capital, are gaining ground on the market.
Methods: Based on secondary data, the impacts of the Covid 19 pandemic on basic macroeconomic indicators will be analyzed and their further development will be predicted. A partial goal will be the analysis of the impacts of Industry 4.0 on the labor market. The correlation analysis will be performed (correlation matrix will be composed) at first, which will be established between the unemployment rate, sales, average wages and labor productivity. Subsequently regression models will be developed with relevant economic indicators.
Findings & Value added: All key macroeconomic indicators were negatively affected by the Covid 19 pandemic. There is a very strong positive correlation between sales and the average wage, on the contrary, there is a very strong negative correlation between sales and the average unemployment rate and between the average wage and the average unemployment rate.

Keywords: *Industry 4.0; sales; average wages; correlation analysis; labor productivity.*

JEL Classification: *E24; F62; J21*

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1 Introduction

The last years are marked by constant changes. At the end of 2019, the Covid-19 pandemic came, followed by the war conflict in Ukraine and the current energy crisis, which resulted in the onset of another economic crisis. Companies must adapt quickly and efficiently to this turbulent time.

A growing body of research emphasizes the importance and development of dynamic capabilities, as well as the contingencies that can influence such development. The reality, globalization and context of international trade requires that companies develop and effectively deploy dynamic capabilities to achieve evolutionary fitness, adapt and successfully exploit opportunities (and neutralize threats) arising from technological, social, geopolitical, institutional and economic changes and interdependencies between different layers inclusion (Zahra et al., 2022).

Industry 4.0 will have significant impacts on the labor market. Although a large proportion of jobs will disappear, new jobs will be created (Hedvičáková & Král, 2019, 2021). The benefit of robotization will exceed the negative effects on unemployment and will lead to higher work comfort and possibly even shorter working hours. Companies will increase their labor productivity.

Research (AlKathiri, 2022) has found evidence of unconditional convergence in labour productivity in the manufacturing sector. Capital accumulation is the main driver of the observed unconditional convergence, while technological change contributes to divergence rather than convergence. The findings suggest that expanding productive activities through capital accumulation is essential for developing countries to catch up with developed countries.

Labor productivity is a key parameter because it has a direct impact on the competitiveness of small and medium-sized enterprises (Hamza et al., 2022). At the present time, when material costs and energy costs are rising for companies, companies are trying to save on personnel costs. However, with the rising rate of inflation, pressure is being created by unions and employees to increase wages. The Czech Republic has a specific low unemployment rate, when the demand for labor exceeds the supply of labor on the labor market. This situation stimulates wage growth because there is not enough labor in the labor market. This situation also affects labor productivity and sales of the manufacturing industry. The aim of this article is the analysis of key variables on the labor market of the Czech Republic in the manufacturing industry.

2 Goals and methodology

2.1 The goals of the paper

The goal of the paper is analysis and prediction of basic macroeconomic indicators and the impacts of the Covid 19 pandemic. A second goal will be correlation analysis, which will be established between the unemployment rate, sales, average wages, and labour productivity. Subsequently, regression models will be developed with relevant economic indicators.

2.2 Correlation analysis

There will be performed correlation analysis (correlation matrix will be composed) at first, which will be established between the unemployment rate, sales, average wages, and labour productivity.

The relationship between characters or random variables X and Y can be positive if (approximately) Y = kX, or negative, if Y = -kX. The value of the correlation coefficient −1

indicates a completely indirect dependence (anti-correlation), i.e., the more the values in the first group of characters increase, the more the values in the second group of characters decrease (Hebák, 2007; Meloun et al., n.d.; Romesburg, 1984; Zou et al., 2006).

Pearson's correlation coefficient is defined if the squares of the random variables X and Y are finite. It is based on the idea that we normalize the covariance to a dimensionless number taking on values between -1 and 1 by dividing it by the standard deviations of both variables (Field, 2007; Lavine, 2000).

Subsequently, regression models will be developed where the dependent variable is the relevant economic indicators, and the independent variable is time.

2.3 Data and correlation matrix

The data presented in this and the next chapter are from the Panorama of the Manufacturing Industry from the Ministry of Industry and Trade. Data for the manufacturing industry is available until 2020. The manufacturing industry is key to the economy of the Czech Republic and accounts for approximately 30% of the gross domestic product. In the following Table 1 are data, used for correlation analysis. Other macroeconomic data are drawn from the Czech Statistical Office (Czech Statistical Office, 2022).

Table 1. Data of unemployment rate, sales, average wages and labour productivity, in years 2008 - 2020

	Unemployment rate	Sales (in thousands CZK)	Average wages (in CZK)	Labour productivity
2008	4,4	3 563 298 004	21 713	0,4
2009	6,7	3 009 481 500	22 200	-2,9
2010	7,3	3 345 870 414	23 017	3,4
2011	6,7	3 614 174 623	23 763	1,9
2012	7,0	3 720 020 199	24 573	-0,9
2013	7,0	3 746 577 813	24 894	-0,1
2014	6,1	4 121 638 902	25 735	1,6
2015	5,0	4 281 903 824	26 497	4
2016	4,0	4 347 622 180	27 724	1,3
2017	2,9	4 688 814 806	29 555	3,8
2018	2,2	4 856 275 646	31 935	2
2019	2	4 979 072 709	34 012	2,8
2020	2,6	4 608 612 189	34 600	-4

Source: (The Ministry of Industry and Trade of the Czech Republic, 2018), own processing

Correlation matrix, constructed using Pearson correlation coefficients, is following:

Table 2. Correlation matrix between the examined economic indicators

	Unemployment rate	Sales (in thousands CZK)	Average wages (in CZK)	Labour productivity
Unemployment rate	1	-0,87269381	-0,8497499	-0,11335227
Sales (in thousands CZK)	-0,872693806	1	0,91660372	0,301093203
Average wages (in CZK)	-0,849749901	0,916603721	1	0,007925766
Labor productivity	-0,11335227	0,301093203	0,007925766	1

Source: The Ministry of Industry and Trade of the Czech Republic (2018), own processing

3 Results

3.1 Correlation analysis results

From the table of Pearson's correlation coefficients, it can be seen, that all the examined economic indicators are correlated. There is a very strong positive correlation between sales and the average wage, on the contrary, there is a very strong negative correlation between sales and the average unemployment rate and between the average wage and the average unemployment rate.

These results are also evident from the following graphs, which show the time series of the investigated economic indicators in the monitored period. The graphs also show predictions for the following period.

For the unemployment rate the figure 1 is following:
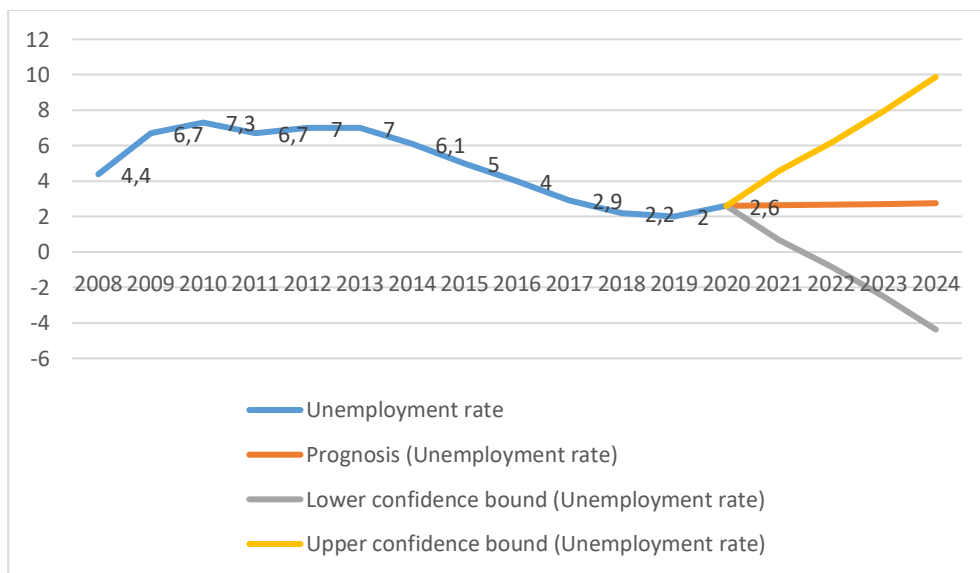
Figure 1. Development and forecast for the unemployment rate

Source: The Ministry of Industry and Trade of the Czech Republic (2018), own processing

For the sales the figure 2 is following:
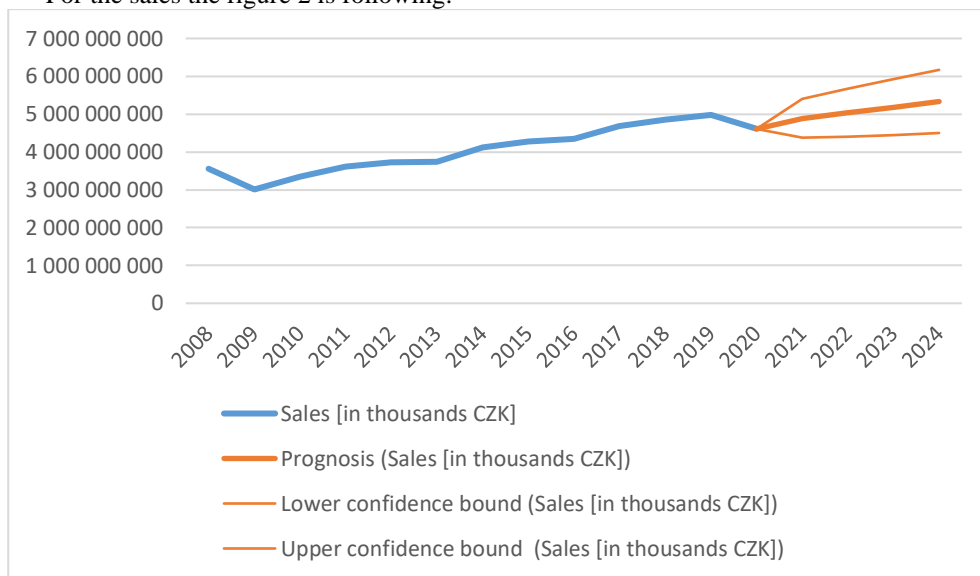
Figure 2. Development and forecast for the sales

Source: The Ministry of Industry and Trade of the Czech Republic (2018), own processing

And for the average wages the figure 3 is following:
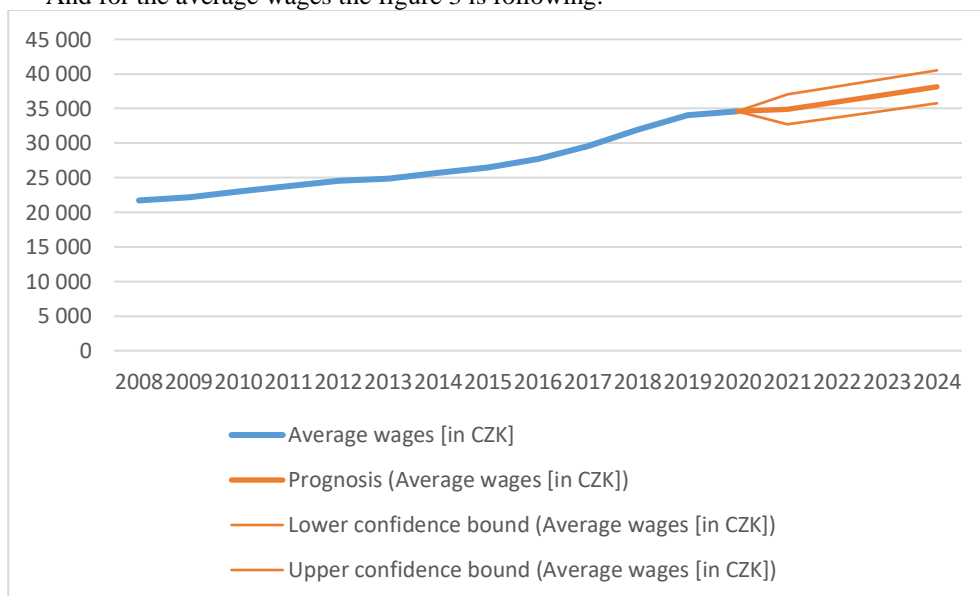
Figure 3. Development and forecast for the average wages

Source: The Ministry of Industry and Trade of the Czech Republic (2018), own processing

And for the labour productivity the figure 4 is following:

Figure 4. Development and forecast for the labour productivity

Source: The Ministry of Industry and Trade of the Czech Republic (2018), own processing

From the previous figures 1-4, it is easy to see that sales and average wages have the same trend, and the unemployment rate, on the other hand, has the opposite trend. Which is consistent with our correlation analysis results.

4 Conclusions and discussion

The Czech Republic has one of the lowest unemployment rates in the European Union. Even during the Covid-19 pandemic, the unemployment rate remained below the natural unemployment rate. In 2021, the general unemployment rate was 2.8% according to the Czech Statistical Office (Czech Statistical Office, 2022). In contrast, the inflation rate began to rise slowly. In 2021, the average annual inflation rate was 3.8% in the Czech Republic. In 2022, there was a significant acceleration in the rate of inflation, and the values passed the double-digit ranks. The consumer price index was 17.2% in August 2022. Although nominal wages rose by 4.4% in the second quarter, real wages fell by 9.8% in the second quarter of 2022. The gross domestic product reached CZK 6,108.4 billion in 2021 and grew. For the second quarter of 2022, it grew by 3.7% year-on-year. This growth is partly influenced by rising prices.

The Industry 4.0 initiative is increasingly gaining ground in the labour market, but also in other areas. This initiative has effects primarily on the labor market. In the beginning, people were worried about the substitution of human labour for machines and the related increase in unemployment. Now, however, the negative expectations have eased, because it is known that although some - mainly routine or less qualified jobs - will disappear and be replaced by robots, new jobs will be created. Discussions are also starting to shorten the working week. However, the current era brings with it pressures to shorten the production cycle, requirements for just in time, and customization of production. As a result of the war,

supply chains were also disrupted. There is also talk of the deglobalization of production. Companies are constantly looking for ways to produce and deliver products to their customers on time. Due to the increase in inflation and average prices, it is increasingly difficult to maintain competitive prices. One of the ways to increase labor productivity and thus overall efficiency is to replace labor with capital. These results support arguments for divergence between the effects of work vs. total productivity on the risks of job loss, as well as the divergence between the effects of temporary (layoffs) and permanent job losses (layoffs or unemployment) (Krutova et al., 2021). Research (Malik et al., 2021) shows that economic slowdowns hurt unemployment rates. Also, ensure that the supply chain works well within various constraints. According to the forecast, average wages and sales in the manufacturing industry of the Czech Republic should grow in the coming years. Conversely, the unemployment rate should stagnate below 3% despite the upcoming Industry 4.0 initiative. The problem of the manufacturing industry is declining labor productivity. The labor productivity of the manufacturing industry should grow slightly in the coming years but should remain lower than before 2019. One of the possibilities for further growth is the significant robotization of the Czech Republic's manufacturing industry.

Research (Stundziene & Baliute, 2022a) in EU countries shows that crises and economic slowdowns reduce investment in tangible capital. Meanwhile, economic growth spurs more investment. A negative correlation between apparent labor productivity and the investment rate suggests that investment in tangible assets is inefficient.

Research (Stundziene & Baliute, 2022b) in 27 European countries has shown that there is a long-term relationship between personal costs and apparent labor productivity, and there are no significant differences between European countries in the impact of personal costs on apparent labor productivity, but they do vary over time. Companies try to maximize their profits and for that reason, they try to optimize personnel costs. The increase in personnel costs increases the gross operating rate if the turnover per employed person is stable. Turnover growth has a positive effect on apparent labor productivity, but a negative effect on the gross operating rate. The effect of turnover on apparent labor productivity is therefore significantly lower than the effect of personnel costs on apparent labor productivity.

The study (Nikulin, 2015) found that the trajectory of the development of wages, productivity and unemployment in the new EU member states is diverse. The study confirmed a strong relationship between changes in the ratio of wages and productivity in Poland in relation to the Czech Republic, Estonia and Hungary. Moreover, the increase in productivity in Poland compared to the Czech Republic is greater than the increase in wages in Poland compared to the Czech Republic.

Acknowledgements

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Think globally or locally in meat consumption: Exploring consumer behaviour of Slovak meat consumers

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Abstract

Research background: Globalization, global trends, expansion of multinational meat companies, and free trade agreements create a wide meat supply for consumers. In recent years, the increased demand for meat and the global increase in meat consumption have been much discussed due to the negative effects on the environment.

Purpose of the article: The aim of the paper is to point out the increasing meat consumption in Slovakia as a global trend, to identify Slovak consumers' behaviour in meat consumption in view of global and local tendencies in the examined market, and to explore factors influencing the future behaviour of meat consumers on the global meat market.

Methods: The consumer survey was conducted by snowball sampling method in 2020 in Slovakia (n=1,409 respondents). Data related to meat consumption and factors determining consumption, considering global and local trends, were processed, and evaluated through mathematical and statistical methods.

Findings & Value added: The results showed that meat consumption in Slovakia is increasing, and most Slovak consumers reach excessive consumption. Key factors affecting consumption are the quality, origin, freshness, and composition. Future meat consumption regarding global trends will be determined by meat supply, meat composition, meat adulteration and changes in eating habits. The study provides an insight into consumer behavior in the global meat market, and meat origin as a determinant of future consumption of local meat products. The study provides valuable information for meat processors, and for creation and improvement of food policy to follow trends related to globalization, sustainability, and environmental protection.

Keywords: *meat; meat products; meat consumption; Slovakia; global trends*

JEL Classification: *Q13; M31; M39*

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1 Introduction

Recently, there has been an increase in meat consumption, and it is expected that the global demand for meat will increase over the coming decades (Font-i-Furnols and Guerrero, 2022). There has been a recent increase in meat consumption. The reason for the growing trend of meat consumption is the growing population, but also the growing incomes of consumers (Filippini and Srinivasan, 2019). Moreover, the average consumption of meat per capita also has an increasing tendency (Henchion et al., 2014).

Globalization and global trends are one of the key reasons for the increase in the consumption of meat and meat products (Llauger et al., 2021). The liberalisation of trade and the expansion of global trade have become important factors determining the growth of meat consumption. Globalization has supported the emergence of multinational companies and business chains in the food industry, including the meat processing industry, which has also changed the availability of various food products and expanded the assortment (Hanus, 2018). A wider range of meat products is also possible due to free trade, new production technologies and packaging options that preserve the freshness of meat for several days and thus extend the shelf life of meat products (Li et al., 2022).

Globalization and the growth of meat consumption also have negative aspects. As international meat trade is growing rapidly, the environmental impacts of meat production are significant (Wen et al., 2018). Without changes in animal husbandry practices or advances in production technology, high meat consumption is environmentally unsustainable (Hedenus et al., 2014). Another negative milestone is the transport of meat and meat products between countries, which has negative environmental impacts due to greenhouse gas emissions (Salami et al., 2019). Hernández-Castellano et al. (2013) adds that the transportation time for imported meat is also a critical factor that affects the quality of imported meat. Thus, high meat consumption represents a serious problem in terms of public health and environmental sustainability (Milford et al., 2019; Filippini and Srinivasan, 2019; Hielkema and Lund, 2021).

In the context of the negative effects of globalization and the high consumption of meat, it is necessary to pay attention to other factors such as the quality or origin of the meat when consuming meat, as well as to gradually reduce the consumption of meat. An increasing number of consumers will pay attention to quality during the process of choosing meat. Meat quality is determined by animal welfare, food safety, and meat production technologies, and consumers in developed countries are increasingly interested in these aspects (Henchion et al., 2014). Consumers assess the quality of fresh meat also based on its origin. The origin of meat can be considered an important factor in the choice of meat, and consumers tend to prefer domestic products to products that are imported from other countries over long distances (Wang et al., 2018). Several studies (Hersleth et al., 2012; Sasaki, 2022) have shown that consumers pay attention to the country of origin when choosing different types of meat and prefer domestic products. In this context, it is desirable to choose meat that is obtained from regional breeds (Hernández-Castellano et al., 2013).

In connection with the pointing out the negative effects of globalization, it is necessary to reduce meat consumption, and thus climate mitigation cost will decrease (de Boer et al., 2016). Despite the fact that meat contains nutrients, proteins and other substances beneficial to health, and it can partly be replaced by other alternatives (Godfray et al., 2018), which are sustainable, e.g. plant-based meat substitutes, hybrid meat products, or in the future edible insects and cultured meat (Hadi and Brightwell, 2021; Font-i-Furnols and Guerrero, 2022).

In the context of globalization and the negative impacts of excessive meat production and consumption, it is necessary to reduce meat consumption and focus on consuming smaller amounts of higher quality meat from local production. The aim of the paper is to point out the development of meat consumption in Slovakia and to identify key factors regarding

global and local tendencies, as well as the possible future development of meat consumption and factors influencing the future behaviour of meat consumers on the global market meat. Therefore, research paper tries to answer the following research questions:

RQ 1. Which factors related to global and local tendencies are key ones for meat consumption of Slovak consumers?

RQ 2. What will be the future development of meat consumption and what factors are important for elimination of meat consumption in Slovakia?

2 Methods

The development of the meat consumption in Slovakia was evaluated based on the data obtained from the Statistical Office of the Slovak Republic. The 10-year period 2012-2021 was analysed and the development trend was described using a linear regression function:

$$yi = \beta0 + \beta1xi + \varepsilon i \tag{1}$$

where: yi - i-th observed value of the explained variable,

$\beta0$, $\beta1$ - unknown parameters of the regression model,

xi - i-th value of the explanatory variable,

εi - number of observations

Mathematical methods and calculation of the coefficient $\bar{k}$ were also used in the processing of secondary data.

$$k = \sqrt[n-1]{k_2 * k_3 * \ldots . k_n} \tag{2}$$

Consumer behaviour on the meat market was examined based on the consumer survey. The online questionnaire survey was carried out using the snowball sampling method in 2020 on a sample of 1,409 respondents. Respondents were divided into eight categories: gender (women 59.0%; men 41.0%), age (18-25 years 38.8%; 26-35 years 22.1%; 36-50 years 21.8%; over 51 years 17.3%); education (basic 3.4%; secondary school 47.5%; university education 49.1%), place of residence (countryside 45.5%; city 54.5%), economic status (employed 48.9%; entrepreneur 8.9%, student 31.2%, pensioner 7.6%, unemployed 0.8%, maternity leave 2.7%), number of household members (1 member 5.8%; 2 members 20.3%; 3 members 27.3%, 4 members 30.0%, 5 members 11.9%, more than 5 members 4.6%), monthly income of the respondent (up to 500 euros 39.2%; 501 – 1,000 euros 37.3% ; 1,001 – 1,500 euros 16.5%; 1,501 – 2,000 euros 4.6%; more than 2,001 euros 2.3%), monthly household income (up to 1,000 euros 17.7%; 1,001 – 2,000 euros 49.6%; 2,001 - 3,000 euros; 23.7%; 3,001 – 4,000 euros 4.8%; more than 4,001 euros 4.1%).

Consumers determined the amount of consumption of individual types of meat products in the number of portions consumed per week. Subsequently, we converted these portions into consumption amounts in kilograms per week and year. Meat consumption of each respondent involved in the questionnaire survey was compared with the recommended consumption doses. Using the Chi-square test of independence, we determined the dependence between the meat consumption and the respondent's monthly income.

Consumers further rated 20 factors of meat consumption on a scale from 1 to 10, with 1 representing the unimportance of the factor and 10 the high importance of the factor. We

determined the differences in the evaluation of these factors by applying the Friedman test and multiple pairwise comparisons using Nemenyi's procedure.

Consumers determined the possible development of the future meat consumption, as well as its possible determinants. Respondents evaluated 12 aspects that may affect the future global meat market. We identified differences in the evaluation of these aspects using the Friedman test and the Nemenyi's procedure. We identified the hidden relationships between the investigated factors using a categorical principal components analysis (CATPCA).

The collected data from the questionnaire survey were processed by using Microsoft Excel and evaluated in the statistical programs IBM SPSS and XLSTAT.

3 Results and discussion

The consumption of meat and meat products per inhabitant of the Slovak Republic has gradually grown in the last 10 years, and the average annual growth rate has reached the level of 3.25% (k´=1.0325) (Figure 1). Until 2016, the consumption of meat and meat products in the Slovak Republic was slightly below the level of recommended doses (57.3 kg). Currently, the consumption of meat and meat products is recorded at a high level, and in 2021 the average Slovak consumer consumed 70.0 kg of meat and meat products, and the recommended amount of consumption was exceeded by more than 20%. Pork (55.7%) and poultry (33.9%) account for the largest share of the total consumption of meat and meat products. On the other hand, beef (8.1%) and other types of meat, such as venison, mutton, goat, or horse meat (2.3%) are the least represented in the total consumption of meat.
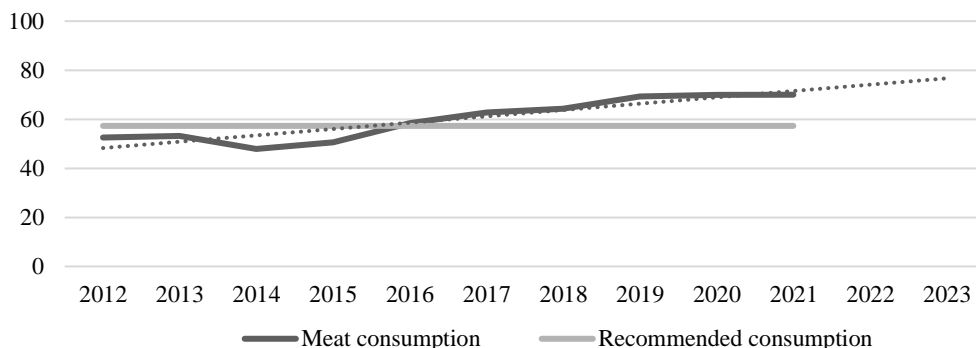
Figure 1. Annual meat consumption in the Slovak Republic in the years 2012-2021.

Source: own processing according to the data of the Statistical Office of the Slovak Republic, 2022

We described the development trend of meat consumption using a linear regression model (3). The regression model as well as its parameters are statistically significant (p-value = <0.001) and the prediction accuracy of the statistical model is 84.79% (R^2= 0.8479).

$$qt = 45.693 + 2.583 * t \tag{3}$$

The consumption of the most consumed types of meat (poultry, pork, and beef) was also determined by Slovak consumers involved in the questionnaire survey. The results of the survey showed that Slovakia belongs to countries with a strong meat culture and only 2.6% of respondents do not consume meat. The survey was also aimed at identifying the amount of consumption, and the results showed that almost a third of respondents consume less than 56 kg of meat per year, which is relatively low consumption, but with a future perspective,

low consumption is desirable. Furthermore, we found that more than 50% of Slovak consumers have an excessive meat consumption, which represents a level of more than 62 kg meat per year. Adequate consumption of meat and meat products, within the range of recommended doses, was recorded in 15.4% of consumers. An increasingly discussed topic is that the consumption of meat depends on the income of the population, and therefore, by applying the Chi-square test, we determined the existence of a dependence between the monthly income of Slovak respondents and meat consumption (Table 1). We note that more than 50% of non-consumers of meat and meat products are consumers with a low monthly income of up to 500 euros. On the other hand, consumers with higher incomes tend to consume higher amounts of meat and meat products. In general, however, it is necessary to emphasize that even consumers with a low or average income consume relatively large quantities of meat and meat products, but prefer pork, which is cheaper compared to beef.

Table 1. Meat and meat products consumption in dependence of monthly income of Slovak consumers included in the survey.

		No consumption		Low consumption <56 kg		Middle consumption 56 – 62 kg		High consumption >62 kg	
Respondents (n=1,409)		**37** 2.6%		**441** 31.3%		**217** 15.4%		**714** 50.7%	
Monthly	*<500 €*	19	51.4%	202	45.8%	97	44.7%	234	32.8%
	501 – 1,000 €	8	21.6%	157	35.6%	72	33.2%	289	40.5%
	1,001 – 1,500 €	9	24.3%	61	13.8%	33	15.2%	130	18.2%
	1,501 – 2,000 €	1	2.7%	10	2.3%	9	4.1%	45	6.3%
	>2,001 €	0	0.0%	11	2.5%	6	2.8%	16	2.2%
		37	100.0%	441	100.0%	217	100.0%	714	100.0%

Source: questionnaire survey, 2020

The results showed that more than 97% (1,372) of Slovak consumers consume meat. Based on the consumption of individual types of meat, it can be concluded that the average meat consumer involved in the survey consumes 74.3 kg of meat annually, of which poultry is 31.3 kg (42.1%), pork 38.9 kg (52.4%) and beef is 9.2 kg (12.4%). Meat consumers were divided into three groups depending on the amount of consumption – low consumption, moderate consumption, and high consumption. The average consumer from the group "low consumption" consumes 36.4 kg of meat and meat products per year, with poultry meat accounting for 52% of the total consumption. Annual consumption of the average consumer from the group "moderate consumption" is at the level of 57.13 kg, and poultry meat accounts for the largest share of total meat consumption. The average consumer from the group "high consumption" consumes 103 kg of meat per year, and the largest share of consumption is pork. The average annual consumption of individual types of meat is shown in Table 2.

Table 2. Average meat and meat products consumption per consumer included in the survey (divided into groups of consumers based on the amount of meat consumption).

	Meat consumers			Average meat consumer
Meat and meat consumption	**Low consumption <56 kg**	**Moderate consumption 56 – 62 kg**	**High consumption >62 kg**	
Total meat consumption	**36.41 kg**	**57.13 kg**	**103.01 kg**	**74.34 kg**
in that: *poultry meat*	18.93 kg	27.77 kg	40.04 kg	31.31 kg
pork meat	13.42 kg	22.78 kg	49.88 kg	33.87 kg
beef meat	4.05 kg	6.58 kg	13.09 kg	9.16 kg

Source: questionnaire survey, 2020

The consumption of meat and meat products is very widespread among Slovak consumers and determined by various factors. The survey results showed that the quality of meat is a key factor. Applying Friedman's test (p-value = <0.0001) and its post hoc test by Nemenyi's procedure using pairwise comparisons, statistically significant differences between the selected factors were identified (Table 3). Based on the results, we can conclude that quality, freshness, proportion of meat are the most important factors, followed by aroma, appearance, country of origin, shelf life, health aspect, producer, price. Less important factors are meat composition or aspects of environment and convenience. Furthermore, we found that consumers perceive the quality based on its origin (the identifiers are the country of origin, the producer, or other markings on the packaging of meat products). In terms of the origin of meat, consumers prefer Slovak meat products, especially poultry (94.3%) and pork (85.6%). The lowest preference for Slovak meat was recorded for beef (80.8%), which can be justified by the lower beef consumption, as well as the availability of Slovak beef in groceries.

Table 3. Results of Nemenyi's procedure.

Factor	Mean of ranks	Groups										
quality	14.95											J
freshness	14.88										I	J
proportion of meat	14.13										I	
aroma	12.87									H		
country of origin	12.74									H		
appearance	12.72									H		
shelf life	12.24								G	H		
health	11.56							F	G			
producer	11.32						E	F				
price	11.27						E	F				
emulsifiers	10.57						E					
proteins	9.13					D						
water	9.11					D						
fat	8.53				C	D						
energy value	8.08			B	C							
salt	7.62	A		B								
saturated fatty acids	7.40	A		B								
environment	7.01	A										
nitrates	6.98	A										
convenience	6.88	A										

Source: questionnaire survey, 2020

The aim of the survey was also to explore how meat consumption, divided into individual types of meat, will develop in the future. The results showed that approximately half of consumers will not plan to change the amount consumed. A positive finding regarding the current global meat market is that 27.6% of consumers will plan to reduce poultry consumption, 37.5% of consumers will plan to reduce pork consumption, and 35.9% of consumers will plan to reduce beef consumption. The negative is that some consumers are thinking about increasing the future consumption of poultry (16%), beef (14.2%) and pork (9.4%). We also monitored the changing meat consumption in the future in individual groups of consumers according to the current level of consumption (Table 4).

Table 4. Future meat consumption.

Meat consumers		Future meat consumption								
		Poultry			Pork			Beef		
		↓	x	↑	↓	x	↑	↓	x	↑
Average consumption	n	379	774	219	514	729	129	492	685	195
(n=1,372)	%	27.6	56.4	16.0	37.5	53.1	9.4	35.9	49.9	14.2
Low consumption	n	109	272	60	178	235	28	164	230	47
(n=441)	%	24.7	61.7	13.6	40.4	53.3	6.3	37.2	52.2	10.6
Moderate consumption	n	57	119	41	90	106	21	74	108	35
(n=217)	%	26.3	54.8	18.9	41.5	48.8	9.7	34.1	49.8	16.1
High consumption	n	213	383	118	247	387	80	254	347	113
(n=714)	%	29.8	53.6	16.5	34.6	54.2	11.2	35.6	48.6	15.8

*↓ = lower future consumption x = future consumption without changes ↑= higher future consumption

Source: questionnaire survey, 2020

As it is desirable to reduce meat consumption in the future and the high meat consumption among Slovak consumers has been proven, the survey was also focused on factors that can influence the global meat market and the amount of consumption. The results showed that the most important factors for the future direction of the meat market are the meat adulteration, animal diseases, composition, living conditions of animals or the existence of food scandals. Applying Friedman's test (p-value = <0.0001) and Nemenyi's method, we found differences in the assessment of the factors of future meat consumption (Figure 2).
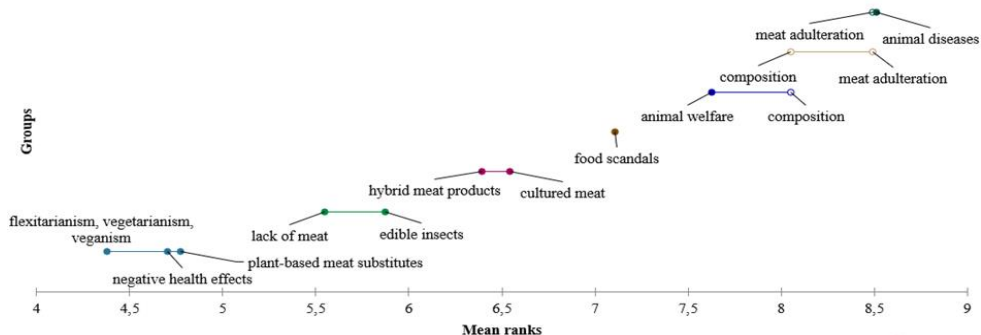
Figure 2. Factors affecting future global meat market (Demsar plot).

Source: questionnaire survey, 2020

Furthermore, we also identified hidden relationships between individual factors using a categorical principal components analysis (CATPCA) (Table 5). Three latent components were identified. The first one consists of meat adulteration, meat composition, animal diseases, animal welfare and food scandals. This component is related to livestock breeding and the meat production process, which is why it was named as "factor of production". The second latent component includes a tendency towards flexitarianism, vegetarianism, veganism, negative health effects resulting from meat consumption, as well as the lack of meat and the existence of plant-based meat substitutes. These factors relate to current problems and trends in the meat market, which can significantly affect consumption in the future, and therefore this factor was named as "factor of lifestyle and plant-based meat substitutes". The last latent component consists of the existence of hybrid meat products, cultured meat, and edible insects. The component refers to meat substitutes, which in the future may affect the global meat market and meat consumption, and therefore the factor was named "future meat substitutes".

Table 5. Factors affecting future global meat market (CATPCA).

	Dimensions		
	1	**2**	**3**
meat adulteration	**0.899283376**	0.012496714	0.190302627
meat composition	**0.875347288**	0.027940842	0.117322435
animal diseases	**0.836495555**	0.103697806	0.212592602
animal welfare	**0.813877867**	0.218028275	0.182787428
food scandals	**0.745305466**	0.122478674	0.046851308
flexitarianism, vegetarianism, veganism	0.094904078	**0.844763306**	0.073913974
negative health effects	0.055674434	**0.856869814**	0.210913557
plant-based meat substitutes	0.028001489	**0.803759695**	0.301864102
lack of meat	0.218116097	**0.733135209**	0.180357214
hybrid meat products	0.204601565	0.221712919	**0.907756408**
cultured meat	0.216429311	0.228235765	**0.867940973**
edible insects	0.165647142	0.244880824	**0.84900485**

Source: questionnaire survey, 2020

The results of the study showed a high meat consumption in Slovakia, while it was proven that the consumption of meat increases with increasing income. This is also confirmed by many studies that emphasize the connection between the growing demand for meat and the growing income of consumers (Milford et al., 2019). A study conducted by Regmi and Meade (2013) found that meat consumption is increasing even in countries with a lower average income per capita. Slovak consumers with a lower income also show a relatively high meat consumption, but especially pork. We have also identified the factors determining meat consumption, and the key ones are quality, origin, composition, price, convenience, or environment. We also pointed out the elements of globalization and locality in the identified factors of meat consumption. The high meat consumption in Slovakia is also a result of globalization, which has enabled a wide range of imported meat in groceries in Slovakia. Manning and Baines (2004) emphasize that the consumer saw the advantage of globalization in lower prices, a wider choice of products and "convenience" foods. On the other hand, Slovak consumers are interested in consuming high-quality meat and notice meat freshness and durability, as well as the country of origin and individual ingredients in meat products. The preference for the consumption of domestic meat is also confirmed by study conducted by Sasaki (2022). The aspect of the environment is also an important factor, and from the point of view of globalization, it is not only about negative impacts on the environment during the production and consumption of meat, but especially about the creation of the greenhouse emissions footprint when transporting meat between countries (Barthelmie, 2022). The global trend associated with consumer convenience has made it possible to produce semi-finished products that are sought after by consumers due to saving time in preparing meals (Grunert, 2006). Consumption trends in meat market related to globalization may raise concerns among consumers about the safety and quality of meat (Viegas et al., 2012). For this reason, it is possible that in the future more consumers will be inclined to consume meat of domestic origin, which will be fresh, high-quality and from the region. The results of a study conducted by Wongprawmas et al. (2018) show that consumers perceive the country of origin, especially domestic origin, as an indicator of meat quality and safety. We found that a significant reduction in meat consumption among Slovak consumers is not expected in the future. A study conducted by Hielkema and Lund (2021) also found that approximately 57% do not intend to reduce meat intake and 5% plan to increase it. However, considering the current trends in the meat market, we have identified the factor of production, lifestyle, and plant-based meat products, as well as future meat substitutes as key determinants of the future global meat market. Font-i-Furnols and Guerrero (2022) emphasize that the future global meat market will be influenced by the aspect of

sustainability, nutritional aspects, animal welfare, and meat alternatives. It is desirable to support a more rational meat consumption, which would contribute to public health and environmental protection (Font-i-Furnols and Guerrero, 2022). Many studies have also been carried out and indicate that a significant proportion of European citizens are willing to reduce meat consumption and partially replace meat with plant-based meat substitutes (Hielkema and Lund, 2021).

4 Conclusion

The high meat consumption is a discussed global problem, as it has a significant negative impact on sustainability, the environment, and the health of consumers. The aim of the paper was to point out the development of meat consumption in Slovakia in the years 2012-2021 and to identify the consumer behaviour of Slovak consumers. The results show excessive meat consumption, which should not decrease significantly in the coming years. Due to globalization, Slovak consumers can choose from a wide range of meat products. Currently, they reach an average annual consumption of more than 70 kg and the most preferred are poultry and pork. The key factor influencing the purchase of meat is quality, which is judged based on the country of origin by most Slovak consumers. Slovak consumers prefer to eat meat of Slovak origin. In the context of meat consumption and identified factors, it is therefore possible to point to elements of both globalization and locality in meat consumption. In the future, the meat consumption is not expected to change significantly, but with the current problems of the global meat industry, it is possible that future consumption will be determined by factors related to animal husbandry and meat production, or problems with a lack of meat and an orientation towards the consumption of meat substitutes. Based on the results and current developments on the meat market, it is possible to summarize that excessive meat consumption is a global problem and Slovak consumers should reduce meat consumption. However, it is necessary that they consume meat regarding their health and the environment, and therefore we suggest that Slovak consumers reduce their meat consumption and prefer Slovak meat characterized by high quality and freshness. The results of the study are a relevant basis for the scientific and research sphere because a similar study in Slovakia has not been conducted. The results of the study can also be applied in the practice of food enterprises in the development and production of meat products as well as meat substitutes. The limitation of the paper is the constant development of the global meat market, as well as the implementation of a consumer survey only in Slovakia. For this reason, it is possible to expand future research by exploring consumer behaviour between several countries.

Acknowledgements

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Micro-credentials in support of attesting the results of learning experiences

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Abstract

Research background: It is found that skills in the labor market are insufficient and inadequate. The digital transition and the green transition contribute to changing skills requirements and tasks. Certain learning experiences can lead to a flexible acquisition of skills, knowledge and abilities. Thus, through micro-credentials, these learning outcomes could be certified.

Purpose of the article: In the current context, the purpose of the article is to analyze the level of education of the population in the member countries of the European Union. It also analyzes the evolution of graduates by education level, as well as employees by educational attainment level.

Methods: In the article, the comparative situation of the number of graduates by education level is presented. The article also presents an analysis of the level of education of the population of the population of the European Union. At the same time, the article presents the situation of employees by educational attainment level.

Findings & Value added: Following the analysis, it is found, at the level of the European Union, in 2021 compared to 2006, the population aged between 15 and 64, with a level of education between 3 and 4, decreased, and the population with a level of education between 5 and 8 increased. Also, in most countries of the European Union, the number of graduates for 2020 has decreased compared to the number of graduates in 2013. Regarding the share of employees, at European level, in 2020, compared to 2013, the values have decreased for less than primary, primary and lower secondary education, respectively for upper secondary and post-secondary non-tertiary education, and increased for people with levels 5-8 of education.

Keywords: *education level; employees; graduates*; *micro-credentials*

JEL Classification: *I21; I25; J21*

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1 Introduction

There are frequent changes in the labor market (Ladaru et al., 2022; Belostecinic et al., 2022)). Thus, there are certain gaps between the market demands and the professional training that the population has (Angheluta et al., 2021). For this reason, measures are needed to update the skills of the population (Radulescu et al, 2021).

The acquisition of personal and professional skills has become increasingly aware . This is also due to the requirements of the labor market to increase the level of competitiveness (Profiroiu et al., 2021).

Even if people want to participate in a training process for the purpose of personal development or want to access additional training programs, which will ensure a career development or an increase in employability, interest in participating in education programs and training is great (Sarbu et al., 2021).

At the same time, on the market of vocational education and training, there are requests for identification and application of more flexible forms of education (CEU, 2022b).

The evolutions of production technologies have led to changes in the labor market, but at the same time they have also influenced the learning environment (Nastase et al., 2020). This creates new opportunities in terms of skills development, but also new perspectives for applying knowledge (Radulescu et al., 2020). The transformation of learning and teaching environments can be achieved by educators by capitalizing on the benefits of digital technology in terms of the educational process (Ifinedo & Kankaanranta, 2021).

In this context, micro-credentials can be the solution to these issues. With their help, knowledge can be more easily acquired and recognized, even if the learning took place in a formal, non-formal or informal context (Negescu Oancea, et al., 2020). And in these conditions, a more accessible transition from school to work can be achieved (Bodislav et al., 2019). One of the objectives that micro-credentials should meet is the possibility for them to be developed and compared. Micro-credentials can also be an advantage for vulnerable or disadvantaged people. Regardless of the sector or field of activity, the development, use and comparison of micro-credentials should be carried out in a consistent manner for all stakeholders (CEU, 2022a).

To the transformation of the teaching environment, of the learning environment, but also of evaluation, a contribution can be made by the use of electronic portfolios for this purpose (Walland & Shaw, 2022).

Solving together practical work situations, tasks that require teamwork, lead to the common construction of knowledge (Profiroiu et al., 2020). Thus, students participate in the arguments of other participants in the training act (Valero Haro et al., 2019).

The efficiency of teaching and learning can also be increased by applying computer-based assessments. Thus, students could follow the evolution of their performance, respectively the acquisition of skills and knowledge (Admiraal et al., 2020).

In any field of higher education, due to technological transformations, interdisciplinary approaches are needed. Solving problems that occur in society can be achieved through interdisciplinary practices (Cobb & Golub, 2022).

Their own research conducted by students, research that allows the construction of skills, allows them to later put into practice more easily the knowledge they acquire in the educational process (Steinhardt, 2020).

It has been shown in pedagogical practice that the use of information and communication technology has allowed the rapprochement between community members, as well as the creation of networks, which have led to improved learning (Hrastinski & Ekman Rising, 2020).

2 Methods

With the implementation of information and communication technology, educational practices have been reorganized. Roles have changed and new tasks and responsibilities have emerged, as well as learning tools (Maaranen & Kynäslahti, 2021).

Starting from these aspects, for the population of the member countries of the European Union, in the age group 15-64 years, the article presents a comparative analysis of the level of education of the population. At the same time, for 2013, respectively for 2020, an analysis of graduates by education level is performed. At the same time, for the member countries of the European Union, the article presents the situation of employees by educational attainment level.

Following the analysis, it is found, at the level of the European Union, in 2021 compared to 2006, the population aged between 15 and 64, with a level of education between 3 and 4, decreased, and the population with a level of education between 5 and 8 increased. Also, in most countries of the European Union, the number of graduates for 2020 has decreased compared to the number of graduates in 2013.

Regarding the share of employees, at European level, in 2020, compared to 2013, the values have decreased for less than primary, primary and lower secondary education, respectively for upper secondary and post-secondary non-tertiary education, and increased for people with levels 5-8 of education.

3 Results and Discussions

The new requirements of the labor market have led to the need to apply measures to readjust study programs. In this sense, it is necessary to bring the economic sectors and educational institutions closer together, especially universities (Gruszka, 2020).

The Table 1 presents the comparative situation of the population by educational attainment level, for people aged between 15 and 64, for 2006, respectively for 2021 (%).

From the point of view of the population by educational attainment level, from the data presented in the previous table, it is observed that, at the level of the European Union, the population aged between 15 and 64, with a level of education between 3 and 4, decreased by a percentage in 2021 compared to 2006.

The countries where the values decreased in significant percentages are: Austria (-10.5%), Luxembourg (-9.8%), Slovenia (-8%), Lithuania (-8%). Increases were: Portugal (+14.7%), Malta (+13%), Greece (+6.5%), Italy (+3.8%), Romania (+3.7%), Croatia (+3.1%), Spain (+2.8%).

In 2021, high percentages of the population aged between 15 and 64, with a level of education between 3 and 4, had: Czech Republic (64.5%), Romania (62.1%), Slovakia (62.1%), Croatia (61.3%). For each of these countries, the share of the male population was higher than that of the female population.

For the same time period analyzed (2006-2021), at the level of the European Union, the population aged between 15 and 64, with a level of education between 5 and 8, increased by 10.5%. It is also observed that in all countries there have been increases in values. The most significant were: Luxembourg (+24%), Malta (+18.2%), Lithuania (+17.8%), Ireland (+17.7%), Slovenia (+17.6%). The smallest increases were registered in: Denmark (-5.5%), Italy (-6.4%), Finland (-6.5%), Romania (-6.8%), Germany (-6.9%).

In 2021, high percentages of the population aged 15 to 64, with a level of education between 5 and 8, had: Ireland (45.2%), Luxembourg (44.5%), Cyprus (41.9%), Lithuania (39.8%), Belgium (39.7%), Sweden (39.7%). For each of these countries, the share of the female population was higher than that of the male population.

Thus, in 2021, approximately 40% of the female population in the following countries had a level of education between 5 and 8: Ireland (49.2%), Sweden (46.4%), Luxembourg (46.3%), Lithuania (46.1%), Cyprus (45.9%), Estonia (45.3%), Belgium (44.2%), Latvia (42.6%), Slovenia (42%), Finland (41.9%), Denmark (39.8%), Spain (39.7%), France (39.1%).

Table 1. The comparative situation of population by educational attainment level (%)

Countries	Upper secondary and post-secondary non-tertiary education (levels 3 and 4)						Tertiary education (levels 5-8)					
	2006			2021			2006			2021		
	Total	Males	Females	Total	Males	Females	Total	Males	Females	Total	Males	Females
European Union	46,6	47,6	45,6	45,6	47,1	44,1	19	18,6	19,4	29,5	26,9	32,1
Belgium	36,4	37,3	35,6	37,6	40,5	34,6	27,9	26,4	29,4	39,7	35,3	44,2
Bulgaria	51,3	54,9	47,7	53,3	58,2	48,3	18,2	14,1	22,1	25,9	20,8	31,1
Czechia	72,2	74	70,4	64,5	67,7	61,2	11,4	12,3	10,5	23,4	20,8	26,1
Denmark	45,3	48,3	42,3	39,7	42,4	37	29,3	27,3	31,3	34,8	29,9	39,8
Germany	55,3	54,7	56	52	50,5	53,6	20,1	23	17,1	27	28,4	25,5
Estonia	52	54,2	50	47,3	53,5	41	27,4	21,6	32,9	36	26,8	45,3
Ireland	37	36,5	37,5	37,1	38,4	35,8	27,5	24,9	30,1	45,2	41,3	49,2
Greece	39,9	38,3	41,5	46,4	47,5	45,4	18,7	18,9	18,4	30,1	28,5	31,6
Spain	22,8	22,3	23,2	25,6	25,4	25,9	26,4	25,4	27,3	36,5	33,3	39,7
France	41,1	43,4	38,8	41,6	44	39,4	24	22,5	25,4	36,3	33,4	39,1
Croatia	58,2	63,6	52,9	61,3	65,9	56,6	13,6	12,5	14,6	21,8	18	25,5
Italy	39,1	39,1	39	42,9	43,3	42,5	11,4	10,5	12,3	17,8	14,9	20,8
Cyprus	38,8	40,3	37,4	38,4	41,2	35,7	27,6	26	29,1	41,9	37,7	45,9
Latvia	58	57,7	58,2	51,6	57,6	45,8	17,4	13,2	21,3	34,2	25,5	42,6
Lithuania	57,4	59	55,8	49,4	53,7	45	22	18,2	25,5	39,8	33,5	46,1
Luxembourg	40,2	41,2	39,2	30,4	31,1	29,6	20,5	21,7	19,4	44,5	42,8	46,3
Hungary	57,7	61,7	53,9	55,4	60,1	50,7	15	13,6	16,4	25,4	21,3	29,5
Malta	21,5	25,2	17,6	34,5	35,8	33,1	11,1	10,7	11,5	29,3	26,8	32,2
Netherlands	41,5	41,7	41,2	38,9	39	38,8	24,8	25,9	23,7	37,5	36,5	38,6
Austria	60,3	62,8	57,8	49,8	51,8	47,7	14,7	16,9	12,6	31,8	31,3	32,3
Poland	64,2	66,2	62,1	57,9	62,7	53,1	14,9	12,7	17	29,1	23,4	34,7
Portugal	16,7	15,9	17,4	31,4	33,3	29,6	11,7	9,4	13,8	28,3	22,5	33,7
Romania	58,4	62,1	54,7	62,1	64,8	59,3	9,6	9,7	9,4	16,4	14,9	17,9
Slovenia	59,4	63,7	54,9	51,4	57,5	44,8	17,8	15,1	20,5	35,4	29,2	42
Slovakia	69,2	71,1	67,4	62,1	67,6	56,5	11,9	12,2	11,6	24,7	19,8	29,8
Finland	44,8	46,8	42,7	46,3	50,8	41,6	29	24,7	33,3	35,5	29,2	41,9
Sweden	47,2	50,9	43,4	40,1	45,3	34,8	25,9	22	29,9	39,7	33,4	46,4

Source: Author

The comparative situation of graduates by education level, for 2013 and 2020, respectively, is presented in the Table 2 (number of graduates).

According to the existing data on the EUROSTAT website, it is observed that, for two countries, the number of graduates for 2020 has decreased compared to the number of graduates in 2013, regardless of the level of education: Poland and Slovakia. Other countries where there have been decreases for most levels of education are: Bulgaria, Estonia, Croatia, Latvia, Lithuania, Romania, Slovenia. Also, for Belgium alone, there are increases in values for all levels of education.

Considering the total number of graduates, as well as the importance of the level of education, the data for the bachelor's or equivalent level, respectively for the master's or equivalent level were analyzed.

Thus, for the bachelor's or equivalent level, the most significant increases in values were registered in: Hungary (+88130), Spain (+80825), Germany (+79709), Italy (+63338), France (+50969). Also, significant decreases are observed for: Portugal (-116252), Romania (-21107), Slovakia (-15565), Bulgaria (-13440), Lithuania (-12673).

Table 2. The comparative situation of graduates by education level

Countries	Upper secondary education and post-secondary non-tertiary education		Short-cycle tertiary education		Bachelor's or equivalent level		Master's or equivalent level		Doctoral or equivalent level	
	2013	2020	2013	2020	2013	2020	2013	2020	2013	2020
European Union	5244096	5117395	413698	462087	2016238	2185152	1408105	1436004	103486	86550
Belgium	127609	129634	2480	5410	65947	74050	36993	44129	2464	2857
Bulgaria	57506	95785	:	:	38303	24863	26918	20395	1202	1097
Czechia	135867	:	416	:	58270	:	38813	:	2433	:
Denmark	83024	75689	8251	10178	38806	45237	17522	24095	1888	1889
Germany	1016913	879211	211	5614	283959	363668	183931	206557	27707	26220
Estonia	16739	11534	:	:	7522	5317	3112	3579	233	221
Ireland	8911	87898	14687	13562	29391	47349	15687	27769	1532	1417
Greece	119939	117590	:	:	53394	46868	11299	20577	1522	1597
Spain	369433	496134	112835	131132	116715	197540	166982	154596	10504	9353
France	1005494	1129464	213708	230635	239564	290533	259849	315102	13890	11810
Croatia	:	38964	9	7	19362	18357	16679	15489	829	615
Italy	521720	559498	1034	5233	201652	264990	148534	175797	10687	7691
Cyprus	10100	8355	1073	1026	3374	3251	1855	5974	52	152
Latvia	23065	17098	4194	3245	12921	6788	4180	4372	315	120
Lithuania	42785	29561	:	:	29810	17137	9014	6957	441	345
Luxembourg	4966	6123	192	284	545	660	799	801	64	131
Hungary	128784	116888	9752	4559	42683	130813	20124	41379	1069	1221
Malta	8222	8839	639	337	2153	2570	987	1656	24	66
Netherlands	248038	238703	1381	3525	92323	105279	40262	50144	4321	4460
Austria	108759	98153	27358	28519	27863	31246	27830	27429	2228	2178
Poland	549162	387841	3267	65	392182	275930	198956	133100	3719	2439
Portugal	122251	112873	:	4791	51467	52832	25017	26235	2463	1941
Romania	244827	211219	:	:	97661	76554	69155	51648	5370	2069
Slovenia	21590	19693	2349	1980	9799	8405	5861	4678	1166	431
Slovakia	66323	49402	792	781	32887	17322	34233	19144	2119	1301
Finland	99224	93335	21	:	33669	39242	17141	22474	1899	1901
Sweden	102845	97911	9049	11204	34016	38351	26372	31928	3345	3028

Source: Author

For master's or equivalent level, high increases of graduates had: France (+55253), Italy (+27263), Germany (+22626), Hungary (21255), Ireland (+12082). Significant decreases in the number of graduates were registered for: Poland (-65856), Romania (-17507), Slovakia (-15089), Spain (-12386).

In 2020, most bachelor's or equivalent level graduates were from: Germany (363668), France (290533), Poland (275930), Italy (264990). For master's or equivalent level, most

graduates were from: France (315102), Germany (206557), Italy (175797), Spain (154596), Poland (133100).

At the level of the European Union, the comparative situation of graduates by education level is presented in the Figure 1.
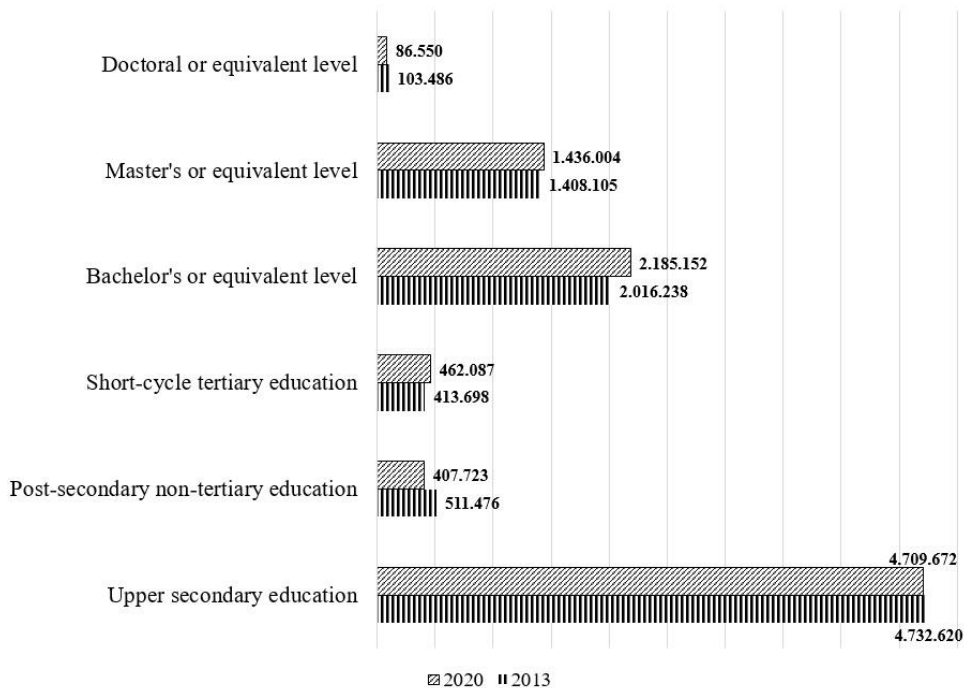
Figure 1. Comparative situation of graduates by education level (2013-2020)

Source: Author

It is noted that, at European level, in 2020 compared to 2013, the number of graduates decreased for: upper secondary education (-22948), post-secondary non-tertiary education (-103753), doctoral or equivalent level (-16936).

Also, the number of graduates increased for: short-cycle tertiary education (48389), bachelor's or equivalent level (168914), master's or equivalent level (27899).

We considered that another important indicator is given by employees by educational attainment level. Thus, the Table 3 shows the comparative situation of this indicator for 2013 and 2020, respectively, as well as for each genre. The analysis was done for the age group 15 - 64 years (%).

From the presented data, it is observed that, at European level, in 2020, compared to 2013, the share of employees decreased for less than primary, primary and lower secondary education (-2.6%), respectively upper secondary and post-secondary non-tertiary education (-2.4%). For people with 5-8 levels of education, the share of employees increased by 5%.

Compared to 2013, in 2020, the highest values of employees for people with 0-2 levels of education were registered in: Portugal (37.1%), Spain (29.3%), Malta (29.2%), Italy (28.5%). The weights are higher for males.

For people with 3-4 levels of education, high values of employees had: Czechia (70.5%), Slovakia (67.4%), Romania (66.0%), Croatia (63.1%), Hungary (60.2%). And in this case, higher weights are for males.

For people with tertiary education, high values of this indicator were recorded in: Ireland (54.1%), Luxembourg (50.7%), Lithuania (49.2%), Slovakia (49.0%), Cyprus (48.9%). For this level of education, the share of females is higher than that for males. Only for Germany, the share is higher for males (31.3% compared to 28.5%).

Table 3. The comparative situation of employees by educational attainment level

Countries	Less than primary, primary and lower secondary education (levels 0-2)		Upper secondary and post-secondary non-tertiary education (levels 3 and 4)		Tertiary education (levels 5-8)	
	Total		Total		Total	
	2013	2020	2013	2020	2013	2020
European Union	18,3	15,7	50,7	48,3	31,0	36,0
Belgium	18,9	13,8	40,2	38,5	40,9	47,8
Bulgaria	9,4	10,6	60,4	56,8	30,2	32,5
Czechia	4,5	4,8	73,9	70,5	21,6	24,6
Denmark	21,5	18,1	43,3	42,1	35,2	39,9
Germany	13,1	13,4	59,7	56,6	27,2	29,9
Estonia	8,6	9,3	53,4	50,5	38,0	40,2
Ireland	14,5	9,3	35,5	36,6	50,1	54,1
Greece	19,2	11,8	40,7	45,8	40,0	42,4
Spain	33,7	29,3	23,4	24,1	42,9	46,6
France	19,1	13,7	44,5	42,5	36,4	43,8
Croatia	8,8	6,2	64,6	63,1	26,5	30,7
Italy	32,2	28,5	48,9	48,2	18,9	23,3
Cyprus	15,3	13,3	40,2	37,9	44,5	48,9
Latvia	8,1	7,3	56,9	53,1	35,0	39,6
Lithuania	3,8	3,4	53,6	47,5	42,6	49,2
Luxembourg	17,8	17,3	38,4	32,0	43,8	50,7
Hungary	11,3	11,5	62,9	60,2	25,8	28,2
Malta	39,8	29,2	33,6	35,0	26,6	35,8
Netherlands	23,2	19,3	43,1	40,3	33,7	40,4
Austria	14,9	12,7	65,6	52,1	19,5	35,2
Poland	5,0	4,2	61,3	56,7	33,7	39,1
Portugal	50,5	37,1	25,8	31,3	23,7	31,5
Romania	8,1	7,5	66,6	66,0	25,3	26,5
Slovenia	8,3	6,1	57,9	53,5	33,8	40,4
Slovakia	4,3	3,9	73,7	67,4	22,0	28,7
Finland	11,4	7,6	46,5	43,4	42,1	49,0
Sweden	13,7	11,3	48,5	43,0	37,8	45,7

Source: Author

The evolution of employees is shown in the following figure.
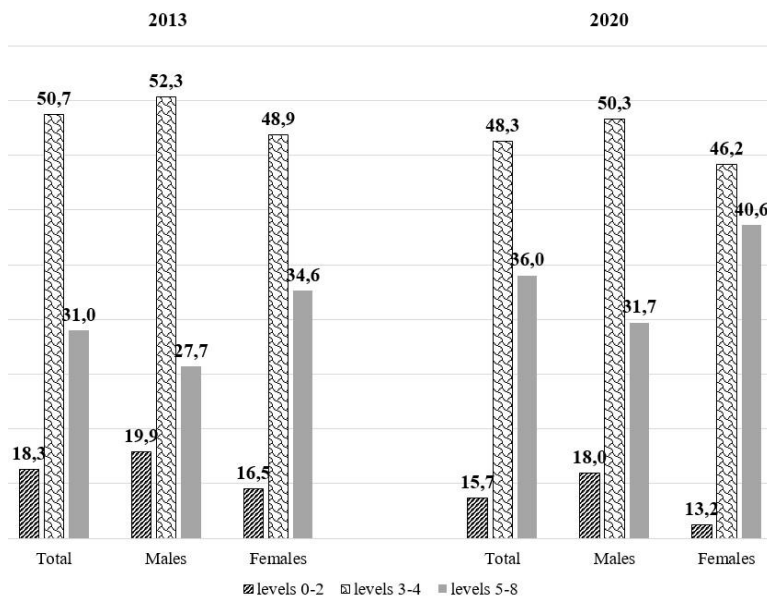
Figure 2. Evolution of employees by educational attainment level (2013-2020)

Source: Author

It is observed that, at the level of the European Union, both for males and especially for females, an increase in the weights corresponding to the levels of education 5-8. Thus, for males, the increase is 4% (from 27.7% to 31.7%), and for females, the increase is 6% (from 34.6% to 40.6 %).

4 Conclusions

Approaching the learning and teaching process in an open but strategic way, for any educational context is a feature of open education. The use of new technologies in order to collaborate, but also to share ideas, as well as access to content (Heck et al., 2020) are considered.

Following the analysis, it is found that at the level of the European Union, in 2021 compared to 2006, the population aged between 15 and 64, with a level of education between 3 and 4, decreased. In 2021, the population aged between 15 and 64, with a level of education between 3 and 4, was in shares of over 60% for the following: Czechia, Romania, Slovakia, Croatia.

In 2021 compared to 2006, the population aged between 15 and 64, with a level of education between 5 and 8, increased. It is observed that in all countries there have been increases in values. In 2021, approximately 40% of the female population in the following countries had a level of education between 5 and 8: Ireland, Sweden, Luxembourg, Lithuania, Cyprus, Estonia, Belgium, Latvia, Slovenia, Finland, Denmark, Spain, France.

Also, in most countries of the European Union, the number of graduates for 2020 has decreased compared to the number of graduates in 2013. In 2020, most graduates of bachelor's or equivalent level (over 250,000) were from: Germany, France, Poland, Italy. For master's or equivalent level, most graduates (over 100,000) were from: France, Germany, Italy, Spain, Poland.

Regarding the share of employees, at European level, in 2020, compared to 2013, the values decreased for less than primary, primary and lower secondary education, respectively for upper secondary and post-secondary non-tertiary education, and increased for people with levels 5-8 of education. For people with 3-4 levels of education, high values of employees (over 60%) had: Czechia, Slovakia, Romania, Croatia, Hungary. For people with tertiary education (5-8), high values of this indicator (over 40%) were recorded in: Ireland, Luxembourg, Lithuania, Slovakia, Finland, Cyprus, Spain, France, Belgium, Greece, Estonia, Netherlands, Slovenia, Sweden.

The importance of skills, but especially their recognition, underpins skills strategies (OECD, 2021). Thus, the need for a positive impact, in terms of the recognition of skills in the labor market, based on increasing their comparability and visibility, leads to improved relevance of skills development as well as their quality. When accessing a job, the skills gap that appears could be reduced with micro-credentials. Thus, there is a trend of transition from recognition of qualifications to recognition of micro-credentials (Maina et al., 2022).

It can be appreciated that with the help of micro-credentials it will be possible to create and follow personalized paths both in terms of learning and in terms of career. The development and comparison of micro-credentials will bring an advantage to disadvantaged or vulnerable people. For this, it is necessary that they be carried out in the most coherent way possible, regardless of the sector or field of activity (CEU, 2022a).

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Understanding post-pandemic panic selling during Ukraine-Russian conflict based on Thai companies listed in SET100

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Abstract

Research background: The disputes in Ukraine-Russian conflict somehow stir both economic and political turmoil. In general, regarding the unforeseen and abnormal situations, these phenomena can plausibly cause the panic selling from investors' side.

Purpose of the article: This research aims to explore how Thai/foreign investors react on such news, authors try to understand and investigate the effect of Ukraine-Russian conflict news.

Methods: This research studies Thai companies listed in Stock Exchange of Thailand (SET100). Data were collected via reliable sources such as corporate announcements and so on.

Findings & Value added: The results exhibit that, after the announcement of Ukraine-Russia conflict, there are some panic selling, which somewhat causing the stock price to decline. We suggest that, for companies to attain business sustainability in any given unforeseen circumstances, they should provide the way to communicate about bad news. Future researchers can investigate on how a proper business communication can thence lead to less severe panic selling.

Keywords: *SET100; Stock Exchange of Thailand; Investment; Business Communication; Panic Selling*

JEL Classification: *M10; M16; M20*

1 Introduction

The emergence of Covid-19 in Thailand, since January 2020, has affected Thailand until nowadays (Joob and Wiwanitkij, 2020). This global pandemic creates a stir for Thailand both economically and societally, as well as stock markets in other country, such as in Europe (Škrinjarić, 2021) or USA (Shahzad, et al. 2021). Even though the impact is short-termed (Singh and Shaik, 2021), the effect seems to be diminished now in Thailand, but this is not only the viral factors attributed to the stock price in SET100. On 24th February 2022, in the morning, there was a report on both civilian and military deaths in Ukraine, resulted from a

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conflict (J.P. Morgan, 2022; Ray, 2022). This conflict caused the stock price to collapse globally (Boungou and Yatié, 2022).

We cannot deny the fact that, this event confirms the political tension between the two countries is still on-going and also indicates that the global market is quite unstable (Neely and Jordan-Wood, 2022). Furthermore, stock investors nowadays are turning to safer assets such as gold. Nevertheless, it is not only the stock price, which is affected by this conflict, but also other industries in Thailand, including tourism and exports. Consequently, Thai government has to be careful with their policies in order to minimize the impacts of this global pandemic and political turmoil as well as stock market fluctuations in SET100. Apart from that. A few research are available to fill in this paradigm discrepancy, for example, Boungou and Yatié, (2022) report on global stock market returns, resulted from the Ukraine-Russian dispute. However, the studies available are less concentrated on a country-specific.

As a result, this research aims to explore how Thai or foreign investors react on Ukraine-Russian conflict news, authors try to understand and investigate the effect of such conflict news. This research studies Thai companies listed in Stock Exchange of Thailand (SET100). Authors arrange the sections accordingly: first, we provide the background of panic selling since post-pandemic situation in Thailand; secondly, the reviews are discussed in-depth about the panic selling; thirdly, the quantitative methodology is discussed; fourthly, data and the findings are demonstrated to prove the hypothesis; and finally, conclusion and discussion are depicted.

2 Literature Reviews

Stock prices are determined by the interaction of supply and demand in the market. When there are more buyers than sellers, prices go up. The reverse is true when there are more sellers than buyers. However, stock prices can also be influenced by emotion (Chen, et al. 2021). When investors become fearful or anxious (Wu, et al. 2021) or even shocked (Rabbani, et al. 2021), they may make decisions based on those emotions rather than on rational analysis. This can lead to what is known as panic selling, where investors sell their holdings in a hurry, driving prices down. While panic selling can temporarily create opportunities for bargain-hunting investors, it can also lead to longer-term problems for the market as a whole. When large numbers of investors sell at the same time, it can trigger a self-reinforcing cycle of falling prices and further selling, leading to a sharp decline in the market. Panic selling is one of the most destructive forces in the financial markets, and it is important for investors to be aware of its dangers.

In addition, when the war occurs, especially Russia and Ukraine are world' major exporters of various products (Neely and Jordan-Wood, 2022), panic selling is often in response to a perceived threat (Aslam, et al. 2021). As mentioned earlier, the threat could be anything from an imminent war to a natural disaster, and it can cause investors to lose confidence in the market and sell their stocks at a loss. In some cases, panic selling can lead to a market crash, where the stock prices of all companies plunge rapidly. This can have devastating consequences for the economy, as businesses lose value and people lose their jobs. While panic selling is often driven by fear and irrationality, it can also be a rational response to a real threat. In either case, it is important to understand what causes panic selling and how to protect yourself from its effects. Stock Exchange of Thailand, especially in SET100, also faced the problem of panic selling caused by Ukraine-Russian conflict as well. This, in fact, is not uncommon, since all other stock markets are also affected by this turmoil (Deng, et al. 2022; Jones, 2022). Consequently, we hypothesize that:

Hypothesis: *There is a difference in stock price of SET100 before and during the conflict occurred.*

3 Research Methodology and Research Findings

Data were collected vis-à-vis Stock Exchange of Thailand website, covered the period from before the conflict (23rd February 2022) and during the conflict (24th February 2022). Paired sample t-test will be used to see the difference in SET100's stock price before and during the conflict. With 100 companies in total (represented in stock symbol in Table 1), the percent change shows that SET100 when the conflict occurred, it plummeted to -2.40%.Surprisingly, stock that could make positive change are mostly in petroleum (PTT and PTTEP) or medical care field (BDMS).

Table 1. SET100 – before and during the conflict (price in Baht).

Stock Symbol	Price before the Conflict	Price when Conflict Occurred	Change	% Change
ACE	3.18	3.08	-0.10	-3.14
ADVANC	233.00	227.00	-6.00	-2.58
AEONTS	199.00	193.00	-6.00	-3.02
AMATA	21.90	20.70	-1.20	-5.48
AOT	64.25	62.75	-1.50	-2.33
AP	11.30	10.80	-0.50	-4.42
AWC	5.00	4.86	-0.14	-2.80
BAM	21.30	20.60	-0.70	-3.29
BANPU	11.10	10.80	-0.30	-2.70
BBL	143.00	139.50	-3.50	-2.45
BCH	19.50	19.10	-0.40	-2.05
BCP	30.75	31.25	0.50	1.63
BCPG	12.80	12.40	-0.40	-3.13
BDMS	23.20	23.80	0.60	2.59
BEC	16.30	15.90	-0.40	-2.45
BEM	8.80	8.70	-0.10	-1.14
BGRIM	33.75	32.50	-1.25	-3.70
BH	150.50	155.50	5.00	3.32
BLA	45.75	43.25	-2.50	-5.46
BPP	16.80	16.60	-0.20	-1.19
BTS	9.75	9.50	-0.25	-2.56
CBG	102.00	99.25	-2.75	-2.70
CENTEL	35.50	35.00	-0.50	-1.41
CHG	3.46	3.42	-0.04	-1.16
CK	20.80	20.20	-0.60	-2.88
CKP	5.25	5.05	-0.20	-3.81
COM7	80.25	79.25	-1.00	-1.25
CPALL	67.50	65.75	-1.75	-2.59
CPF	26.25	25.25	-1.00	-3.81

CPN	57.00	54.75	-2.25	-3.95
CRC	38.25	36.75	-1.50	-3.92
DOHOME	23.60	23.20	-0.40	-1.69
DTAC	47.50	47.00	-0.50	-1.05
EA	94.00	92.75	-1.25	-1.33
EGCO	182.00	176.50	-5.50	-3.02
EPG	10.30	9.90	-0.40	-3.88
ESSO	7.60	7.50	-0.10	-1.32
GLOBAL	21.40	21.10	-0.30	-1.40
GPSC	75.50	73.50	-2.00	-2.65
GULF	50.75	49.75	-1.00	-1.97
GUNKUL	6.60	6.20	-0.40	-6.06
HANA	62.50	59.25	-3.25	-5.20
HMPRO	15.50	15.10	-0.40	-2.58
INTUCH	77.00	75.50	-1.50	-1.95
IRPC	3.80	3.72	-0.08	-2.11
IVL	48.00	47.00	-1.00	-2.08
JMART	54.00	52.75	-1.25	-2.31
JMT	67.25	67.00	-0.25	-0.37
KBANK	168.50	163.00	-5.50	-3.26
KCE	62.50	60.50	-2.00	-3.20
KEX	23.10	22.10	-1.00	-4.33
KKP	70.00	69.25	-0.75	-1.07
KTB	14.10	13.80	-0.30	-2.13
KTC	65.00	63.50	-1.50	-2.31
LH	9.55	9.40	-0.15	-1.57
MAJOR	20.50	20.10	-0.40	-1.95
MEGA	46.00	42.75	-3.25	-7.07
MINT	31.25	30.25	-1.00	-3.20
MTC	52.75	51.75	-1.00	-1.90
OR	26.75	26.25	-0.50	-1.87
ORI	12.50	11.90	-0.60	-4.80
OSP	34.00	33.50	-0.50	-1.47
PLANB	7.95	7.80	-0.15	-1.89
PTG	14.70	14.30	-0.40	-2.72
PTT	38.50	38.75	0.25	0.65
PTTEP	128.00	132.50	4.50	3.52
PTTGC	54.75	54.25	-0.50	-0.91
QH	2.34	2.30	-0.04	-1.71
RATCH	46.00	45.25	-0.75	-1.63

RBF	16.30	15.50	-0.80	-4.91
RCL	47.00	44.00	-3.00	-6.38
RS	17.60	17.00	-0.60	-3.41
SAWAD	59.00	57.25	-1.75	-2.97
SCB	129.50	125.50	-4.00	-3.09
SCC	393.00	387.00	-6.00	-1.53
SCGP	63.50	62.00	-1.50	-2.36
SINGER	47.50	46.25	-1.25	-2.63
SIRI	1.28	1.22	-0.06	-4.69
SPALI	22.00	21.50	-0.50	-2.27
SPRC	8.70	8.80	0.10	1.15
STA	29.00	27.50	-1.50	-5.17
STARK	4.30	4.48	0.18	4.19
STEC	14.40	13.90	-0.50	-3.47
STGT	26.75	25.75	-1.00	-3.74
SUPER	0.93	0.92	-0.01	-1.08
SYNEX	27.75	26.25	-1.50	-5.41
TASCO	18.10	18.10	0.00	0.00
TCAP	41.50	40.25	-1.25	-3.01
THANI	4.46	4.34	-0.12	-2.69
TIDLOR	37.50	36.50	-1.00	-2.67
TISCO	98.00	97.00	-1.00	-1.02
TOP	52.75	53.00	0.25	0.47
TQM	46.00	45.00	-1.00	-2.17
TRUE	5.00	4.90	-0.10	-2.00
TTA	10.20	9.45	-0.75	-7.35
TTB	1.39	1.36	-0.03	-2.16
TU	20.90	20.10	-0.80	-3.83
TVO	32.25	32.25	0.00	0.00
VGI	5.60	5.40	-0.20	-3.57
WHA	3.48	3.38	-0.10	-2.87
$\bar{x}$	45.79	44.83	-0.96	-2.40

Source: author, adapted from Stock Exchange of Thailand (2022)

Based on Table 2, with standard deviation of 1.62 p-value (0.000), it does not accept our null hypothesis and we can conclude that there is a difference in stock price of SET100 before and during the conflict occurred.

Table 2. T-test result.

Std. Deviation	S.E. Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
		Lower	Upper			
1.62	0.16	0.64	1.28	5.93	99	0.000

Source: author (2022)

4 Conclusion and Discussion

The recent Ukrainian-Russian conflict has led to a great deal of political and economic turmoil in the region (Neely and Jordan-Wood, 2022). Globalizationally, this unrest has caused many investors to sell off their assets in fear of an impending recession. In order to study how Thai investors have reacted to this news, the authors collected data from corporate announcements and other reliable sources. We found that the majority of Thai companies listed on the Stock Exchange of Thailand have experienced a dip in stock prices since the start of the conflict. Moreover, since this study emphasizes on SET100 in in the context of Thailand and the number of related study in this contemporary topic is somehow small, the results may not generalize for audience, but study in other country-specific context is highly recommended (for example, Mehenthiran, et al. 2020). Apart from guiding investors to make them satisfied (Murphy, et al. 2020), regarding the originality of the research, while this research only studied a small sample of companies, it provides valuable insight into how the conflict is affecting investor confidence in the region for future researchers.

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Trends and Risks of Electronic Banking in Slovakia during the COVID-19 pandemic

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Abstract

Research background: Currently, commercial banks prefer using electronic banking as much as possible. One of the reasons is cost savings, but also more effective communication with customers and a greater collection of data about them. Electronic banking has several forms like fintech technology, biometrics, instant payments, chat bots, electronic signature or multibanking, and there are many risks associated with them. **Purpose of the article:** The aim of the paper was to present a part of the results of our survey with 180 respondents focused on new trends and risks of electronic banking. We focused on the use of electronic banking during the COVID-19 pandemic in Slovakia, while we researched statistically significant differences of its use in terms of gender, age, education and permanent residence.
Methods: We used Chi-square goodness of fit test and Chi-square test of Independence.
Findings & Value added: The results of our survey have shown that the majority of the respondents use electronic banking, and that the respondents used the electronic banking during the COVID-19 pandemic in the same way as before. Men are more familiar with the risks of electronic banking, while a large group of respondents have never heard of some of the mentioned risks like phishing, vishing, scam or pharming. Therefore, we recommend continuous education of the population about the risks and safety of electronic banking.

Keywords: *electronic banking; risk; COVID-19 pandemic*

JEL Classification: *G21; G40; I00*

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1 Introduction

Electronic banking is a modern form of payment, which involves controlling bank accounts using electronic means. Communication between the bank and the client takes place through modern telecommunications equipment. Banks have always ensured the highest protection of clients' deposited money, which they also strive for in electronic banking. The most frequently used security measures in banking operations are PIN - a four to eight-digit number, GRID card - codes, Electronic personal code - a generated code, and biometric data that work using biological signs. The advantage of electronic banking is that we can carry out various banking operations from any place in the world without visiting the bank in person (20).

The outbreak of the COVID-19 disease has undoubtedly greatly increased the opportunities for online shopping (5), thereby increasing the demand for internet banking. The long-lasting pandemic has significantly accelerated customer expectations regarding digitization of banking. With the increasing popularity of internet banking during the COVID-19 pandemic, researchers are thus motivated to investigate the factors influencing the intention to use internet banking, e.g. in Indonesia (8).

Banks can be chosen based on several factors, such as location, security and electronic banking functions. Customer characteristics such as gender and age can also influence this decision. As the digitization of banking has accelerated due to the COVID-19 pandemic, the factors that affect this decision may change as well (19).

The role of social media in the transition of internet banking during the COVID-19 pandemic was also clarified in the research (13). Covid-19 has disrupted personal banking operations and increased the physical threat to both retail bankers and customers. As a result, the world has moved towards online banking to continue with routine transactions related to paying bills, buying groceries, and shopping for brands.

In recent years, in general, all bank services in branches have become more expensive. Branches are a significant cost item for banks, which is why banks are trying to optimize them. Experts say that bank fees will continue to rise. Due to the pandemic, fees for non-cash and cash transactions have increased. Banks are trying to push their clients to use digital applications in order to reduce the number of branches in Slovakia (16, 17).

The year-on-year increase is 109%, which increases internet banking logins by 31%. The overall use of mobile or online applications has increased by 30%. Currently, in banks, contracts and signatures are purely electronic, and banks plan to constantly improve their online applications (10).

Innovative banking technology should address the needs of the modern client, provide relevant markets, bring benefits to the customer and be easily accessible and user-friendly (21, 24).

However, growing threat of cyber-attacks and computer crime is associated with the increase in the use of internet services and also internet banking during the COVID-19 pandemic. Therefore, banks must also focus on cyber security solutions.

According to the study (1) aimed at analyzing the coronavirus crisis (COVID-19) from the point of view of cybercrime, the most common were hacker attacks (37%), followed by spam emails (13%), malicious domains (9%), mobile applications (8%), phishing (7%), malware (7%), browsing apps (6%), DDoS (6%), web apps (6%) and MSMM (6%). The study recommends that governments and organizations should work on staying resilient and innovative in their cyber security decisions to weather

the current and future consequences of a pandemic or similar crisis that may be prolonged.

Fraudsters aimed to steal sensitive data such as passwords, usernames, banking information and other personal information. Some hackers used the stolen data to withdraw money from people's accounts. At the height of the COVID-19 crisis, bank loan fraud spread rapidly, as many of the scams focused on robbing people of their money and personal information through online shopping. As a result of the pandemic, the number of fraud cases was 42% higher than in the previous year 2019, as cyber fraudsters took advantage of the fact that many physical stores had to close down. Some bank clients said they received text messages instructing them to connect to the Internet and change the delivery date of the package. At the same time, others filled in their bank details, which subsequently led to their accounts being hacked (1).

Many other studies (16, 11) focus on researching various cyber threats associated with the COVID-19 pandemic and exploring potential preventive measures. The results also point to the importance of education and user training to increase cyber security awareness.

2 Methodology

The data used for the analysis are derived from own survey, which was realized in January and March 2021 during the COVID-19 pandemic. We used MS OFFICE-FORMS applications to compile the questionnaire. 180 respondents took part in the research.

To assess the representativeness of the sample, we used the Chi-square goodness of fit test.

$$\chi^2 = \sum_{i=1}^{r} \frac{(E_i - T_i)^2}{T_i}$$

(1)

For calculations of theoretical frequencies, we used data from The Statistical Office of the Slovak Republic (SOSR). Used gender, education and age categories applied to the economically active population in the year 2020. For permanent residence, we used data concerning total population.

To detect statistically significant differences between individual groups, we used the Chi-square test of Independence:

$$\chi^2 = \sum_{i=1}^{m} \sum_{i}^{r} \frac{(E_{ij} - T_{ij})^2}{T_{ij}}$$

(2)

To determine the degree of dependence, we used the Pearson coefficient (C) and Crammer coefficient (V), which are in the interval <0; 1):

$$C = \sqrt{\frac{\chi^2}{\chi^2+n}}$$
(3)

$$V = \sqrt{\frac{\chi^2}{n*(\min((m,r)-1)}}$$
(4)

and it applies that:

- values close to 0 indicate weak dependence
- values close to 1 indicate very strong dependence
- the maximum value depends on the size of the table

When evaluating the number of banks and payment institutions, we used data on financial market entities from the National Bank of Slovakia (NBS) (26).

3 Results

According to the authorization aspect, we have several institutions in Slovakia. There are 25 banks and branches of foreign banks in Slovakia; 12 payment institutions and branches of foreign payment institutions; 39 payment services agents; and 58 e-money services distributors (26).

3.1 Testing the representativeness of the sample set

The data used for the analysis are derived from own survey, which was realized in January and March 2021 during the COVID-19 pandemic. 180 respondents took part in the research, of which 87 were women and 93 were men. The age range of the participating respondents in our research was:

- age of 15-34 years: 146 respondents,
- age of 35-54 years: 13 respondents,
- age of 55 – more years: 21 respondents,

In terms of permanent residence, the structure comprised of 97 respondents from cities and 83 respondents from rural areas. In terms of education, there were 124 respondents with elementary and secondary education, and 56 respondents with university education and higher. Originally, there were more groups, but they were merged, as we were not able to achieve representativeness by these several groups. The results of the performed tests are shown in Table 1. It follows that the representativeness was confirmed for the parameters of gender, education and permanent residence.

Table 1. Results of the representativeness tests of the sample

Gender	Male	93	52%	Chi-square goodness-of-fit test:	0.63594131
	Female	87	48%	Chi table value:	3.84145882

		Sum	180	100%	Result:	representative
Age	15-34	146	81%	Chi-square goodness-of-fit test:	244.852385
	35-54	13	7%	Chi table value:	5.99146455
	55+	21	12%		
	Sum	*180*	*100%*	*Result:*	*unrepresentative*
Education	Primary - secondary	124	69%	Chi-square goodness-of-fit test:	1.25557409
	Higher	56	31%	Chi table value:	3.84145882
	Sum	*180*	*100%*	*Result:*	*representative*
Permanent residence	City	97	54%	Chi-square goodness-of-fit test:	0.03376263
	Village	83	46%	Chi table value:	3.84145882
	Sum	*180*	*100%*	*Result:*	*representative*

Source: authors (2022)

3.2 Development trends of electronic banking

The first group of questions in our survey dealt with using and trends of electronic banking. To the question "Do you use electronic banking?" the majority of the respondents answered "yes" regardless of gender. Only 13 respondents answered "no" (Figure 1).
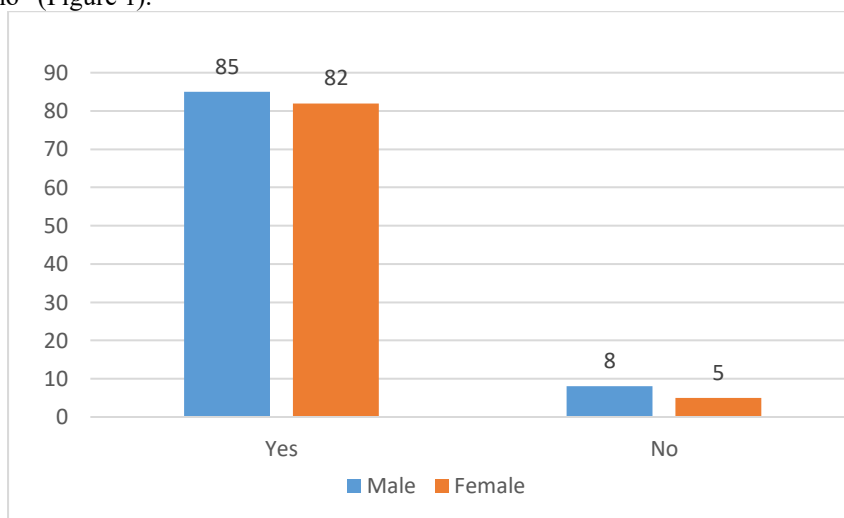

Figure 1. Answers to Question 1: Do you use electronic banking?

Source: authors (2022)

To the second question "How often do you use electronic banking?", there were different answers, while the respondents could choose from 5 answers:
1. once a week
2. 2-3 times per month
3. 2-3 times per week
4. never
5. every day

Most women answered "2-3 times per month", while most men answered "2-3 times per week". Important groups of answers were "once a week" or "every day" (Figure 2).
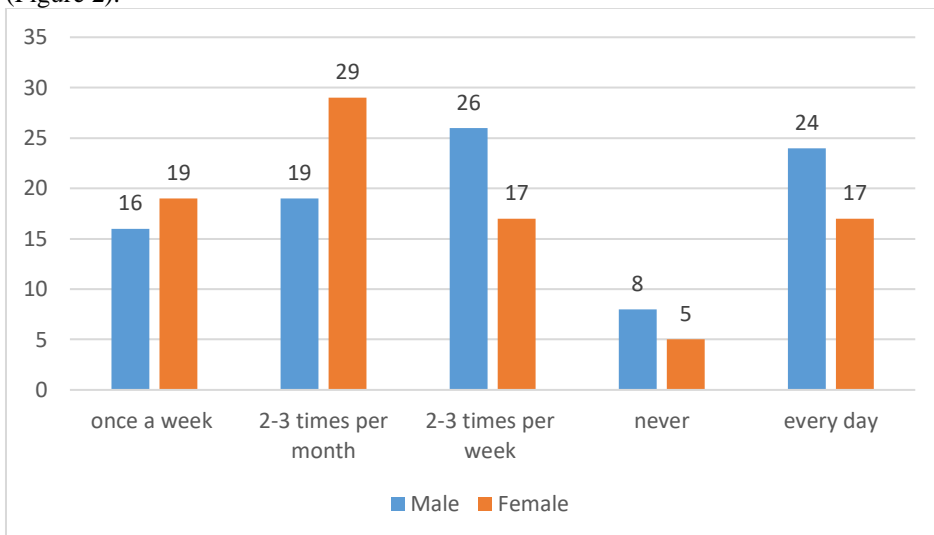
Figure 2. Answers to Question 2: How often do you use electronic banking?

Source: authors (2022)

The third question was related to new trends in electronic banking. In our survey, we listed the following new trends of electronic banking:

Fintech technology – this is aimed at protecting financial transactions, payments and money transfers. The system's task is to help residents and detect criminals in time. Fintech uses scientific methods to preserve, collect, identify, document and obtain digital resources to facilitate actions that have been found criminal. (7)

The entire overview of research questions regarding Fintech is processed in the study (22), where all innovations in payment systems are included, while smart contracts supported by Blockchain technology are important, too.

Biometrics – this is a system for observing human patterns, which is currently also used in banking. With the help of these patterns, we can identify a person. This task was being performed by fingerprints for a long time, but today we know a much broader form of biometrics, which was created by technological development and can recognize a walking style, face, iris, and retina.(2)

Instant payments – a crisis like the coronavirus accelerates development and this pandemic has forced many clients to use online services. The bank's goal is to be able to fully serve groups of clients, both online and at branches. The idea of instant payment is to credit the money immediately, within a few seconds, to the account during a payment, regardless of the bank – whether it is different or the same bank. (9)

Chatbots – these are software conversational agents, or dialogue voices, which provide users with access to information and services through interactions in their everyday languages via voice or text. In electronic banking, they work as an online service where you ask the chatbot necessary questions. The service is still being improved. (18)

Electronic signature – this serves as a tool for identification and authentication via the Internet. The signature is based on certification services, and is most often used to sign electronic mail or documents in electronic form, according to the website of the Police of the Czech Republic. (28)

Multibanking – this is a tool that allows controlling all bank accounts in different banks from one place. A user can keep his current account balances in his internet banking together. (27)

For this question, respondents had the opportunity to choose several answers at once. Respondents were most familiar with biometrics, followed by electronic signature and chatbot. As many as 44 respondents stated that they did not know any of the listed.
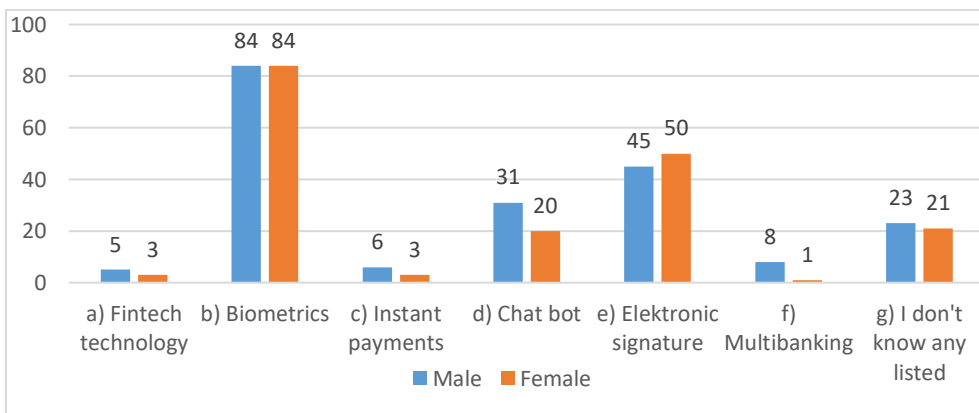
Figure 3. Answers to Question 3: Do you know any of the above mentioned forms of electronic banking?

Source: authors (2022)

Table 2 shows the results of testing whether the differences between men and women are statistically significant in the 3 given questions. In all 3 questions, we accepted the null hypothesis (H0) that is: "there are no statistically significant differences between men and women in the answers". This is also confirmed by the low values of the Pearson and Crammer coefficients.

Table 2. Testing the statistical differences between men and women in the first group of questions.

Test	Question 1	Question 2	Question 3
Chi-square test of Independence	0.55	6.47	8.65
Chi table value	3.84	9.49	12.59
Result	H0	H0	H0
Pearson's contingency coefficient	0.055	0.187	0.148
Crammer's contingency coefficient	0.055	0.190	0.150

Source: authors (2022)

Fintech technologies are becoming increasingly important in the banking sector, as they enable alternative effective means of interacting with clients and gathering hard information, i.e. codifiable data, to make better credit decisions. However, the

advent of technology contrasts with the traditional relationship between banks and firms, which is based on human interactions and soft information. For example, the study (6) examines whether Fintech favours or limits the volume of debt financing issued to SMEs. The findings reveal that the use of internet banking reduces SME debt, suggesting that credit decisions based on hard information reduce the likelihood that SMEs use bank debt. A key implication of the findings is that banks and entrepreneurs should strengthen their personal relationships.

The purpose of another study (12) is to investigate how consumers in emerging markets interact and collaborate with banking chatbots when conducting banking transactions.

3.3 Risks of electronic banking

The study (1) focuses on current cyber challenges in the context of the COVID-19 pandemic. This pandemic has witnessed the largest use of the Internet and attacks. Many people around the world use the Internet to keep in touch, do business, learn, and get medical care, among other things. This pandemic has put the stress level of each of us to the test. The pandemic showed that people could perform their duties, participate in any activities, and study at home. However, cybercriminals have seized the opportunity to profit from the widespread use of the Internet by the public. We should all learn our lesson from the COVID-19 pandemic so that everyone can be prepared for the future better, as well as to ensure that cyber security does not cause any more problems for the world. Cyber security issues must be on the agenda of executive committee meetings of organizations. While preventative measures are key, cyber-attack detection, response and recovery skills are also required.

In the second group of questions, we focused on safety and risks of electronic banking. To the question "Do you consider electronic banking safe?", most respondents answered "yes". However, 46 answered that they were not completely decided (Figure 4).
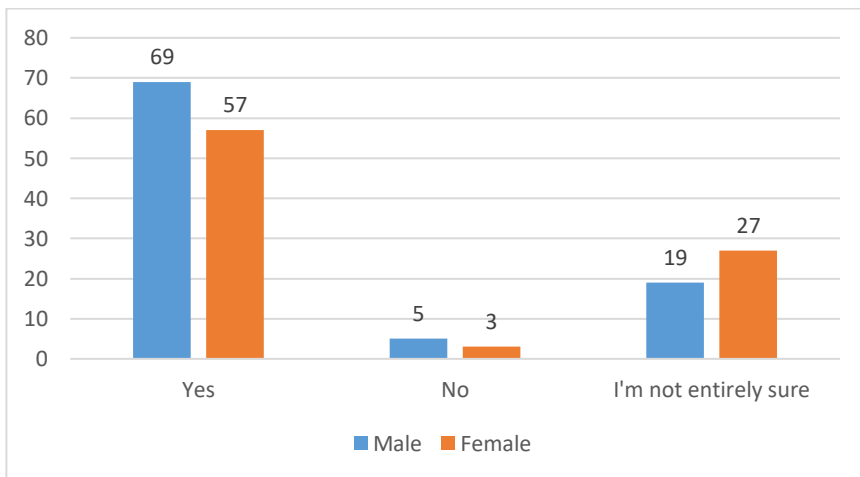
Figure 4. Answers to Question 4: Do you consider electronic banking safe?

Source: authors (2022)

The second question in this part was: "Have you ever been a victim of electronic banking fraud?". 12 respondents have experienced being such victim, but despite this, 6 of them consider electronic banking to be safe (result of internal answers matching with the previous question).
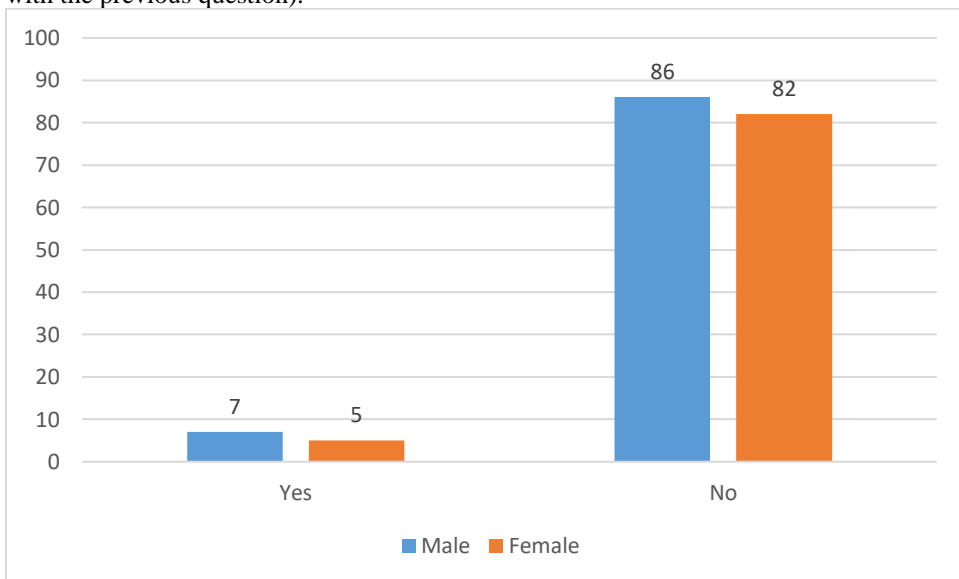
Figure 5. Answers to Question 5: Have you ever been a victim of electronic banking fraud?

Source: authors (2022)

In the third question regarding safety, we asked the respondents which of the listed risks they knew:

Phishing – this represents mass unsolicited emails with deceptive content sent via SMS, email, and other services. The intention is to make the victim log into his internet banking or social network account via a sent URL. After logging in, the attacker gets access to data such as passwords, user ID, or email, through which financial funds can be stolen. Phishing has increased significantly during the COVID-19 pandemic. (3)

The study (4) explains how to prepare for the onslaught of phishing emails, and it states that there is a worrying increase in attacks from phishing emails by almost 700% compared to the last year.

Vishing – this is a fraud that uses phone calls. Its aim is to obtain sensitive data from the victim, such as internet banking password or payment card numbers. The process begins with a suspicious text message, by which the perpetrator encourages the client of the bank to call the relevant number. The perpetrator impersonates a bank employee and asks for an authorization code to obtain financial funds from the client's bank account. (29)

Scam – these are fraudulent phone calls, SMS and emails from an untrustworthy person who demands the client's bank details or paying of various payments and fees immediately. This method contains suspicious characters such as strange name, sender address, and grammatical and stylistic mistakes. This method is very similar to the phishing method. (25)

Pharming – this is similar to phishing, but the perpetrators attack the user's computer or device. Even after entering the bank's website in the right way, a fake page loads, from which the attacker obtains the necessary data to steal financial resources from the account. (25)

To this question, the respondents could again choose several answers. They were most familiar with scams and phishing. Figure 6 shows that there is a difference regarding gender. As many as 38 women answered that they have not heard about any of the listed forms until now. This was also confirmed by the results of the statistical testing of differences in responses by gender. Responses were given to the question about the risks of electronic banking, and we confirmed the H1 hypothesis (Table 3).
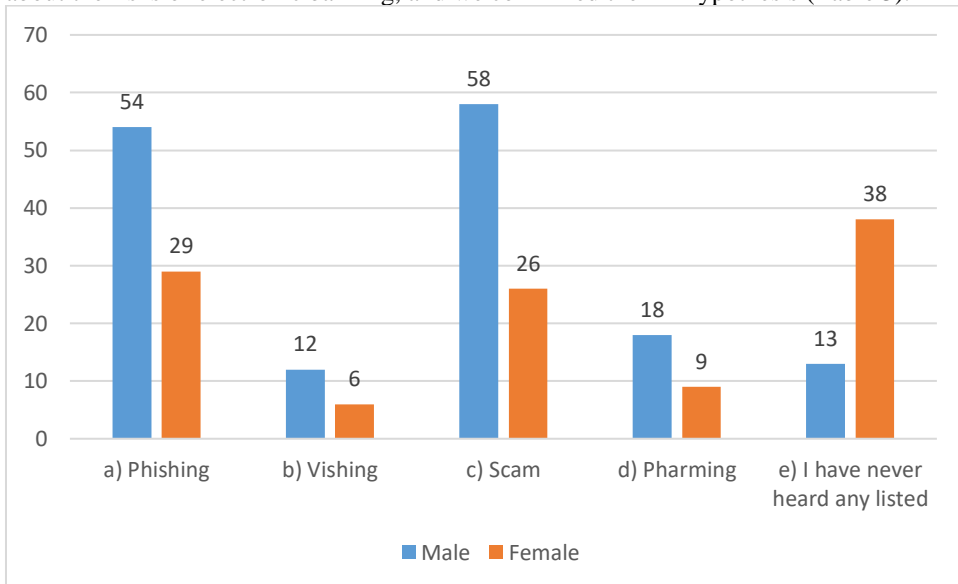
Figure 6. Answers to Question 6: Do you know any of the listed risks?

Source: authors (2022)

Table 3. Testing the statistical differences between men and women in the second group of questions.

Test	Question 4	Question 5	Question 6
Chi-square test of Independence	2.84	0.23	29.52
Chi table value	5.99	3.84	9.49
Result	H0	H0	**H1**
Pearson's contingency coefficient	0.125	0.036	0.318
Crammer's contingency coefficient	0.126	0.036	0.335

Source: authors (2022)

To other risks of the electronic banking, we can add:

Fraudulent deviation from payment – after gaining access to internet banking, the fraudster receives a fake application on his mobile phone, the task of which is to change the parameters of bank orders. After the client enters the transfer order, the bank sends a message to confirm the payment. The infiltration intercepts the first SMS

and in the meantime, the perpetrators change the transfer to their own order with their IBAN. The client then sees only the second fake SMS. If the client does not check the completed data and IBAN before confirmation, money from his bank account will be sent to another account. (25)

According to the research (15) on credit card fraud detection using artificial intelligence, credit card transaction fraud is common today due to the advancement in technology and increase in online transactions, which lead to fraud causing huge financial losses.

Online transaction processing - OLPT – these are the programmes with the ability to support Internet-oriented transactions. It is used for orders, financial transactions, CRM and MOO sales. The system represents a huge number of users with short transactions. Its main task is to maintain the concurrency of transactions. Currently, it is used by the vast majority of applications. It can be used by many users simultaneously. The main goals of the application embrace availability, speed and concurrency. (23)

3.4 Questions related to the COVID-19 pandemic

According to the results of a study in Hungary (19), personal visits to banks decreased after the outbreak of the COVID-19 pandemic. In addition, the number of electronic bankers has increased. There have been no correlations found between gender and location of the bank, when clients chose the bank. On the other hand, older people chose different banks than their younger colleagues. The security of the internet banking features was not associated with the bank choice, while the security of the mobile banking app was. Regarding bank ratings, men and women did not rate banks differently, and younger people tended to be more critical in their ratings. Safety, an accessible location, and good customer service can also lead to more positive reviews. The findings can be used by banks in Hungary to improve their services to attract customers and increase their satisfaction.

In the next part of our paper, we deal with the issue of using electronic banking during the COVID-19 pandemic. We evaluated respondents' answers according to gender, permanent residence, age and education.

Figure 7 shows that most men (61 answers) and women (58 answers) answered that they used electronic banking to the same extent during the COVID-19 pandemic as before the pandemic.

Figure 7. Answers to Question 7: Did you start using electronic banking to a greater extent during the COVID-19 pandemic? (according to gender)

Source: authors (2022)

According to the distribution of respondents based on permanent residence, most respondents from the city (65 answers) and from the village (54 answers) stated that they used electronic banking to the same extent during the pandemic as before the pandemic. The fewest respondents (11 respondents with permanent residence in the city and 5 respondents with permanent residence in the village) stated that they used it less. (Figure 8).

Figure 8. Answers to Question 8: Did you start using electronic banking to a greater extent during the COVID-19 pandemic? (according to permanent residence)

Source: authors (2022)

In terms of the differentiation of respondents by age (Figure 9), most respondents (104 answers) in the age of 15-34 answered that they used electronic banking to the same extent during the COVID-19 pandemic as before the pandemic. 36 respondents in the same age range answered that they started using electronic banking to an increased extent during the COVID-19 pandemic. Only 16 respondents used the electronic banking less during the COVID-19 pandemic.

Figure 9. Answers to Question 9: Did you start using electronic banking to a greater extent during the COVID-19 pandemic? (according to age)

Source: authors (2022)

81 respondents with primary and secondary education and 38 respondents with higher education stated that they used electronic banking to the same extent as before the pandemic. The fewest respondents (2 answers of respondents with university education and 14 answers of respondents with primary and secondary education) stated that they used electronic banking less. Moreover, 45 respondents stated that they used it more (Figure 10).
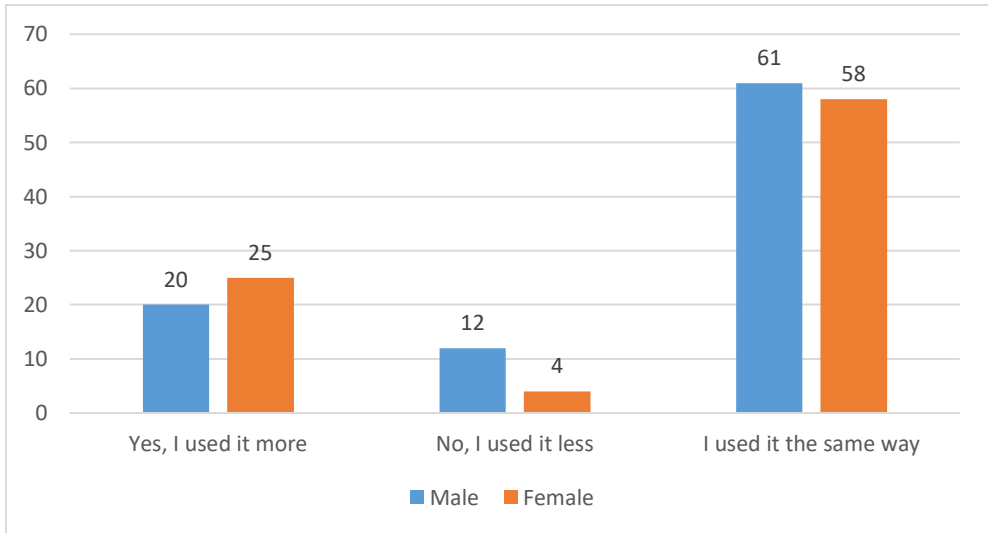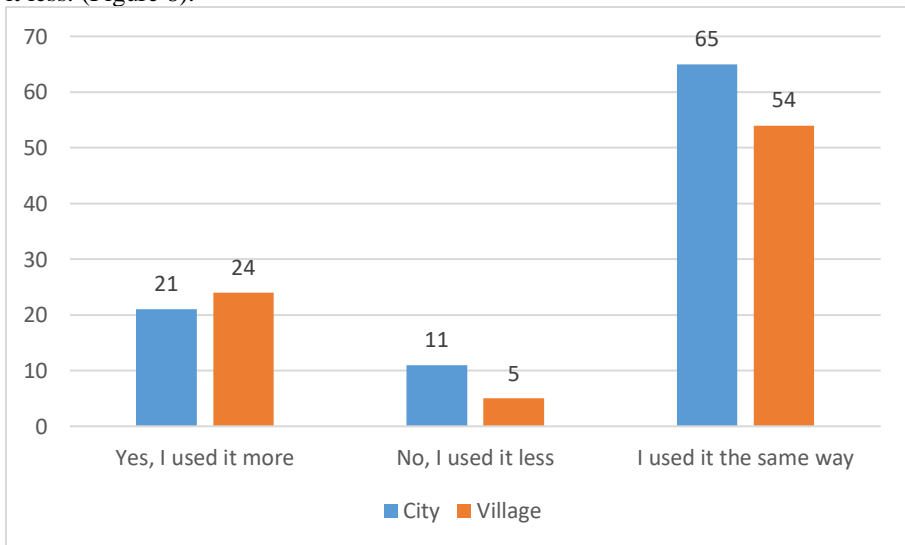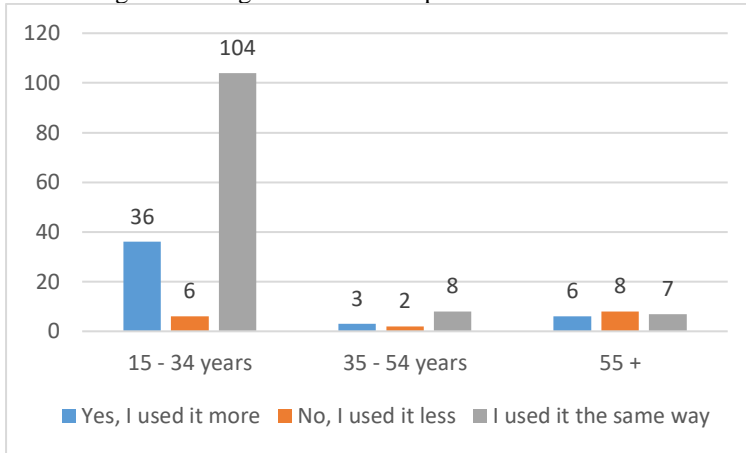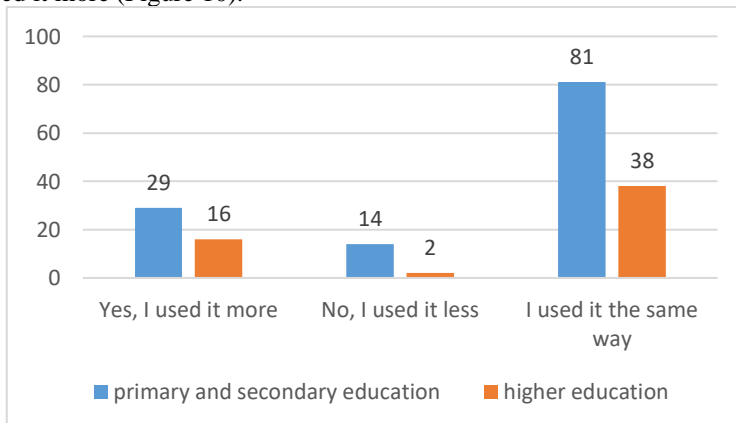

Figure 10. Answers to Question 10: Did you start using electronic banking to a greater extent during the COVID-19 pandemic? (according to education)

Source: authors (2022)

The results of the testing the 4 given questions show that a statistically significant result was obtained only when dividing the respondents by the age category, which can also be considered logical. Older people used electronic banking more during the COVID-19 pandemic, probably out of fear of personal contact in public. However, we remind that precisely from the point of view of the age category, our sample was not representative (Table 1).

Table 4. Testing the statistical differences by the COVID-19 questions.

Test	Gender	Permanent residence	Age	Education
Chi-square test of Independence	4.44	2.39	28.69	3.04
Chi table value	5.99	5.99	9.49	5.99
Result	HO	H0	**H1**	H0
Pearson's contingency coefficient	0.155	0.115	0.37	0.129
Crammer's contingency coefficient	0.157	0.115	0.28	0.130

Source: authors (2022)

4 Conclusions

In this paper we present a part of the results of our survey focused on new trends and risks of electronic banking in Slovakia. The survey was carried out in March 2021 during the COVID-19 pandemic. Representativeness of the sample was confirmed for the parameters: gender, education and permanent residence. In terms of age, the representativeness was rejected due to the fact that up to 81% of the 180 respondents were in the age of 15-34. The first group of questions was related to the use and new trends in electronic banking, while we investigated statistically significant differences between men and women, too. The results showed that the majority of respondents use electronic banking, while the most common answer for men was "2-3 times per week", and "2-3 times per month" for women. Biometrics and electronic signature were the most familiar terms, while the least known were multibanking, instant payments, and fintech technologies.

The second group of questions was related to safety and risks of electronic banking. Most of the respondents consider electronic banking to be safe, while 12 of them have already become victims of fraud in electronic banking. The most famous risk terms were scam and phishing. It is precisely in this question that a statistically significant difference between men and women was confirmed, while we can claim that men know the risks of electronic banking better than women.

The last asked question was "Did you start using electronic banking to a greater extent during the COVID-19 pandemic?" Most of the answers were that the respondents used the electronic banking the same way. Therefore, we can say that the COVID-19 pandemic did not have an impact on the use of electronic banking for most of the respondents. Statistically significant differences in answers were not confirmed in terms of gender, permanent residence, and education. It was confirmed only in the case of age, since older people used electronic banking more during the COVID-19 pandemic than before. However, our sample is not representative in terms of age.

In conclusion, we can say that there is a need for continuous education of the population, especially in the area of risks of electronic banking. We call also for

caution when using electronic banking, since 12 out of 180 respondents have fallen victims to fraud in electronic banking.

Acknowledgements

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The consequences for the EU of the new set of sanctions against Russian oil

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Abstract.

Research background: The European Council has reached an agreement on the sixth package of sanctions to be imposed on Russia in the context of the war in Ukraine. The leaders of the Member States of the European Union have finally reached an agreement on the new package of sanctions that will be imposed on the regime led by Vladimir Putin. It is the sixth package of sanctions set by leaders in Brussels on targets oil imports from Russia. It is expected that by the end of this year, Russian oil imports into Europe will be reduced by 90%. This will not happen suddenly but progressively.
Purpose of the article: In this paper, we want to see the efficiency of this measure and analyse what the consequences are from an economic and environment point of view.
Methods: Through descriptive and comparative analysis the paper reveals the difficulties and consequences that both parties will be confronted.
Findings & Value added: The most obvious consequence is the higher price of energy and because of this we see all the prices going up – the inflation is at the top level in every country, including in the U.S. which is less dependent on Russia exports. Nevertheless, there is also room for speculation, it is not normal that wheat and corn prices to go up since we are consuming at this time the last year's crop and not the future one, which will definitely be more expensive.

Keywords: war economic sanctions, global warming objectives

JEL Classification: *H22; F53; F50; Q54*

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1 Introduction

The European Council, during the official communiqué realised to the press on May 30, 2022, condemned "resolutely Russia's war of aggression against Ukraine" [1]. European leaders reached a consensus on the introduction of the sixth package of sanctions against Moscow.

Future sanctions approved will cover imports of crude oil and petroleum products delivered by Russia to the Member States. These will be banned altogether. The exception will be the import of crude oil delivered through pipelines, in which case the embargo will be applied later.

European Council President Charles Michel says the sanctions will have an immediate impact on 75% of Russian oil imports. By the end of this year, 2022, oil imports from Russia are expected to fall by 90% due to bans. In this context, according to the communiqué, the leaders of the Member States called on the Council of the European Union to finalize and adopt without delay the new sanctions against Moscow.

Of course, another important topic discussed at this meeting was the security of civilians, the prosecution of war crimes, and EU support for Ukraine. This included humanitarian, financial, military, and political support.

On the other hand, Russia has demanded the lifting of the sanctions imposed on it, in exchange for lifting the blockade on Ukrainian ports on the Black Sea. The latter would be necessary in order to resume grain exports from Ukraine to other states.

United Nations Secretary General Antonio Gutierrez has called on Vladimir Putin to lift the blockade [2]. This is because the UN world food program feeds about 125 million people and buys 50% of the grain in Ukraine. It is worth mentioning that fertilisers are also an important aspect of this equation since most developing countries are in deep need of these products to increase their agricultural productivity. Russia is the second most important exporter, after Canada, of potash, ammonia, urea, and other nutrients. Belarus, which is also suffering from the same sanctions, is another an important player in this market so in order to maintain a high yield of production of corn, wheat, soy, rice, sugarcane, etc. These inputs are highly important for farmers to avoid a weak 2023 season with higher agricultural products prices. The solution of farmers from Brazil, Argentina, Peru, etc. is only to reduce the fertiliser used on the current crops. The prices were already getting high, and Canada, China, or Israel not being on a position to fulfil the demand.
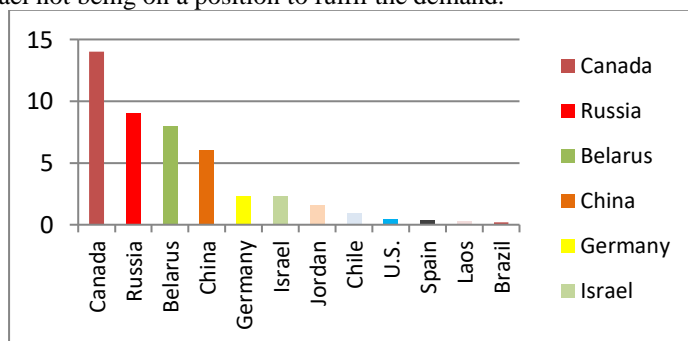

Figure 1. Global fertiliser production (by country/ thousand metric tons)

Source: USGS, 2022, Mineral Commodity Summary [3].

In a discussion with German Chancellor Olaf Scholz and French President Emmanuel Macron, Vladimir Putin resumed his demands. He said Russia was ready to increase supplies of fertilizers and agricultural goods in exchange for the elimination of Western sanctions.

During the negotiations, the two Western representatives opened the discussions regarding the world food situation; nevertheless, the situation is particularly tense due to the Russian war of aggression. The German official said that President Putin has declared that he will take into consideration opening the export of agricultural products from Ukraine, first of all by sea, thinking that Odesa is a commercial shore controlled by the Russian army. These measures will facilitate the control, which is why such a quick solicitude and openness for a sensitive cause.

1.1 History of sanctions

If we look back, the first sanctions against Russia started on the 3rd of March 2014 after the annexation of Crimea and Sevastopol. If at the beginning the EU decided to suspend preparation regarding the participation at the G8 summit in Sochi, during time new measures were imposed. First of all, there were the freezing and recovery of assets from a few persons identified as being responsible for this operation. Later, other persons and entities (companies and organisations) were added to the list as well as the decision to not hold any bilateral summits with Russia.

It is worth mentioning that in 2014, OSCE (represented by Francois Hollande and Angela Merkel) and representatives of Russia, Ukraine, and other representatives from regions Donetsk and Lugansk signed the Minsk Protocol. Even though the intention was to impose a buffer zone having as the main purpose the idea of ceasing fires and extending negotiations, in reality, the parties involved never stopped to attack each other. One year later we have Minsk II but as a final result, in 2022 Russia recognised Lugansk and Donetsk as the independent republic of peoples and blamed Ukraine for the failure of the negotiations. We wanted to bring this aspect of goodwill for negotiations from the E.U. side in order to show that the sanctions were not the only decision for solving the crises in the middle of Europe.

On the 23rd of February 2022, the E.U. decided to impose the first package of sanctions against Russia which consisted in targeting the 351 members of the Russian State Duma and restrictions on Russia's access to the E.U. capital and financial markets. The second package consisted mainly in freezing the assets of Vladimir Putin and Sergey Lavrov (foreign affairs minister). The third package imposed a ban on the transaction with Russian Central Bank but also a ban on Russian flights in the E.U. airspace as well as airports. It was also the moment when seven Russian banks were excluded from the SWIFT system and Russia Today and Sputnik were suspended from broadcasting in the E.U. area. The fourth package imposed a ban on new investments in the Russian energy sector and all transactions with specific state companies. On the 8th of April, the E.U. has decided to ban imports from Russia of coal and other solid fossil fuels, wood, cement, and seafood, as well as interdictions for Russian ships to access the E.U. ports and for transporters companies to operate on E.U. territories. On the 30th of May 2022, European leaders decided the sixth package of sanctions which consist of the interdiction of delivering Russian oil to E.U. member countries. A temporary exception was agreed upon for oil coming from pipelines because some Central European countries cannot reorganise their sources in such a short time (Hungary opposed a total ban). Up until now, no sanctions on Russian gas were imposed. Germany and Poland pledged voluntarily to stop oil Russian from pipelines, till the end of the year, which finally will be materialised in a 90% ban on total Russian oil exports to the E.U. It was decided that no longer than 6 months, the E.U. countries have to stop the import of Russian crude oil coming from the sea; they have 8 months for cutting imports of refined products also.

In order to understand how important the sanctions for the E.U. countries are, in the next graphic we can see who the main oil providers are and where the E.U. countries have to look for new arrangements.
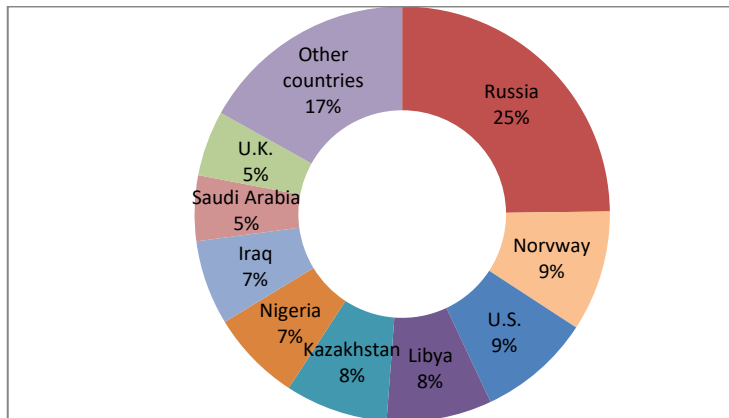
Figure 2. The E.U. total oil imports by countries, 2021.

Source: IENE, 2022 [4].

Finding a solution to replace 25% of oil sources will not be easy. Some steps were already taken by diversification of suppliers, reducing demand by investments in energy efficiency, or increasing the production of green energy inside the E.U. Still, today the E.U. is highly dependent on Russian exports; if some arrangements might be found for replacing the oil, nobody talks about Russian gas dependency, which is 43,5% in 2021.

Liquefied natural gas (also known as LNG) could be a solution, in the long term. For the moment the E.U. has only 20 large/scale terminals fully operational and connected to the national energy systems. In the next picture, we could see who the biggest LNG importers in Europe are.
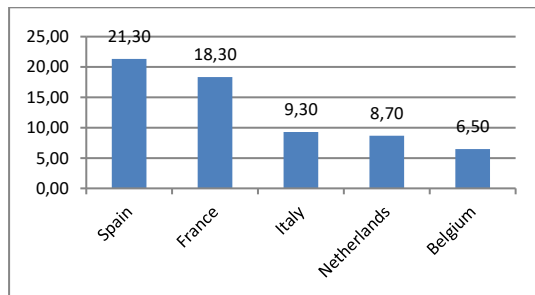
Figure 3. The most LNG importers in the E.U. / 2021 (bcm / billion cubic meters of natural gas)

Sources: European Commission, 2022, [5].

Naturally, these countries are less dependent on Russian energy.

It is also useful to look at the next picture to understand what other options Russia might have in order to divert its oil production.
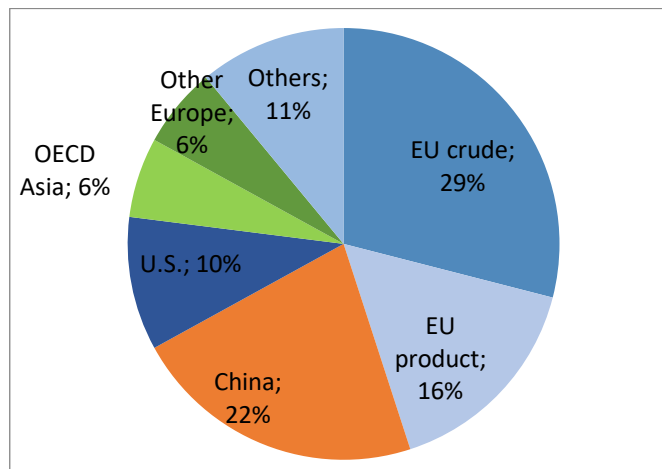
Figure 4. Importers of Russian oil

Sources: Reuters, 2022, [6].

It is obvious that Russia moved its attention traditionally to China but also to India (who never condemned openly the aggression), offering lower prices for the crude. India also took advantage of discounted prices and increased its imports. We like it or not, the reality shows that, despite the sanctions, Russia is still capable to export its oil and gas by slashing prices, setting up financial arrangements, and leveraging its position as the world's largest exporter of such products.

1.2 Some positive consequences

For sure, this is not an easy situation; since by sanctioning Russia, the E.U. is damaging its economy (the inflation rate in May is 8.1%, up from 7.4% in April 2022, Eurostat, [7]). The most interesting part of this situation is that, at the same time, the E.U. has committed reducing its carbon footprint, reaching net zero greenhouse gas emissions (GHG) by 2050, in other words, to become carbon neutral and by reducing its import of fossil energy there is a chance to find ecological solutions or at least friendlier environment [8].

There is also a mid-term objective for 2030 which consist in:
- at least 40% cuts in greenhouse gas emissions (from 1990 levels),
- at least 32% share for renewable energy,
- at least 32.5% improvement in energy efficiency.

Al these ambitious objectives were settled in a frame known as European Green Deal and it comes as a road map in order to achieve the Paris Agreement outcomes (European Commission, 2020) [8].

After the COVID -19 pandemic, the world faced an important reduction of GHG and there was a hope that maybe this situation will be continuing. Once the economic activity restarted we can clearly see that in 2022 the world is almost at the same level as in 2019.
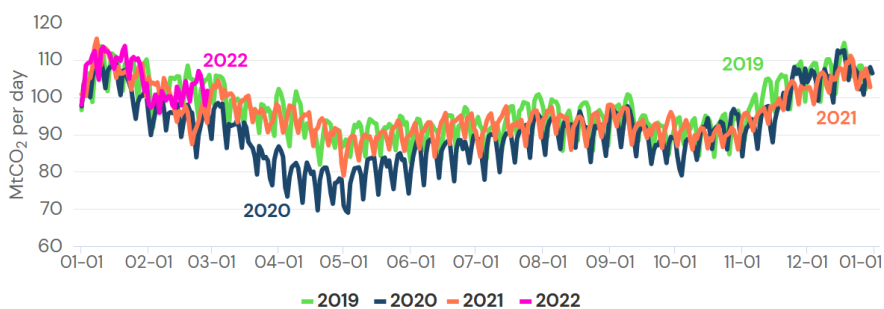
Figure 5. World CO2 emission, 2019-2022

Source: Liu et al. 2022, [9].

Of course, the results could be predicted since the reduction of GHG emissions was realised by changes in human activities because of lockdowns, and consequently, the global energy consumption was diminished which finally negatively impacted on CO2 emitted.

Nevertheless, the pandemic forced us to create the largest annual decrease in CO2 since 1900, which is not an easy thing. In the next graphic, we can see what happened with GHG emissions during the main events of the XX century.
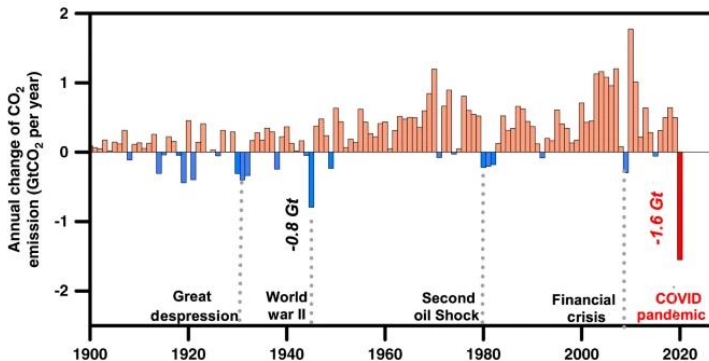
Figure 6. Annual change of CO2 emission/year (GtCo2)

Source: Liu et al, 2020, [10].

As we could see, the reduction of CO2 emitted was doubled compared with what happened during the Second World War and far more important than all the other main events that had influenced the global economy.

So until now, data proved that when people are forced there is always a possibility to reduce GHG emissions even though is not an easy one. We also showed that despite the sanctions, Russia will continue to export its oil, probably at lower prices, and that will bring no help in minimising the CO2 quantities.

Contrary, by pursuing its path of sanctioning Russia, the E.U. has a chance to take a step further in fulfilling its ecological objectives [11,.12]. Diversifying its energy sources will only bring positive aspects on the way of reducing the dependence on fossil fuels. By adopting the 6th package sanctions, the E.U. put itself in a delicate position of finding new sources of energy and this may be an occasion to change something. Investing more in renewable energy (wind and solar) could only bring benefits in long term. A unique and solid solar strategy for installing solar panels on all rooftops may be one of the answers that the E.U. Commission is looking for but the future is still unclear.

2 Conclusion

The sixth package of sanctions announced by the E.U. probably will not affect that much the resources of the Russian economy since they could find other buyers ready to take the opportunity of discounted prices. In any case, it is a lose-lose situation, since for Putin is not easy or cheap to redirect the exports. The most obvious consequence is the higher price of energy (either we talk about gasoline for cars, gas for home heating or electricity) and from this we see all the prices going up – the inflation is at the top level in every country, including in the U.S. which is less dependent on Russia exports.

Nevertheless, there is also room for speculation, it is not normal that wheat and corn prices to go up since we are consuming at this time the last year's crop and not the future one, which will definitely be more expensive.

Besides the moral necessity to punish an aggressive country, the E.U. could benefit from this situation by going further into the race of becoming carbon neutral by 2050. By limiting the imports of fossil fuels, without any doubt, the only way is to force people to change their habits: to replace the old cars with electric vehicles, to modernise the pollutant industry and make them more efficient and oriented through greener fuels, to open in people's consciousness the idea of saving energy, or consuming less or more efficiently, to develop new facilities to produce clean energy on the European soil. Some steps are already taken; Italy and Greece announce that during summer the public institutions will start the air conditioning only if temperatures exceed 25-27 degrees.

No one takes difficult decisions without being in a complicated situation. However, this crisis can have an appreciable long-term result, the future will confirm or not. The clock of the global warming crisis is also ticking and people should not forget about that but rather adapt the strategy for a better solution, as a s possible.

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The impact of the Covid-19 pandemic on the activities of libraries, archives, museums and other cultural facilities

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Abstract

Research background: The illness Covid 19 was first time detected in Slovakia in march 2019. Subsequently, the disease progressed rapidly and affected every area of life of countries and people all over the world, not excluding the business sector. One of the sectors most affected by the pandemic was the creative and cultural industries, but not to the same extent. While some of the sectors of this industry saw a positive effect of growth in sales, added and newly created value during the pandemic, others stood on the threshold of their own existence.
Purpose of the article: At the beginning, the article is focused on theoretical explaining what creative and cultural is and its importance for business and society. The second part of article is practical part. Based on development of selected financial indicators, it is tried to evalued the impact of pandemic to selected creative sector - the activities of libraries, archives, museums and other cultural facilities.
Methods: In this article, there are used basic research methods such as analysis, synthesis, deduction. The practical part of article is based on the latest financial data from research of company Slovak Credit Bureau.
Findings & Value added: The main value added of this article is to measure and evaluate the condition of selected sector of creative and cultural industry due to pandemic situation. At the end, the article tried to point some recommendation how to protect and support this sector in the case the same situation in the future.

Keywords: *creative and cultural industry, pandemic, financial indicators*

JEL Classification: *Z10; M21*

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1 Introduction

The term creativity is derived from the Latin word "creatio", which in translation expresses creation. It represents a person's ability to create various new and original ideas that he did not know until now. In each of us, creativity is the main element of human existence, albeit in different forms. individual creativity is one of the two personal characteristics mentioned to impact an individual's innovative behavior. Individual creativity as a personal characteristic reflects the idea that creativity is heterogeneous and distributed across individuals in the organization. (Asbari, M., Prasetya & et, 2021, p. 67) Creativity is flexible and dynamic and varies from employee to employee. Translating creativity into innovation is a function of multiple incentives, and sustaining innovation is inseparable from heavy investment in research. Ultimately, the transition from innovation to commercially viable products requires the midwifery of many service providers and the entrepreneurial skills of firms small and large. (Yusuf, 2009, p.1). Creativity can also be characterized as Big "C" and little "C":

- Big C – this is about creativity, which has a long-term character and therefore appears in creative people only a few times in a lifetime, but has a longer attribute.
- Little C – it is everyday creativity, and therefore people have the possibility of solving any problems through several methods. (Frey, 2003)

Creative economy is a concept in the new economic era that prioritize information and creativity by relying on ideas and knowledge of human resources as a factor of production. (Chollisni & Syahrani & et., 2022, p. 416). Currently, it is necessary for the development of the creative economy to take place, and several conditions must be met for this. It is about achieving the highest possible economic level of the given country, technologies must be accessible not only to companies but also to consumers and, last but not least, the social environment. That is, the given country must be open, tolerant and must create a suitable cultural environment for citizens so that they can fully develop their talent. Therefore, in order to increase the growth of the creative industry, economic wealth, an educated workforce and the maturity of consumers are needed. (Alexy & Káčer, 2015). 2021 has been designated International Year of Creative Economy and Sustainable Development by the United Nations. In a sense this represents the creative economy 'coming of age'; in 2008 the seminal Creative Economy report was first published by UNCTAD in collaboration with UNDP and members of the UN family. The creative economy is a fastchanging and shape-shifting phenomenon. It has challenged policy makers who have generally tried and failed to use generic policies to guide its development. The notion of a creative economy ecosystem has helped to 'rethink' the networks, linkages and interdependencies that characterise it. (Pratt, 2021). Creative industries can help foster positive externalities in preserving and promoting cultural heritage and diversity, as well as increasing developing countries' participation in and benefiting from new and dynamic growth opportunities in world trade. (Harper, 2021, p. 108). Increasing the creative economy during the pandemic is very urgent. The character of the creative economy is characterized by economic activities that are based on the exploration and exploitation of creative ideas that have high selling value. Intelligent marketing is needed in order to know the strengths of our competitors and market tastes, because in the era of globalization, creative economy is the main tool. (Palla & Strickler, 2021).

2 Methods

The object of investigation of our contribution is the cultural and creative industry in Slovakia. Cultural and creative sectors are important in their own right in terms of their

economic footprint and employment. They also spur innovation across the economy, as well as contribute to numerous other channels for positive social impact. (Travkina & Sacco, 2020). In 2020, the most dominant sector of the cultural and creative industry is software, IT and computer games with 30%, then advertising and marketing with 31%, TV, film, video, photography and radio with 13%, architecture with 10%. Other branches of industry already have a lower representation than 10%. These are publishing activities with 7%, design with 6% and performing and visual arts, music with 3%. For comparison, in 2018 the most dominant industry was advertising and marketing with more than 33%. The Covid-19 pandemic may be the reason why software, IT and computer games have grown so much in the last two years, mainly because we were forced to go online due to anti-epidemiological measures. (Slovak Business Agency, 2021) The largest representation of the cultural and creative industry in Slovakia for the year 2022 in terms of the legal form of business entities is a limited liability company with more than 51%. Next, trade with 44.80%. The remaining business entities such as freelancers, joint-stock companies and other legal forms have only a small representation. (Ministry of Culture, 2020) Currently, it is not statistically possible to obtain the sales of all business entities in the cultural and creative industry in Slovakia. This is because not all entities are required to submit financial statements.

The disease COVID-19 is an infectious disease which, according to available information, is caused by the SARS-COV-2 virus. The first case of this infection was identified in the Chinese city of Wuhan in December 2019. The virus has spread throughout the country and is causing an ongoing pandemic. In Slovakia, we recorded the first case of the disease in March 2020, when the so-called the first wave, which lasted until June 2020, when the epidemiological situation improved. During the first wave, cultural and creative industry businesses were closed for 2-3 months. In 2020, the sector of cultural and creative industries will experience a break for at least half a year. The pandemic had a serious economic impact on the Slovak Republic. Although its impact on individual industries was different. We will try to point out the negative impacts on the activities of libraries, archives, museums and other cultural facilities.

3 Results and Discussions

Our researched subsector of the cultural and creative industry is the activities of libraries, archives, museums and other cultural facilities. According to SK NACE, it belongs to code 91. Zoological and botanical gardens, operation of historical buildings, nature reserves can also be included in this division. It also includes cultural objects that create added value for society (monuments of cultural heritage). In the post, we will continue to focus on several financial and economic indicators that will tell us more about how the COVID-19 pandemic has affected this sector. In 2020, 70 business entities participated in the CRIF-Slovak Credit Bureau survey in this sector. In contrast, there were only 47 of them in 2019. In the last year, the largest number of business entities participated in the survey for the entire period we monitored. According to the obtained data, up to 63 entities have assets of less than 1.6 million euros. 4 business entities are in the range from 1.6 to 5 million and 3 entities exceeded the threshold of 5 million euros.
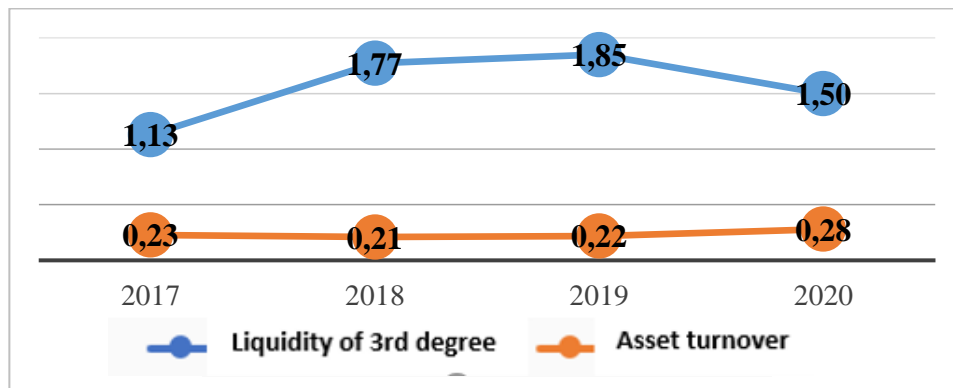
Figure 1. Evolution of the 3rd degree liquidity indicator and asset turnover

Source: Author

In 2017, we fell below the acceptable limit of total liquidity to the value of 1.13 coefficient. In 2018 and 2019, we see an increase in liquidity of 3 degrees, which means that business entities in this sector were able to better use all short-term assets to cover their short-term liabilities. In the last year, we have recorded a drop in total liquidity to 1.50 coefficient, but we are still in a satisfactory range. On graph 14, we can see that the turnover of assets has a relatively stable development. During the entire monitored period, the turnover of assets did not exceed the value of 0.30. Even though we observe a slight increase in asset turnover from 2017-2020, this number is significantly below the acceptable value of 1. That means that these companies do not turn over assets even once a year.

Other economic indicators in Table 1 are expenses spent on the activities of libraries, archives, museums and other cultural facilities and current indebtedness. We observe the highest expenses in the first year we monitor. In 2018, expenses fell by 10,015 euros. In 2019, these expenses were further reduced to the amount of 9,964.43 euros. From 2017 to 2019, this represents a 30% decrease. In the last year, expenses for the sub-sector of activities of libraries, archives, museums and other cultural facilities increased year-on-year by 10,057.27 euros. We could attribute such an increase in expenses to the worsening situation due to the corona crisis, when all cultural facilities had to remain closed. Current indebtedness reached its highest value in 2017. It takes up to 72 years in the sub-sector of activities of libraries, archives, museums and other cultural facilities before they are able to pay off their foreign liabilities with the help of profit and depreciation.

Table 1. Expenditures and current indebtedness of the activities of libraries, archives, museums and other cultural facilities

	2017	2018	2019	2020
Expenditures	33 524,23 €	23 509,23 €	9 964,43 €	20 021,70 €
Current indebtedness	72,06 year	18,81 year	21,82 year	59,23 year

Source: Author

In 2018, we can see the biggest drop in 53 years, which we evaluate very positively. Another increase was in the last year. In 2020, it therefore takes 60 years for business entities to pay off their foreign liabilities, which is an increase of 37 years compared to 2019.

The share of newly created value in 2018 grew by almost 10% year-on-year as can be seen in figure 2. We evaluate this phenomenon very positively. Companies in this subsector are able to create 14.06% of newly created value using their own production. Since 2019, we

have observed a sharp decline, where the share of newly created value in sales fell to the level of 6.26%. In the last observed year, it is a further decrease of 2.45%. In the last two years, as a result of the COVID-19 pandemic, we can observe that business entities in the activity sector of libraries, archives, museums and other cultural facilities fail to create newly created value through their own production. The share of added value in sales has a steady tendency during the years 2017-2019. In 2018, similar to the newly created value, it achieves the best results. We can state that the contribution of business entities to the performance value is growing in the mentioned years. In 2020, we see a decrease in added value on sales by 15.24%. This indicator also shows that this sub-sector was adversely affected during the pandemic.
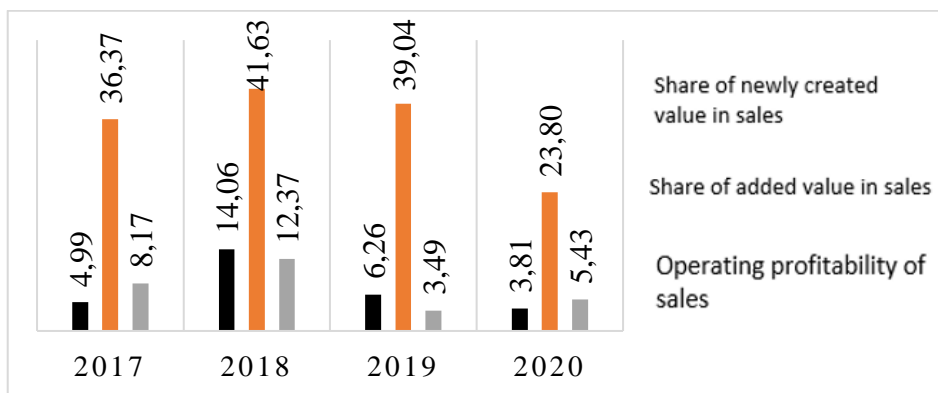
Figure 2. Evolution of share of newly created value in sales, the share of added value in sales and operating profitability of sales

Source: Author

The operating profitability of sales has a variable development in this sub-sector. In 2018, we observe an increase in operating profitability by 4.2%, which we evaluate as a positive fact, but already in 2019 there is a decrease to a value of 3.49%. In the last year examined by us, the operating profitability of sales increased by 1.94%. Although this is a growing development, the profitability of sales is still low.

In March 2019, when the Covid-19 pandemic broke out in Slovakia, no direct form of aid was established for the cultural and creative industry. Aid from the state during the first wave of the pandemic was very unsystematic and even chaotic. The reason why such chaos has arisen is certainly also the fact that in Slovakia we have a great diversity of business entities and also their legal forms of doing business in this industry. The cultural and creative industry was able to cover part of its costs through the support of the Ministry of Labour, Social Affairs and the Family. As part of the measures, several laws were approved and adjustments were made in various areas, where the main goal is to mitigate the effects of the Covid-19 pandemic on the cultural and creative industry. The reason why the cultural and creative industry is supported precisely from public goods is that it brings various benefits for the individual as well as for the whole society. Therefore, the state should participate in the financing of this sector, because with its help we achieve national goals such as:

- cohesion and unity,
- increasing respect for other people's opinions,
- the identity of the nation.

During the corona crisis, the state must take responsibility and compensate the economic losses incurred by the entities. Therefore, several compensatory tools were adopted:

postponement of tax payment, postponement of contributions to the social insurance company, partial compensation of fixed costs, payment of rent costs, postponement of installments from loans and credits and many others. However, only a small percentage of entities used this assistance. Therefore, during the next wave of the pandemic, the state should focus more on:

- provision of more targeted aid to affected entities - during the first and second wave of the pandemic, several entities did not fall under the created state aid.
- reducing the administrative burden - adopt administrative adjustments to facilitate easier communication between the affected entities and the state. As a result, it is also possible to shorten the waiting period and, ultimately, the funds will be paid out earlier.
- the maximum possible use of European funds - to ensure and maintain jobs in the field of cultural and creative industry.

4 Conclusion

The cultural and creative industry is an important part not only for Slovakia, but also for the world economy, as it represents approximately 4% of the countries' GDP. The primary goal of the submitted paper is to analyze and evaluate the impact of the COVID-19 pandemic on the activities of libraries, archives, museums and other cultural facilities. Based on the processed data and the evaluation of the development of financial and economic indicators, it can be claimed that covid-19 had a very negative impact on companies operating in this industry. The year 2020 represented a downward trend in almost all financial and economic indicators. Aid from the state during the first wave of the pandemic was very unsystematic and even chaotic. The reason why such chaos has arisen is certainly also the fact that in Slovakia we have a great diversity of business entities and also their legal forms of doing business in this industry. The cultural and creative industry was able to cover part of its costs through the support of the Ministry of Labour, Social Affairs and the Family. During the next wave of the pandemic, tha state should focus more on provision of more targeted aid to affected entities, reducing the administrative burden or the maximum possible use of European funds.

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Smart cities in the context of solving their problem areas

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Abstract

Research background: The smart city is a concept of strategic management of the city and there is a synergy between the various activities and public services that make the city work. Through this activity, they increase the quality of life of their citizens. A smart city is able to provide individual services to stakeholders as efficiently as possible while supporting job creation, innovation, research and development, new ideas, while taking into account the environment and the views of stakeholders. Traditional city systems, infrastructure and services are being improved with the use of ICT and modern technologies, which make it possible to improve the services provided, use of resources and eliminate adverse effects on the environment.

Purpose of the article: The result of the article is to find out and verify the current state of Slovak municipalities and cities in terms of the level of smart cities. The greatest emphasis is placed on weaknesses, shortcomings, and problematic aspects that they encounter in the management of a municipality or city.

Methods: The theoretical part was processed using the method of analysis and synthesis. In the practical part, the primary research was used to determine the attitude of cities, which was carried out in the form of a questionnaire.

Findings & Value added: From the environment of Slovak cities and municipalities, a growing interest in the area of smart cities can be observed over the last year, which is manifested by the implementation of the first concrete projects, despite the absence of system support for smart cities. Applying the smart cities approach increased the quality of life of citizens and improved the business environment, including significant savings in public finances. Cities and municipalities are primarily interested in projects leading to energy efficiency, improving the quality of electronic services of municipalities, smart transport and parking systems.

Keywords: *smart city, digital transformation, innovation*

JEL Classification: *O14; O18; R11; R58*

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1 Introduction

Many people perceive modern terms such as smart cities, smart companies, or machines capable of learning and replacing human labor as general terms, or even as the music of the future. However, the reality is different and behind these concepts are hidden real tools that improve not only the functioning of businesses but also people's lives. [1,2] The quality of life is changing dramatically in terms of economic, social, health, and environmental conditions. Many tried to comprehensively evaluate the quality of life from different points of view. [2] The term smart city is a topic that can be used to illustrate current technological progress and development, both in the area of municipal management as a whole, but also in specific areas such as transport, waste management, engineering networks, etc. Above all, a smart city is expected to be able to adapt to the needs of users and provide the necessary interfaces. [3,4]

In recent years, city leaders have been trying to declare their readiness by implementing the globally recognized smart city concept, expecting it to solve most of the city's problems. [1] Despite this, there is no uniform definition of this concept, the authors note different starting points as the basic characteristics of a smart city. However, without a clear understanding of the smart city and its elements, a coherent state policy to support urban development and an objective scientific discussion about whether a smart city is a suitable solution for everyone are impossible. [1,3,4]

Among the first studies of the development of smart cities, P. Hall's work „*Cities in Civilization: Culture, Innovation, and Urban Order*" should be noted. In his research, the author focused on studying the reasons for the prosperity and decline of cities through the development of art and technology, as well as the role of human capital and creative industry in the development of cities, including modern IT. [5,6] At the same time, P. Hall claims that in the 21st century the key moment will be „the relationship between art and technology", which means that the quality of life in cities (rather than material resources) will turn out to be the decisive factor in production for the new economy, which requires a change in the development strategies of most cities. [6,7]

Developing the ideas of P. Hall, the second block of smart city studies understood as an area accumulating highly qualified personnel is being formed. This block includes human capital (creative potential of the population), social capital, infrastructural capital (all existing educational institutions and IT infrastructure), and business capital. [8,9] In the studies of JM. Shapira and K. Kurtit et al. it is reported that smart cities with a high proportion of highly skilled workers show a high rate of economic growth and labor productivity, which leads to an improvement in the quality of life and enables them to compete in the battle for talent. However, it is necessary to take into account that the high quality of life in the city also contributes to the growth of labor productivity. [10,11]

A separate block of work that deserves attention is the smart city concept built based on the concept of sustainable development. Among the most important studies on the subject of smart cities are the works of R. Giffenger et al. and A. Caraglju et al., who study the European experience in creating smart cities. For example, Rudolf Giffinger, in his 2007 study „Evaluating large smart cities in Europe", argues that the term smart is often used to describe: [12]

- cities with a „smart" industry, which primarily includes ICT; business parks, separate areas of cities where IT predominates;

- the role of highly qualified workers in the economic development of cities and regions; participatory management processes;

- various aspects of city management, including energy efficiency, environmental friendliness, safety, sustainability, etc.

His research formed the basis for a study by A. Caralja, S. Del Boa, and P. Naikampa, published in 2009 under the title „Smart cities in Europe". The authors claim that the urban development model proposed by Giffinger logically fits into the neoclassical theory of economic growth, and competitiveness of cities and regions. [12] The study allowed A. Caragliu et al. to identify a stable positive relationship between such indicators of cities as the level of well-being of the population, the number of highly qualified professionals, the quality of human capital, the quality of urban transport infrastructure, the spread of IT, and others. [13,14]

According to A. Caraglia, all factors contributing to the growth of the well-being of the population living in cities and to the growth of the cities themselves can be considered as capital stocks that accumulate over time, but at the same time are subject to decay processes. [14] Thus, educating people will increase the rate of economic growth in cities only if investments in education are realized in the long term with a stable flow of resources. Likewise, transportation networks and urban infrastructure must be constantly updated to keep up with rapidly growing cities and continue to attract people and their ideas. [11]

The rapid pace of IT development requires constant and deep restructuring and reassessment of the communication infrastructure. [14] This approach is the only way to ensure a sustainable urban development path while ensuring that cities retain their critical role as „cradles of ideas and freedom". [3,4,15]

Cities in their conceptual materials and mayors in their election programs use several terms to name the smart city concept - intelligent, wise, or reasonable (city). [16] The most commonly used characteristics of the term smart city in Slovakia are:

- **Ministry of Economy SR (ME SR):** *„…a new approach [...], using technical and technological innovations, including information and communication technologies. It is an effort to increase the quality of life and the quality of the business environment in cities and regions, to increase the efficiency of their functioning, to make them safer, cleaner, more energy efficient, and capable of responding to social, ecological, or other challenges and needs."*
- **Smartcity.gov.sk:** *„…uses information and communication technologies to improve its functionality, long-term sustainability and increase the standard of living of citizens. For the creation of a smart city, it is important to collect, share and analyze data about its functioning, so that solutions can subsequently be implemented that will contribute to improvements and long-term sustainability in important areas such as urban mobility, energy, waste management, telecommunications, health and healthcare, social services, education, culture, community development, climate change mitigation, public safety and more."*
- **Žilina:** *„…to bring intelligent, so-called „smart" solutions, where the end user of the solution is the citizen,"*
- **Bratislava (2014-2018):** *„…it mainly represents an ideological approach focused on the ability of cities to respond to the emerging challenges of their territorial development, which is primarily aimed at increasing the quality of life-based on innovations."*
- **Bratislava (2018-):** *„… being smart doesn't just mean reading and analyzing data but being able to manage the knowledge and skills of all its residents and visitors within the city."*
- **Poprad:** *„…it is not only the technical development of the city and infrastructure but the wider context of social and economic changes. A smart city is intelligently connected, intuitive and understandable for its residents and visitors."*
- **Kežmarok:** *„…technological and strategic shift of the city, responding to the rapid development of solutions supporting the satisfied life of citizens."*

- **Slovak Smart City Cluster:** *„…technology represents only part of the „smart" quality, and technological innovations can be purposefully and effectively used for the benefit of people only if they are connected to human needs and at the same time understandable, accessible, and easy to use for different social groups of the population…"*
- **Chceme smart mesto:** *„[technologies] that deliver a simpler, greener and better-organized life in long-term sustainable cities."*

The concept of a smart city has several names, but despite this, the Ministry, the Deputy Prime Minister, and the cities agree on the definition of the concept of a smart city - they denote a city that not only introduces new technologies but also emphasizes the quality of management and life in the city. [17]

2 Methods

This scientific article aims to evaluate the attitude of Slovak cities and municipalities towards the implementation of innovative solutions. To achieve the main goal, it was necessary to carry out primary research, which was aimed at finding out and verifying the current situation in Slovak municipalities and cities in terms of the level of smart cities, while the greatest emphasis was placed on weaknesses, shortcomings and problematic aspects encountered in management villages or cities. For the needs of the primary research and the achievement of the goal, a research problem and research objectives, assumptions and questions were set, which are listed in the Table 1.

Table 1. Research problem, objectives, assumptions and questions.

A research problem	Research objectives	Research assumptions	Research questions
Insufficient monitoring of problems and shortcomings of cities and municipalities within the concept of smart cities in Slovakia	RO1: Find out the implemented smart solutions in municipalities and cities in Slovakia	RA1: The most frequently implemented solution is public Wifi	RQ1: What specific solutions are implemented in your village/city?
	RO2: To find out the main obstacles that arose for municipalities and cities in the implementation of smart solutions	RA2: The biggest obstacle in the implementation of smart solutions in municipalities and cities with a population of up to 20,000 was finances	RQ2: What have you noticed as the biggest obstacle in the implementation of smart solutions?
		RA3: The biggest obstacle to the implementation of smart solutions in municipalities and cities with a population of over 20,000 was the absence of experts	
	RO3: Find out what activities municipalities and cities in Slovakia implement in the	RA3: In the concept of smart cities, municipalities and cities currently most often perform the	RQ3: The activity of your municipality/ city in the field of the smart city consists in:

	concept of smart cities	activity of searching for financing options	
	RO4: Identify the main shortcomings and problematic aspects in municipalities and cities in Slovakia	RA4: The biggest problem for cities and municipalities in Slovakia is financial resources	RQ4: In which area does your municipality/city record the main shortcomings or problem aspects that need to be addressed?

Source: Authors (2022)

The sources of the information used were obtained from secondary research, consisting of book and Internet sources, and primary research, conducted through electronic inquiry, implemented electronically using a questionnaire in the Google Forms environment. The primary sources of information come from the answers of research respondents (cities and municipalities) randomly selected according to the designated representative research sample. The primary research was focused on individual cities and towns with a total number of 2933. The minimum number of respondents was then calculated using the following formula:

$$n \geq \frac{N*t^2_{1-\frac{\alpha}{2}}*\sigma^2}{(N-1)*\Delta^2+t^2_{1-\frac{\alpha}{2}}*\sigma^2} \tag{1}$$

where: n = minimum sample size (minimum number of respondents); $t_{1-a/2}$ = critical value determined from tables; σ^2 = variance calculated from the standard deviation; Δ = maximum permissible error range. [18]

Before the start of the primary research, a pre-test was conducted on a sample of 30 respondents, with the help of which possible errors and shortcomings of the electronic questionnaire were identified. Through the calculation of the selected sample, it was found that out of the total number 2,933 towns and villages in Slovakia, while maintaining 95% reliability, it was necessary to obtain answers from at least 247 respondents. 2004 towns and villages were contacted by email. To obtain e-mail addresses of cities and municipalities, all self-governing regions were approached with a request for a database of contacts, but it was also necessary to search from freely available websites of cities and municipalities in order to reach the majority of cities and municipalities in Slovakia.

Out of the 2,004 towns and villages in Slovakia that were contacted, 324 respondents successfully completed the questionnaire. The return rate of the questionnaire was at level of 16.2%. The necessary sample of 247 respondents was filled, while all self-governing regions were represented. The questionnaire consisted of 22 questions, which were branched out through filter questions. The filter questions generally divided the respondents into 2 groups, namely: a group that is familiar with the issue or has already encountered it, and a group that does not know the concepts of the issue being addressed and has not even encountered it. Through specific questions, the logic and truthfulness of the answers of individual respondents were further verified. The opinion of the respondents on the area of the solved issue was ascertained through meritorious questions. Based on the identification questions, the respondents' answers were subsequently categorized into individual groups.

3 Results

The most represented was the Banskobystrický self-governing region with 88 respondents, the least represented was the Bratislava self-governing region, with only 6 respondents. The largest group, with a total of 111 respondents, were cities and towns with a population in the range of 100-499 inhabitants. Figure 1 shows the relative representation of individual groups within the examined sample, which takes into account the number of inhabitants of the city/municipality linked to the region within Slovakia.
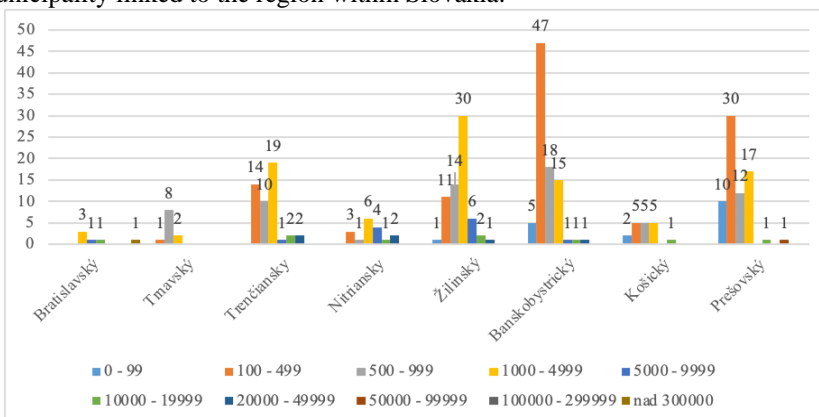
Figure 1. The number of respondents categorized based on the number of inhabitants in individual regions of Slovakia.

Source: Authors (2022)

As mentioned, in the initial phase of the evaluation, the respondents were divided into two groups, those who know the term smart city (also with an explanation, in case they know the issue, but not the name) and those who do not know it. Figure 2 presents the percentage representation of respondents categorized by size based on the number of inhabitants in this question.
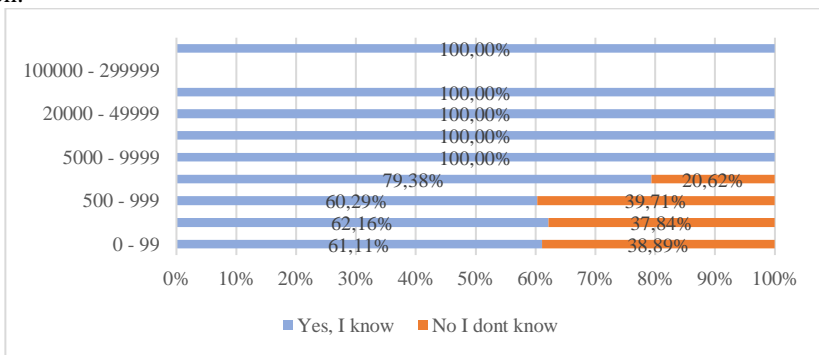
Figure 2. Percentage representation of respondents who know the term smart city, categorized based on the number of inhabitants.

Source: Authors (2022)

A total of 72% of respondents know the term smart city, and as shown in Figure 2, all respondents from the group of over 5,000 inhabitants know the term. The weakest awareness is in villages with up to 1,000 inhabitants, but knowledge of this concept prevails even in them.

Furthermore, the respondents who are familiar with the term smart city were asked what they specifically imagine under this term, respectively. as they perceive it as a municipality/city. The most frequent answer was that they consider the smart city to be a new solution in the area of municipal service provision, with 152 respondents agreeing with this statement (Figure 3).
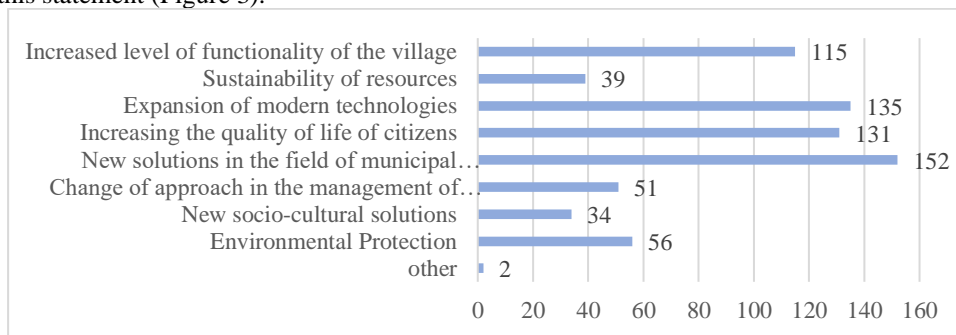
Figure 3. The number of respondents categorized into groups based on their understanding of the term smart city.

Source: Authors (2022)

Finally, it was necessary to find out how many respondents started implementing smart solutions. A total of 163 respondents started implementing, while their representation by size category is shown in Figure 4.
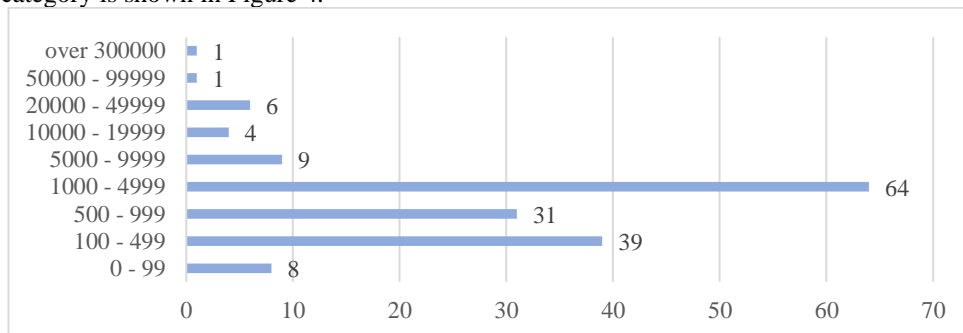
Figure 4. The number of respondents who started implementing smart solutions, categorized based on the number of inhabitants.

Source: Authors (2022)

The first research goal was focused on the level of implementation of smart solutions in Slovakia. The research premise for the first research objective was „The most frequently implemented solution is public Wifi."

In this case, all respondents who started implementing smart solutions in their village or city answered. In total, answers from 163 respondents were evaluated.

The results show that the most widespread smart solution in Slovakia is public Wifi, which is implemented by a total of 64 respondents, thus confirming the first established assumption (RA1). The respondents also mentioned other solutions, but only the most frequently implemented ones are captured in Figure 5.
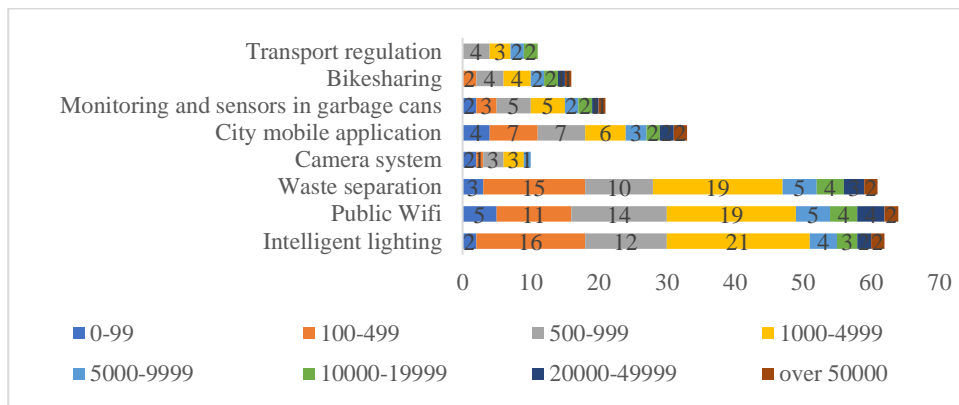
Figure 5. The number of most frequently implemented smart solutions among respondents categorized based on the number of inhabitants.

Source: Authors (2022)

The second research objective was aimed at revealing the obstacles that arose for the respondents during the implementation of smart solutions. Two research assumptions were set for the second goal, namely „Finances represented the biggest obstacle in the implementation of smart solutions in municipalities and cities with a population of up to 20,000" and „The biggest obstacle in the implementation of smart solutions in municipalities and cities with a population of over 20,000 was the absence of experts."

In this case, all respondents who started implementing smart solutions in their village or city answered. In total, answers from 163 respondents were evaluated.
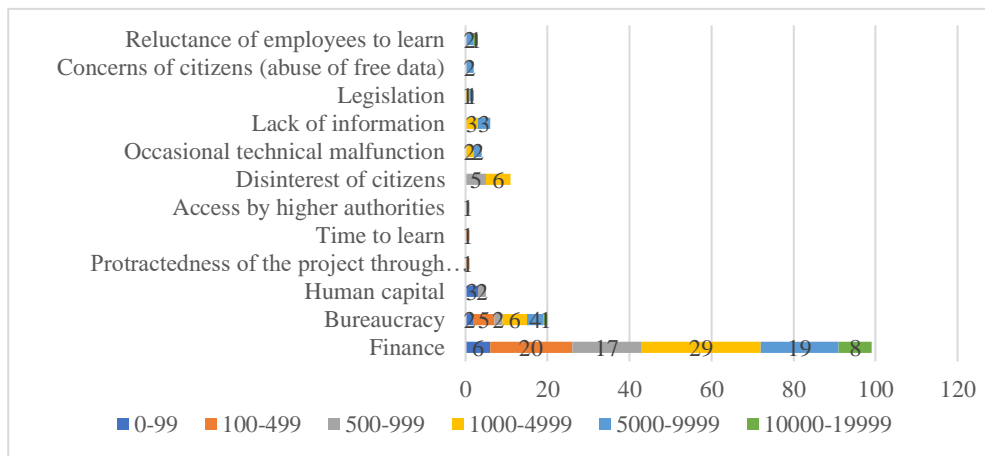
Figure 6. The number of most frequently encountered obstacles in the implementation of smart solutions for respondents with up to 20,000 inhabitants.

Source: Authors (2022)

Answers from 151 respondents were processed to evaluate the first research assumption (RA2). Figure 6 shows that the first research assumption was confirmed, because the most common obstacle encountered by Slovak municipalities and cities with up to 20,000 inhabitants in the implementation of smart solutions was finance.
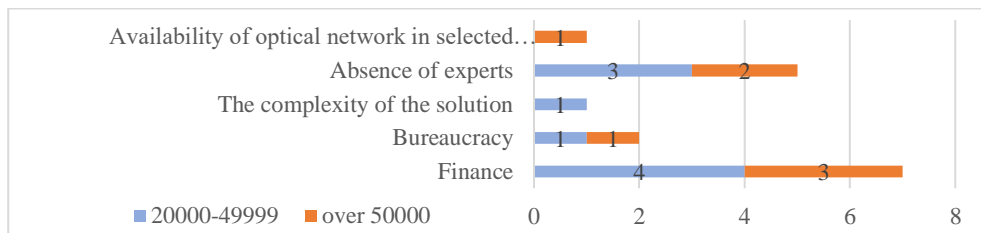
Figure 7. The number of most frequently encountered obstacles in the implementation of smart solutions among respondents with more than 20,000 inhabitants.

Source: Authors (2022)

Answers from 12 respondents were processed to evaluate the second research assumption (RA3). Figure 7 shows that the second research assumption was not confirmed, because the most common obstacle encountered by Slovak cities with more than 20,000 inhabitants in the implementation of smart solutions was finance.

The third research objective was aimed at finding out what activities are most often carried out by Slovak municipalities and cities within the concept of smart cities. One research assumption was established for this goal, namely „In the concept of smart cities, municipalities and cities currently most often perform the activity of searching for financing options.“

In this case, all respondents who know the term smart city answered. In total, answers from 219 respondents were evaluated.
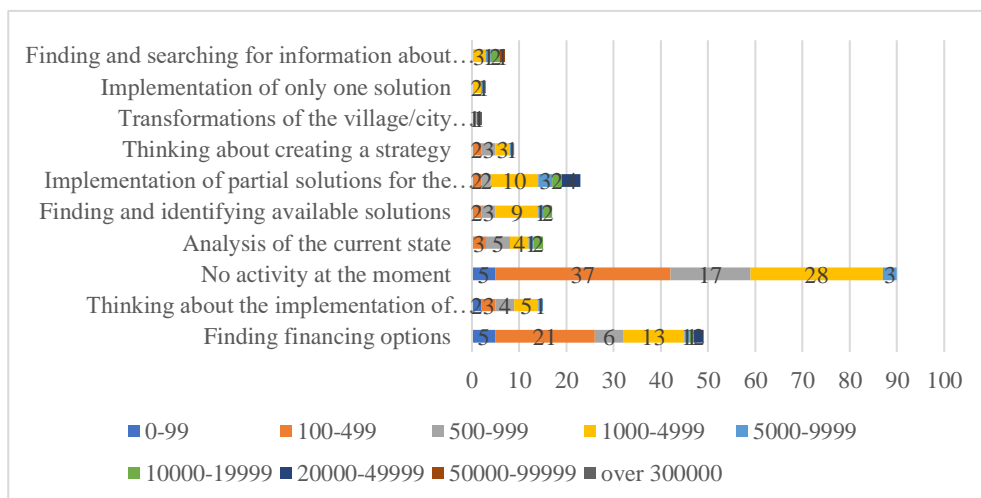
Figure 8. The number of implemented activities in the smart city concept among respondents categorized based on the number of inhabitants.

Source: Authors (2022)

The majority of respondents, namely 90, currently do not carry out any activity in the concept of smart cities, which means that the established research assumption (RA4) was not confirmed. However, respondents who perform some activity are most often looking for financing options, namely 49 respondents (Figure 8).

The fourth research objective was aimed at revealing the biggest shortcomings and problems of Slovak cities and municipalities. For the fourth research objective, one research assumption was established, namely „The biggest problem of cities and municipalities in Slovakia is financial resources.“

In this case, all respondents answered. In total, answers from 324 respondents were evaluated.
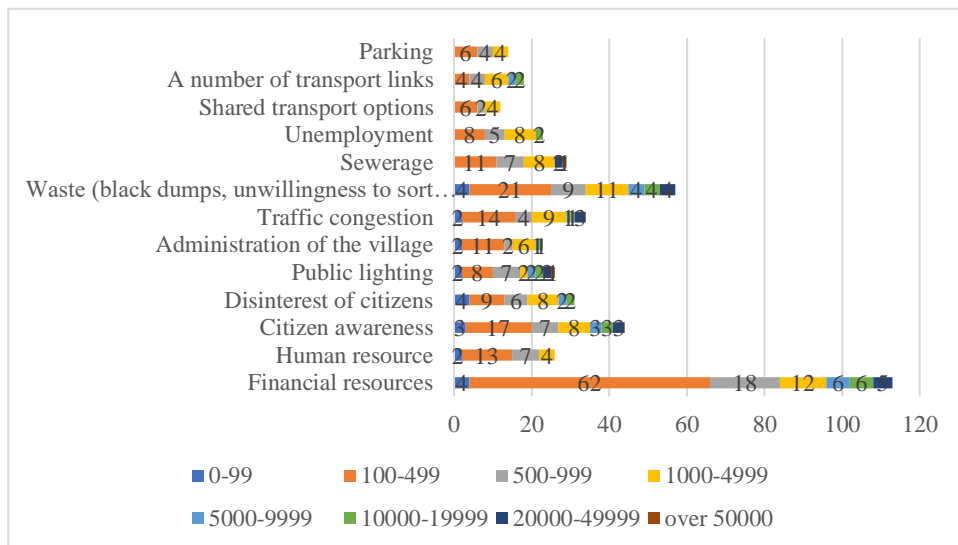
Figure 9. The number of revealed deficiencies among respondents categorized based on the number of inhabitants.

Source: Authors (2022)

The last research assumption (RA5) was confirmed, because the respondents most often mentioned problems with financial resources in their answers, namely up to 113. The respondents also mentioned other shortcomings and problems, but only the most frequently mentioned ones are captured in Figure 9.

4 Discussions

In the process of digital transformation of Slovakia's territorial development, the concept of a smart city can be very helpful, that is, a smart city that uses technology to increase the quality of life in villages, cities, or in regions. A smart city is therefore a municipality, a part of a city, a city, or a region that uses different types of electronic sensors to collect different sets of data about a given location (geodata, sensor data, open data, data from citizens), which are then used for effective asset management and resources. The development of already existing information systems will ensure verified and guaranteed real-time traffic data, which will improve the quality of information on road, rail, and air transport for the general public. Thanks to the data obtained from smart cities, it will be possible not only to fundamentally change spatial planning and environmental protection but also to achieve significant energy savings, improve the mobility of citizens and their safety, respond to climate changes, ensure more efficient functioning of offices and overall improve the quality of life of citizens.

Solving the most complex problems of urban areas requires the cooperation of municipal authorities, local communities, civil society, economic, knowledge institutions, and other interested parties. Together, they become the driving force behind the formation of sustainable development aimed at the ecological, economic, social, and cultural progress of urban areas. The European Union, national, regional, and local policies should establish the necessary frameworks in which citizens, NGOs, entrepreneurs, and municipal authorities, with the contribution of knowledge institutions, can address their most pressing challenges.

From the environment of Slovak cities and municipalities, a growing interest in the area of smart cities can be observed over the last year, which is manifested by the implementation of the first concrete projects, despite the absence of system support for smart cities. Applying the smart city approach would significantly increase the quality of life of citizens and improve the business environment, including significant savings in public finances.

Cities and municipalities are primarily interested in projects leading to energy efficiency, improving the quality of electronic services of municipalities, smart transport and parking systems. However, projects can only achieve the necessary quality if they are created as a result of the cooperation of all relevant parties. MH SR considers the creation of partnerships at the level of the city and business entities to be a key parameter that will create a basis for increasing the competitiveness of Slovak cities.

However, if we want Slovak regions, cities and municipalities to become smart places for the quality of life of their residents, it is necessary to significantly improve and transform the current form of spatial planning preparation, which is a determining element in the life of cities and municipalities, but its preparation is considerably outdated and it does not reflect the needs of the 21st-century world. It turns out to be necessary that the current state of preparation of the spatial plan in Slovakia undergo a significant transformation so that it begins to be prepared agilely together with strategic planning based on the collection and use of all available data, through participation and with the help of experimental pilots and effective communication.

Acknowledgements

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Key Indicators of Inventory Management in Global Environment

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Abstract

Research background: Globalization is a phenomenon rapidly changing global environment and companies then operate in a highly competitive environment. Businesses have to implement various management tools and manage and measure their outputs. Manufacturing companies monitor data of production process and that is why they have to face up-to-date inventory indicators control, which serve a basis for evaluation the efficiency of resources, productivity and other indicators in the area of inventory management. Managing the supply chain in this manuscript is about managing the flow of materials, goods and services from their point of origin to the point of consumption in the production process.

Purpose of the article: There are many approaches and indicators, which companies calculate in order to evaluate supply chain management, including movement and storage of raw materials, finishing goods and spares. The aim of the paper is to present key indicators evaluating inventory management and to provide a clue for reporting the inventory costs.

Methods: A recent survey conducted in manufacturing companies in the Czech Republic brings the primary data collection. Supply chain process evaluation has been prepared via analysis and evaluation of the primary survey and according to the secondary sources related to inventory management.

Findings & Value added: The article presents internal evaluation indicators for businesses using the elementary principle based on evaluation of supply and storage activities of businesses.

Keywords: *inventory management; supply chain management; inventory costs*

JEL Classification: *M19; M20; M21*

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1 Introduction

Investing in inventory is often one of the largest financial items of businesses, so it should be given due attention. The negative effect of inventories is that inventories tie up capital, consume additional labour and resources, and carry with them the risk of depreciators of unusability or unsaleable.

On the one hand, the size of stocks should be as small as possible, mainly due to the lowest possible amount of money tied up in them, but also in connection with the capacity and number of warehouses and workers in them. On the other hand, however, it is advisable to have as many goods as possible available for sufficient readiness of deliveries, or for the highest possible level of service and customer satisfaction. As these are conflicting requirements, the company's management or responsible managers must choose a suitable compromise.

By stocks we understand that part of utility values that have been produced and have not yet been consumed. These are not only finished products, but also stocks of raw materials, basic and auxiliary materials, fuel, semi-finished products, tools, spare parts, packaging and work in progress.

In inventory management, it is necessary to monitor indicators, such as the development of demand, stock level, expected orders and costs associated with inventory. The aim of the paper is to introduce key inventory indicators of supply chain management which are calculated and managed in businesses based on the secondary and primary research. Due to inventory management complexity, the article highlights that it is possible to work in companies with an efficient tool that allows to measure economic order quantity and total cost of inventory management and it can help to conduct inventory management more effectively.

2 Theoretical background

An international supply chain conceptualizes a complex, dynamic system in which disruptions interact with long shipping and lead times to generate costs (Levy, 1995).

Since the early 2000s, research at the intersection of entrepreneurship and strategic management has flourished, as has work at the intersection of strategic management, inventory management and supply chain management. In contrast, little inquiry has occurred at the intersection of entrepreneurship and inventory management. This presents a tremendous opportunity for primary research in globalized environment (Ketchen and Craighead (2020), Sharma et al. (2022), Kano et al. (2020), Stopkova et al. (2019))

Montez and Schutz (2021) study companies in advance in a setting first source inventories that remain unobservable to rivals, and then simultaneously set prices. In the unique equilibrium, each firm occasionally holds a sale relative to its reference price, resulting in firms sometimes being left with unsold inventory. In the limit as inventory costs become fully recoverable, the equilibrium converges to an equilibrium of the game where firms only choose prices and produce to order-the associated Bertrand game (examples of which include fully asymmetric clearinghouse models). The analysis of Montez and Schutz (2021) involves, as an intermediate step, mapping the price-inventory game into an asymmetric all-pay contest with outside options and non-monotonic winning and losing functions.

Kim (2021) build a unique micro-level data set that combines scanner-level prices and quantities with producer information, including the producer's banking relationships, inventory, and cash holdings. Kim (2021) exploits the Lehman Brothers failure as a quasi-experiment and found that the firms facing a negative credit supply shock decrease their output prices approximately 15% more than their unaffected counterparts. Kim (2021)

hypothesizes that such firms reduce prices to liquidate inventory and generate additional cash flow from the product market. Kim (2021) finds strong empirical support for this hypothesis: (i) the firms that face a negative bank shock temporarily decrease their prices and inventory and increase their market share and cash holdings relative to their counterparts, and (ii) this effect is stronger for the firms and sectors with a high initial inventory or small initial cash holdings.

Lanzolla and Markides (2021) argue that while the business model construct may not be entirely new, it can still provide a novel lens, complementary to Resource Based View and Market Positioning, to develop new theoretical insights in strategy management and measurement. Lanzolla and Markides (2021) propose that the consideration of interdependencies among the activities of a business model provides such a lens. Lanzolla and Markides (2021) show that by starting strategy development with interdependencies among activities, can: (1) develop new insights on how to build superior strategies in inventory management; and (2) explain variances in inventory management performance. Overall, Lanzolla and Markides (2021) propose that a promising research avenue for the business model literature is to integrate complexity theory with demand-side and supply side theories of inventory strategy to generate more nuanced insights to inventory indicators, and to develop superior interdependencies among activities, that can form the basis of inventory management performance.

Inventory management is influenced by inventory consumption, the share of inventories in sales, the capacity of means of transport and, above all, the reliability of suppliers. Stopkova et al. (2019) perform sophisticated and specific calculations for the individual parameters in the modified model. The modification of the objective function of the deterministic model has created a new multi-criteria model. The outcome of their model sought to optimize the supply process in a way that minimizes the risks associated with a lack of inventories while maintaining the economic effectiveness thereof.

Jablonský (2002) writes about the theory of stocks and inventory management. The article presents only the basic patterns that are sufficient for the derivation of inventory models. Below there are five formulas how to measure total cost of inventory.

$$C_{INVENTORY} = C_{ORDERING} + C_{HOLDING} \tag{1}$$

$$C_{INVENTORY} = n_o * \frac{P}{D} + n_h * \frac{D}{2} \tag{2}$$

$$C_{INVENTORY} = \underbrace{n_o * \frac{P}{D_{OPT}}}_{C_{ORDERING}} + \underbrace{n_h * \frac{D_{OPT}}{2}}_{C_{HOLDING}} \tag{3}$$

$$C_{MIN} = \sqrt{2 * P * n_O * n_S} \tag{4}$$

$$D_{OPT} = \sqrt{\frac{2 * P * n_O}{n_S}} \tag{5}$$

Where:

P	*demand*
D	*delivery*
$\frac{P}{D}$	*number of deliveries (number of supply cycles)*
n_O	*cost per delivery (ordering)* $\left(\frac{CZK}{delivery}\right)$
$n_O * \frac{P}{D}$	*total cost per delivery (ordering)*
$\frac{D}{2}$	*average level of delivery (pcs)*
n_h	*holding (storage) cost per unit* $\left(\frac{CZK}{pc}\right)$
$n_h * \frac{D}{2}$	*total cost per holding (storage)*

To determine the optimal order size, the approach of minimizing the total costs associated with ordering and storing goods is most often used, the result of which is the calculation relationship of the optimal delivery size. Yang et al. (2020), Marziali et al. (2021) and Dufour et al. (2019) and Kuncová (2006) then perform sensitivity analysis of holding cost and ordering cost.

3 Methodology

Primary research was conducted in the form of a questionnaire survey and was focused on the use of performance indicators in selected enterprises in the Czech Republic. The data was collected in 2020. The objectives of the quantitative part of the primary research in a selected group of enterprises in the Czech Republic were linked to the description of the current state of use of indicators in inventory management, the aim was also to analyze the attitude of enterprises to measurement and management in supply activities. The final sample consisted of 77 companies out of 150 companies that were included in the "Pike of Czech Business" evaluation in 2019. The questionnaires were structured into several parts, while one part of the questionnaire focused on information regarding the use of specific measures, tools, methods and concepts for measuring and managing the supply process and the company's attitude to value management. The primary research questionnaire was compiled on the basis of a literature review, previous knowledge and experience, and last but not least, discussions with the employees of the companies in question. With regard to the nature of the investigated issue, cooperation was established with employees in managerial positions who evaluate and manage the financial situation and performance of the company or entrusted areas (general directors, financial direcotrs, production directors, economic directors). Ten companies were asked to study the questionnaire and answer the questions in order to eliminate imprecise wording, ambiguities and errors.

4 Results

Table 1 includes key indicators monitored in inventory management.

Table 1. Indicators monitored in supply chain.

Indicator	Yes, we measure the indicator	No, we are planning to implement	No, we are not planning to implement	No, we do not use, we do not know the indicator
Material consumption	100 %			
Number of deliveries	75 %	25 %		
Share of delayed deliveries to total deliveries	71 %	29 %		
Inventory turnover	79 %	21 %		
Costs per delivery	100 %			
Holding (storage) costs	87 %	13 %		
Ordering cost	73 %		27 %	
Number of suppliers	76 %	24 %		
Delivery time	78 %	22 %		
Inventory structure	100 %			
Delays of suppliers	66 %	34 %		
Current stock	100 %			
Emergency stock	63 %	37 %		
Degree of warehouse utilization	70 %	30 %		
Quality of stock	29 %	18 %	53 %	
Transportation costs	85 %	15 %		
Storage capacity	84 %	16 %		
Level of supplier services	7 %		93 %	
Delivery time	73 %	27 %		
Average stock	58 %	42 %		
Number of deliveries sent on time	61 %	39 %		
Logistics costs	3 %			97 %
Optimum delivery level	3 %			97 %
Total inventory cost	3 %			97 %

Source: own processing

Based on the results in the table 1, all companies measure material consumption, inventory structure and current stock level. Contrary, they do not calculate logistics costs,

optimum delivery level, total inventory cost because they do not know how to calculate such indicators.

5 Discussion

Supply chain is a complex, dynamic system in which disruptions interact with long shipping and lead times to generate costs. Findings from a case study of Levy (1995) and simulation model indicate that demand-related disruptions created substantial and unexpected costs in terms of expedited shipping, high inventories, and lower demand fulfilment. Production-related disruptions declined over time, but demand-related disruptions did not (Levy, 1995). The ABC analysis method, demand forecasting, safety stock, reorder point, and economic order quantity should be applied (Conceicao et al., 2021). Measurement of total cost of inventory and its analysis could help companies to manage inventory in a more effective way.

Inventories should mainly solve time, location, capacity and assortment mismatch between production and consumption and cover foreseen and unforeseen fluctuations and disturbances. A long-standing question is whether differences in management practices across firms can explain differences in productivity. To investigate this, Bloom et al. (2013) ran a management field experiment on large Indian textile firms. Bloom et al. (2013) provided free consulting on management practices to randomly chosen treatment plants and compared their inventory performance to a set of control plants. Bloom et al. (2013) find that adopting inventory management indicators raised productivity by 17% in the first year through improved quality and efficiency and reduced inventory, and within three years led to the opening of more production plants. Why had the firms not adopted these profitable practices previously? Results of Bloom et al. (2013) suggest that informational barriers were the primary factor explaining this lack of adoption. Also because reallocation across firms appeared to be constrained by limits on managerial time, methods of inventory management (Bloom et al. (2013) and Matsa (2011)). For future research, authors would like to analyse relation between productivity and inventory management in a more detailed way.

6 Conclusion

Due to the complexity of business activities, it is possible to work in companies with an efficient tool that allows you to measure inventory management cost and minimize them and perform activities more efficiently and with quality, and allows all support services and processes to be managed precisely. This article shows a tool for reporting the results of the inventory management. The overview of inventory indicators and total cost of inventory indicator can be a powerful instrument and should provide information in business units to control the supply chain process and valuable data to manage the performance of companies as a whole.

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Slippery Slope Framework in Connection with Smart Technologies and the Environment

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Abstract

Research background: Efforts to improve the environment in the context of the use of Smart technologies, e. g. in waste management, it carries with it a number of advantages, but also several disadvantages compared to other forms of imposing obligations of monetary performance, which are related to influencing the production and consumption of selected types of goods producing negative externalities. Many authors do not consider a deterrent tax policy as a tool because it can encourage aversion to the use of smart technologies. One of the options for reducing negative externalities is the full use of Smart technology, or a comprehensive solution by the state by introducing environmental taxes.

Purpose of the article: In removing the negative externalities that apply to the above goods using environmental taxes, we have captured many advantages in the paper. The following part of the contribution is devoted to the tax issue as a current issue and summarizes the determinants that affect taxpayers and their attitude towards tax.

Methods: Part of the paper in the results and discussion section is devoted to taxpayer research using behavioral theories and econometric models. Other aspects of taxpayers' behavior and willingness to pay taxes are characterized.

Findings & Value added: The result of the contribution is the identification of taxpayers, the attitude towards paying or not paying taxes and it is pointed out that a higher rate of tax liability exists if the country has a fair legal system and citizens have quality public services. using smart technologies.

Keywords: *smart technologies*, *environmental taxes*, *ecologic economy*,

JEL Classification: *Q56; Q57; M48; K22; O33*

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1 Introduction

The effort to improve the environment, in the context of usage Smart technologies, e.g. in waste management, carries with it a number of advantages, but also several disadvantages compared to other forms of imposing obligations of monetary performance, which are related to influencing the production and consumption of selected types of goods producing negative externalities. Braithwaite (2009) does not considers deterrent tax policy as a tool because it can encourage aversion to use Smart technologies One of the options for reducing negative externalities is the full use of Smart technology, or a comprehensive solution by the state through the introduction of environmental taxes. In removing the negative externalities that apply to the previously mentioned goods using environmental taxes, we have captured the following benefits: environmental taxes have the potential to greatly minimize the costs of legal compliance by economic entities, so that part of the tax (or the whole tax) will be borne by consumers; Gravelle (2009) points out that one must distinguish between two various types of tax.

Within the "Slippery slope framework" together Kirchler, Houlzl and Wahl (2008); and Kirchler, Kogler, and Muehbacher (2014) suggested that in an adversarial interaction environment, the strong power of authorities leads to enforced compliance. In a synergistic environment, strong mutual trust leads to voluntary cooperation. This voluntary cooperation depends mainly on trust in the state and its authorities, but if this cooperation does not occur voluntarily, it is necessary to ensure compliance with tax regulations by law. The power includes all deterrent measures, such as effective tax controls and heavy fines for evasion.

On the other hand, trust in authorities and the government as such (Trust in authorities) requires tax laws that are understood by taxpayers, services that help to comply with them, a positive attitude towards taxes and high tax morale on the part of taxpayers, fairness in distribution and procedure and also the belief that compliance is the norm rather than the exception are societal norms requiring cooperation. In addition, trust also comes from the proper use of power in the sense that the authorities cooperate with the majority of free passengers.

The assumptions of the "Slippery slope framework" were tested by Wahl, Kastunger and Kirchler (2010). Voluntary cooperation was high when authorities were characterized as trustworthy, and enforced compliance was high when the country was characterized as Power of Authority. Similar results were reported by Kastlunger, Lozza, Kirchler, and Schabmann (2013), Kogler, Batrancea, Nichita, Pantya, Belianin, and Kirchler (2013), and Muehlbacher, Kirchler, and Schwarzenberger (2011). They confirm the assumptions of the "slippery slope framework" and also show that taxpayers who feel compelled to contribute to the authorities try to think strategically about how to reduce the tax burden instead of spontaneously cooperating. A good example of trust in authorities and subsequent compliance contributing to their share is Switzerland (Feld & Frey, 2005). The performance-enhancing and trust-building measures proposed in the "Slippery slope framework" have complex interactions and dynamics over time (Hofmann, Gangl, Kirchler, & Stark, 2014). The paper will present an overview of current research on social norms, which combines the results of different research traditions (Bobek et al., 2007). The main goal of the paper's research is to identify the respondents' attitudes. (Mohamed, 2012) listed the following negative effects: inefficient goods and labor markets, inaccurate statistics and diverted finances due to tax evasion, non-use of modern Smart technologies. These can result in a political crisis. (Giles, 1998) linked the existence of the shadow economy or "hidden income" to the tax loophole. With advancing globalization, new technologies, know-how, ideas, unusual solutions brought by human capital are needed. Creative human element, visionaries, problem solvers provide creative development potential (Gubová & Richnák, 2016).

2 Methods

2.1 Behavioral theories

Economic theory is built on the idea of utility, which describes people's preferences or values (Fishburn, 1968).

2.1.1 Information sharing and personal data protection

The desire for communication is inherent in people as a characteristic feature of humanity. Leaving a written legacy that can inform many generations to come is a uniquely human advancement in society. However, privacy is also a primary human value. People choose what information to share and like to keep certain parts of themselves private. Protecting people's privacy is a codified virtue around the world to protect the dignity of the individual. To date, there is no utility theory that describes the conflict between an individual's communication preference and privacy value.

2.1.2 Human preferences for communication

Communication is a key feature of humans. Sharing information, which means giving up privacy, is at the heart of communication. Different institutions and media sources have different kinds of language and information sharing styles. Access to information is related to social status and market power. Social visibility is a powerful and inexpensive incentive that makes people more likely to contribute to public goods and charities and less likely to lie, cheat, pollute, or be insensitive and antisocial.

2.1.3 Protecting privacy in the era of Big data

The amount of big data stored every second has reached an all-time high in the digital era. Internet privacy is the ability to determine what information about oneself to disclose or withhold over the Internet, who has access to personal information, and for what purpose that information may be used. Social media tools have become large factories with unpaid labor (Puaschunder, 2017). For example, Facebook is the largest social networking site with nearly 1,490 million members who upload more than 4.75 billion pieces of content daily about their lives and the lives of others. The accuracy of this information also appears to be questionable, with approximately 83.09 million accounts believed to be fake. In addition to directly observable information, social media sites can also easily track browsing logs and patterns, search queries or secondary information providing information about sexual orientation, political and religious views, race, substance use, intelligence and overall personality, mental state, individual opinions and preferences.

2.1.4 Useful information theory of privacy and information sharing

Based on classical utility theory, individuals constantly evaluate competing choices. Individuals consider alternative options based on their expected utility. Indifference curves would then connect points on a graph representing different quantities of two goods between which an individual is indifferent.
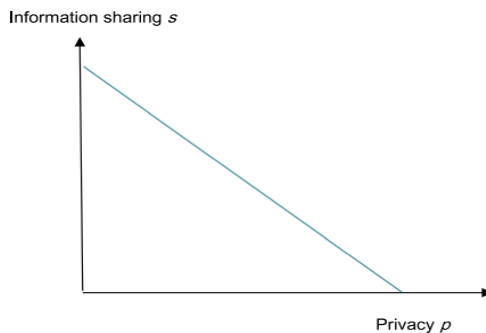
Figure 1. Indifference curve (blue line) for information sharing and privacy p with respect to total information and communication constraints.

Source: Puaschunder, J. (2020)

The indifference curve is therefore the locus of different points of different combinations of privacy and information sharing that give her the same utility. Indifference curves are thus seen, which represent potentially observable patterns of behavior for individuals over information bundles.

Graph 1 represents the relevant indifference curves for information sharing and privacy. That is, an individual does not prefer one combination or bundle of information sharing or privacy over another combination of the same curve. All points on the curve have the same utility for an individual.

2.2 Econometric modeling and regression analysis

Econometrics can be defined as a scientific discipline that deals with the quantification of economic relations, the empirical estimation of the parameters of economic relations. Simply put, econometrics is about measurement in economics or the quantification of relationships between economic variables. In econometric modeling, several theoretical hypotheses are compared with each other in order to show which one best fits the measured data. In the econometric model, hypotheses are first formed and then theoretical knowledge is processed using mathematical and statistical methods. In this way, an economic-mathematical model will be created, with the fact that an econometric model will only be created when stochastic influences are included in the model (Hatrák, 2007). On basis of the determined scientific objective, we decided to use quantitative methods in the empirical part of the research (Minárová et al., 2015). Econometrics includes "economic measurement" and is much broader in scope as it involves the use of mathematical theory and statistical procedures to study and analyze data to establish numerical relationships in the field of economics. Simply put, econometrics means economics that focuses on providing experimental content and compiling relationships between economic variables using statistical methods to discover economic relationships. This has really elevated the subject to a highly specialized field of study and this usually happens at postgraduate level. Before starting to study the scope of econometrics, it is necessary to distinguish it from mathematical economics and statistical economics, although econometrics is closely related to them and touches on the results obtained in these areas.

The preceding definitions indicate that econometrics uses both mathematical models and statistical techniques to analyze economic data and compare it with economic theory. So it combines economic theory, mathematics and statistics, but is completely different from each of these three fields. Econometrics can be considered as the integration of economics, mathematics and statistics with the main purpose of providing numerical values for people

dealing with economic relationships and verifying economic theories. It is a subject that deserves a separate study for the following reasons:

-   Economic theory makes statements or hypotheses that are mostly qualitative in nature. For example, the law of demand is stated in microeconomic theory. This means that when the price of the commodity increases in the market, the contracts demanded the quantity and vice versa. Please note that this claim is purely theoretical and does not imply any numerical or empirical measurements to validate it.
-   As already mentioned, statistical economics mainly deals with the collection, processing and presentation of economic data in the form of graphs and tables. It can't go any further. The one who does this is an econometrician. The work done by a statistical economist is the basis for an econometrician who wants to use various mathematical models, statistical tools and techniques to analyze data in tables, interpret findings, explain and confirm economic relationships.
-   Econometric methods can be used to simulate the effects of alternative policies. For example, with an appropriate econometric model, we could quantitatively see how different tobacco tax increases affect tobacco consumption.
-   The study of econometrics fills the gap between the past and the future. When we identify an equation or model, we better understand past trends and predict the future.
-   Econometric methods are often used to predict future values of economic variables. By forecasting, we try to reduce our uncertainty about the future of the economy. However, it should be noted that forecasts are generally satisfactory or valid only if there are no drastic changes in the economy. Although it would be useful to be able to accurately predict these drastic changes, econometric and other alternative methods tend to be imprecise.

The probabilistic aspect in regression is specifically incorporated into the model for the variability of date Y given particular fixed values of the data X. This variability is modeled using a conditional distribution; because of the conditional distribution - this view unifies various methods such as classical regression, ANOVA, Poisson regression, logistic regression, heteroscedastic regression, quantile regression, models for nominal Y data, causal models, neural network regression, and tree regression. All are conveniently displayed in terms of models for the conditional distribution of Y given particular values of X.

Regression models can also help us predict the future. Forecasting is a special case of prediction: Forecasting means predicting the future, while prediction involves a "what-if" type of analysis, not only about what might happen in the future, but also about what might have happened in the past under various circumstances. circumstances. In regression analysis, variable Y has many names, including response variable, target variable, criterion variable, dependent variable, endogenous variable, and others. Variables X are variously called predictor variables, descriptor variables, characteristic variables, independent variables, exogenous variables, and more.

Simple linear regression is a statistical method that helps us to summarize and study the relationships between two continuous, quantitative, variables by:

-   One variable (labeled as X) is considered to be the predicted, explanatory, or independent variable.
-   The second variable (labeled Y) is considered the response, outcome, or dependent variable.

Since the other terms are used less frequently today, we will use the terms "predictor" and "response" to refer to the variables we will encounter further. We mentioned the other terms mainly so that we know them if we happen to encounter them. Simple linear regression

is called "simple" because it refers to the study of only one predictor variable. The opposite is the case with multiple linear regression, which deals with the study of two or more predictor variables.

In regression, people usually understand the relationship between Y and X as a linear function. Specifically, the assumption of linearity states that the means of the conditional distribution p(Y|X) fall exactly on the place from ß0 + ß1x, i.e.

$$ux = E\ (Y|X = x) = ß0 + ß1x. \tag{1}$$

Multiple regression analysis is used to determine whether statistical significance exists between sets of variables. This analysis is used to look for trends in these datasets. Multiple regression analysis is quite similar to simple linear regression. The only difference between simple linear regression and multiple regression is the number of predictors (X - variables) used in the regression. A simple regression analysis uses one variable X for each dependent variable Y for example (X1, Y1). Multiple regression, on the other hand, uses multiple X variables for each independent variable: (x1)1, (x2)1, (x3)1, Y1). In linear regression with one variable, we would therefore enter one dependent variable (e.g. sales) and opposite it one independent variable (e.g. profit).

Regression analysis is always performed in software such as Excel or various specialized programs. The output varies depending on how many variables we have, but it's basically the same type of output you'd find in a simple linear regression. The difference is only in:

- Simple regression:

$$Y = b0 + b1\ x \tag{2}$$

- Multiple regression:

$$Y = b0 + b1\ x1 + b0 + b1\ x2…b0…b1\ xn \tag{3}$$

3 Results and Discussions

Within this area, research questions were set along with expected hypotheses. Question 1: What is the attitude of the citizens of the Slovak Republic to the tax liability in environmental taxes? Question 2: Is there taxpayers' trust in the authority, the power of the authority and enforced or voluntary compliance with tax regulations? Question 3: From the point of view of the taxpayer, is it necessary to know the basic requirements and connections in the field of environmental taxes? Question 4: To what extent is the public aware of the importance and payment of environmental taxes? Question 5: What view does the taxpayer have of presenting the importance of environmental taxes in the member states of the European Union compared to the Slovak Republic?

The hypotheses, which are based on a set of research questions, were created in accordance with the findings in the theoretical definition of the thesis and are presented below:

H1: More than three-quarters of taxpayers/respondents do not trust the authorities. H2: Transparent monitoring of state revenues and expenditures would lead to increased tax

compliance. H3: The public is not sufficiently informed about the importance and payments of environmental taxes. H4: Taxpayers/respondents think that environmental taxes are important for life, people and the planet. H5: In schools, more emphasis should be placed on education about environmental taxes. H6: Environmental taxes are paid more attention in the member states of the European Union than in the Slovak Republic. H7: The tax system within environmental taxes is set up incorrectly. H8: The public is insufficiently informed about environmental tax payments.

The answers of 122 respondents were collected in the survey. In the following table, we have provided an overview of age, gender, social status and level of education, together with the percentage of the total number of all officers/respondents. According to Simser (2008), there is never a clear distinction between the two, but Slemrod and Yitzhaki (2002) simply conclude that the main distinguishing feature is the illegality of corporate actions.

Similar studies which confirmed that analysis matters for asset pricing too (Sedliačiková et al., 2015). The relationship between respondents, the state and its authorities is an important aspect of tax compliance. As already mentioned, together Kirchler, Houlzl and Wahl (2008); and Kirchler, Kogler, and Muehbacher (2014) proposed a theory known as the Slippery slope framework, which states that enforced or voluntary tax compliance depends on the degree of trust in authority.

3.1 Descriptive statistics

Table 1. Descriptive statistics of respondents consisting of absolute and relative expressions

	Numerical expression	Percentage
Gender		
Men	45	36,9 %
Woman	77	63,1 %
Age categories		
Up to 18 years	2	1,6 %
19 – 29 years	59	48,4 %
30 – 49 years	38	31,1 %
Over 50 years	23	18,9 %
The highest education achieved		
Basic education	1	0,8 %
Secondary education	2	1,6 %
High school education with high school diploma	39	32 %
University education I. degree	28	23 %
University education II. degree	50	41 %
University education III. degree	2	1,6 %
Classification of the respondent		
Employed	80	65,6 %
Unemployed	7	5,7 %
Student/doctoral student	29	23,8 %
Maternity leave	2	1,6 %
Owner of own business	4	3,3 %

Source: Own processing

3.2 Credibility of respondents in the state

The basis of our questionnaire survey, the respondents presented considerable mistrust towards the government of the Slovak Republic. Out of the total examined sample, up to 99 respondents (81%) expressed distrust in the state when collecting taxes. Only 23 respondents (approx. 19%) expressed the opposite, namely trust in the state when collecting taxes. The result of this question confirms hypothesis 1.
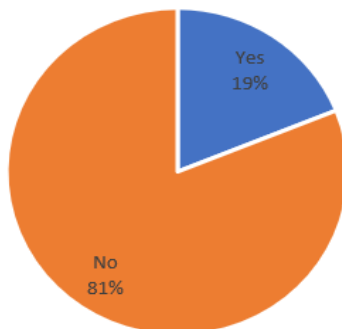
Figure 2. Question 6: The respondent's trust in the state when collecting taxes.

Source: Own processing.

Closely related to this issue is the issue of the level of corruption in the country. Unfortunately, corruption is one of the factors that influence the behavior of respondents in the area of compliance with tax regulations, and credibility is also reflected from this factor. It is obvious that corruption is also present in the Slovak Republic, which is also proven by the Corruption Perceptions Index (CPI) of the countries of the European Union. The Slovak Republic ranked far below the average and took the fifth worst place among other countries of the European Union, which can be seen in the following overview chart.
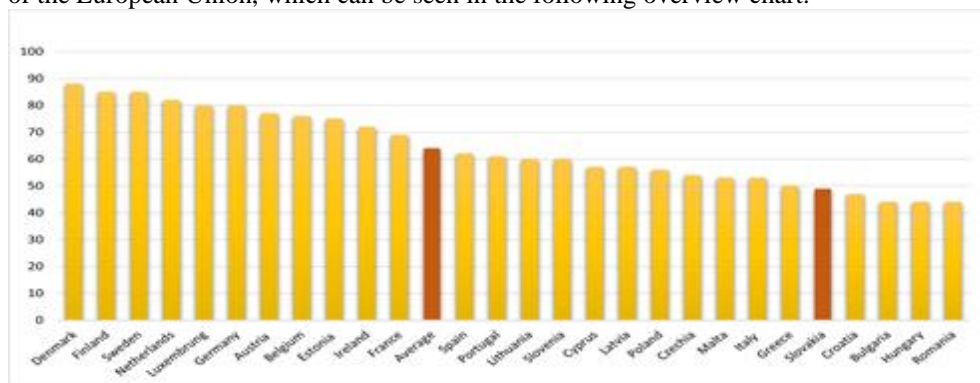
Figure 3. Corruption Perceptions Index (CPI) for 2020.

Source: Own processing according to Transparency International (2020).

The Corruption Perceptions Index shows us a picture of the state of corruption all over the world, but we focused on the states of the European Union. While most countries have made little progress in the fight against corruption, more than half of the countries are below the average, which is only 64 points. Our analysis shows that corruption not only threatens the global health response to COVID-19, but contributes to the continuing crisis of

democracy. 2020 turned out to be one of the worst years in recent history, with the outbreak of the global COVID-19 pandemic. The health and economic impact on individuals as well as communities around the world has been catastrophic. More than 90 million people have been infected and nearly 2 million people have lost their lives worldwide. As this year has shown, COVID-19 is not only a health and economic crisis, but also a corruption crisis, with countless lives lost due to the insidious effects of corruption that undermines a just global response.

Some research shows that corruption negatively affects people's access to high quality health care, our analysis also suggests that even when determining economic development, higher levels of corruption are associated with lower quality health care. Corruption is one of the key obstacles to achieving the United Nations Sustainable Development Goals (SDGs), and the COVID-19 pandemic is making these goals even more difficult to achieve. The long-term effects of corruption on health care systems remind us that corruption often intensifies the effects of a crisis.

Finally, this research shows that corruption continues to undermine democracy, even during the COVID-19 pandemic. Countries with higher levels of corruption tend to be the worst perpetrators of democratic violations in crisis management even during a pandemic.
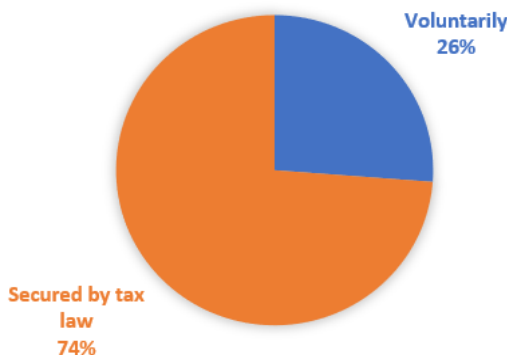
Figure 4. Question 7: How should the payment of environmental taxes be ensured in the state.

Source: Own processing.

4 Conclusion

It can be concluded that in the previous graph we can see the result of the question, what do the respondents think about the method of securing the payment of environmental taxes in the Slovak Republic. Based on the examined sample of respondents, we can conclude that up to 90 respondents (73.8%) think that the payment of environmental taxes should be ensured by the tax law, and only 32 respondents (26.2%) think that the payment of environmental taxes should be voluntary and fully at the discretion of the payer.

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International cooperation as a prerequisite for the successful implementation of groundswell when creating and promoting open-source-based products

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Abstract

Research background: Digitization of information and sharing of knowledge with other Internet users in a virtual environment have pushed the boundaries of innovation process implementation and product promotion. The fact that anyone can easily access valuable information and further develop it to resolve a particular problem heralds the rise of activities known as the "groundswell". In this regard, the so-called open-source projects come to the forefront. Open-source projects often rely on a certain level of cross-border cooperation of Internet users who wish to find an optimal solution to the given task based on the consumer experience.

Purpose of the article: The aim of the paper is to analyze the peculiarities associated with the implementation of open-source projects initiated in accordance with the rules of a new socio-societal phenomenon called the groundswell.

Methods: Primarily, the paper made use of analytical-synthetic thought processes, inductive and deductive reasoning, as well as analogy, which became the basis for various comparative arguments. The terminology used brings up-to-date, verified and comprehensible information. The authors ensured the balance of opinion and objectivity of knowledge by using Slovak as well as international literature, mainly monographs and articles published in peer-reviewed journals.

Findings & Value added: The paper helps develop the concept of the groundswell usually found in innovation processes open to the general lay public (open-source projects), especially in research and development activities.

Keywords: *digital environment; communication; groundswell; open-source project; cooperation*

JEL Classification: *L17; M15; M31; O36*

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1 Introduction

Due to the rising prices of inputs and raw material needed for research and development activities as well as production process, prices of goods and services offered on the market also rise. This forces many consumers to look for alternatives outside the official distribution channels so as to maintain the current standards of living. Many consumers opt for using used goods marketed usually by former as well as current owners. Some consumers are willing to share with others their experience and knowledge of producing a substitute, or are inclined to sell such products. This approach, which naturally has a significant effect on the amount of sales and economic results of business entities, includes activities that could be called groundswell (Bencsik et al., 2019). Cooperation at the international level aiming at finding the most suitable solution to any given problem is facilitated by the exchange of relevant information. With regard to the provision of intangible services, the process may even involve procedures and models introduced by lay people whose aim is to develop the social skills and professional competences of individuals not only for personal benefit, but also in the public interest. This is primarily facilitated by the intensive development of information and communication technologies, intelligent automation and machine learning, thanks to which digital platforms can process data more efficiently so as to improve the accuracy of search results, to display content in line with the Internet user's previous activities in the online environment and, in the case of social media, to show results that are relevant to the social media user's profile (Dahlander et al., 2021). This helps connect persons with certain knowledge or interests with the group discussing a certain topic, regardless of their physical location. Interactivity in this regard is based on feedback to the received content. It can have many forms, in particular discussions among a wide group of Internet users who have different, but at the same time mutually compatible and complementary knowledge. On the other hand, issues related to cyber security are repeatedly brought to the fore to raise awareness and to prevent the destruction, loss and unauthorized transfer of information, unauthorized processing or misuse of accessible data, including sensitive personal data (Svec and Horecky, 2019; Galik et al., 2018). It is not uncommon that the results of joint work of laymen presented under open-source solution compete with much more expensive branded products. However, the specific conditions under which an open-source solution was developed make it very difficult for the solution to gain a monopoly position on the market, because such solutions (and processes upon which they were built) are freely accessible to anyone. Also worthy of attention are some open-source projects used for public purposes, in particular computer software. The problem is that an application with open-source code can quite easily become harmful to its users once it loses support of the public.

2 Methodology

The aim of the paper is to point out peculiarities typical for open-source projects in which common Internet users (laymen) are involved. The issue is important given the ongoing societal changes which also directly affect the preferred form of communication between entities (especially with regard to face-to-face meetings). The improvement of media and information-related skills and competences of people over the past years also plays a significant role here. This ultimately resulted in the introduction of completely new standards of processing, supplementing and sharing digital data with others. As a result, virtual services that make use of public content creation have been developed, leading to a much more frequent interactions among website visitors. To reach the aim of the paper, analysis and synthesis were used to find and closely examine the complex issues of the open-source approach and its impact on groundswell. The analysis of knowledge and its systematization

required mainly inductive and deductive reasoning in order to consider all aspects, signs and properties of the investigated phenomena. In order to draw conclusions, the authors made use of analogy to predict solutions to similar (but new) problems and situations. Through scientific abstraction, the authors defined key terminology that takes into account not only theoretical, but also practical starting points regarding open innovation processes taking place in an online environment. Primarily, the paper makes use of international literature, in particular monographs and peer-reviewed journal articles registered in international bibliometric databases. The authors' opinions are based on several years of research into what makes business entities want to cooperate in digital platforms innovations. The research was supported by several scientific projects and grants.

3 Results and discussion

Ensuring the conditions for high-quality international research cooperation in the implementation of innovative measures is very challenging. This is especially true for open-source projects, when having correctly defined goals is not enough to achieve maximum productivity. The factors decisive for the overall level of final outputs include, inter alia, knowledge arrived at under the research and its importance in relation to the identified problem. It is important to know whether the published ideas have the potential to appeal to researchers on an international scale and, therefore, spread further on their own. It is assumed that people not only share acquired knowledge, but also create their own derivative works based on the supplied data set. There are cases where researchers set the same requirements as sponsors of the open-source project, and after learning of such open-source projects, researchers decide to continue in their research using open-source project's data (Li et al., 2021). In this regard, promising young talents are stimulated by the opportunity to acquire new professional skills and develop their competences in the field. It is also important to define the circle of information recipients on whom most communication activities will focus. These activities should make use of viral marketing, especially if projects wish to arouse a viral response at home and abroad at low cost (Camara et al., 2021). In terms of content, it is extremely important to motivate participants to take part in the project and evaluate results arrived at. It seems beneficial to emphasize the fact that mutual sharing of experience of all parties involved may, under certain circumstances, lead to the solution much faster. Varied outputs are likely to satisfy the needs of much more parties than expected (Strbova, 2016). On the contrary, those who wish to participate in the process of open innovation based on open-source principles as associated researchers should keep in mind the principle of universal availability and free exchange of data provided, since once knowledge is shared with partners in the group, it cannot be taken back (Tang et al., 2021). Open source as a modern trend in innovation could be defined as "*a set of procedures or codes making up a new product which can be changed and subsequently disseminated while maintaining the condition of free availability of the source code*" (Duparc et al., 2022). Basically, it is any information that is available to the public, provided that it is further disseminated free of charge. Information source is considered to be open if it is available to all potential interested parties without the need to ask for special permission, or if the conditions for accessing its content are not too difficult to meet and are not discriminatory. This means that they are not the cause of unequal treatment (Germonprez et al., 2020). It should be noted, however, that the future intentions of the user are not taken into account when access to the source code is provided. Users can freely use and modify the received information to meet their needs. However, users should not forget that in order to distribute the new product created using open-source code, they must comply with the obligation to disclose steps leading to its creation. The form and method of forwarding this information,

as well as other obligations of the user, is described in the relevant license authorization. Therefore, it is always up to the author of the open-source project to decide on conditions under which the source code or its modifications will be made available. On the other hand, the author of the open-source project may decide to relinquish complete control over how his code is further developed. Currently, the most popular open-source licenses include BSD, GPL, LGPL and MIT (Kapitsaki and Charalambous, 2021). The consequences of choosing borderline cases of open-source licenses, in particular minimum and maximum openness towards the end user should are discussed further in the text. In general, if the source code is made available to the public under a license that is too restrictive, developers will not be able to use it as they see fit. They will have unrealistic expectations in relation to the research and development activities carried out, thus opting for someone else's source code at the end. Too loose a wording of an open-source license has its own pitfalls, in particular that the code could be modified and distributed for commercial purposes without having to inform the original author (Pivneva et al., 2021). Additional interventions on the side of the project sponsor aimed at improving coordination of the modifications and the project itself thus appear to be irrelevant for new researchers.

The motivation of people to participate in the tasks under the open-source project depends on the field they work in and their personality (Olšovská et al., 2016). Inviting lay people (people outside the official channels of manufacturers or distributors of similar products) to join the open-source project is justifiable provided there is a wide community of future users of the output in question (Lin and Maruping, 2022). These people should be willing to help develop the product and address possible shortcomings as there is no centralized management body involved. The focus is therefore on the problem itself and the effort to arrive at the solution. Since there is no systematic redistribution of tasks between the actors participating in the innovation process, some actions needed to achieve the set goal are performed in vain. As some tasks are performed by the actors involved independently of one another, the quality of outcomes may vary (Kupec and Pisar, 2021; Pacalajova and Kubinec, 2021). There is a solution to these problems – communication. The parties involved should get acquainted with the current versions of open-source solutions they are working on and discuss steps taken. In particular, mistrust in the cooperation of disparate and unrelated entities that lack long-term collective management leadership may deter many from relying on the outcomes of such endeavour. The open-source approach to problem-solving combined with groundswell may be sometimes perceived as ineffective and taking too long to reach the desired result.

Lately, several open-source projects have gained international recognition thanks to the cross-border cooperation of amateur researchers. The concept of open-source projects is well known, especially in the field of computer software, CMS and web tools, data analysis, data platforms, cyber security, design tools, etc. The most famous open-source solutions include Linux computer operating system, the Mozilla Firefox web browser and the word processing software OpenOffice. The Android system, which is one of the most popular operating systems for mobile devices in the world, is one of the most successful open-source projects. It was created by the developer Andy Rubin as an open-source alternative to the existing Palm OS operating system for iPhone. Android currently has over 3 billion active users in over 190 countries. The popularity of this operating system skyrocketed thanks to its wide availability, as it was supported by tech giants such as Samsung, LG, HTC and Motorola (Katsamakas and Xin, 2019). Following the booming groundswell trend, it is also important to note that the number of active Android users is constantly increasing (see Table 1).

Table 1. The number of active users of the Android operating system (2012 – 2021).

Year	Users (bil.)
2012	0.5
2013	0.7
2014	1
2015	1.4
2016	1.7
2017	2
2018	2.3
2019	2.5
2020	2.8
2021	3

Source: Lin and Maruping (2022)

Open-source projects also include various CMS software solutions that allow the website owner, or programmer, to create, publish and additionally edit content, not only in terms of text formatting, but also by adding or removing multimedia elements. The advantage of this type of open-source solution is usually a simple, easy-to-use automated implementation, so that anyone without prior experience in programming or designing websites can work with it. The most famous open-source CMS solutions include WordPress, which is built on the PHP scripting language, unlike other similar virtual platforms that prefer the Python or JavaScript programming languages. The intention of the WordPress author was to create a digital platform intended primarily for blogging (Hervas-Oliver et al., 2020). However, mainly due to the influence of the groundswell, new opportunities for its use gradually appeared. At the moment, WordPress serves as an editorial system for the complex management of content published on the Internet.

Since the developers of open-source products try to take into account the requirements of the interested communities, there are various open-source alternatives to well-known commercial digital platforms. An alternative to the commercial platform Shopify is a platform called Medusa. It is an open-source business tool running in the Node.js-based environment, which is commonly used by companies such as IBM, PayPal and Netflix (Pivneva et al., 2021). Medusa is open to innovations and tips on how to improve its code or eliminate shortcomings. By updating the software and installing new functions, those involved try to meet expectations of Medusa users and ensure increased data protection against accidental or intentional misuse. Open-source solutions are often used in library and information systems. The reason is simple – open-source solutions save costs. FOSS (Free and Open Source Software), which also includes ILS (Integrated Library Systems) or ALS (Automated Library Systems), represent sophisticated systems that can be used to record and archive various library documents. The basis of ILS is a relational database, software for communication with the database and two graphical user interfaces (for the user and the administrator). Frequently used modules of the system include registration module, module for placing an order, data file borrowing module and OPAC (public user interface). One of the most popular freely available library system is Evergreen (Pearce, 2020).

A crucial part in open-source solutions is played by community discussion forums. Discussion forums are almost like a customer support portal. Users and developers add comments, answer questions or open new topics themselves. Forums usually work with information that is not available on the official websites of business entities. One of the most popular open-source community software is Discourse, a highly adaptable tool that accommodates needs of its users thanks to a wide range of add-ons to make the final product more attractive. In order to create a modern discussion forum without trolls and spammers, Discourse developers added the "trash bin" addon. This addon helps discussion participants

ban people who behave inappropriately or who have repeatedly violated community rules. Those helpful can be awarded an emoticon (Shwartz-Asher et al., 2020). Discussions on open-source projects implemented through discussion forums (following the rules of the groundswell) should not take into account business entities that do their business activities in the specified field. The dual nature of the activities defined by the groundswell is particularly noteworthy. First of all, it is the sequence of steps needed to finish the product, and second of all there is an emphasis on ensuring proper communication and sharing of information to achieve result desired.

4 Conclusion

The implementation of groundswell-related activities in open-source projects in the international space represents a tool designed to stimulate creative thinking of an individual and also the way a person can contribute to the research with their knowledge. All in all, it is a non-violent way to tap into the unlimited amount of ideas and human potential. By publicly presenting needs and available solutions to problems, the parties involved are able to work on and further develop ideas of others, while undertaking to keep modified source codes open and accessible. A significant role is played by digital communication, which on one hand makes the need for physical contact almost obsolete, but on the other hand offers an opportunity to understand the essence of public information sharing - the core of the open-source approach. The multidisciplinary nature of open-source products helps popularize science. However, a person wishing to take part in an open-source discussion should carefully consider all the possible risks before disclosing their workflow and work methodology to the general public.

Acknowledgements

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Competitiveness of Countries - Position of V4

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Abstract

Research background: In connection with ensuring the long-term prosperity of individual nations, more and more emphasis is being placed on comparing their competitiveness. The reasons for this include growing demands at various levels of economic activities, which are caused by globalization processes within the world economy. Globalization represents economic activities that cross national borders in order to achieve efficiency through the optimal allocation of resources on an international scale. Growth and the ability to use differences in the competitiveness of companies, regions, countries, or economic blocs represent the tools to achieve this goal. (Šofranková et al., 2018).

Purpose of the article: This scientific article is aimed at evaluating the results of an analysis that compares the competitive position of the V4 countries in the years 2010 to 2021, focusing on the development of indicators in the four main factors of the selected competitiveness index.

Methods: To evaluate the development of competitiveness and its individual factors in the V4 countries, we used a graphical representation of data using MS Excel. We used the Datawrapper website to visualize the score achieved in EU countries in 2021. In the case of a comparison of European Union countries, 26 member states are evaluated, excluding Malta. We also used the method of synthesis, creative compilation, and descriptive analysis using a box graph.

Findings & Value added: In the evaluation of the competitive position, the V4 countries are ranked below the EU average, while the Czech Republic is the best-rated country on several indicators, followed by Poland, Hungary, and the last fourth place belongs to Slovakia.

Keywords: *competitiveness; V4 countries; position; globalization*

JEL Classification: *F62; P51; R11*

1 Introduction

The country's competitive position has a great telling value about the current and future success of the country. The countries of the European Union are very interested in increasing competitiveness in several areas, especially due to several problems and challenges that

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individual economies face. The recent economic crisis and the weaknesses of globalization in connection with the disruption of global supply-consumer chains have shown us that the question of the competitiveness of national economies should be a key priority for policymakers at the regional, national, and transnational levels.

Every decision made by policymakers that favourably affect the evaluation of the competitive position in one of the evaluated areas makes the country more attractive, which ultimately has a positive impact not only on the business sector, and the effectiveness of the government but also on social, economic, and ecological aspects related to increasing the standard of living.

There is no generally accepted and unified definition of the concept of competitiveness in the professional literature. It is possible to look at this concept from several perspectives of economic theories. Sliacky and Musa (2016) say that by the term competitiveness we mean a comparative view of a certain subject under investigation and its ability to sell and offer goods and services in a given market. They add that this definition is based on David Ricardo's economic theory of comparative costs, in which he argues that each country should specialize in the production and subsequent export of those goods that can be produced in that country at lower costs than in other countries.

In connection with ensuring the long-term prosperity of individual nations, more and more emphasis is placed on the mutual comparison of competitiveness. The reasons also include growing demands at various levels of economic activities. These activities are caused by globalization processes within the world economy. Globalization represents economic activities that cross national borders in order to achieve efficiency through the optimal allocation of resources on an international scale. Growth and the use of differences in the competitiveness of companies, regions, countries, or economic blocs are the tools to achieve this goal.

Increasing the competitiveness and productivity of the national economy is a frequently discussed topic in the academic sphere. It represents an important object of interest for policymakers, multinational institutions, businesses and also for many authors of scientific studies. Cheba et al. (2020) propose that sustainable development indicators should be used only as a basis for assessing the economy's ability to compete in a sustainable manner. On the other hand, the comprehensive assessment of sustainable competitiveness should also include the stage of assessing the sustainable competitive position, assessed e.g. through the prism of exporting technologically advanced environmentally friendly solutions or indicators describing the development of eco-friendly technology. Some countries are known to be more competitive than others. The Visegrad Four represents an informal grouping of four post-communist Central European countries with a common history, culture, and shared values. However, there are significant differences in terms of the competitiveness of these economies, as the V4 countries are currently facing many challenges. In this scientific article, we will evaluate the development and state of competitiveness of the Visegrad Four countries using a selected multi-criteria competitiveness index for the monitored period of 2010 to 2021.

2 Methodology

In this scientific article, we focus on the analysis of the development of the achieved score and the ranking of selected countries in individual factors of the World Competitiveness Yearbook. Data for analytical processing were obtained from databases and the annually published World Competitiveness Yearbook (WCY). World Competitiveness Yearbook is presented annually by the International Institute for Management Development (IMD). We take a closer look and analyse the data from 2010 to 2021. The IMD (2021b) establishes the

World Competitiveness Index, which is based on 334 criteria that are regularly revised and updated, according to new theories, research and data related to the development of the global economy. According to this institution, the overall economic environment of countries can be divided into four basic factors, namely economic performance, government efficiency, business efficiency and infrastructure, while each of these factors is made up of five partial sub-factors. These factors and sub-factors are shown in Table 1

Table 1. Competitiveness factors used in the WCY methodology.

Competitiveness Factors			
Economic Performance	Government Efficiency	Business efficiency	Infrastructure
Domestic Economy International Trade International Investment Employment Prices	Public Finance Fiscal Policy Institutional Framework Business Legislation Societal Framework	Productivity and Efficiency Labour Market Finance Management Practices Attitudes and Values	Basic Infrastructure Technological Infrastructure Scientific Infrastructure Health and Environment Education

Source: Own processing from IMD World Competitiveness Yearbook, 2022

To evaluate the development of competitiveness and its individual factors in the V4 countries, we used the graphical representation of data using MS Excel. We used the Datawrapper website to visualize the score achieved according to the mentioned yearbook in EU countries in 2021. In the case of a comparison of the countries of the European Union, 26 member states are evaluated, except for Malta, which the IMD does not evaluate in its yearbook. To analyse the current state of the problem, we mainly used the method of synthesis and creative compilation.

We used various statistical methods to analyse the relevant data. In order to evaluate the national competitiveness in the V4 countries, basic descriptive characteristics are used in the work. In comparing V4 countries, the descriptive analysis is carried out using a box graph, the so-called box plot graph. The box plot graph is used to display data that is measured on an interval scale. It is used in the exploratory analysis of values. It is a type of graph used to show the shape of a distribution, its mean and variability. The created box plot consists of several values, it captures the minimum value (*Xmin*), the first quartile (*Q1*), the middle values as the arithmetic mean ($\bar{x}$) and median ($\tilde{x}$), the third quartile (*Q3*) and the maximum (*Xmax*). The chart is also useful for identifying unusual observations called outliers. Box plots are very useful when comparing two or more sets of data (Wegner, 2013).
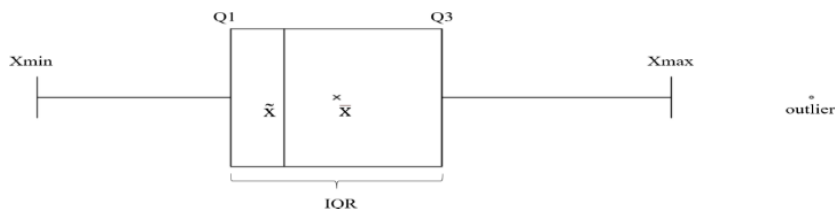
Figure 1. Box Plot

Source: Own processing (2022)

The arithmetic mean is expressed by the relation:

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i \tag{1}$$

where:
x_i = i-th value of the statistical character
n = extent of a statistical set

We refer to the middle value of the ordered statistical set as the median. Wegner (2013) says that it is the median value that divides the ordered set into two halves, that is, 50% of the values are below the median value and 50% are above it. The calculation of the median if the range of the set (*n*) is even is given by the relation:

$$\tilde{x} = \frac{x\left(\frac{n}{2}\right) + x\left(\frac{n+2}{2}\right)}{2} \tag{2}$$

To compare the variability of the achieved score in the chosen competitiveness index between the V4 countries, we used the calculation of the coefficient of variation. The coefficient of variation (*v*) is given by the ratio of the standard deviation (*s*) to the arithmetic mean ($\bar{x}$). We then express the stated ratio in percentages.

$$v = \frac{s}{\bar{x}} 100 \tag{3}$$

Graphical analysis using time series was used to describe the development of competitiveness in comparison between V4 countries and subsequently to evaluate the development of the four basic factors of the IMD competitiveness index.

3 Results

To begin with, we considered it necessary to evaluate the competitiveness of EU countries. As part of our methodological procedure, we used the World Competitiveness Ranking for the year 2021 for this assessment. We present the results of the competitiveness assessment in a graphic format, where the score achieved in the mentioned index is presented, while 26 countries of the European Union are included, except for Malta, whose competitive position The International Institute for Management Development does not track in its publication. The score takes on values from the interval from 0 to 100, while the more competitive the country is, the higher the final rating on the aforementioned scale. The average score in the monitored ranking within EU countries is at the level of 70.75 points. The highest achieved score (1st place) among European countries can be observed in the case of Sweden with the achieved score (score 96.71 points). Among the EU countries, Croatia ranks the least competitive (26th place), with a score of 43.13. Among the Visegrad Four grouping, the Slovak Republic ranked last at 24th place (score 52.52 points). The 22nd place belongs to Poland, which reaches a score of 55.20 points. Hungary, with a score of 61.68 points, ranks 20th, and the Czech Republic ranked best at 14th place (score 67.47 points).
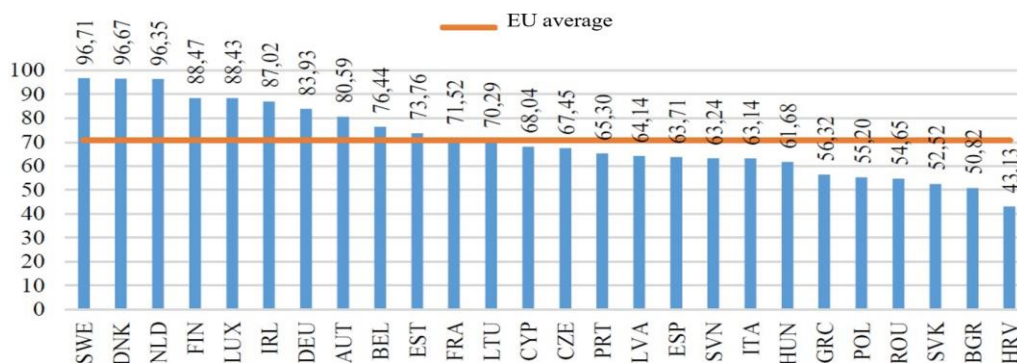
Figure 2. Position of selected EU countries according to WCY.

Source: Own processing, data from 2021 World Competitiveness Yearbook (2022)

Subsequently, we focused on analysing and comparing the development of the aggregate global competitiveness index.
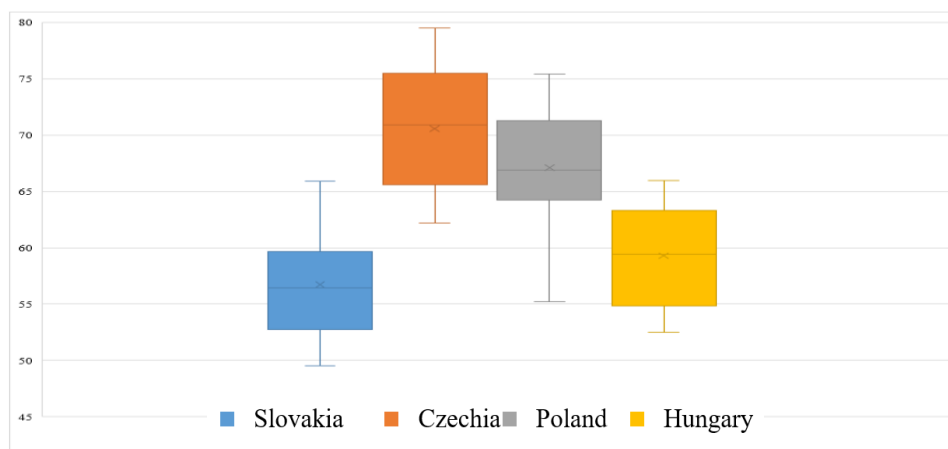
Figure 3. The score of V4 countries in the WCY index in 2010-2021

Source: Own processing, data from 2010 - 2021 World Competitiveness Yearbook (2022)

Figure 3 presents the basic descriptive characteristics of the score achieved in the World Competitiveness Yearbook (WCY) between the monitored period of 2010 and 2021 for the individual states of the Visegrad Four - Slovakia, Czech Republic, Poland, and Hungary using the box plot graph. With an average value of 56.71.

During the monitored period, the Czech Republic is the most competitive country among the V4 countries, as evidenced by the average score of 70.59. From the box plot graph, it is clear that in most of the monitored years, values that are higher than the long-term average occur more often. The highest value in the mentioned index was achieved by the Czech Republic in 2018, on the contrary, the lowest rating (62.21) can be observed in 2014. The score of the Czech Republic in the competitiveness ranking fluctuates ± 8% from the average.

We can rank Poland as the second most competitive V4 country. Poland's score takes an average value of 67.11. We found that in most years there are more frequent values that are lower than the long-term average. We observe the minimum value of the score in 2021 (55.20), which was largely affected by the global crisis related to the pandemic. The highest

value (75.43), as in the case of the Czech Republic, can be observed in 2018. WCY scores in Poland fluctuate ± 8.27% from the average.

Hungary ranks 3rd. The average score of Hungary in the analysed years reaches the level of 59.30. The country reaches its maximum level also in 2018 when the score takes on the value of 65.98, Hungary reached its minimum in 2021. The variability of the achieved score expressed by the coefficient of variation is at the level of 7.58% in the case of Hungary.

Slovakia ranks 4th among the V4 countries. We can observe the lowest value for Slovakia in 2020 (49.54) and on the contrary, the best value was achieved by Slovakia in 2016 (65.88). The variability of the achieved score, measured by the coefficient of variation, is the highest in the case of Slovakia within the V4 countries, its value is at the level of 8.93%. When examining the results achieved in the competitiveness of selected countries, we do not observe any extreme values.
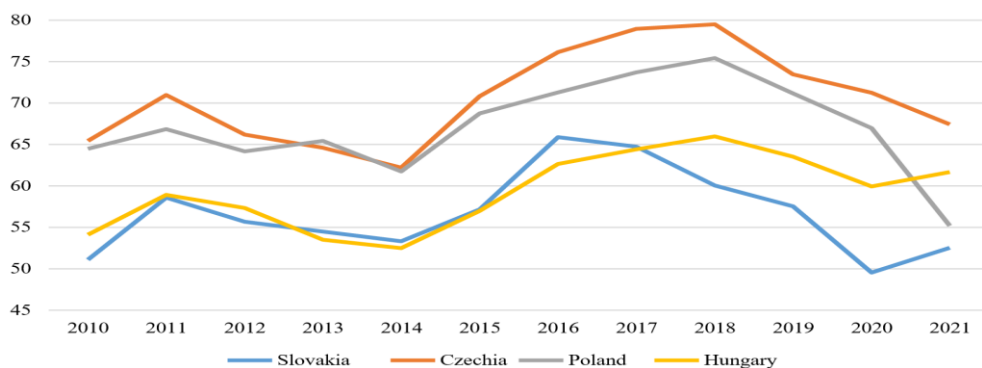
Figure 4. Development of the WCY score in the years 2010 - 2021.

Source: Own processing, data from 2010 - 2021 World Competitiveness Yearbook (2022)

Figure 4 illustrates the development of the competitive position of the V4 countries in terms of the achieved point score in the WCY competitiveness ranking over the last 12 years. From the above figure, it is clear that the development trend in the selected countries fluctuates considerably, and it appears that the trend in the case of Slovakia, the Czech Republic, Poland and Hungary is quite similar. Next, we analysed and compared the development of the main four factors in the compiled IMD competitiveness index in the years 2010 to 2021. We mainly focused on identifying the main causes of such development of the competitiveness of the selected V4 countries.

The methodology of the IMD World Yearbook for Competitiveness consists of four main factors: economic performance, government efficiency, business efficiency and infrastructure. The mentioned factors create an environment whose goal is to support competitiveness at the enterprise level.

The results of the analysis show that we can observe a dynamic fluctuating development in the factor of economic performance in all countries of the V4 region. Slovakia ranks last in the mentioned area. We can observe the greatest dynamics in the case of Hungary because in the macroeconomic evaluation of the country it has reached 1st place in the last three years. This positive trend was mainly caused by significant investment support and a drop in the unemployment rate. For Slovakia, Poland and the Czech Republic, efficiency in the government sector (government efficiency) is stagnant or has a decreasing level. The results show that the position of Slovakia worsened mainly due to the state of public finances and the deterioration in the sub-factor of the institutional framework. Deterioration in the area of public finances, tax policy and social framework leads to a slight decrease in government

efficiency in the case of the Czech Republic. Poland is characterized by a significant deterioration in government efficiency over the entire monitored period, mainly due to an increase in the public administration deficit and the legislation sub-factor. On the contrary, Hungary has seen an improvement in government efficiency in recent years.

1) Economic performance   *2) Government Efficiency*

3) Business efficiency   *4) Infrastructure*
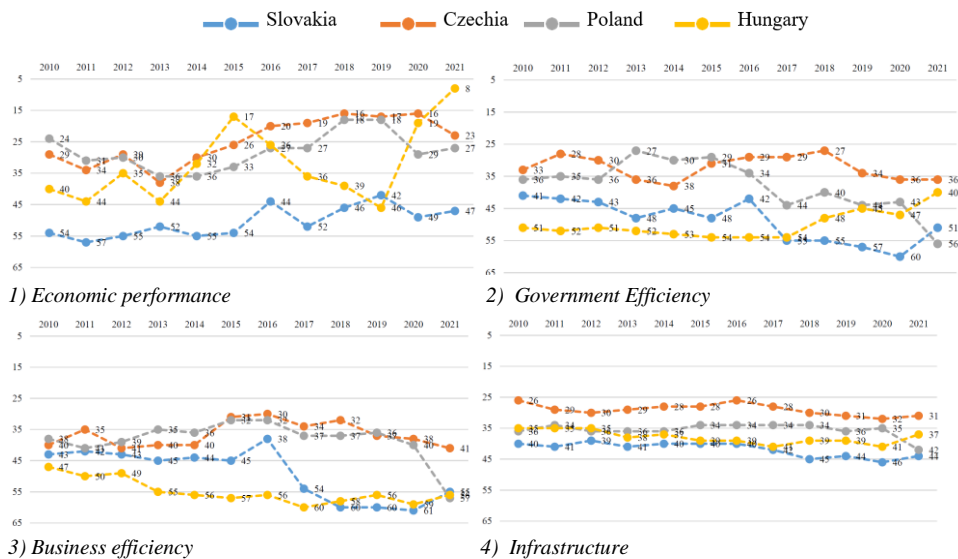
Figure 5. The development of the V4 countries' position in the WCY factors of competitiveness (2010-2011).

Source: Own processing, data from 2010 - 2021 World Competitiveness Yearbook (2022)

In business efficiency, the position of Slovakia and Poland deteriorated significantly. The causes are the deterioration of the efficiency of the labour market and management practices.

Laitsou et al. (2020) state that in order to improve digital competitiveness, policy strategies should be implemented that might lead to digital diffusion to a boost. The areas where such policies are more needed include the demand side and more precisely education and digital skills improvements. Human capital seems to be a critical factor for digital competitiveness, while digital literacy can facilitate the more productive use of the internet as well.

Critics of the use of competitiveness indices may be concerned that the opinion presented may reinforce existing differences across countries, sectors or firms, as more performing players would potentially find it easier to attract foreign investment. Such concerns have notably been expressed in the context of the performative capacity of economics. Advantages of our opinion - a strong signal for investors, because of the inclusion of firm-level information and the resulting potential to draw attention to small and medium-sized players in the economy (Falciola et al., 2020).

The positions of the V4 countries in the infrastructure factor did not change significantly in the observed time series. Countries have reserves, especially in the areas of scientific and basic infrastructure.

4 Discussion

The results of the article point to the areas in which the V4 countries have a competitive advantage, as well as to criteria and parameters that can be characterized as insufficient and represent weaknesses for individual economies.

The strengths of Slovakia are mainly a high level of export performance, a low value of the Gini coefficient, a positive assessment of the remuneration of service workers or the rate of wage growth in business efficiency. The competitive disadvantages of Slovakia include the threat of re-allocation of domestic production to other countries, protectionism and a low level of transparency, low capitalization of the stock market and, in the area of infrastructure, especially the area of higher education and insufficient health care infrastructure.

In the case of the Czech Republic, we positively assess the low rate of unemployment, also the low value of the Gini coefficient, the total remuneration of workers and the number of SMEs (small and medium enterprises). In the area of infrastructure, it is the added value of the high-tech industry or the greater export of information and communication services. The Czech Republic lags mainly in the area of the state of foreign direct investments (FDI), and the rate of insurance premiums for social security. The efficiency of the business in insufficient apprenticeship training, and the low number of qualified workers in the infrastructure.

Gavurová et al. (2020) show that educational attainment is a significant factor in evaluating the total structure of V4 countries' entrepreneurs' attitudes to the statement: properly set strategic management improves the company's competitiveness.

Poland is progressing in the areas of GDP growth, low corporate income tax rate (19%) and lower number of working hours. We observe reserves mainly in the state of FDI, in the higher number of days to start a business, in the lack of openness of the national culture or in excessive environmental pollution.

To create a lively innovative entrepreneurial culture in the Eurozone, the public sector must be efficient and ensure that business-friendly policy. Firms can reduce the cost of establishing their businesses, can build strong partnerships, and be able to enhance their dynamic capabilities and competitiveness (Pradhan et al., 2020).

Attracting FDI is welfare-improving for the V4 countries. Foreign firms would have to reinvest more of their profits, which would be desirable (Zélity, 2022).

Profit-oriented market expansion caused by accelerating globalization (press on the environment) only brings expected results with sufficient efficiency and organization. Logistics play a key role in these tasks (Kálmán and Tóth, 2021).

In three countries (Slovakia, Hungary and the Czech Republic), it has been shown that energy consumption could lead to economic growth. In the case of Slovakia, there is a negative relationship and it means that decreasing energy consumption leads to a faster increasing GDP. On the other hand, in the case of the Czech Republic and Hungary, there are positive relationships between energy consumption and economic development and it means energy conservation may harm economic growth in these countries. In Poland, there is not a significant relationship between energy consumption and economic growth (Krkošková, 2021).

Hungary's competitive advantages are FDI, a low corporate income tax rate (9%), and associated investment incentives. The overall remuneration of the workers and the speed of the internet connection are also positively evaluated. We can point to the overall resilience of the economy, a high rate of value-added tax, an insufficiently qualified workforce or low digital and technological skills as negative aspects.

Our research results show that the value of GDP measured in PPS per capita in Austria is still (even more than 30 years after the change to a market economy) much higher than in the

V4 countries. These results can be considered unsatisfactory from the point of view of the V4 countries. Among the V4 countries, the Czech Republic has the highest value of GDP. Currently, the lowest economic level is reached by the Slovak Republic (2019). Nevertheless, a positive fact is that in the last 10 years (2010-2019) the trend of GDP development was growing in all 4 monitored V4 countries (except Slovakia in the year 2016). On other hand, this growth cannot be considered sufficient (Rajnoha et al., 2021).

Koišová et al. (2021) write that the results of a cluster analysis confirm that the best conditions for the potential of human resources are concentrated mainly in metropolitan areas (the Slovak region of Bratislava, the Czech region of Praha, the Hungarian region of Közép-Magyarország and the Polish region of Mazowieckie). Their economic development is attractive for a highly-qualified workforce that can make use of their potential in high-paying jobs. However, these regions are at risk of depleting available human resources and their potential.

It seems that the quality and uniqueness of products, the ability to identify and satisfy individual customer needs, as well as comprehensive promotional activities and the creation of national brands should be important sources of competitiveness (Roszko-Wójtowicz and Grzelak, 2020). Although the performance of the V4 countries in SDGs is above average, like any other state in the world they are still far from achieving most of them (Zemanová and Druláková, 2020).

5 Conclusion

This scientific article aimed to clarify the development and current state of the competitive position of the Visegrad Four countries and individual competitiveness factors using the composite multi-criteria competitiveness index compiled by the International Institute for Management Development. The monitored period was the years 2010 to 2021.

The competitive position of the countries of the European Union varies significantly between individual member states. Our graphic analysis shows that the competitiveness of the countries of Northern and Western Europe is different compared to that of the countries of Central and Eastern Europe. Of the V4 countries, the Czech Republic comes closest to the average level of the EU countries. Based on the box plot graph, we can say that the Czech Republic ranks 1st when comparing the V4 region. The average value is at the level of 70.59. Poland took second place with an average value of 67.11. Hungary ranks 3rd among the V4 countries in the monitored period, with an average score of 59.30 points. In last, fourth place is the Slovak Republic, whose average value is at a level of 57.71 points.

The evaluation of competitiveness at the national level with the identification of the main problems will help each country to determine the priority areas of interest that should be the subject of effectively targeted structural reforms.

Acknowledgements

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Implementation of the circular economy to strengthen the state's energy security

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Abstract

Research background: Focuses on innovative strategies of the circular economy in the context of energy security of the state, the importance of which has increased significantly especially after the events of February 24, 2022 (aggression of the Russian Federation in Ukraine).
Purpose of the article: To point out the importance of the circular economy for energy security through an interdisciplinary approach of social sciences (especially economics, political science).
Methods: For the study of the observed problems, the genetic method of analysis prevails, with the help of which the mentioned issue can be clarified within the dimension of the state's economic policy in the national and transnational dimensions. Other supporting methods are comparison (determining the similarities and differences of the monitored phenomena) and synthesis (to reveal the structure, mutual processes and relationships of individual aspects of the studied phenomenon).
Findings & Value added: The article deals with the current issue of the security contexts of the implementation of circular technologies within the economy to strengthen the state's energy security. In connection with the implementation process of circular technologies, it monitors the possible appropriate reduction of potential risks in the economic base of the state in the energy field. It is based on the reality of the multifunctionality of circular technologies, which are fully in the context of sustainable development and contribute through the use of alternative renewable sources to ensuring the security of the state through the diversification and decentralization of the production of strategic energy commodities.

Keywords: *circular economy; alternative renewable sources; energy security*

JEL Classification: *A14; B41; Q01*

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1 Introduction

The article focuses on the current issue of the security implementation of the circular economy to strengthen the state's energy security. The importance of the implementation of circular technologies is fully in the context of sustainable development in the period of the onset of the Industry 4.0 era. In this era, it is certain that the desired economic growth also brings with it dark sides, such as the pressure to obtain new raw materials. Therefore, one of the priorities of sustainable development is to solve the growing amount of waste, the devastation of nature, and the waste of energy resources. A paradigm shift can be brought about by the application of the principles of a circular economy, where waste is perceived as a resource. In this context, the circular economy represents a concept that can work better not only with valuable materials, but also uses shared services and new consumption models that reduce pressure on primary resources (Šetek, 2015). The current security and economic situation also shows the importance of implementing the principles of circular technologies across industries and areas of life. Within its framework, the importance of raw material and energy independence from external or exhaustible sources is emphasized, but also a great opportunity for the national economy and its business entities. Assuming that business entities will perceive waste as a resource and use it repeatedly, then the innovative process of implementing circular technologies will mean significant business potential. This will consist in reducing the cost of purchasing material and subsequently in stronger resistance to changes in the world market. As a result of the aggression of the Russian Federation in Ukraine, after February 24, 2022, the phenomenon of energy security increases in importance within the economic policy of the state. The implementation of the circular economy in the production of energy commodities can also contribute to its strengthening.

The implementation of circulation technologies in the economy based on the above-mentioned factors will contribute to the diversification of the energy mix and the subsequent decentralization of the production of energy commodities of strategic importance. It can also be seen in the strengthening of the state's energy and ecological security. For this reason, the mentioned implementation process is in accordance with the contexts of the security theories of the Copenhagen School (Šetek and Petrách, 2017).

2 Materials and methods

Especially due to armed aggression in Ukraine, the phenomenon of energy security is growing in the Czech economy as well as in the entire Western European area. An integral part of the aforementioned security concept is the search for alternative sources, to which the application of circular technologies can make a significant contribution. For these reasons, the use of the method of analysis, comparison, synthesis and generalization prevails during processing. The research results are supported by statistical data - documents from the Ministry of Industry and Trade and the Ministry of the Environment.

The interdisciplinary approach of social sciences and humanities (especially economics, economic policy, sociology, ecology and security sciences) is also applied to the current development trend of energy security of the Czech economy in connection with the emerging era of Industry 4.0.

3 Results and discussions

3.1 Starting points for a circular economy

In its essence, the goal of the circular economy is to contribute to the quality growth of the environment and human life by increasing the efficiency of production. According to the concept of sustainable development, the implementation of circular technologies solves the effect in three dimensions: economic, ecological and social. For this reason, the subject of theoretical interest is social economics, which also focuses on issues of environmental protection and creation in its main areas (Sousa and Correia, 2022). The concept of the circular economy thus arose as a reaction to the significant uncontrollable dynamics of the linear nature of material flows in almost all areas of production. Primary raw materials such as wood and non-living environmental raw materials, oil, coal, metal ores, aggregates, sands, etc. are converted into products after extraction, and once their life cycle ends, they end up unusable in landfills. The situation is also aggravated by the fact that the life cycle of up to 95% of products ends after only 6 months from their purchase (Androniceanu et al., 2021). From a sociological point of view, this attitude of both producers and consumers is fully in line with the theoretical concept of consumer society (Velenturf et al., 2019). This has been taking shape in the area of Western economies since the second half of the 20th century. The second wave dates from the early 1980s, and from the mid-1990s, the phenomenon of globalization entered the mentioned way of life of society, which to a certain extent facilitated the population following this way of life in their consumption habits on a global scale. From an economic point of view, the consumption type of society is characterized by an excess of supply over demand. It is not a problem for companies to produce a large amount of products, but to sell this amount. Mass production is beneficial for companies, because in a large number of products they can more easily minimize fixed costs, which would unnecessarily increase the price of the final product (Faltová Leitmanová et al., 2021). The stage of overproduction is followed by the stage of massaging the public with advertising campaigns, elaborate marketing strategy and other persuasive practices. In this way, competition operates on the market along the lines of identical, substitutable and completely interchangeable commodities. The advantage for manufacturers is the fact that the company is able to consume more than it actually needs, so they often do not examine the consumer willingness of consumers, but what quantity of products they can bear (sales strategy of volume discounts). The mentioned type of society is diagnosed by the Norwegian social anthropologist Thomas Hylland Eriksen with the "big wolf syndrome", which is voracious and greedy (Akanbi et al., 2020).

The circular economy is fighting the aforementioned trend, it is often defined as a zero-waste concept. Its essence lies in technological applications within the framework of connecting material flows and maintaining their value in the cycle for as long as possible. Following the example of natural ecosystems, it proposes closing material flows in functional and never-ending cycles, drawing energy from renewable and sustainable sources and creating sustainable products and services. Materials that would thus become waste in the existing linear economy are reused or recycled (Shennib and Schmitt, 2021). Although the emphasis is mainly on material recovery and recycling as a way to achieve the goals of waste management, supporting the energy use of waste that would otherwise have to be removed can also play an important role. This method of waste utilization is very common when dealing with mixed municipal waste originating from households or businesses and is considered the fastest way to reduce landfilling (Schröder et al., 2020). In addition to mixed municipal waste, residual municipal waste from sorting lines, which have been

inappropriately sorted by their originators, also enters the waste energy utilization process (Velenturf et al., 2019).

3.2 The concept and genesis of energy security within the established economic policy

Energy security is an integral part of energy policy. Certain hints of a common energy policy are already evidenced by the position of France on May 9, 1950, namely the presentation of the so-called Schuman Plan (a project of the then Minister of Foreign Affairs Robert Schuman) for the unification of Europe, which later came to be known under his name. The aim of the aforementioned plan was to subordinate the then French and West German coal and steel production to a joint multinational body, thereby simultaneously abandoning the post-war restrictions on West German heavy industry. The French plan was implemented in 1951 with the creation of the European Coal and Steel Association within the so-called Six (Federal Republic of Germany, France, Italy, Belgium, Luxembourg and the Netherlands). A common market for coal and steel was established in 1954 within this area. The positive experiences of the Montane Union led the member countries to take another step within the integration tendencies. This was followed in 1957 by the signing of the mentioned "six" of the Treaty of Rome, on the basis of which two new communities began to operate in early 1958, namely the European Economic Community and the European Atomic Energy Association (Euraton). This also shifted and expanded the solution of the energy issue to include nuclear energy within the framework of the "six".

Since roughly the beginning of the 1970s, the concept of energy security has been widely used in the world economy and national security strategies. A certain impetus for this would be the term "oil peak - turning point", i.e. the state when the world economy is experiencing a decrease in energy mineral resources - fossil fuels. In this context, there is also talk of the so-called Hubbert curve (after the American geologist King Hubbert), which means that reserves are at their peak in the given period, and that production will gradually decrease (Newbert, 2018). This was logically related to the increase in the prices of energy commodities in the world economy, some important exporters began to use energy commodities (especially oil and natural gas) as a certain "weapon" in their foreign policy (Šetek, 2015).

Based on the above-mentioned facts, the starting point for creating the state's energy security is its economic policy. In the above case, its goals are to protect the producer and the consumer from the potential risk of e.g. blackout, shortage, etc., which can lead to e.g. household energy poverty, etc. At the same time, it also addresses the possible potential risk for instability within the functioning of the economic system (typical enormous inflationary growth of the Czech economy as a result of the war and energy crisis with the events of February 24, 2022).

The basis of energy security of the national economy is determined by its energy base, which is determined by the state of raw energy commodities, production, distribution, energy infrastructure (electricity transmission system, oil pipelines, gas pipelines, steam pipelines...) final consumption, import and export of energy commodities (Marrucci et al., 2021). From the point of view of energy security, the main energy commodities of strategic importance for the economy still include electricity, oil, natural gas and thermal energy. Another concept of energy security is very closely related to the phenomenon of ecological security, which clearly fits into the theoretical concept of the Copenhagen Safety School, which has been formulated since the mid-1980s. Since then, based on the study of the world, to expand the original concept of military security to address political, economic, environmental and social issues within national and global security (Šetek, 2018).

On the basis of the analysis of some selected concepts of energy security within the framework of the fulfillment of the goals of the economic policy, a clear conclusion of its nature can be reached. This consists in access to a sufficient amount of reliable energy at an acceptable price with due regard for the quality of the environment. The implementation of circular technologies in the framework of industrial and agricultural production in the production of electrical and thermal energy can also contribute to the fulfillment of these

3.3 The ecological benefit of circular implementation in the energy industry

It is in the interest of every state to ensure, as far as possible, an economy that is as independent as possible from the import of energy raw materials from abroad, and to achieve at least partial energy self-sufficiency within its capabilities. However, there is no longer enough fossil natural resources (such as coal, oil and natural gas) on the European continent. Until the end of the 20th century, traditional energy sources based on massive sources of electricity from coal and nuclear power were at the top around the world. Green sources generating from solar and wind were considered more as a supplement. In connection with the reduction of carbon dioxide emissions, which contribute to global warming, bets were placed on the further development of nuclear energy. For these reasons, not only the Czech, but also the European electric power industry is working in parallel as part of the strategy of strengthening energy security and in an ecological direction. This results in the shutdown of large non-ecological electricity production plants and their replacement in the form of decentralized ecological electricity production plants, including through circular technologies (Grafström and Aasma, 2021).

Renewable resources represent a whole range of raw materials and technologies, and the main goal of their use is to replace fossil (non-renewable) resources, mainly coal, oil and natural gas. It is waste, as a part of renewable resources, whose properties are particularly suitable for the decentralized production of energy commodities (mainly electricity and thermal energy), which, of course, requires more of their construction near settlements. This leads to the inevitable interaction of the investor with local businesses and residents. For this reason, the dislocation of circular technologies within the region depends on the technology of local industrial and agricultural business entities on the one hand and consumers on the other (Graczyk-Kucharska and Hojka, 2021). Within the framework of the circular economy, this is a wide range of technological use of renewable resources for the production of energy commodities. These are energy use during the incineration of solid municipal and industrial waste, processing of biomass from forest waste into wood chips, energy use of waste water, biogas production, application of liquid biofuels as a substitute for fossil fuels in transport. In this context, the conditions for cogeneration, i.e. the combined production of electrical and thermal energy, are also created from the point of view of economic efficiency within circular technologies (Kumaraswamy and Garud, 2018).

The share of circular materials, as alternative fuels, in the production of electrical and thermal energy using the example of the Czech economy is shown in Table 1 for the year 2019 (the year before the pandemic covid-19 and subsequent war crisis). At that time, the gross production of electricity from renewable sources took part in the total domestic gross production of electricity 12.7%, where almost half (6.41%) was represented by circular materials. They contributed 30.82% to the production of thermal energy.

Table 1. Share of circular materials in the production of electrical and thermal energy in the Czech Republic in 2019 (in %)

Circular materials	Share of gross electricity production	Share of heat production
Biomass	3,07	24,33
Biogas	3,19	4,24
Municipal solid waste	0,15	2,25
In total	6,41	30,82

Source: Ministry of Industry and Trade. Renewable energy sources in 2019 and own processing

Regarding the energy use of solid waste (municipal waste and mixed municipal waste), its amount for the period 2009-2019 (before the beginning of the crisis situation) is shown in table number 2. However, in 2019, the goal set by the Ministry of the Environment for waste management was not met. This is evidenced by table number 3.

Table 2. Amount of energetically used municipal waste (MW) and mixed municipal waste (MMW) in the Czech Republic 2009-2019 in thousands tons

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
MW	360	469	613	634	638	643	632	666	703	668	685
MMW	292	436	541	573	580	583	575	613	602	588	596

Source: Information system of waste management, Ministry of the Environment 2020 and own processing

Table 3. Comparison of forecast and actual state of municipal waste management in 2019 in %

Waste management	Energy use	Material use	Landfilling
Reality	12	41	46
Prognosis	15	49	36

Source: Waste Management Plan of the Czech Republic 2014, Ministry of the Environment 2020 and own processing

Compared to conventional large-capacity sources of electricity production (such as nuclear, thermal or, for example, hydropower plants), circular producers are much more flexible and efficient. There is also the possibility to apply the principles of the circular economy in the use of energy waste to the production of electrical and thermal energy.

For the reasons mentioned above, the implementation of the circular economy in the production of strategic energy commodities also makes it possible to adapt to the local conditions of the regions, thus significantly increasing the efficiency of energy transformation. The lower need for transmission contributes to higher efficiency of the entire system and offers the opportunity to use any available energy, including renewable energy. This simultaneously fulfills economic, ecological and social goals within the regions as well as requirements in the context of sustainable development within the national economy (Graczyk-Kucharska, 2021). The potential for the circular economy can be represented by the so-called secondary energy products, which are created during the production of electrical and thermal energy after burning solid fuels or during the flue gas desulfurization process. However, their further use must be appropriately set up so that the environment and human health are not endangered (Bilan et al., 2020).

According to foreign experience (when burning solid waste), it is also directly related to the use of fly ash and slag in the construction industry. Waste can thus fully replace rare mineral raw materials such as sand, natural gypsum or aggregate. At the same time, however,

it is possible to use these by-products in other ways – for example for water retention. Fly ash has a large specific surface area, for example in China it is mixed into clay soil, thanks to which it retains more water in the landscape. In South Korea, they use fly ash to capture emissions in wastewater (Chowdhury et al., 2022). This can also be seen as a challenge for the development of the mentioned circular technologies in the Czech Republic within the regions.

3.4 Circular economy in the framework of the restructuring of the production of energy commodities

The basic strategic goal of implementing the circular economy is to reduce negative externalities resulting from the production, use and disposal of products. The mentioned attitude can also contribute to restructuring in the production of energy commodities. The main instrument for the development of restructuring consists in the liberalization of the energy market, which should create a competitive environment as a necessary condition for dynamic development. The technical means for this are decentralization, diversification and technical innovation. At the same time, the integration of these means can contribute to the concept of smart energy, which represents one of the basic pillars of the Smart Region concept. It mainly includes the use of renewable energy sources, elements of smart networks (the so-called smart grid) in the electricity distribution system in the region, intelligent management of energy consumption, including energy management of buildings and intelligent management of city services, especially public lighting. Smart energy is closely linked with the other pillars of the Smart Region concept – the environment and mobility (Jabbour et al., 2019).

In this context, the circular economy points out that any natural systems are capable of evolutionary development in a positive direction. When talking about the biomimetic aspect of the circular economy, nature is imitated in terms of the efficiency of resource use and the creation of sustainable ecosystems. Understanding the system is key if we want to make changes within such a system. Ignoring or misinterpreting trends, processes, the functioning of things and the degree of real human impacts on the socio-ecological system can lead to catastrophic results (Bag et al., 2021).

4 Conclusion

The implementation of the circular economy is undoubtedly a phenomenon that has gained popularity together with the environmental movement and also the requirements for the protection and creation of the environment (Galvão et al.,2018). Due to the uncertainty surrounding energy supplier entities after the start of the third decade of the 21st century, it is also seen as a tool to strengthen the state's energy security.

It is certain that the implementation of circular technologies and the use of renewable resources is determined by a number of factors of the national economy, such as area, geographical location and natural conditions. Based on the aforementioned determinants, the Czech Republic is a small country without the possibility of planting its territory with crops used as biomass. The water flows are limited, it has no sea for the construction of tidal power plants, the solar intensity does not reach the same level as for example at the equator, it does not have large areas for the installation of large photovoltaic panels and the wind does not blow as strongly as on the coast in northern Germany.

In addition, the transmission system has problems dealing with the sudden production of wind and photovoltaic power plants. According to these facts, renewable sources, which also include energy utilization of waste, cannot contribute to a significant share of the energy mix

in the Czech Republic to guarantee the country's energy security. However, the most fundamental contribution of the aforementioned innovative trends of the circular economy lies in the ecological aspects. Nevertheless, the energy use of waste means additional resources, the use of which will contribute to independence from exhaustible raw materials.

Acknowledgements

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Global methods, models and tools for detecting material misstatements in the financial statements of business entities in the conditions of the Slovak Republic

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Abstract

Research background: The article deals with the issue of material misstatements in the financial statements. Currently, there are many methods, models and other tools used worldwide to detect material misstatements in the financial statements. These are, for example, Beneish M-score, Dechow F-score, or more modern and newer tools of artificial intelligence, such as machine learning. The article analyses existing methods, models and tools, compares them and then examines their possible application in the conditions of the Slovak Republic.

Purpose of the article: The purpose of the article is, based on the analysis of individual existing methods, models and tools, to determine their possible use for the information reported in the financial statements in the conditions of the Slovak Republic.

Methods: The article uses statistical methods in connection with models designed to detect misstatements in the financial statements (Beneish M-score, Dechow F-score) and also works with modern machine learning tools.

Findings & Value added: Based on the analysis of global existing models, methods and tools, the article determines whether it is possible to use them in the conditions of the Slovak Republic without further modification, or whether it is necessary to modify the existing tools, or develop own model or tool that can be used to detect material misstatements in the financial statements of business entities in the Slovak Republic. The added value of the article is primarily the possible future use of the research results to detect material misstatements in the financial statements under the conditions of the Slovak Republic.

Keywords: *Beneish M-score; Dechow F-score; Machine Learning*

JEL Classification: *M40; M41; M49*

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1 Introduction

Not only in the present, but also in the past, there were several misstatements in the financial statements of business entities all over the world, some of which were material. Over time, various authors have come to the conclusion that the financial statements have several common features that may indicate manipulation of the reported information. Forensic accounting is in focus and plays a prominent role in discovering the financial statement frauds (Halilbegovic et al., 2020). Based on this, using various methods, the Beneish M-score and subsequently the Dechow F-score were developed, which are used to detect and predict material misstatements in the financial statements. Further development brought the use of the most modern artificial intelligence tools, specifically machine learning, in the area of detecting material misstatements in the financial statements. This development was mainly due to the behaviour of many executives, which was and is fraudulent (Suh et al., 2020).

The purpose of this article is, based on the analysis of individual global existing methods, models and tools, to determine their possible use for the information reported in the financial statements in the conditions of the Slovak Republic. In creative accounting, the primary goal of every business entity is to increase and strengthen its market position and over the years, manipulation of the financial statements has also reached the territory of Central European countries, including the Slovak Republic (Durana et al., 2022). The assessment of whether a given misstatement is material or not may run into the problem of subjective view. According to International Accounting Standard 1 Presentation of Financial Statements (European Commission, 2008), information is material if omitting, misstating or obscuring it could reasonably be expected to influence decisions that the primary users of general purpose financial statements make on the basis of those financial statements, which provide financial information about a specific reporting entity. It is already clear from the given definition that the assessment of materiality is subjective from the point of view of each user of information from the financial statements. However, it is important that the financial statements should not contain any misstatement, whether material or not. The issue of material misstatements is also addressed by auditors, while a recent approach talks about including the review of misstatements from the previous period (Moon et al., 2022). Even from the point of view of the auditors, it can be seen that they are paying a lot of attention to the given issue. Auditors are primarily concerned with the risk of material misstatement, and its year-to-year changes may also have an impact on audit performance (Zhang and Shailer, 2021).

The financial statements of business entities assembled according to the legislation of the Slovak Republic have a specified structure and a prescribed template for the balance sheet and the profit and loss statement. In the case of the notes, their content is determined, while the exact structure is not prescribed. The structure of the templates for the balance sheet and the profit and loss statement depends on the size group of the accounting units. The criteria for inclusion in the size group are determined by the Slovak Act on Accounting (National Council of the Slovak Republic, 2002). Micro accounting units have a separate template, and small together with large accounting units have an extended common template. These differences must also be taken into account when detecting material misstatements in the financial statements. On the other hand, however, it is possible to assume that the just-prescribed templates for the balance sheet and the profit and loss statement can ensure easier use of already existing methods, models and tools that are used worldwide in the given area. In our article, we will focus on the template designed for small and large accounting units (Ministry of Finance of the Slovak Republic, 2014).

2 Methods

In connection with the purpose of the paper and the information given in the introduction of the paper, we will verify the following qualitative hypothesis:
H: Beneish M-score, Dechow F-score and machine learning are useful tools for detecting material misstatements in the financial statements of business entities in the conditions of the Slovak Republic.

Data from the financial statements of business entities within the Slovak Republic are needed to verify the hypothesis. Business entities are obliged to publish the financial statements in the publicly accessible Register of Financial Statements. The published financial statements are further processed by the company Finstat on its website, while providing paid services in the form of mass data exports in CSV format (Finstat, 2022). Also, in order to verify the hypothesis, it is necessary to provide basic information about the given instruments. Beneish M-score and Dechow F-score have been analysed by several authors in their studies and have already been used in the conditions of various countries around the world. The same trend is also in the case of machine learning, i.e. the tool of artificial intelligence.

2.1 Beneish M-score model

The Beneish M-score model is a statistical model based on the use of financial indicators to detect profit manipulation. First, Beneish (1999) analysed companies that tended to manipulate earnings and then developed a statistical model to determine which entity is a manipulator and which is not. Subsequently, Beneish and Nichols (2009) refined the model and added 8 variables. This resulted in the following formula (1):

$$M - score = -4.84 + 0.92 \times DSRI + 0.528 \times GMI + 0.404 \times AQI + 0.892 \times SGI + 0.115 \times DEPI - 0.172 \times SGAI + 4{,}679 \times TATA - 0.327 \times LVGI \tag{1}$$

Individual variables represent abbreviations of financial indicators, while their meanings are as follows (2) - (9):

$$DSRI = Days\ Sales\ in\ Receivables\ Index \tag{2}$$

$$GMI = Gross\ Margin\ Index \tag{3}$$

$$AQI = Asset\ Quality\ Index \tag{4}$$

$$SGI = Sales\ Growth\ Index \tag{5}$$

$$DEPI = Depreciation\ Index \tag{6}$$

$$SGAI = Sales\ General\ and\ Administrative\ Expenses\ Index \tag{7}$$

$$TATA = Total\ Accruals\ to\ Total\ Assets \tag{8}$$

$$LVGI = Leverage\ Index \tag{9}$$

The calculation of DSRI (2) is based on the ratio of net receivables and sales for two periods. GMI (3) is affected by the difference between sales and cost of goods sold in a ratio to sales over two periods. AQI (4) is subtracted from the value of 1 the sum of current assets, property, plant and equipment and securities in proportion to the total value of assets over two periods. SGI (5) compares the sales of the given period to the sales of the previous period.

DEPI (6) is based on depreciation in proportion to the sum of property, plant and equipment and depreciation for two periods. SGAI (7) is calculated from the ratios of selling, general and administrative expenses and sales for two periods. TATA (8) represents the difference between income from continuing operations and cash flows from operations in a ratio to the total value of assets of the given period. LVGI (9) is affected by the sum of current liabilities and total long-term debt in proportion to the total value of assets over two periods.

If the result of the calculation of the Beneish M-score formula is more than -2.22, the business entity is classified as a manipulator, and vice versa, if the number is less than -2.22, the business entity is not a manipulator.

2.2 Dechow F-score model

The F-score model was developed by Dechow et al. (2011). This model is a fraud risk assessment tool that uses an F-score to determine the probability of fraudulent financial reporting, and its development was based on a similar methodology to Beneish's. The F-score is calculated with 3 models corresponding to 3 levels (10) – (12):

$$Model\ 1 = -7.893 + 0.790 \times rsst_{acc} + 2.518 \times ch_{rec} + 1.191 \times ch_{inv} + 1.979 \times soft_{assets} + 0.171 \times ch_{cs} - 0.932 \times ch_{roa} + 1.092 \times issue + \varepsilon \quad (10)$$

$$Model\ 2 = -8.252 + 0.665 \times rsst\_acc + 2.457 \times ch\_rec + 1.393 \times ch\_inv + 2.011 \times soft\_assets + 0.159 \times ch\_cs - 1.029 \times ch\_roa + 0.983 \times issue - 0.15 \times ch\_emp + 0.419 \times leasedum + \varepsilon \quad (11)$$

$$Model\ 3 = -7.966 + 0.909 \times rsst\_acc + 1.731 \times ch\_rec + 1.447 \times ch\_inv + 2.265 \times soft\_assets + 0.160 \times ch\_cs - 1.455 \times ch\_roa + 0.653 \times issue - 0.121 \times ch\_emp + 0.345 \times leasedum + 0.082 \times ret_t + 0.098 \times ret_{t-1} + \varepsilon \quad (12)$$

Basic Model 1 (10) examines the relationship between misconduct and elements of the financial statements including accrual accounting (rsst_acc), changes in accounts receivable (ch_rec), changes in inventories (ch_inv), assets average liquidity (soft_assets), changes in cash sales (ch_cs), changes in return of assets (ch_roa) and stock issuance in the year (issue). Model 2 (11) is extended by abnormal change in employees (ch_emp) and the existence of operating leases (leasedum). The last model 3 (12) also includes the market-adjusted stock return of the given period (ret$_t$) and the previous period (ret$_{t-1}$).

If the calculated F-score is less than 1, there has been no manipulation of the financial statements. If the F-score is more than 1, it can be a signal of fraud in the financial statements of the business entity.

2.3 Machine Learning

In recent years, artificial intelligence tools have been used in various fields. These tools can also be used in the field of accounting. Machine learning is also a part of artificial intelligence. Machine learning is based on analysing data and learning to predict the outcome. It is from the analysis of reported data in the financial statements that machine learning tools should be able to detect deviations that represent material misstatements. Some authors use a machine learning technique to assess whether the content of the financial statements disclosures is incrementally informative in predicting intentional misreporting (Brown et al., 2020).

An example of a program that deals with machine learning is Microsoft Azure Machine Learning Studio. It uses various functions to analyse data and learn. Some authors' results

implied that decision-making based on the machine learning predictions is more accurate and brings a higher monetary value (Rezazadeh, 2020). As part of Microsoft Azure Machine Learning Studio, it is also possible to use the globally known Python programming language, which is used for research and development.

3 Results

Working with data obtained from the financial statements of business entities in the conditions of the Slovak Republic requires a different approach in the case of Beneish M-score, Dechow F-score and machine learning. Beneish M-score model and Dechow F-score model are based on financial indicators, so their calculation is necessary first of all. Machine learning tools can also work with reported data in the financial statements, and their modification to financial indicators is not necessary, but not excluded.

We will examine the application of each of the global methods, models and tools detecting material misstatements in the financial statements in the conditions of the Slovak Republic separately in separate subsections, thereby gradually verifying the hypothesis from the previous section.

3.1 Application of Beneish M-score model in the conditions of the Slovak Republic

Beneish M-score consists of several financial indicators. The financial statements compiled according to the legislation of the Slovak Republic should provide all the data necessary for the calculation of these financial indicators. Our considerations will concern the template prescribed for small and large accounting units. All the names of the items that will affect the individual indicators are based on the names determined in the prescribed template. Since the data for two periods are reported in the prescribed template, in the case of indicators that work with data from two periods, their content will be simple.

When calculating the DSRI indicator (2), the net values of trade receivables and sales of goods, own products and services for two periods are authoritative. The GMI indicator (3) compares the data of two periods and depends equally on sales of goods, own products and services and costs incurred for the procurement of sold goods, or other costs that can be definitely attributed to the given sales - these costs, however, would it was possible to find it rather in the notes and even then only if the given business entity reports them. The value of the AQI indicator (4) is affected by the value of current assets, then the value of long-term tangible assets, part of long-term financial assets and part of short-term financial assets corresponding to securities, while the total value of assets is also necessary in proportion to these values - and all this for two periods. The calculation of the SGI indicator (5) depends only on sales for two periods. From the point of view of Slovak legislation, the DEPI indicator (6) should be influenced by the values of depreciated long-term tangible and intangible assets together with the costs that belong to the depreciation of long-term intangible and tangible assets for two periods. The SGAI indicator (7) is primarily influenced by the costs of services, personnel costs, taxes and fees, i.e. those that are not directly related to production and can be compared to sales, while data for two periods are again required. A problem arises with the TATA indicator (8) because income from continuing operations and cash flows from operations do not directly fill the balance sheet or the profit and loss statement in the prescribed template. However, their content can be part of the notes, but only in the case of large accounting units that have the obligation to compile a cash flow statement. In the case of TATA, only one period is dealt with and the total value of assets is also required for its calculation. The last indicator is the LVGI (9) and its calculation depends on short-term liabilities, long-term liabilities and the total value of assets for two periods.

3.2 Application of Dechow F-score model in the conditions of the Slovak Republic

Dechow F-score is based on 3 models corresponding to 3 levels, with different values specified for the variables in each model and more variables at each additional level. The use of a specific model can also affect whether a given business entity has the content for the given variables.

The application of Dechow F-score in the conditions of the Slovak Republic using the prescribed template for small and large accounting units is more complicated. Individual variables are primarily based on changes in items reported in the financial statements. Since these are changes, it is obvious that two periods of data are needed. Average values are also used in the calculations. However, we will try to gradually analyse the individual variables and find the filling according to the items in the prescribed template.

Model 1 (10) primarily includes accrual accounting (rsst_acc), which is calculated as the sum of several changes in proportion to the average value of total assets. The sum of changes is mainly influenced by the items of assets and liabilities, while each change is influenced by something else, be it current assets, short-term liabilities, or even the total value of assets or liabilities. Changes in receivables (ch_rec) are affected by changes in short-term and long-term receivables in a ratio to the average value of total assets. Changes in inventories (ch_inv) depend on the change in the value of inventories in a ratio to the average value of total assets. The average liquidity of assets (soft_assets) is based on a calculation in which the value of long-term tangible assets and financial accounts is deducted from the total value of assets, while this difference is put in proportion to the value of total assets. In the case of a change in cash sales (ch_cs), it is a percentage change that is based on the difference in the amount of sales of goods, own products and services and the change in the value of receivables. The change in the return of assets (ch_roa) is influenced by the differences in the ratios of the economic result for the accounting period after taxation and the average value of assets for two periods. Issues of stocks in the year (issue) are filled in the case that the business entity issued securities in the given year, such information could be found in the notes to the financial statements. An extension of model 2 (11) is primarily represented by abnormal changes in employees (ch_emp), while information about employees can be disclosed in notes, and the calculation of this variable depends on the difference between the percentage change in the number of employees and the percentage change in assets. Another expansion is the existence of operating leases (leasedum). The last model 3 (12) also contains the market-adjusted stock return of the given period (ret_t) and the previous period (ret_{t-1}), while their content would be difficult to find even in the notes to the financial statements.

3.3 Application of machine learning in the conditions of the Slovak Republic

As we indicated earlier, in the case of the application of artificial intelligence, in our case machine learning, it is possible to work with data directly reported in the financial statements, but also with data calculated using financial indicators.

If we start from the data published in the financial statements of business entities that are subject to Slovak legislation, and therefore also to the prescribed template for small and large accounting entities, it is important to have a sufficient amount of data so that machine learning is able to find possible deviations indicating material misstatements. If we decide to base the work on financial indicators, the procedure would require first calculating the financial indicators and then using machine learning to detect deviations that may represent manipulation.

In the case of the application of machine learning, it is also important to determine which of the reported data we consider critical and which are susceptible to material misstatements from the point of view of manipulation. Such data should be the best basis for machine

learning. In general, these are primarily estimated items such as provisions, allowances, etc. The given data are, of course, also the content of the financial statements according to the legislation in the conditions of the Slovak Republic.

3.4 Hypothesis verification

Based on the previous results, we approach the verification of the qualitative hypothesis:
H: Beneish M-score, Dechow F-score and machine learning are useful tools for detecting material misstatements in the financial statements of business entities in the conditions of the Slovak Republic.

We tried to fill the variables in the case of Beneish M-score and Dechow F-score as best as possible using items from the financial statement template for small and large accounting entities prescribed by Slovak legislation, namely the template corresponding to the balance sheet and the profit and loss statement. We encountered a problem with some variables, but if we took into account the notes as part of the financial statements when processing the data, all the variables could be filled. In the case of the application of machine learning, everything is already in the hands of a specific person who will work with the data, and thus it is possible to use this tool, either for reported data or for modified data using calculated financial indicators. We state that we managed to confirm the given qualitative hypothesis and Beneish M-score, Dechow F-score and machine learning are useful tools for detecting material misstatements in the financial statements of business entities in the conditions of the Slovak Republic.

4 Discussion

Our findings came to the conclusion that Beneish M-score, Dechow F-score and machine learning are also usable in the conditions of the Slovak Republic. These globally used methods, models and tools have already been used in several countries of the world and many authors have confirmed their correct application.

As a first example, we will present a study, the authors of which are Papik and Papikova (2020). Their study tested Beneish M-score model. The testing was carried out on a sample of 40 companies based in the USA at a periodicity of 10 years, and these were companies that corrected and republished their financial statements. In addition to testing the Beneish model, they also developed two new prediction models, the first based on linear discriminant analysis and the second based on logistic regression. As a result, these models revealed various deviations in the form of errors, or balance sheet fraud. These were misstatements in several reported items in the financial statements, for example cost of goods sold, short-term liabilities. The authors themselves consider the developed models to be widely applicable due to the easy interpretation of the results in the form of equations.

Research on financial statement fraud has also been conducted by Malaysian experts (Aghghaleh et al., 2016). In this case, the basis of the research was the financial statements from 2001 to 2014 of companies from Malaysia listed on the stock exchange. Existing models were used in the work to detect fraud, specifically the Beneish model, or Beneish M-score and Dechow F-score. This study compares the accuracy and error rates of these two models. Its results show that Dechow's model is better, and the authors recommend it to regulatory authorities for use in error and fraud detection.

Last but not least, there are also studies that use the most modern methods of artificial intelligence. One such method is machine learning. This method was used in a study that focuses on accounting fraud in US publicly traded companies (Bao et al., 2020). In their study, the authors were based on initial accounting figures. They also compared the results

with other models that are used to detect fraud in the financial statements. They found that machine learning has the best reporting ability compared to other models.

Some studies are based on primary information in the financial statements, while others use already calculated financial indicators. The studies contain results on errors in various items of the financial statements, therefore it is important to consider these items as risky and to focus on them when working in the conditions of the Slovak Republic. There is also a study that is focused on the agricultural, forestry and fishing sector of the Slovak Republic - its authors, based on the use of models, detected entities that were previously involved in the manipulation of the financial statements (Blazek et al., 2020). Even on the basis of the mentioned studies, it is more than likely that their application is also possible in the conditions of the Slovak Republic. The results of our article also confirm this statement.

5 Conclusions

It is very important that the financial statements of business entities in the conditions of the Slovak Republic, but also in the whole world, do not contain data that would lead to material misstatements. Therefore, as part of the purpose of our article, we stated that based on the analysis of individual existing methods, models and tools, we will determine their possible use for the information reported in the financial statements in the conditions of the Slovak Republic.

We managed to confirm the established qualitative hypothesis, and thus we confirmed that Beneish M-score, Dechow F-score and machine learning are useful tools for detecting material misstatements in the financial statements of business entities in the conditions of the Slovak Republic. However, we cannot forget certain limitations in the case of using existing tools. For example, in the case of Beneish M-score and Dechow F-score, a problem may arise when filling in some variables, as not all business entities are obliged to publish the data necessary for the calculation of financial indicators, especially with regard to the reporting of data in the notes. Therefore, it would be appropriate to create a prescribed template for reporting data in the notes to the financial statements, as is currently the case for the balance sheet and the profit and loss statement, which have a prescribed template under Slovak legislation. With machine learning, it is necessary to consider which reported data we consider critical and which data we will therefore subject to machine learning. However, these findings do not preclude the use of globally existing tools as they exist at this moment. It also does not rule out that it is possible to count on the possibility of modifying the existing instrument in the future so that it corresponds even better to the conditions of the Slovak Republic. It is also possible to consider creating own model based on further research and best practice findings.

Acknowledgements

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The role of sustainable business practices in developing environmental sustainability; An analysis of the serious concern of the contemporary business world

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Abstract

Research background: Sustainable business practices are those practices that allow companies to reduce their negative environmental impact while maintaining profits. In recent days, eco-friendly behaviour and environmental sustainability are serious matters of concern. The business world has the largest impact on the environment and that is the reason reputed organizations, and multiple small, and big companies are also leaning towards green business practices. However, the key problems towards adopting sustainable business practices are less financial support, awareness and basic concern among the business owners and their associates.

Purpose of the article: This research will shed light on the multiple aspects of sustainable or green business practices and how it become more fruitful to reshape environmental sustainability in the future days. The theoretical views of environmental sustainability are further elaborated with a critical review of previous academic research and demonstration of scientific stats.

Methods: This qualitative research method analysed the crucial theoretical views about sustainable business practices and their impressions on the environment. The secondary research with a strategic theme base analysis assisted to establish the relationship between green business practices and environmental suitability supported by valid and realistic data.

Findings & Value added: The adopted inductive reasoning enriched this research to draw a realistic conclusion on developing and implementing multiple sustainable business practices more efficiently and diminish its interrupting factors so that organizations can undertake more efficient ways to implement such practices. Sustainable businesses have introduced lean and green initiatives and recycling programmes which significantly contribute to environmental sustainability. Similarly, organizations can get benefited from the multiple aspects of such practices besides leaving contributions to the environment and society.

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JEL Classification: *A10; B50; I31*

1 Introduction

1.1 Research Background

The concept of sustainability in business delineates the practice of reducing the negative impact or enhancing the positive impact of a business on society, the environment and the community. Business sustainability reflects the responsibility of organisations to remain concerned about the environment and society besides the financial profits. However, sustainability is not limited to environmental concerns, as business sustainability is envisioned to satisfy the needs of the present generation and also create the scope for future generations to satisfy their needs (Soderstrom and Heinze, 2021). In the present age, companies focus on sustainability practices for profits and success as it helps them to create a higher position in the market and make consumers perceive the brands positively. In the first embodiment of business sustainability, there was a market shift where market pressure made the companies more attentive to sustainable practices (Hoffman, 2018).

Corporate social responsibility (CSR) was one of the strategies to connect sustainability with corporate strategy. Then the sustainability concept and practice evolved to market transformation when the focus shifted to incorporating the KPIs of the planet such as climate change. Considering this KPI, companies can reduce carbon emissions and also take the initiative to reduce other negative impacts of business on the environment. In the present society, awareness among people has increased regarding the necessity of actions which can help businesses and entrepreneurs to prosper along with maintaining environmental sustainability (Tur-Porcar et al., 2018). The actions which lead to organisational sustainability include environmental and business factors, as well as behavioural and human relations factors. Individual values and ethics are also significant for driving organisations towards sustainability. The latest trends in online consumer behaviour after the emergence of the Covid-19 pandemic and importance has been given to e-commerce or e-business. The sustainability of e-commerce practices revolves around three dimensions- environment, economy and society, and all these three dimensions of sustainability have become areas of concern for e-commerce sustainability. As stated by Paștiu et al. (2020), previous studies have emphasised that the environmental dimension of e-commerce sustainability is the most uncertain one among the other sustainability dimensions as e-commerce possesses both benefits and drawbacks for environmental sustainability.

Some e-commerce companies use proper sustainability measures for delivering products to customers, and the transportation of customers to buy products is also get reduced, but the shipments of products increase transportation and also the material packaging of some companies poses negative effects on the environment. Some companies around the world have taken green initiatives concerning climate change such as plastic waste recycling which acts as a solution to plastic pollution. The chemical structure of most plastics resists the process of degradation and it leads to plastic pollution. It has been stated by Anabaraonye et al. (2022) that plastic recycling is a benefit to the environment and also for businesses as it can be cost-beneficial for the national economy, and can contribute to an increase in the nation's GDP (Gross Domestic Product). In many countries, the government has become concerned about the environmental issues caused by business practices, and laws have been

created so that companies can conduct their business practices by complying with the laws and ethics. The present research is envisioned to get a clear picture of the contribution of business sustainability to environmental sustainability as companies all over the world are becoming more aware of the environmental dimension of sustainability and it has become a serious concern in the modern business world.

1.2 Research aim and objectives

The present study aims to analyse the role played by sustainable business practices in developing environmental sustainability. To achieve the aim, it is crucial 1) to interpret the significance of sustainability in business functions and practices, 2) to identify effective sustainable business practices implemented by organisations in recent times, 3) to analyse the contribution of sustainable business practices to the environment, 4) to identify major issues in conducting sustainable business practices and their possible solutions.

1.3 Research Questions

The research questions of the present study are:
1. Why sustainability in business functions and practices are significant?
2. What are the sustainable business practices organisations implement in recent times?
3. How do sustainable business practices contribute to the environment?
4. What are the major issues in conducting sustainable business practices?

1.4 Research problem

In the present modern world, people are increasingly aware of carbon credits, global warming and other environmental issues. On the other hand, mass consumption, mass production and mass marketing contribute to a negative impact on the environment, and this is the reason for companies to pay attention to creating new ways of addressing this public concern (Zhang and Chabay, 2020). However, the major problem in implementing green business practices include a lack of financial resources as well as a lack of awareness and concern among business owners and their associates. Therefore, large companies and SMEs should be made aware and learn about the basic strategies to lean towards green business practices and consequently develop environmental sustainability.

1.5 Research significance

In today's world, environmental, social and economic sustainability has received immense concern from the business world. Organizations have taken initiative to progress in sustainability using effective measures which can reduce the negative impact of business. Environmental sustainability is a serious matter of concern in the present world. The present study sheds light on the role played by sustainable business practices which the business sectors to develop environmental sustainability. This study is significant for making people aware of the necessity of sustainability in business and also the strategies which can help company owners and their associates to focus on environmental sustainability while operating their businesses. This paper emphasizes various aspects of sustainable business practices which have practical implications in the business world and the potential to include valuable information in the existing literature to expand knowledge in this research area.

2 Methods

2.1 Research Philosophy

Research philosophy depicts the beliefs based on which research is implemented. The philosophical approach of the present study is Interpretivism. This philosophy possesses the idea that reality is socially constructed and thus, is subjective. Interpretivism considers subjective views and human experiences to interpret reality, and thus, it is suitable for conducting qualitative research. Interpretivism assumes humans and physical phenomena are different and thus, the variables in social science research are treated differently from natural sciences. The differences in culture, times and situations are considered in social realities which provides rich insight into the research area (Alharahsheh and Pius, 2020). In the present study, the interpretivism philosophy is suitable to be applied for collecting qualitative data on sustainable business practices and their influence on environmental sustainability. However, this philosophy might create the scope of biases in data and also make it difficult to generalise the data. The collected data is difficult to generalise using interpretivism philosophy as it would contain specific viewpoints and value which varies from person to person. Therefore, secondary data have been collected and verified with reliable data sources for reducing biases, and also to leverage the application of interpretivism in this study.

2.2 Research Strategy

Research strategy directs the research towards its accomplishment through a plan of answering the research questions. In the present study, a qualitative research approach had been adopted for equipping the study with rich subjective data that provide theoretical information about sustainable business practices and their contribution to environmental sustainability. This research method is flexible for analysing hazards by shedding light on details and rich insights (Cantelmi et al., 2021). The qualitative research strategy has helped the study to conduct broad discussion and analysis on various aspects of sustainable business. Though the qualitative research strategy does not provide the scope of representing data statistically, this strategy is suitable to conduct an interpretation of sustainable business practices and their relation to environmental sustainability. Through the qualitative strategy, the research has collected mostly subjective or non-numeric data that provided meaningful and detailed information about the role of business sustainability in environmental sustainability.

2.3 Data collection method

The data collection process has been conducted with the help of a secondary data collection method. It has informed the study with findings of previously conducted studies on this research area. The data collection tools used in this study include recent and peer-reviewed journal articles. The secondary data collection has assisted the research to be accomplished within the available budget and time; and also reduced ethical issues. This method has benefitted the research process as a large amount of data could be accessed feasibly and the insights of different researchers also have been attained. However, this method derives pre-existing data on sustainable business practices and their role in environmental sustainability, therefore any unique data has not been accessed through this method of data collection.

2.4 Search strategy

Research has been conducted using the secondary data collection method. The main focus was given on the journal articles which belong to the Q1 and Q2 quartile, web of science database and lie within the range of last 4 years. The credibility of the secondary sources has been analysed using the CRAAP analysis method which provided insight into the suitability of the sources for the present study. The articles which are found to be less credible, less reliable and outdated have been excluded from the data collection process. Google Scholar has been a useful platform for accessing recent and reliable journal articles. The articles have been searched using relatable keywords such as green business, business sustainability, environmental sustainability, sustainable business practices and green packaging.

2.5 Data analysis method

Data analysis has been conducted to generate meaningful information from the raw data. Secondary data analysis has been conducted in this study for deriving contexts and meanings from the secondary data on the present research topic. The tool used for secondary data analysis in this study is thematic analysis, which enabled the research to present the results in certain themes. The thematic analysis is an effective tool to analyse qualitative data in a simple process which does not require technical knowledge or detailed information about related qualitative approaches. This method also helped to identify patterns in the raw data and emphasise the valuable information obtained through the research.

2.6 Ethical consideration

The present study has been conducted with ethical considerations to enhance the integrity and reliability of the research. The present research has not involved any human subjects and primary data has not been collected which reduced the ethical issues. The sources of information that is the peer-reviewed journal articles used in this study have been duly acknowledged using proper rules of citation and referencing. Duplication of data or data falsification has not been committed in this study. The security of data has been maintained to reduce the issues related to data sharing or compiling. Hence, the collected data has been retained in a safe and secure place with proper security measures so that the risks of data theft could be minimised.

3 Results

The secondary data analysis conducted in the present study has taken place through thematic analysis. Some themes have been constructed based on the research objectives which are presented in the following sub-sections.

3.1 Significance of business sustainability in the recent times

Business sustainability has become an important concept and function in the modern business world due to the increased concern of companies as well as consumers regarding the environment, economy and society. Several companies have become envisioned reducing the negative impact of their business practices on the environment and society, but there is still a lack of proper knowledge and resources for the successful implementation of sustainable business. Sustainable business practices benefit organisations and consumers also prefer

sustainable practices of companies; thus, business sustainability has become a very significant concern in the business world.

3.1.1 Benefits of sustainable approaches for firms

The sustainable business approaches bring about several benefits for the firms, which made sustainability an important concept in the business world. The study by Alkaabi, H. and Nobanee, H., (2019) shows that the efforts of firms toward business sustainability have several positive sides which benefit the society, environment and economy such as reduction in carbon footprint, elevating a shared value among industries, improving financial performance as well as relationships with various stakeholders and ensuring protected environment from harmful business practices. Over the past years, the awareness and knowledge about business sustainability have increased through the contribution of research studies. Previous studies have also shown that the firms which have developed sustainability approaches have attained higher profitability than the firms which have not concentrated on sustainability. The economy is one element of business sustainability, but it is essential to focus on the other two elements which are the environment and society. Soderstrom and Heinze (2021) highlighted the paradox which is related to business sustainability as the latter focuses on the triple bottom line. The paradoxical thinking of entrepreneurs in the recent world helps their businesses to creatively manage business sustainability and solve the associated issues and complexities using innovative models.

3.1.2 Consumer awareness and preferences toward sustainable business practices

In the present world, most businesses have turned customer-centric and prioritise customer preferences the most. The increased awareness among consumers about the environmental issues caused by business operations has made consumers prefer eco-friendly products and services. This is also a major factor which contributed to the significance of business sustainability in the contemporary world. The data published by Statista (2022) showed that 80% of UK consumers prefer sustainable packaging of products because it is environmental-friendly (Figure 1).
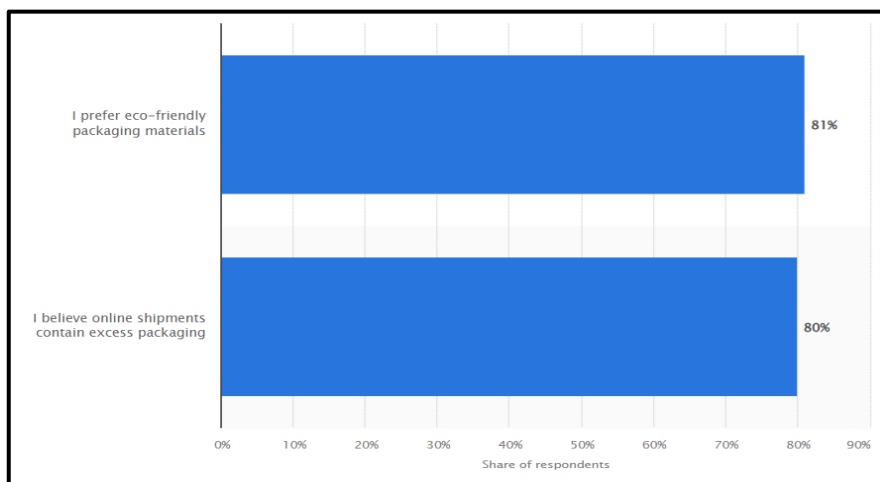
Figure 1: Consumer preferences toward sustainable packaging in the UK

Source: Statista (2022)

Producing eco-friendly packages for products, especially in e-commerce where proper packaging is mandatory for the safe shipment of products, is crucial for meeting the preferences of the majority of consumers. This helps in elevating brand image and maintaining a positive relationship with consumers. Green packaging has become a crucial strategy for business sustainability in recent years due to the increased concern about environmental protection and human health (Wandosell et al., 2021). The eco-design innovation has got importance in the packaging process as it can help organisations to achieve sustainable business goals. Sustainable packaging has also an important role in circular economy and waste management; therefore, consumer preferences for sustainable packages are considered to be important for businesses which drive them towards innovation and sustainable approaches.

3.2 Effective sustainable business practices in the contemporary world

In the present era, various organisations have implemented sustainable business practices. It has increased the efficiency of the business and helped the organisation to develop its performance. It enhances the relationship with the customers. Moreover, it also facilitates economic development and contributes to the success of the organisation in this competitive environment.

3.2.1 Sustainable business practice and CRM

According to Gil-Gomez et al. (2020), sustainable business models are essential for dynamic and modern business. It also facilitates customer relationship management (CRM) and provides technical solutions to the organisation. It can provide green IT to the organisation, which is essential for digital transformation as well as sustainable development. From several dimensions such as environmental, economic and social. CRM helps to gather knowledge about the customer, which can lead to successful survival, and growth, which can increase the efficiency of the organisation and leads to sustainable competitive advantages. Understanding the customers also reduces the unnecessary waste of resources. It affects the financial as well as non-financial aspects of the organisation (Alqudah et al., 2021). Sustainable business practices often attract more customers. It enhances the performance of the company in this contemporary business environment. Hence, sustainable practice and CRM are both associated with the success of the business.

3.2.2 Sustainable business and economic development

Sustainable business practice also leads to economic development in the contemporary world. It increases sustainable circular products. The importance of a circular economy has been enhanced through sustainable business practices. As quoted by Agrawal et al. (2021), a circular economy ensures the recycling of material and enhances resource efficiency. Industry 4.0 evolutions have enhanced the necessity for more sustainable development as well as a circular economy. The circular economy has helped to adopt various strategies that can narrow the resource loop, which leads to the economic development of the organisation. On the other hand, sustainable business facilitates economic development through enhancing corporate social responsibility (CSR). A study by Muhmad and Muhamad (2021) has revealed that since the companies have adopted sustainable development practices, they have focused more on maintaining CSR. They have adopted several programmes related to people, the environment and the planet. The study has found that there is a positive relationship between sustainability practices and the financial performance of the organisation. It leads to

the economic development of the organisation and helps it to be a success in the contemporary business environment.

3.3 Contribution of business sustainability to the development of environmental sustainability

Sustainable business practices significantly contribute to the sustainable development of the environment. These business strategies include waste management, green practices as well as recycling programmes. These strategies can reduce the production of waste products and also enhance the value of the organisation. The contribution of these practices is as follows:

3.3.1 Lean & green thinking

According to Caldera et al. (2019), several businesses have focused on adopting sustainable business practices because the majority of the organisation have a significant responsibility to address waste pollution. Therefore, they have aligned their business strategies with sustainable practices to prevent waste pollution through adopting lean and green practices. This uses one or more tools to control several waste sources such as overproduction, transportation, waste of raw material and many more. These lean and green practices increase the sustainability of the environment. Another study by Fernando et al., (2019) also revealed that eco-innovation has an effective relationship between environmental innovation and sustainable business performance. Moreover, it also has a significant impact on enhancing the value of the organisation. Therefore, it leads to a positive outcome for the environment and also enhances the economic performance of the organisation.
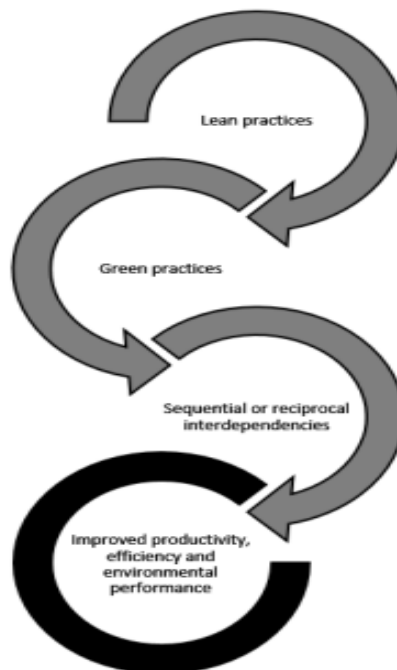
Figure 2: Relationship between lean and green practice and environmental sustainability

Source: Caldera et al. (2019)

3.3.2 Developing recycling programmes

Another important aspect of sustainable business to maintain environmental sustainability is to develop recycling programmes. It reduced several kinds of pollution. As suggested by Barbieri and Santos (2022), eco-innovation has enabled circular strategies. These strategies have been combined with the sustainable strategies in the organisation is beneficial for the business as well as the organisation. Recycling is one of the circular strategies that extend the life cycle of the resources through several actions such as reuse, recycling, remanufacturing and many more. Besides preserving the resources, it also reduced the generation of waste products. Therefore, it increases the sustainability of the environment. Another study by Eslami et al. (2019), on the manufacturing industry, suggests that sustainable manufacturing business focuses on creating all recyclable products. It protects the environment by reducing energy as well as water consumption. Hence, it leads to environmental protection.

3.4 Issues in implementing sustainable business practices

Business sustainability is associated with major benefits for firms, the environment, society and the economy, but there are various issues and barriers which companies and various stakeholders face while implementing and being involved in sustainable business practices. The conflict between economic, environmental and social dimensions of business sustainability creates issues for entrepreneurs during the implementation of sustainable business practices because a solution can be advantageous for one dimension but disadvantageous for the other; therefore, addressing multiple goals can be difficult for entrepreneurs due to the conflicting demands and requirements for the three dimensions of sustainability (Soderstrom and Heinze, 2021). Sustainable business practices implementation can become more complicated if the focus is given to profit maximising for increasing shareholder value (Bocken and Geradts, 2020). Some major issues are experienced by various network actors such as suppliers, implementers, consumers and other partners who are involved with a sustainable business. The issues which get created among different network actors during sustainable business practices implementation can be categorised into economic issues, structural issues, behavioural issues and psychological issues.

The economic issues occur for the companies, suppliers and customers as well when sustainable business practices are implemented. The investments of firms increase due to the high cost of sustainable technologies, production equipment and innovative production processes. Due to increased costs of production, the product prices also increase which affects the customers. The structural issues include the increased concentration on governance and coordination. For implementing sustainable business practices, the levels of monitoring and controlling have to be increased for managing the networks. Moreover, some businesses believe that sustainable business practices increased dependence on suppliers. The structural issues are experienced by the implementers, suppliers and other network partners (Tura et al., 2019). The behavioural issues include the reluctance of employees to adapt to the change brought into the workplace for implementing sustainable business practices. The maintenance needs also increase for meeting customer needs through sustainable practices along with the need to maintain communication among various network actors. The psychological tensions among the firms and suppliers occur due to the uncertainty in financial profits, technological risks, data security issues, and uncertainty in political decisions and regulations. The uncertainty related to sustainable business practices is caused due to the difficulty in accurately anticipating returns on investments. In some circumstances, the codes of conduct of suppliers and implementers regarding sustainability might not match and it can

create pressure on the suppliers to accept the sustainability principles of implementers (Tura et al., 2019).

4 Discussion

In this chapter, the research findings and results have been discussed to explore the proper meanings and context that help to achieve the research objectives. After the discussion section, a conclusion has been drawn along with delineating the future scope of research and the implications of the present study.

4.1 Discussion

4.1.1 Sustainable business practices and their significance

In this study, the importance of business sustainability and effective sustainable business practices have been explored in sections 3.1 and 3.2. The findings have suggested that sustainable business practices are important for businesses to improve financial performance, gain competitive advantages, and also meet customer preferences. Sustainable business practices help to protect the environment and society from harmful substances which are released into the environment due to business operations. The findings have also shown that sustainable businesses can acquire higher profitability than non-sustainable businesses. It is important to focus on innovation for implementing sustainable business practices and sustainability encompasses three dimensions which are economy, environment and society, therefore; paradoxical thinking of entrepreneurs and also other business owners are crucial for the successful implementation of sustainable business practices. It has also been found in section 3.1.2 that customer preferences towards eco-friendly behaviour of businesses have increased in recent times and the statistics have shown that the majority of customers prefer eco-friendly packaging in the UK which makes companies concerned with the implementation of sustainability so that customers can be attracted and retained in the competitive market. Thus, sustainable business practices are significant for businesses to implement so that environment can be protected, people can be satisfied and protected as well, and the financial performance of firms can also be elevated. Effective sustainable business practices are also significantly associated with customer relationship management. It has been found in section 3.2.1 that green IT can help sustainable development and digital transformation. CRM helps companies to gain sustainable competitive advantages and get customer insights which can help to reduce unnecessary waste in packaging and other resources. Sustainable business practices help firms to attract more customers. These approaches also increase corporate social responsibility which enables the firms to boost financial performance.

4.1.2 Sustainable business practices and environmental sustainability

The present study has explored the contribution of sustainable business practices to environmental sustainability. In section 3.3, it has been found that sustainable business practices such as lean and green initiatives and recycling programmes. The lean and green initiatives have emerged as sustainable initiatives of firms especially the manufacturing sector to reduce wasting resources and overproduction, and also to control other waste sources so that the negative impact of manufacturing on the environment in the form of pollution, can be reduced significantly. Eco-innovation has become an important concept for

organisations to improve sustainable business practices as it increases the value of the business in the market. The recycling programmes of the green business show an important eco-friendly behaviour which promotes the reuse and recycling of waste materials to reduce pollutants. In this way, environmental sustainability is increased by sustainable business practices.

4.1.3 Issues related to sustainable business practices

In section 3.4, it has been found that sustainable business practices can cause some issues to the implementers, suppliers and customers as well. Financial problems can arise for the companies who implement sustainable business practices as they require high investment in sustainable technology, equipment and processes. Due to this factor, the product prices can also increase which is an issue for the customers to afford such products. The structural issues are mainly experienced by implementers and suppliers which involves the increase in monitoring and control so that all the networks can be managed effectively. Behavioural issues are prevalent in companies due to the reluctance of employees to adapt to new working processes, technology and policies. This reluctance can be due to a lack of knowledge and skills or a lack of motivation to adopt sustainable business practices. The psychological tensions are caused due to uncertainty, financial risks, data security issues and technological risks. These tensions are experienced by firms because new technologies are adopted and a large amount of data are managed which requires proper data security measures so that data loss or theft can be avoided. These issues associated with sustainable business practices can be reduced if all the network actors cooperate and coordinate properly for the implementation of sustainable practices so that the environment can be protected from harmful business practices.

5 Conclusion

It can be concluded that business sustainability is important and beneficial for firms, consumers, the economy, the environment and the entire society as sustainable practices reduce the harmful effects of business on the environment such as reduction of carbon emission, recycling programs and eco-friendly packaging systems which helps the businesses to reduce environment pollution. The present study has achieved its objectives through secondary data analysis and adopting a qualitative research method. Sustainable business practices are helpful for companies to reduce the negative effects of business practices on the environment which also contributes to the corporate social responsibility of the companies. The environment and society get benefitted from sustainable business practices. Consumer preferences in the United Kingdom have also shifted to eco-friendly practices of firms such as eco-friendly packaging in e-commerce. Sustainability is positively associated with the circular economy and financial performance of firms which can encourage entrepreneurs and other businesses to adopt sustainable practices. The lean and green initiatives and recycling programmes have a significant contribution to environmental sustainability as these practices reduce waste of raw materials and overproduction, and also enable the firms to recycle the products and packages after their usage so that harmful substances are not released into the environment. In this way, sustainable business practices contribute to the protection and preservation of the environment.

The present study can be adopted by future researchers as a groundwork to further expand the knowledge on the present research topic. This study has explored sustainable business practices and their contribution to environmental sustainability using secondary and qualitative methods; thus, future research can take place to explore the quantifiable data and

primary data that can provide more insights on this research topic. It can be recommended to the firms that the issues related to the implementation of sustainable business practices can be reduced if the proper measures are taken by the management. The involvement of all the functions and network actors can bring more feasibility to the implementation of sustainable business practices. Sustainability can also be achieved with proper implementation of training and development in the workplace and also for the suppliers. Instead of dictatorial strategies, inclusive and collaborative strategies can work more effectively for reducing the gap in sustainability criteria between implementers.

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Neoteric insight on the multidimensional performance evaluation in public hospitals from the aspect of their structure after Covid-19 pandemic era

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Abstract

Research background: The healthcare quality issue and its assessment is actually discussed more than ever. Pandemic situation of COVID-19 revealed the importance of a sufficient material and physical resources equipment in the public hospitals, which are exhausted regarding to everyday new COVID-19 cases. In connection with the requirement imposed on healthcare providers to deliver an integrated care, a need to measure a quality by a multidimensional approach arises. Purpose of the article: The purpose of the presented study was to analyse multidimensional performance evaluation of public hospitals from the aspect of their structure, within the importance of the disposable resources impact on the overall performance was investigated.

Methods: The research was based on secondary data obtained by the Institute for economic and social reforms (INEKO) among the 66 public hospitals in Slovak republic. Out of the whole set of currently monitored and evaluated performance indicators in the Slovak republic, the nine structural quality indicators were identified as factors with a potential impact on the overall performance of public hospitals. The processed data were analysed by the use of Shapiro-Wilk test, Spearman test and Wilcoxon test.

Findings & Value added: From the structure point of view, it was found that the overall performance of public hospitals is primarily related to the patients' complexity of diagnoses - Case Mix Index, which expresses the ratio of the average costs per hospitalization case. The study also revealed that the overall performance and quality of provided healthcare does not depend solely on the structures' dimension and its disposable resources, but on the efficient management of structure, processes and outcome matrix.

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1 Introduction

Every organizational improvement process needs appropriate measures. In fact, what is considered to be of relevance to be measured, deserves attention and allows to focus efforts to obtain an improvement. Measures, therefore, play a fundamental role in every organization because they are able to give the dimension, pace and direction of the expected change. The level of quality of the structure in hospitals is measured and expressed by structural quality indicators, which are used to assess the setting of care, such as the adequacy of facilities and equipment, staffing ratios, qualifications of medical staff and administrative structures (Quentin et al., 2019). According to the WHO (2022), the quality of provided healthcare is defined as the highest achievable level of professionalism, with efficient use of resources, with minimal risk for the patient, resulting in a positive effect on health. Ramirez et al. (2019) stated that the healthcare system aligns the available or required resources to produce the key notions of utilization, access, productivity, efficiency, and effectiveness, which interact to shape the organization's performance. Performance, meanwhile, depends on the competent actions of healthcare managers and other available resources in the organization. The OECD (2017) in their report shed a new light on the relationship between quality and performance in healthcare. They emphasized that the quality of provided healthcare can be considered as one of the components of the health care performance, expressed through measured quality indicators. Generally, the quality of healthcare provided by hospitals can be assessed through three dimensions – structure, process and outcome (Donabedian, 1988). The main elements of the structure dimension represent these resources: physical, materials, technology and finance.

Based on the mentioned above, it can be assumed that there is a close relationship between quality and performance. In this context, out of the whole set of performance indicators (actually monitored and evaluated in the Slovak republic) 9 structural quality indicators were identified as factors with a potential impact on the quality of health care provided. One of the main issues in the field of performance evaluation in healthcare is, that there is no common methodology for evaluating the quality and performance of healthcare facilities. Performance measurement is largely recognised as a key tool for quality improvement. Several previous studies suggested multidimensional assessment of the quality of provided healthcare from the aspect of the hospitals' structure, processes and outcomes (Donabedian,1988; Mainz,2003; Kringos et al., 2010; Hung & Jerng, 2015; Lorini et al., 2018), while a large number of these studies were focused mainly on the investigation of the caused-and-effect relationship between processes and outcomes. OECD research (2019) proves, that countries which spends more on healthcare and have more resources (finances, material, physical resources etc.) in their structure, provide more accessible and better quality of care to their citizens. This paper is concerned with the impact of public hospitals' resources on their overall performance.

2 Methods

In this study, we conducted a research focused on the importance of the impact of structure dimension in public hospitals (expressed through current evaluated structural quality indicators) on the level of their overall performance related to the quality of provided

healthcare. Secondary data obtained from the Institute for economic and social reforms (INEKO), which annually evaluates the overall quality of provided healthcare in the public hospitals through its own multidimensional performance model, were used for the analysis and computation. The structure and its' level of the disposable resources in 66 public hospitals were expressed through the variables of nine structural quality indicators and the overall performance was evaluated on the basis of achieved rank position in overall public hospitals ranking in the Slovak republic. The data were collected by INEKO in 2020.

Assessed structural quality indicators in this research were divided into three categories in the terms of evaluated phenomenon:

1. Material and technical equipment of the hospital:
   a) Number of beds
   b) Computed Tomography (CT)
   c) Magnetic Resonance Imaging (MRI)
2. Financial resources:
   a) Profit after taxes
   b) Net revenues
   c) Regional standard of living
3. Physical resources:
   a) Number of patients per 1 physician
   b) Number of patients per 1 nurse
   c) Complexity of patients diagnoses (Case-Mix Index)

In terms of material equipment, the number of beds is an important indicator of every single hospital and it indicates size of the hospital. With regard to technical equipment, the exclusive ownership of devices such as "computed tomography (CT)" and "magnetic resonance imaging (MRI)" have been taken into account, which have a significant impact on the quality of provided healthcare.The ownership of these facilities in Slovakia is mostly private, which causes an unnecessary outflow of finances from the public health sector. Exclusive ownership of these facilities by public hospitals increases their net revenues and saves patient waiting time, which in turn leads to increased patient satisfaction with the provided healthcare. Based on the relationships outlined above, the following research hypotheses have been formulated:

- H1a) There is a statistically significant relationship between the overall performance of the public hospital and the number of beds.
- H1b) There is a statistically significant relationship between the overall performance of the public hospital and the exclusive ownership of Computed Tomography (CT).
- H1c) There is a statistically significant relationship between the overall performance of the public hospital and the exclusive ownership of Magnetic Resonance Imaging (MRI).

Current multidimensional performance evaluation model assesses also financial condition of the public hospitals through structural quality indicators "Profit after taxes" and "Net revenues". The relationship between the "Regional standard of living" and the overall performance was assumed on the basis of the different amount of the average salary in the individual regions and the related different standard of living. This assumption was based on the health statistics findings of the National health information centre (2020), that Slovak citizens with permanent residence in the regions with a lower average wage have a lower standard of living and are therefore more prone to more frequent use of public healthcare (expressed by the "Number of hospitalizations by patients' territory of permanent residence" indicator). On the basis of this assumption, our research sample of public hospitals was divide into the eight groups, according to their region affiliation. Research hypotheses determining mentioned relationships have been formulated as follows:

- H2a) There is a statistically significant relationship between the assessment of the overall performance of the hospital and its Profit after taxes.
- H2b) There is a statistically significant relationship between the overall performance of the hospital and its Net revenues.
- H2c) There is a statistically significant relationship between the overall performance of the hospital and the regional standard of living.

The area of physical resources must also be taken into account when assessing the level of overall performance. The OECD research (in 2019) which was focused on identifying the relationship between governance spending on health and number of healthcare workers revealed that there is a weak positive association between spending on health and number of physicians, but the opposite phenomenon can be observed in the case of nurses. Solely 16 countries from 36 OECD countries spent more than the OECD average and have higher number of nurses per 1 000 people. The shortage of medical staff remains a serious problem in majority of countries. Such divergences between countries may also reflect differences in remuneration levels, staff composition and the prominence given to nurse practitioners and other health professionals (as compared with physicians). Within this area, we consider the number of healthcare workers (physicians and nurses) in the hospital to be important, which is one of the key determinants of the quality of health care provided. In our analysis, we therefore took into account the ratio of "number of patients per 1 physician" and "number of patients per 1 nurse".

The field of physical resources does not include only healthcare workers but also patients, so it is important to examine whether the complexity of their diagnoses (expressed by the "Case-Mix Index") significantly affects the overall performance of the hospital. The Case Mix Index (CMI) is the average relative DRG weight of a hospital's inpatient discharges, weight for each discharge and dividing the total by the number of discharges. If a hospital has a CMI higher than 1.00, its adjusted cost per patient or per day will be lower and conversely if a hospital has a CMI less than 1.00, its adjusted cost will be higher. The CMI reflects the diversity, clinical complexity, and resource needs of all the patients in the hospital. A higher CMI indicates a more complex and resource-intensive case load. Some publications assign the complexity of patient diagnoses to the dimension of processes, but we consider the patient as a carrier of the diagnosis, which stimulates the creation of a structural dimension and has a direct effect on the overall quality of provided healthcare.

- H3a) There is a statistically significant relationship between the overall performance of the hospital and their Number of patients per 1 physician.
- H3b) There is a statistically significant relationship between the overall performance of the hospital and their Number of patients per 1 nurse.
- H3c) There is a statistically significant relationship between the overall performance of the hospital and CMI index.

The data were processed in Microsoft Excel and R – version 3.6.1

3 Results

Prior to testing the hypotheses, we verified the statistical distribution of the variables (i.e., overall relative performance and all continuous structural quality indicators) using the Shapiro-Wilk test. The results of the normality test shows Table 1, where W represents the value of the Shapiro-Wilk criterion.

The presence of a normal distribution was not confirmed in any examined variable. For this reason, in the case of continuous variables we proceeded to the use of non-parametric tests - the calculation of the Spearman correlation coefficient. In the case of categorical variables, which require a comparison of two groups, the Wilcoxon signed-rank test was

used. When comparing more than two groups, e.g. differences in the overall hospital performance between regions, was used a non-parametric alternative to analysis of variance - the Kruskal-Wallis test.

Table 1. Results of testing the normality of structural quality indicators

Variables / KPI	Results			
	W	p-value	sign.	normality
Overall performance	0.80697	< 0.001	***	not present
Number of beds	0.71683	< 0.001	***	not present
Number of patients per 1 physician	0.8016	< 0.001	***	not present
Number of patients per 1 nurse	0.9122	< 0.05	*	not present
Case-Mix Index (CMI)	0.72714	< 0.001	***	not present
Profit after taxes	0.35263	< 0.001	***	not present
Net revenues	0.6516	< 0.001	***	not present

Source: Skerhakova, Tirpak & Ali Taha (2022)

H1a) Spearman's correlation test found no significant relationship between the number of beds and the overall performance of hospitals. The H1a hypothesis was rejected.

Table 2. Results of the H1a testing

	S	ρ	p
Spearman's rank correlation coefficient	55405	-0,16	> 0.05

Source: Skerhakova, Tirpak & Ali Taha (2022)

H1b) The non-parametric median Wilcoxon signed rank test did not confirm a different level of the overall performance between hospitals that own and do not exclusively own a computed tomography (CT) device. We rejected the H1b hypothesis.

Table 3. Results of the H1b testing

	W	p
Wilcoxon signed rank test	443.5	> 0.05

Source: Skerhakova, Tirpak & Ali Taha (2022)

H1c) The non-parametric median Wilcoxon signed rank test did not reveal a different level of performance between hospitals, which own or do not own a Magnetic Resonance Imaging device. On the base of this result, the H1c hypothesis was rejected.

Table 4. Results of the H1b testing

	W	p
Wilcoxon signed rank test	528	> 0.05

Source: Skerhakova, Tirpak & Ali Taha (2022)

On the basis of these results, we can state that there is no direct statistically significant relationship between the material and technical equipment of the hospital and their overall performance.

H2a) Spearman's correlation test did not reveal any significant relationship between Profit after tax and the performance of public hospitals. Therefore, the H2a hypothesis was rejected.

Table 5. Results of the H2a testing

	S	ρ	p
Spearman's rank correlation coefficient	48192	-0.005	> 0.05

Source: Skerhakova, Tirpak & Ali Taha (2022)

H2b) On the basis of Spearman's correlation test we could not observe any significant relationship between Net revenues and the overall performance of public hospitals. The H2a hypothesis was rejected on the basis of disproved cause-and-effect relationship.

Table 6. Results of the H2b testing

	S	ρ	p
Spearman's rank correlation coefficient	49662	-0.03	> 0.05

Source: Skerhakova, Tirpak & Ali Taha (2022)

H2c) The non-parametric Kruskal-Wallis test did not reveal any significant relationship between the overall performance of public hospital and the regional standard of living. In other words, there is no difference in the level of quality of provided healthcare in public hospitals performance depending on the region. Given the above, the H2c hypothesis was rejected.

Table 7. Results of the H2c testing

	Chi-square $\chi2$	df	p
Kruskal-Wallis test	10.1	7	> 0.05

Source: Skerhakova, Tirpak & Ali Taha (2022)

H3a) Spearman's correlation test did not reveal any significant relationship between Number of patients per 1 physician and the overall ranked performance of public hospitals. On the basis of this result, the H3a hypothesis was rejected.

Table 8. Results of the H3a testing

	S	ρ	p
Spearman's rank correlation coefficient	20344	-0.10	> 0.05

Source: Skerhakova, Tirpak & Ali Taha (2022)

H3b) On the basis of Spearman's correlation test we could not observe any significant relationship between Number of patients per 1 nurse and the performance of hospital. Therefore, the H3b hypothesis was rejected.

Table 9. Results of the H3b testing

	S	ρ	p
Spearman's rank correlation coefficient	19914	-0.08	> 0.05

Source: Skerhakova, Tirpak & Ali Taha (2022)

H3c) Finally, Spearman's correlation test confirmed a significant inversely proportional relationship between the complexity of patients diagnoses (CMI) and the overall ranked performance of public hospitals. According to this result, we therefore accept hypothesis H7a.

Table 10. Results of the H3c testing

	S	ρ	p
Spearman's rank correlation coefficient	44882	-0.34	> 0.001

Source: Skerhakova, Tirpak & Ali Taha (2022)

The relationship between overall performance and the factor assessing complexity of hospitalized patients diagnoses (Case-Mix index) is apparently the only one significant indicator from the group of all examined structural quality indicators. This relationship is inversely proportional what indicates that the more demanding diagnoses are treated in the hospital, the lower is the level of its overall performance what is connected also to reduced quality of provided healthcare. The current situation in health care sector due to COVID-19 pandemic is clear evidence of the validity of this relationship.
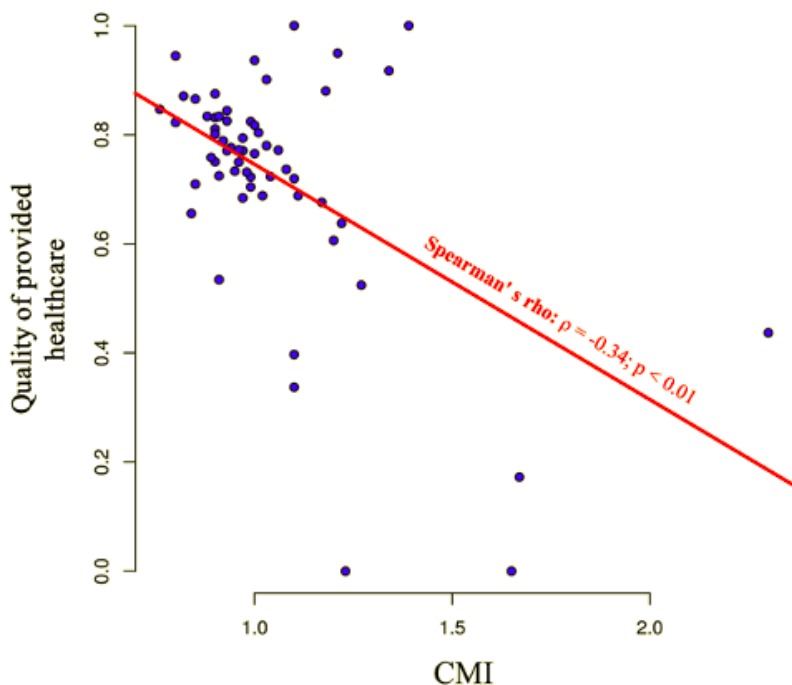
Figure 1. Relationship between the overall performance of public hospital and complexity of patients diagnosis (CMI)

Source: Skerhakova, Tirpak & Ali Taha (2022)

4 Discussion and Conclusion

Through the verification of stated hypotheses, this research was focused on investigation, whether the individual resources have an impact on the overall performance in examined public hospitals. Ramirez et al. (2019) in their study emphasized that the quality of human resources management in hospitals affects the quality of healthcare provided more than their availability. Our results showed, there is no significant relationship between overall performance of public hospitals and the physical resources. However, this statement has its

limitations and appears to be valid solely under normal conditions, certainly not in exceptional circumstances, such as the current pandemic situation related to COVID-19. Collings et al. (2021) highlighted the central role that HR is playing driving operational and strategic success during the COVID- 19 pandemic. The pandemic hit health systems hard and fully exposed the unpreparedness of healthcare sectors around the world, in which the shortage of doctors and nurses was one of the major problems. The study of Michele and Ecarnot (2020) also showed that in many European countries (Croatia, Estonia, Hungary, Latvia, Poland, Romania, Slovakia) the number of medical staff is low and insufficient. Economic and political developments in individual regions of Europe is usually monitored at the macroeconomic level and have unequivocally signed on the fundamental differences in the real tax burden on labour, investment return, or double taxation, are a reality in the Union and all these affect the free movement of labour (Korecko et al., 2019). All of these countries are suffering from an outflow of talented healthcare workers to more developed countries, mainly due to better financial remuneration. Low wages are a serious problem since there is a proven significant relationship between the financial remuneration and benefits system and the performance of talented employees (Coculova et al., 2020). According to Aslan and Morsunbul (2018) the effectiveness of a healthcare workers job performance depends on most of all on their engagement with the working process. To have a high motivation at work and better living standards, work-life balance is an important determinate. Also, the perceived organizational purpose is positively associated with employees' job-related and general wellbeing (Jasinenko & Steuber, 2022).

The relationships between overall performance and financial resources expressed through financial indicators did not prove as significant. OECD (2019) study emphasised importance of sufficient health care resources what is - according to their observations - critical to a well-functioning healthcare system. However, more resources do not automatically translate into better health outcomes; the effectiveness of spending is also important. Overall, countries with higher health spending and higher numbers of health workers and other resources have better health outcomes, quality and access to care. Although institutional structures are certainly important for providing high-quality care, it is often difficult to establish a clear link between structures and clinical processes or outcomes (Quentin et al., 2019). Therefore, improving quality is not enough: it must lead to a reduction in costs. Authors Marshall and Øvretveit (2011) highlighted that the starting point is the quality achieved considering the patient's needs. It is precisely the focus on the patient that makes it possible to avoid unnecessary or repeated services which are, in healthcare, the most significant causes of reducible costs. Identifying these areas of deviation, i.e. when the offer is not perfectly adequate to the demand, represents the main challenge for the coming years, both for policy-makers and health managers, and for health professionals who are increasingly called to assume precise responsibilities not only towards their patients but towards the general population. According to Argaw et al. (2019) strengthening the health system through the implementation of health standards can be one method to significantly improve in performance and quality of health care services. However, not only financial resources must be allocated to a sustainable long-term health care system. Cost effectiveness is extremely important to achieve the objectives of fiscal sustainability and access to quality health care for all citizens in a given country (Ivankova et al., 2019).

The relationship between overall performance and the factor assessing complexity of hospitalized patients diagnoses (Case-Mix index) is apparently the only one significant indicator from the group of all examined structural quality indicators. This relationship is inversely proportional what indicates that the more demanding diagnoses are treated in the hospital, the lower is the level of its overall performance what is connected also to reduced quality of provided healthcare. The issue of key competences comes to the fore in the context

of this problematic. They represents a suitable tool for the first step to improve the level and quality of professional and personal knowledge and prerequisites of a healthcare workers.

On the basis of our proven findings we can conclude, that the importance of the structure in public hospitals is undeniable because it represents the basic pillar for the increasing quality of provided healthcare, but the level of overall quality lays on the matrix of structure, processes and outcomes. Pitocco et al. (2020) according to their research results recommend to focus on outcomes and help hospital administrators seeking to improve organizational performance. Ivankova et al. (2019) also argue, that regarding effectiveness, there are differences between systems in terms of their predisposition to certain areas of health output. Where one system proves to be ineffective, or its effectiveness is questionable, another system appears to be effective. Stefko et al. (2017) stated that performance and efficiency increasing of public healthcare sector in Slovakia can be by achieved only by system changes, particularly in hospitals, health insurance companies, drug policies. The fact that the assumptions were verified in Slovak republic, in ordinary conditions for healthcare provided by public hospitals (i.e. not during the pandemic crisis) is considered to be the main limitation of this study. As the harmonization contributes to the growth of the European Union (Lukacova et al., 2020), the cross-cultural research in the field of this problematics could reveal more significant findings.

Future research in the field of this problematic should focus on the investigation of the relationship between factor assessing the complexity of hospitalized patients diagnoses and the financial health of public hospitals. The treatment of patients with more demanding diagnoses represents a financial burden for the hospital mainly due to the more complicated processes required to achieve the patient's recovery. Also the investigation of the relationship between the complexity of hospitalized patients diagnoses (especially of covid-19 diagnosed patients) and the lack of medical staff could bring interesting insights on the level of overall performance and quality of provided healthcare.

Acknowledgements

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Optimal portfolio before, during and after COVID19

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Abstract

Research background: During the last couple of years the Exchange-Traded fund (ETF) market of assets got a higher traction in financial decision making, academic studies and financial modelling. The Covid-19 pandemic created an opportunity to analyse portfolios of ETF assets and their performance during a more volatile timespan of economic instability.
Purpose of the article: The article uses classic methods to analyse and weight a portfolio of ETF assets before during and after the Covid-19 years. Furthermore, it compares multiple portfolio weighting strategies and their overall performance during the first pandemic years.
Methods: We utilized correlation analysis, modern portfolio theory, Sharpe ratio maximalization and minimalization of portfolio variance in our modelling as well as a basic equal weight portfolio as a base model to compare the different performances of a portfolio of ETF-s.
Findings & Value added: We have shown that a small portfolio consisting only of ETF assets could be weighted during the pandemic years using the Modern portfolio theory and would be able to beat the market.

Keywords: *investment, ETF, modern portfolio theory, Sharpe ratio*

JEL Classification: *G1, G10, G11*

1 Introduction

During the past couple of years, we had to become familiar with a "new world" dominated by a pandemic of Covid-19. Even though there is a significant lower level of covid cases during the summer times, the overall statistics are showing a rising trend of positive cases even in the summer year of 2022. The ever-changing variants of Covid-19 reduces the effectiveness of vaccinations and further booster vaccination shots are researched to keep the most endangered groups of people safe. Hence the overall theme of the pandemic years should not be considered the issue of the past, but the current times and optimistically the next couple of years.

The pandemic had destabilized the financial markets and generated great uncertainty for the investors. Furthermore, it affected tourism across the world, had a negative effect on the

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stability of supply chains, it postponed or reduced consumption on the macroeconomic level, created huge financial stress and was one of the major factors affecting inflation spot which shows a rising trend for the last year (Chang et al., 2020).

This article will deal with portfolio optimization during the pandemics. The remainder of the article is structured as follows. In the first chapter we introduce the relevant literature. There is a multitude of other articles dealing with this issue hence we choose only some highlights in our literature review. After that we present our methodology of portfolio optimization chosen in our paper and the results of our research. In the end we summarize our findings and discuss possible future work.

2 Literature review

The amount of tradeable assets on financial markets are enormous. We know that the U.S. capital markets are the largest in the world and it represents 42% of global equity trades as well as 38,7% of fixed income assets (Kolchin et al., 2022). Keeping up with such a tremendous asset quantity as well as the volume of trades is impossible for any human being. For a purpose to keep up with specific markets different indexes were created like the Dow Jones or the Standards & Poor's 500. They are used as the benchmark indices even in current researches (Hasanudin, 2021; Simionescu et al., 2021). They are effectively used to benchmark even cryptocurrency markets (Zhang et al., 2018).

During the early days of investing a lot of investors would take one or multiple of these indices and would use them as a benchmark for they own investing qualities. However, it is hard to beat the index even for a skilled investor hence an alternative investment vehicle had to be created to fully utilize the whole markets investment capabilities.

For this reason, the Exchanged Traded Fund-s (ETF) were created. They were introduced more than 25 years ago. ETF-s are like mutual funds, where the ETFs are basically investments that own a different number of small investments. These can consist of anything from individual stocks to bonds to commodities even currencies. Most of them are used only to copy indices. Some of them are used to copy specific sectors and there are some specific types of ETF-s which are working in negative correlation with market circles (Krantz, 2022). In our work we utilize portfolios consisting of ETF-s only.

Basically, we can define the process of portfolio selection in 3 consecutive steps. The first is the return estimation, the second can be considered the assignment of weights and the third is the portfolio selection model creation or usage. In the first step one defines the investment pools and generally the future returns estimation is created based on the historical data. The weights might be assigned by the perception of the individuals as well, generally at the beginning of investment periods an equal weighted portfolio would be an acceptable decision (Young, 2021). As for the portfolio models, there might be multiple different ways to approach this issue. A generally accepted one is the mean-variance approach (Markowitz, 1952).

The general idea of the mean-variance model is the assumption, that investors are rational which means that they will always choose the investment with the highest return among choices with similar or in some cases equal risk. Upon the mean-variance model the risk parity approach to weighting was created.

The risk parity approach defines a well-diversified portfolio as one where all asset classes have the same marginal contribution to the total risk of the portfolio. It means that a risk parity portfolio is an equally weighted portfolio, where the weights refer to risk rather than dollar amount invested in each asset. The highlight of this approach is the fact that to employ this approach, we do not need an estimate of expected returns to implement the risk parity

approach Total risk is typically measured by the volatility of the rate of return on the portfolio, which means that it utilizes the mean-variance framework (Kazemi, n.d.).

There were multiple scientific papers on different approaches of risk parity calculation. For example a non-convex least-squares model (Bai et al., 2016) which aimed at selecting the most desirable risk parity solution according to a given criterion or relaxed risk parity optimization model to control the balance of risk parity violation against the total portfolio performance (Gambeta and Kwon, 2020). There are some complex optimalization methods for this approach based on the Cauchy interlacing theorem (Fernandes et al., 2020) to avoid matrix inversions during calculation of the naïve model. In our paper we utilized the basic approach to risk parity portfolio selection described by Kazemi (Kazemi, n.d.).

3 Methodology

In our article we will create 3 different portfolios in three different time periods to analyse them in different timespans. These will be followed by a portfolio with monthly rebalancing consisting of the same basket of assets. The first one will be called a pre-covid portfolio, the second one a covid and third one a so called post-covid (even through the covid pandemic did still not end) phases. The three portfolios will span from 2017-01-01 up until 2020-12-31.

We have created all the portfolios with the same assets. They are consisting of 4 different assets. These were chosen by the authors to represent a small portfolio available for small investors. The assets are chosen as follows:

iShares (TLT) – these are a ETF groups which are run by BlackRock. They were originally created as a collaboration between the investment bank Morgan Stanley and Barclays Global Investors in the 90-s. Only in the early 2000-s they decided to launch an expansion into the ETF markets. In the early days they were called WEBS or World Equity Benchmark Shares. Later they were renamed to iShares. They are traded on stock exchanges all over the world. Most of iShares track a specific subsection of stock market or bond market through their indexes. Today you can find hundreds of iShares issued funds. They cover large cap, small cap and mid cap indexes of stocks. They cover energy funds and industry funds but even health funds or telecommunications. Furthermore, they have real estate index funds as well (Herold, 2016).

S&P 500 Trust (SPY) – SPY is an ETF that consists of all the stocks featured in the Standard & Poor's 500. S&P 500 was created in 1926 and its sole purpose was to trach the lifecycles of the largest 500 stocks traded on the United States exchanges. The way how SPY weights its stock is quite simple. Ut uses the value of stock available to trade. Therefore, it has a downside of being dominated by the largest companies inside the index. This creates some fascinating behaviour by the top 15 companies being equal nearly to the third of the SPY. At the time of writing this article Apple was the largest company in the index with more than 6% of the overall portfolio weight. Even with these cons it is considered the better representative of the market if you consider the alternative of Dow Jones and in fact has more strong rules on portfolio management (Young, 2021).

Vanguard Real Estate ETF (VNQ) – Its main investments are in stocks issued by real estate investment trusts, which are companies that purchase only office buildings, hotels, and other real property. The main goal of this investment vehicle is to closely track the return of the MSCI US Investable Market Real Estate 25/50 Index.

The main positive aspect of this ETF is that it offers high potential for investment income and event some growth. The value of the share rises and falls more sharply than that of funds holding bonds. It's an appropriate investment for helping diversify the risks of stocks and bonds in a portfolio (Ivanov, 2012).

SPDR Gold Shares (GLD) - Gold ETFs are a popular investment options because they give traders exposure to the price movements of gold and that all without having to buy the underlying asset. They are mostly structured as trusts. Under this structure they can hold a certain number of gold bars for each share of the ETF issued. Buying this ETF therefore means, that the investor is owning a portion of the gold held. Because these ETFs hold physical gold, therefore are the owners of the underlying asset, their prices move with the price of gold over the short and long term. Sometimes there are tracking errors when the ETF price deviates from its reference asset. GLD is one of the largest gold ETFs. Each share of the ETF is worth around 0.09 ounces of gold (Mitchell, 2022).

We started our analysis with the use of basic descriptive statistics of the periodic mean returns to describe the overall performance of the assets in the analysed periods on their own. After descriptive analysis we created the portfolio of assets and analysed their co-movement of prices. We derived the optimal portfolio according to Modern Portfolio Theory and Capital Asset Pricing Model. The calculations were done in Excel. To rule out errors as far as possible, we also carried out control calculations via Python programming and compared the results. The results are compared using the risk parity approach and an equal weighted portfolio as well as the performance of the S&P 500 total return index (Bai et al., 2016). We utilized the Sharpe ratio to maximize the portfolio returns as well as the portfolio variance formula.

The portfolio variance formula for two assets:

$$Portfolio\ variance\ =\ w_1^2\sigma_1^2\ +\ w_2^2\sigma_2^2 + 2w_1w_2Cov_{1,2} \tag{1}$$

where:
w_i – the weight of i-th asset
σ_i^2 – the variance of the ith asset
$Cov_{1,2}$ –The covariance between assets 1 and 2 (Markowitz and Todd, 2000).

Sharpe ratio

$$S_a\ =\ \frac{E[R_a-R_b]}{\sigma_a} \tag{2}$$

where:
S_a – Sharpe ratio
R_a – asset return
R_b – risk free return
E – expected value
σ_a – standard deviation from the asset (Perez, 2022).

We set up the excel solver to maximize the Sharpe ratio or minimize the overall variance of the portfolio during the specific periods of time. We created a benchmark portfolio consisting of equal weights to analyze the overall impact of our models.

4 Results

Our first step was to analyze the three hypothetical portfolio basket behavior in the specific timeframes. This gives us an overview of the future modelled weighted basket in the view of the assets chosen. We utilized the data from Yahoo Finance and specifically used the adjusted close column, which is accounted for dividends and stock splits. From the daily data we calculated the returns variances and the standard deviation. The outputs are as follows:

Table 1. Descriptive statistics of pre-covid basket of assets

Pre Covid basket	Start:	2017-01-01	End:	2018-12-31
	SPY	TLT	VNQ	GLD
Daily Mean Return	0,0298%	0,0142%	-0,0029%	0,0201%
Daily Variance	6,701E-05	3,577E-05	7,163E-05	3,826E-05
Daily Std Dev s	0,82%	0,60%	0,85%	0,62%

Source: authors

The pre covid portfolio of assets shows us the highest daily mean return in SPY index and the lowest in VNQ. This implies that a dominant SPY portfolio weight would be a good sign in the pre-covid era of our automatically weighted portfolio at the final part of results. The highest standard deviation was created in VNQ as well which means that it was overall the riskiest asset before the pandemic.

Table 2. Descriptive statistics of covid basket of assets

Covid basket	Start:	2018-01-01	End:	2019-12-31
	SPY	TLT	VNQ	GLD
Daily Mean Return	0,0447%	0,0230%	0,0381%	0,0288%
Daily Variance	8,920E-05	4,531E-05	8,066E-05	4,582E-05
Daily Std Dev s	0,94%	0,67%	0,90%	0,68%

Source: authors

It is quite surprising but during the covid first waves all our chosen portfolio assets had a positive daily mean return even through we can see the overall rising of the daily standard deviations. This is an expected behaviour during uncertain times, hence the risky timespan of first covid year from the financial market's perspective is shown in the risen standard deviation.

Table 3. Descriptive statistics of post-covid basket of assets

Post Covid basket	Start:	2019-01-01	End:	2020-12-31
	SPY	TLT	VNQ	GLD
Daily Mean Return	0,0871%	0,0592%	0,0409%	0,0764%
Daily Variance	2,557E-04	1,200E-04	3,928E-04	1,025E-04
Daily Std Dev s	1,60%	1,10%	1,98%	1,01%

Source: authors

In the post covid basket we see an everlasting rising trend. With the daily standard deviation being the highest signaling that our chosen portfolio has high risk in the early post covid first wave era. This risk can be associated with a still ongoing low understanding of pandemics as well as the expectation of the first vaccines to be researched or approved. Most economies even after a partial opening after the lockdowns were still not fully recovered and the movement of people was still mostly restricted.

After the initial analysis we created correlation matrices to find out about the overall co-movement between our chosen assets. The correlation matrices are as follows:

Table 4. Pre-covid correlation of assets

Pre-Covid	SPY	TLT	VNQ	GLD
SPY	1,00			
TLT	-0,27	1,00		
VNQ	0,51	0,15	1,00	
GLD	-0,08	0,38	0,00	1,00

Source: authors

The pre covid correlations are around -0,3 and 0,3 which is acceptable. The only correlation higher than 0,3 is between VNQ and SPY. This might be an issue during our analysis however we would like to point out that an unpublished correlation analysis was done to filter out from a higher number of assets those remaining 4 chosen into the portfolio analysed.

Table 5. Covid correlation of assets

Covid	SPY	TLT	VNQ	GLD
SPY	1,00			
TLT	-0,35	1,00		
VNQ	0,52	0,12	1,00	
GLD	-0,13	0,42	0,03	1,00

Source: authors

The correlations during the covid period are higher and this can be attributed to the early co-movement of all assets at the beginning of the pandemic and especially when the world started to "shut down". The quarantines or so called "lockdowns" issued in multiple countries at the same time came with an overall drop of prices on the financial markets. Luckily this fall was quite quickly stopped, and the overall bullish trend of the markets came back in most of the market sectors.

Table 6. Post-covid correlation of assets

Post Covid	SPY	TLT	VNQ	GLD
SPY	1,00			
TLT	-0,46	1,00		
VNQ	0,84	-0,33	1,00	
GLD	0,08	0,28	0,13	1,00

Source: authors

Finally, the portfolio correlation in the third timeframe is closer to the first one except of the high correlation of VNQ and SPY. This value is higher than 0,8 which shows a high positive correlation. We could change the SPY or VNQ for a different asset to achieve higher diversification however we stick with this basket of assets because this correlation is non-constant and changes over time (de La Chapelle, 2016), hence in the future it can and will change as in the case of the first pre-covid basket.

After correlation analysis we used the Excel Solver tool to optimize our portfolio. We created three different algorithms. The easiest is the base model consisting of a portfolio with

equal weights. The second is a minimalization algorithm for minimum variance. And the third is a maximalization algorithm for the Sharpe ratio.

The outputs of these three algorithms are shown on the table 7.

We can analyse the Sharpe ratio of the different portfolio weight setups. We can see straight away that portfolios of equal weights have the lowest Sharpe ratios. This was the expected behaviour. Overall, the best Sharpe ratio was achieved with the Sharpe ratio maximalization strategy. It was an expected outcome as well. However, the expected returns are highest in these cases as well. The high amount of correlation between VNQ and SPY does have a negative effect on the VNQ weights in the overall portfolio which except for the pre covid data basket is close to zero. The expected return did essentially skyrocket after the first covid wave and the overall portfolio performance has risen to 16% and above.

From the analysis of the stocks in the three periods of time we can conclude that the chosen basket of assets would be available to use during the whole pandemic and the overall returns would rise through the chosen period achieving an overall positive cash flow of the investor. In the worst case the returns would be on the level of 3,86% but in the case of best weighting it could potentially achieve 5,97% percentage in the pre-covid era. During the covid era the best returns would come from an equal rated portfolio, but with a high standard deviation. In the post first covid wave era it would be considered a great portfolio with expected income between 16-18% with equally risen standard deviation.

Table 7. Summary of returns

	Asset	Pre-covid portfolio		Covid portfolio		Post covid portfolio	
		Weights	Statistics	Weights	Statistics	Weights	Statistics
Minimum Variance	SPY	31,4%	Expect. Return 5,20%	32,1%	Expect. Return 7,92%	30,4%	Expect. Return 17,95%
	TLT	42,0%	Std Dev 6,06%	42,6%	Std Dev 6,55%	49,0%	Std Dev 10,11%
	VNQ	0,3%	Sharpe Ratio 0,40	0,0%	Sharpe Ratio 0,92	0,0%	Sharpe Ratio 1,68
	GLD	26,3%		25,4%		20,6%	
Maximum Sharpe Ratio		Weights	Statistics	Weights	Statistics	Weights	Statistics
	SPY	47,7%	Expect. Return 5,97%	39,0%	Expect. Return 8,41%	31,9%	Expect. Return 18,26%
	TLT	17,8%	Std Dev 6,93%	31,8%	Std Dev 6,81%	42,7%	Std Dev 10,20%
	VNQ	0,0%	Sharpe Ratio 0,46	2,3%	Sharpe Ratio 0,96	0,0%	Sharpe Ratio 1,70
	GLD	34,5%		26,9%		25,4%	
Equal Weighted Portfolio		Weights	Statistics	Weights	Statistics	Weights	Statistics
	SPY	25,0%	Expect. Return 3,86%	25,0%	Expect. Return 8,48%	25,0%	Expect. Return 16,61%
	TLT	25,0%	Std Dev 6,79%	25,0%	Std Dev 7,36%	25,0%	Std Dev 13,97%
	VNQ	25,0%	Sharpe Ratio 0,16	25,0%	Sharpe Ratio 0,90	25,0%	Sharpe Ratio 1,12
	GLD	25,0%		25,0%		25,0%	

Source: authors

The analysis of the different portfolios in specific times showed that the chosen assets would perform nicely during the first part of Covid pandemic. Hence, we can use these assets to model our portfolio with monthly rebalancing, which is the final step in our results.

4.1 Modelling the stocks with monthly rebalancing

The final step of our portfolio basket modeling was to utilize the modern portfolio theory and rebalance our assets in our portfolio with monthly rebalancing. The overall portfolio returns are on the graph bellow. We have shown our portfolio with the performance of SPY index. We have an ETF representing SPY in our dataset but as we mentioned above the ETF-s are sometimes unable to keep the price of the underlying benchmark hence the fact that there is the same ETF does not change the validity of using the SPY index as a benchmark value.

Figure 1. Risk Parity portfolio simulations

Source: authors

It is clearly visible that our monthly rebalanced portfolio would be on par in the beginning of the analysed time period however during the pre-covid era however when the pandemic kicks in our rebalanced portfolio has been able to beat the benchmark index during the whole first two pandemic years. At the final months the rebalancing was unable to beat the index therefore we conclude that the dynamic behaviour of the market was not completely modelled by this approach. It is surprising, that a technically basic model which is considered not too appropriate for practical purposes was able to be efficient enough in exceptionally unstable eras. The overall performance of our rebalanced portfolio can be considered good during the pandemic years.

To analyse the weights of assets in portfolio we created a chart showcasing it. The different weights in different timeframes are shown on the graph bellow.
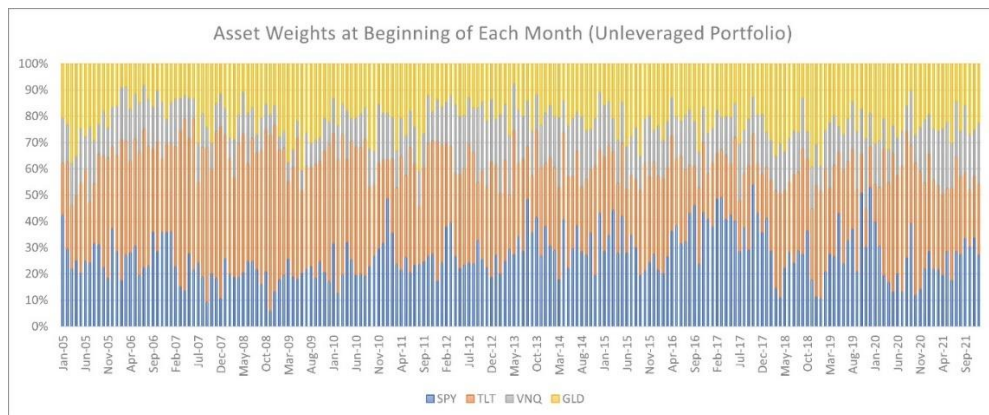
Figure 2. Asset Weights at beginning of Each Month

Source: authors

We can see that the weights are quite different to the static solver outputs whereas the VNQ shares are always represented in the portfolio event if in smaller percentage. Our solver had put a weight of 0 on these shares during static analysis in some specific timeframes. The most dominating assets overall is the TLT ETF-s. It was surprising for us that the weight of the portfolio was not changed so drastically in the beginning of the pandemic even counting in the monthly rebalancing offsets. In some specific months the SPY ETF-s had nearly 50% of the weights.

For overall performance statistics we have created a table as shown below:

Table 8. Summary of weighted portfolio vs. single assets

Total Returns	384,6%	450,2%	186,4%	324,0%	285,0%
CAGR	9,7%	10,5%	6,4%	8,9%	8,3%
Annualized Volatility	8,8%	14,6%	13,1%	22,2%	17,2%
Max Drawdown, monthly	-14,8%	-50,8%	-21,8%	-68,3%	-42,9%
Sharpe Ratio /w $r_f = 0$	1,10	0,72	0,49	0,40	0,48
Calmar Ratio	0,66	0,21	0,29	0,13	0,19
Max Monthly Return	11,5%	12,7%	14,3%	30,7%	12,8%
Min Monthly Return	-9,9%	-16,5%	-13,1%	-31,7%	-16,1%
% Positive Months	63,2%	67,2%	53,4%	60,8%	52,0%

Source: authors

The rebalanced portfolio overall returns are at 384,6%. This is a great outcome considering that we used a conceptionally quick algorithm. A surprising fact is that the SPY ETF would overall be a better investment during this era, but the risk of single asset basket is easily spottable in the Sharpe ratio. Where the portfolio has the highest ratio despite being a bit less profitable. VNQ had the highest and the lowest monthly return as well and is one of the two assets who has a higher loss month then a profit month. The number of positive months is perceptually above 50% in the case of all assets and the portfolio as well. The highest Calmar Ratio is yes again in our portfolio approach. The portfolios volatility is bellow 10% and the maximum drawdown is at -14,8% which considering SPYs and VNQs above -50% is not too high.

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Overall, the rebalancing of our portfolio has a positive impact on the overall performance and might be considered as a viable method of portfolio management for small investors without the capacity or time to calculate more precise or robust analyses.

5 Summary and discussion

In our paper we analysed a portfolio of ETF assets behaviour before during and after the covid pandemic, even through we might consider it to be better explained as the pre-vaccine covid era. We utilized multiple approaches to asset analysis. First, we used descriptive statistics to analyse the performances of specific assets in specific time frames. Then we used correlation analysis to find the best assets to add to our portfolio. Our portfolio was created with small investors in mind hence only 4 assets were chosen.

The portfolio was then analysed statically for specific timeframes. For the analysis we used portfolio variance minimalization as well as Sharpe ratio maximalization. As a benchmark we created an equal weight portfolio as well. Finally, we created the portfolio and rebalanced its weights monthly. The final portfolio with rebalancing might be not considered the best as of the overall returns during the analysed period, but as the best risk/return investment able to achieve great returns with less risk in an exceptionally unstable timespan of the pandemic times.

The outcome of our analysis shows that a relatively basic risk parity approach for weighting with monthly rebalancing can achieve overall positive returns in less stable times and therefore is still good to be utilized at least in the case of small investors. Taking in consideration the small computational requirements of these models most of the investors can generate the weights on their personal computers without the need of external servers.

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Socio-economic consequences of COVID-19 for the national economy in the context of Sustainable Development

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ABSTRACT

Research background: The COVID-19 pandemic, which has grown into a global socio-economic crisis, has affected the usual life society and business, has changed the trajectory of achieving sustainable development goals (SDGs). It is necessary to monitor the achievement of 17 SDGs on social, environmental and economic aspects for long-term sustainable international development.

Purpose of the article: To analyze the impact of the COVID-19 on the achievement of the global SDGs in order to identify the features of their achievement both in developed countries and in Russia. The tasks were to identify the impact of the COVID-19 on the socio-economic conditions of activity; highlight the expected consequences of the pandemic for the implementation of the SDGs and in the Russia in particular, compare the levels of achievement of the SDGs in the OECD countries and Russia.

Methods: The study is based on a review of scientific literature, on a theoretical and a statistical analysis **of economics on this topic.**

Findings & Value added: The empirical data used by the author reflects the deterioration in the achievement of SDG 17 in the post-pandemic period. Both the negative consequences of COVID-19 for the economic and social aspects of the sustainable development of countries, as well as positive changes were noted. The OECD countries significantly improved the dynamics for SDG: 9, 11, 13, 16, but worsened for 1, 8. In Russia, SDG: 1, 3, 8, 15 worsened, but progress was made, for example, on SDG: 5, 9, 13, 16, 17.

Keywords: *sustainable development goals; sustainable development*

JEL Classification: *F01; O40; O57*

1 Introduction

Due to the increasing negative impact of production and consumption on the ecological environment, the concept of sustainable development (SD) has become popular with more

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scientists and practitioners around the world, becoming crucial for securing the future of humanity. The concept of "sustainable development", bringing together the ecological, economic and social aspects of human activity for the benefit of current and future generations, is becoming the universal paradigm of global development, providing a mechanism by which society can interact with the environment without risking the future. Resolution 70/1 "Transforming our world: the 2030 Agenda for Sustainable Development " was adopted by the 193 Member States of the United Nations (UN) in September 2015 to translate Sustainable Development into action. The resolution included 17 Sustainable Development Goals (SDGs), divided into 169 targets on social, environmental and economic aspects. The SDGs are global milestones set by world leaders collectively to lay a solid foundation for long-term sustainable development by 2030. The SDGs include options for any organization (international communities, national governments, business, civil society) to contribute to a more sustainable world (Grainger-Brown and Malekpour, 2019), (Kostoska and Kocarev, 2019), (Spiridonova and Kanaeva, 2020). In its movement of society towards sustainable development, the UN called for universal and equal efforts to accelerate the achievement of the SDGs within the framework of the "Decade of Action". However, this global development was interrupted, including by the COVID-19 pandemic.

The World Health Organization (WHO) declared a pandemic in March 2020 of a new infectious disease (COVID-19), which first appeared in December 2019 in China and has spread worldwide. To date, there have been over 409 million confirmed cases and over 5.8 million deaths worldwide (World Helth Organisation, 2020). The magnitude of the socio-economic impact has made the COVID-19 pandemic the most severe global societal disaster of this century.

In the socio-economic literature, the problems and prospects of Sustainable Development (SD) of the economy in the context of global instability are debatable (UNSTAT, 2017), (UNSTAT, 2021a), (Brakman et al., 2021), (Buckley, 2020), (Petricevic and Teece, 2019), (Spiridonova and Sudova, 2018) and developing policy tools and frameworks for implementing the SDGs for business and civil society (Grainger-Brown and Malekpour, 2019), (Kostoska and Kocarev, 2019), (Fogli and Veldkamp, 2021); and the impact of the COVID-19 pandemic on the implementation of the SDGs (Sachs J. et al., 2021), (Ciravegna and Michailova, 2022), (Dheer et al., 2021), (Alibegovic et al., 2020), (Naidoo and Fisher, 2020). Not all aspects of these complex and multilevel problems have been fully explored.

2 Methodology

The author used both qualitative and quantitative methods of collecting and processing information. The purpose of the study is to analyze the impact of the COVID-19 pandemic on the implementation of the global SDGs, to identify features in the field of their achievement in developed countries and Russia. To achieve the goal, the following tasks were set: to identify the impact of the COVID-19 pandemic on the socio-economic conditions of activity; to highlight the consequences of the pandemic for the implementation of the SDGs in the world and in the Russian Federation, to compare the level of implementation of the SDGs in the developed countries of the world (on the example of the OECD countries) and Russia. The object of the study is the socio-economic activity that ensures sustainable development. The subject is the features of achieving the global SDGs in the context of COVID-19 in the world and Russia during the pandemic period of 2020-21. The study is based on a theoretical analysis of economic theory, a review of scientific literature on this topic, and a statistical analysis of the achievement of the SDGs in the developed countries of the world and in Russia. Government organizations, the international community, NGOs can

use the results to improve the effectiveness of programs to restore national economies to provide them with a more sustainable development trajectory.

3 Research results and discussion

Empirical evidence reflects a deterioration in the achievement of the global SDGs. The author highlights both the negative consequences of COVID-19 for the economic and social aspects of sustainable development, and positive changes in the OECD countries and Russia. Key Findings provide governments, businesses, non-profit organizations and other policy makers with the information they need to mitigate the negative impact of COVID-19 on sustainable development, focus on the SDGs highlighted by the author, and realize all opportunities for the transition to sustainable development after the pandemic. The COVID-19 outbreak has affected all three aspects of sustainability: economic, environmental and social sustainability. The outbreak led to a decrease in economic activity around the world, strongly affecting the industrial, manufacturing and transport sectors, which caused a sharp drop in global demand and oil prices. In 2020, primary energy consumption fell by 4.5% (the largest decline since 1945). In Russia, the decline in GDP in 2020 amounted to 3.1% (in % of 2019), the world average -3.5% of the world. Most countries of the world provided state anti-crisis support to the population and businesses. The most impressive state support measures were in 2020 in the United States - 13.2% of GDP. In Russia, it amounted to 4.5% of GDP. At the same time, US GDP in 2020, at current prices, according to the IMF, was 14.2 times more than Russia's GDP. The growth outlook for the global economy turned out to be worse than previously expected. The IMF predicted a decline in global growth from 5.9% in 2021 to 4.9% in 2022, 5.2-4.5 in Russia, 4.7-2.9 in advanced economies. New risks to financial stability, currencies, and the health of countries' budgets have emerged, especially as countries' debt levels have risen substantially over the past two years (IMF, 2021). Rising energy prices and disruptions to global supply chains have led to higher inflation spreading around the world.

The pandemic, which has developed into a global crisis that has affected people's lives and disrupted business and social functions, has certainly affected the trajectories of achieving the SDGs as well, increasing the gaps in meeting the targets by 2030, especially in developing countries and countries with economies in transition (UN ESCAP, 2020). Due to the pandemic in 2020, the inflow of International Private Investments to developing countries in sectors important for achieving the SDGs was reduced by a third, which threatens progress in the SDGs. The total amount of announced investments in new projects decreased by 33%, while international project financing fell by 36%. Companies have reduced investment and corporate social responsibility (CSR) as well. In doing so, the pandemic has canceled out the increase in investment that has been going on for the past five years to achieve the SDGs (UNCTAD, 2021b).

Several reviews of SD progress have shown that many countries will not be able to meet the 2030 targets for most SDGs (Sachs J. et al., 2021); (UNCTAD, 2021a), (Naidoo and Fisher, 2020). Africa is in the worst post-COVID situation and continues to face serious challenges in achieving most of the 17 SDGs (for more details, see (Sachs J. et al., 2021)). No country in the world has achieved all 17 SDGs yet. The OECD countries are closest to the achievement. High-income countries have an easier time meeting targets for high socioeconomic outcomes and basic access to infrastructure, including SDG 3 (Good health and well-being), SDG 9 (industrialization, innovation and infrastructure), SDG 11 (sustainable cities), SDG 13 (combating climate change), SDG 16 (justice, strong institutions). COVID-19 has highlighted the vulnerability of health systems, income inequality, access to and quality of health and education services, and the gender pay gap persists among various population groups (SDG 5, SDG-10). In developed countries, there

has also been a deterioration in SDG-1 (No Poverty) and SDG-8 (Economic Growth and Decent Work) (Fig. 1).
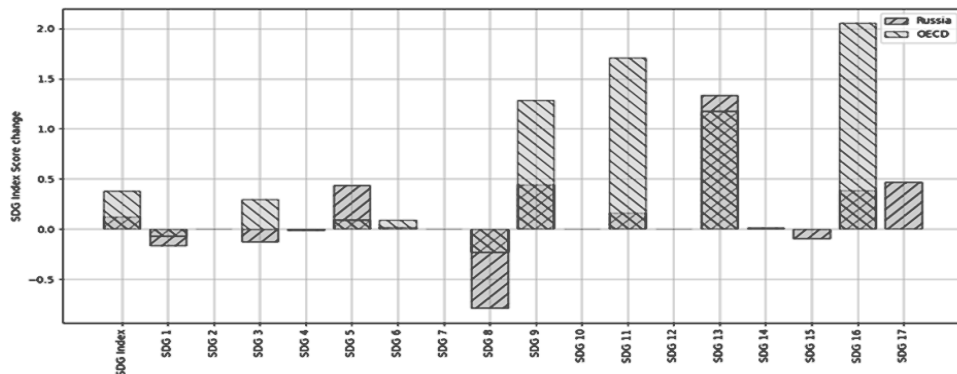
Figure 1. SDG index change from 2019 to 2020 comparison.

Sources: Sachs et al. (2020), Sachs et al. (2019)

In the next pandemic period (2021), positions on SDG-3 and SDG-11 (sustainable cities) decreased sharply (Fig. 2). The UN also notes the need for serious efforts to accelerate progress towards climate change mitigation and the protection of biodiversity (SDGs 12-15), as the previous progress of SDG 13 (combating climate change) and SDG 14 (preservation of marine ecosystems) is clearly insufficient to achieve these goals by 2030 (Sachs J. et al., 2021). Most OECD countries can also generate significant negative environmental impacts beyond their borders. There are also "side effects", such as unsustainable trade and supply chains, and overconsumption, that undermine the efforts of other countries to achieve the SDGs. For example, EU-based companies with carbon leakage move their carbon-intensive operations abroad to take advantage of preferential environmental standards in force there, or EU-based products are replaced by more carbon-intensive imports (Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, 2021). In the worst post-COVID situation are African countries, which continue to face serious challenges in achieving most of the 17 SDGs (more details (Sachs J. et al., 2021)). The most affected by the COVID-19 crisis are not only the global SDGs directly affected by the pandemic, for example, SDG 1, SDG 2, SDG 3, SDG 8, but also their derivatives. Because impacts affect vulnerable groups (the poor, women, children, the elderly, etc.) disproportionately, pre-existing gaps: gender (SDG 5), income inequality (SDG 10), urban-rural dichotomy, urban poverty and vulnerability (SDG11), the human rights situation (SDG 16) may further increase, especially in developing countries. It should be noted that COVID-19 improves the state of the environment due to the restriction of socio-economic activities (SDG-13) (Fig. 1).

Moreover, the production of renewable energy continued to grow, for example, solar energy recorded the largest increase in history. Carbon emissions from energy use fell by 6.3%, i.e. to its lowest level since 2011. The carbon intensity of the energy mix (average carbon emissions per unit of energy used) fell by 1.8%, also one of the largest falls in post-war history (BP, 2021). Also, many experts note a significant reduction in environmental noise and an improvement in the quality of water surfaces around the world (Barreiro-Gen et al, 2020). However, these positive effects may be short-term if society does not learn from the lockdown and reduce pollution in the long term, which in particular demonstrates the deterioration of dynamics under SDG-13, both in OECD countries and in Russia (Fig. 2).
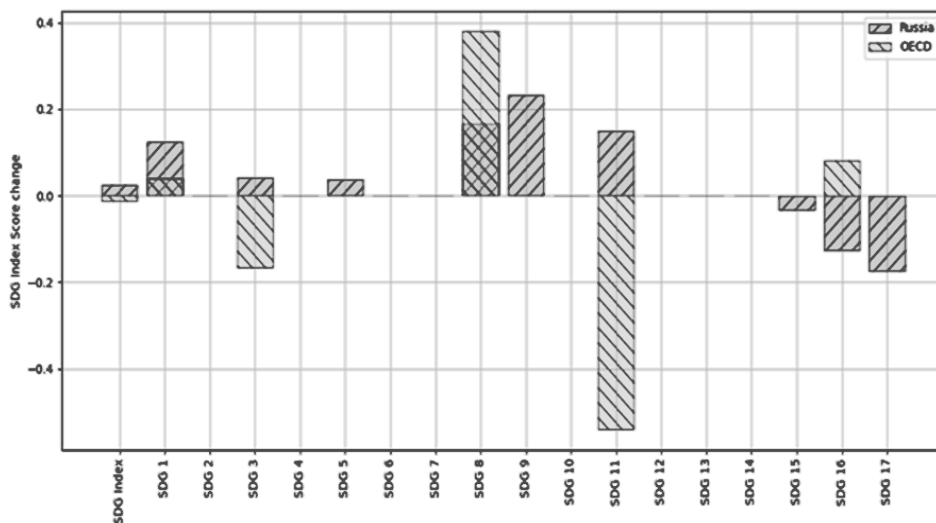
Figure 2. SDG index change from 2020 to 2021 comparison.

Sources: Sachs et al. (2021), Sachs et al. (2020)

In Table. 1 shows some of the expected impacts of the pandemic, which can be quite clearly identified in the implementation of the global SDGs.

In the worst post-COVID situation are African countries, which continue to face serious challenges in achieving most of the 17 SDGs (more details (Sachs J. et al., 2021)).

The SDGs are a kind of global goals that should be adapted to national conditions. For example, in Italy, SDG 1, SDG 4 and SDG 8 are among the most affected by COVID-19 (Alibegovic et al., 2020). In Russia, during the COVID-19 phase, we have seen progress on SDG 5 (Gender equality), SDG 9 (industrialization, innovation and infrastructure) SDG 13 (climate change), SDG 16 (justice, strong institutions) and SDG 17 (global partnership). There was a deterioration in the position on SDG-8 (economic growth and decent work), SDG 1 (poverty eradication), SDG 3 (Good health and well-being) and SDG 15 (preservation of terrestrial ecosystems, biodiversity). At the next pandemic stage from 2020 to 2021, there was a positive trend in SDG 8 due to the measures taken by the government to support the population and businesses. At the same time, SDG 16 (justice, effective institutions) and SDG 17 (global partnership) have worsened, and SDG 15 continues to regress. 12, which indicates a stable socio-economic situation both in the ECO countries and in Russia. Also in the Russian Federation, we are seeing a steady increase in the average global indicator of the SDG Index for the entire period under review. In OECD countries, it decreased in 2021 compared to the previous year, due to rising levels of poverty and unemployment after the outbreak of COVID-19 (Figures 1 and 2).

Measures aimed at achieving SDG 2030 in Russia have been integrated into national projects and various strategic policy documents. Under their influence, the national development projects of the country were adjusted until 2030. The main results are contained in the Voluntary National Review of Russia's achievement of the UN SDGs and the implementation of the SDG Agenda for the period until 2030.

Table 1. Some expected impacts of the pandemic on the implementation of the global SDGs.

SDGs	Negative Consequences	Positive Consequences
SDG 1 (No Poverty)	Reducing incomes, increasing the marginalized, the population below the poverty line.	Increasing social protection measures for the poorest part of the population.
SDG 2 (Zero Hunger)	The normal production and distribution of food is disrupted; reduction in global food stocks and trade and their availability during quarantine.	
SDG 3 (Health and well-being)	Rising mortality and morbidity from COVID; the negative impact of isolation and self-isolation on mental health.	Development of healthcare technologies; slight decrease in mortality; improved health due to reduced economic and social activity.
SDG 4 (Quality education)	Disorganization of education: many schools are closed, distance learning is not always effective and acceptable. There are losses in the development of human capital.	Development of digitalization in education
SDG 5 (Gender equality)	Decrease in incomes of women, growth of violence against them. Women make up the majority of healthcare and social workers where the risk of contracting COVID is high.	
SDG 6 (Clean water and sanitation)	Interruptions in the supply of clean water and insufficient access to clean water hinder the implementation of COVID prevention measures.	
SDG 7 (Affordable and clean energy)	Lack of electricity and lack of staff reduce the capacity of the health care system. Volatility in energy prices.	
SDG 8 (Economic growth and decent work)	Decreased economic activity, reduced incomes, rising unemployment, especially among young people. Problems of social protection.	Government and business focus on job creation, social protection and social dialogue.
SDG 10 (Reducing inequalities)	Slum populations are at risk of contracting COVID due to high density and poor sanitation.	
SDG 13 (Climate change)	The implementation of commitments related to climate change has decreased.	The impact on the environment has decreased due to the reduction of production, transportation, and tourism.

SDG 16 (Justice, strong institutions)	Conflicts cause restrictions on legislative processes and public debate. The operation of freedom of information laws and transparency policies hinder effective responses to COVID.	Digital transformation of state bodies and enterprises.
SDG 17 (Global partnership)	An increase in anti-global tendencies, as well as regionalization, nationalization.	The role of international organizations in the field of healthcare has grown. A global collaboration is developing to find a cure and a vaccine.

Source: Compiled by the author according to Sachs et al. (2021), Sachs et al. (2020), ILO (2020), UNSTAT (2021a)

The serious pressure of the COVID-19 pandemic on the global economy worsened the situation in achieving the SDGs, including by reducing the priority of the SDGs. While pre-COVID-19 SD has faced environmental challenges, issues of education systems engaging in resilience practices, mobilizing funding and investment to achieve the SDGs, health crises, the COVID-19 pandemic has exacerbated these challenges, COVID-19 restrictions have led to new challenges for various practitioners of SD in the future. While significant global efforts are being made to combat the pandemic, resilience in the post-COVID-19 era cannot be neglected. Sustainability and the achievement of the SDGs are even more important now than before.

4 Conclusion

The SDGs are a universal roadmap for the development of the international community until 2030 to achieve social progress and inclusion, protect the environment and stimulate economic growth. The SDGs promote partnerships between governments, the private sector and civil society organizations to ensure long-term sustainable development to meet the needs of the present generation without compromising the lives of future generations.

The strong pressure of the COVID-19 pandemic on the global economy worsened the SDG indicators, including by reducing the priority of the SDGs. While pre-COVID-19 SD faced environmental challenges, challenges for education systems to engage in sustainability practices, mobilization of funding and investment to achieve the SDGs, and health crises, the COVID-19 pandemic has exacerbated these challenges.

The SDGs are global targets that need to be adapted to specific national circumstances. No country in the world has achieved all 17 SDGs yet. The OECD countries are closest to achieving them. During the post-pandemic period (2020-21) studied by the author, they significantly improved the dynamics of SDG 9, SDG 11, SDG 13, SDG 16. But COVID-19 highlighted the vulnerability of health systems in developed countries, income inequality, inequality in access to health services, education and their quality, the gender pay gap persists there, among various groups of the population, which in the first stage of the post-pandemic period led to a deterioration in SDG 1, SDG 8, and in the second (2021) to a sharp deterioration in the position of SDG 3 and SDG 11

In Russia, in the context of COVID-19, at the first stage, the author's analysis shows progress in achieving SDG 5, SDG 9, SDG 13, SDG 16 and SDG 17 and a deterioration in the position on SDG 8, SDG 1, SDG 3, SDG 15. At the next pandemic stage (2021) there is a significant positive trend in SDG 8, due to the measures of state support for the population and businesses. At the same time, SDG 15 continues to regress and SDG 16, SDG 17 are

deteriorating due to restrictions on legislative processes and public debate, the operation of freedom of information laws and transparency policies.

It should be noted that in the Russian Federation, we observed a constant increase in the average global indicator of the SDG Index for the entire period under review. In OECD countries, it decreased in 2021 compared to the previous year, due to rising levels of poverty and unemployment in the wake of the COVID-19 outbreak. It should be noted that the dynamics in the entire active pandemic period of SDG 2, SDG 4, SDG 7, SDG 10, SDG 12 do not actually change, which indicates a stable socio-economic situation both in the ECO countries and in Russia in the period under review.

The COVID-19 restrictions have brought new challenges to various SD practices in the future. While significant global efforts are being made to combat the pandemic, resilience in the post-COVID-19 era cannot be neglected. Sustainability and the achievement of the SDGs are even more important now than before.

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Selected aspects of human resources management in the period of globalization

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Abstract

Research background: The article deals with human resource management, its theoretical principles and its use in practice as part of the company's personnel policy. Each company strives to ensure the workforce which determines its success in the period of globalization. The main goal is to analyze human resource management focused on the essence of personnel policy, the process of recruitment, the selection of employees and other activities related to the issue under study.
Purpose of the article: The article shows how the principles are applied in a selected manufacturing company in Slovakia as an attractive employer who is interested in the satisfaction of its employees. Based on the results there are presented recommendations of the effectiveness in human resources management.
Methods: The data were collected through primary research via a questionnaire survey with employees in the selected company. The selected personnel functions are described and analyzed in practice. Secondary data from company were also used.
Findings & Value added: The article aims to find out how the selected human resource processes in a company are carried out and to reveal its shortcomings based on the results of the conducted survey. The results of the research, such as the recruitment process, selection methods, satisfaction of employees and benefits policy are analyzed and confirmed by hypotheses. There are proposed effective approaches in recruitment and selection of employees in the selected company.

Keywords: *human resource management; personnel policy, recruitment process, globalization*

JEL Classification: *I25; D12; D9; E21*

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1 Introduction

The main factors of change affecting the relevance of HR work are mainly increasing competition and changing customer demands due to progressive globalisation, accompanied by the development of information and communication technologies. (Šikýř, 2016), (Baterliene, 2017), views human resources as the most important assets and valuable resources in terms of business performance. Human resources represent the most significant part of the enterprise. When selecting potential employees, companies are increasingly focusing on people's experience and competencies and to analyse their strengths and weaknesses in light of the company's goals and objectives. (Armstrong, 2007). Modern companies realise that it is the employees who, based on their knowledge and skills, are placed in the right job that can ensure their success and the achievement of their goals (Urban, 2015). Such a position of employees, who are also sufficiently motivated and rewarded, represents a competitive advantage for the company (Ponisciakova, 2020). The recruitment and selection of administrative staff and managers and their effective management is part of the corporate policy, which is part of the corporate strategy. (Andrejcak, 2015). Negative trends in the economies of some countries are forcing organizations to look for ways to increase the effectiveness of human resource engagement. Nowadays, the development and implementation of unconventional employees´ motivation systems. (Bagirova & Vavilova, 2015). The effective functioning of society is influenced to great extent by the employees of the company. Getting comprehensive information about the atmosphere among employees, process reserves and performance capacities, as well as risks, and weaknesses of the company is realized by personnel controlling. (Kalinova, 2016) (Ponisciakova, 2021). The personnel audit assesses the company's personnel policy, it collects and evaluates information on whether the company's personnel policy is set correctly and effectively (Coffee, 2019). These procedures of the company should be by the specific plan of the company, but also with its corporate culture. The basic objectives of the HR policy in the following areas: to achieve consistency between the interests of employees and the company's strategy, to obtain efficient and committed employees, to organize the social and personnel area, to involve employees in the running of the company, to motivate employees as creators of the corporate culture. (Vetráková et al., 2001), (Aghghaleh, 2014). Personnel policy is considered to be the most important tool for implementing the strategy. It may be an internal management document of the company (Brandon, 2010) Recruitment is the process of assessing and selecting the most suitable candidate with the best qualifications for the job based on the information obtained about the job applicants. When selecting an employee, we take into account both the professional and personal characteristics of the candidate. (Mikuš, Droppa,2010), (Cantera, 2000). Recruitment is a process in which HR managers, together with HR controlling, decide which of the applicants is the most suitable for a job, based on various activities and information obtained about the job applicants, concerning the criteria for a particular job. The selection of job applicants is done based on different methods which are determined by the nature of the job, company policy, structure, financial resources, labour market situation, time availability and the decision to use a certain source of employees (Droppa, Budaj, 2006). Some of the most important methods of employees´ selection include an application for employment, initial informative interview, professional assessment of job suitability, selection interview, procedure and decision-making on the admission of applicants, and signing of the employment contract (Hoopes, 2019) The job seeker submits an application for employment to the organisation and other documents required by the organization. Based on this information can follow i.e. initial informative interview, professional assessment of fitness for work, expert tests, psychological tests, use of consulting firms and selection interview. The procedure of recruiting employees and selection of employees are shown in Figure 1.
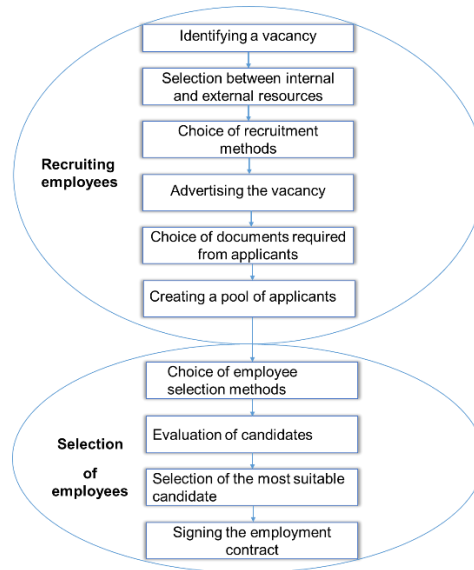
Figure 1. Recruiting employees and selection of employees

Source: author (2022)

Recruitment policy follows several steps in recruiting employees: identifying a vacancy, choosing between internal and external sources, choice recruitment methods, advertising a vacancy, the choice of documents required from applicants, creating a pool of applicants.

2 Methods

The selected company operating in the field of the manufacturing industry. It is a middle size company and it tends to grow in the future. The survey of selected personnel activities in a selected enterprise was conducted using a quantitative method, in the form of a questionnaire survey using Google form, further by expert interviews with human resources management. The employees represented the target group involving 114 respondents. The survey aimed to analyse human resource management focused on the process of human resource development and the selection and recruitment process in the company and the motivational process of the employees. The level of reliability was determined at 95%, with a standard deviation of 0.5, and a confidence interval of 10%. The number of employees in the selected company reached 160 employees. The survey was conducted from March to April 2021. The electronic questionnaire consisted of 20 questions, with a verbal scale (Likert scale), as well as open items. The obtained data were processed using the automatic processing of Google Forms and Microsoft Excel. In the assessment of findings, we have set the assumptions. We monitored the dependence of ordinal variables and binary variables. The tools of descriptive statistics were used. In the verification of hypotheses, the "Fisher test" and the "Chi-square test" to calculate the test statistics were used. The size of the research sample was determined by the exact statistical calculation quantified based on the relationship: Where n-represents the minimum number of respondents, z – is the critical value of normal distribution at significance level $\alpha = 0.05$ (95% estimation reliability), p - the percentage of respondents who know or do not know the issue - the maximum error specified by us (p-admissible gauge margin 0.5 %).

The respondent's size of the sample according to the equation was 113, and the level of significance was set to 0.10, which corresponds to a 90% confidence interval. A representative sample should be 113 respondents, where pop - represented the size of the population. The questionnaire was sent to 131 employees. A total of 114 valid questionnaires were returned, which meant a return of 70%. The questionnaire survey involved 114 respondents, of which only 20 were women (18%) and 94 were men (82%). There are currently more men than women in the company, as indicated by the structure of the company´s workforce. In terms of age structure, the age category of 31 to 45 years is predominant in the enterprise. The second most numerous age category is between 46 and 59 years, namely 35 %. Most of the respondents (60%), work in the position of a production worker. The non-production workers consisted of warehousemen, cleaners and catering dispensary workers. Of the total respondents, non-production workers made up 8%, the total number of respondents. In terms of considering the age structure of respondents, it can be seen that in the age category of 26 to 35 years, 60% of respondents predominated in the company. The information was obtained based on personal meetings with the HR manager of the company and questionnaire survey. The questionnaire survey aimed to find out how the recruitment and selection process was conducted at the selected company and to what extent employees are satisfied at the company. At the beginning of the survey, we set hypotheses, which were then tested using statistical tests.

3 Results

The aim of the article is the proposal of effective approaches in the acquisition, selection and recruitment of employees in the selected enterprise. The analysis of selected personnel activities in the selected enterprise, a questionnaire focused on the perception of the recruitment and selection process of the company's employees. The main objective is to find out how the process of recruitment and selection of employees took place when they were hired in the company and to what extent they are satisfied in this company.

In the case of the methods used to recruit employees, the company uses mainly traditional methods. When the need arises to fill a vacancy, the company immediately looks at the possibilities of filling that need. It first offers the job to its employees. Job portals are used extensively in the company. Recommendations from current employees are perceived also as a very effective method, too. The company could use more e-recruitment in terms of social networks. The company cooperates intensively with secondary schools in the region and tries the students of secondary vocational schools get to practice during their studies and at the same time it wants to educate them as its potential employees. In the selection process, the company focuses mainly on the interview method. Based on the CVs received, the recruiter approaches suitable candidates who are invited to a selection interview. We see the selection interview as a basic tool for selecting a suitable employee, based on which the company can form an opinion about individual candidates and learn as much information about them as possible. If a company wants to achieve an effective selection interview, the recruiter must be thoroughly prepared for it. The selection interview usually includes a test of the candidate's suitability for the job. Testing allows the company to objectively assess the suitability of candidates and also to verify the skills listed on their CVs.

The methods the company uses to recruit employees included recommendations of friends in 48% of respondents, said that they were informed about a job on the Job portals in 20% of respondents, which is a frequently used method either for job searching or when employers post job offers. Social networking sites was mentioned by 14% of respondents. In this option, the most frequent respondents mentioned that the way of obtaining them was based on graduate internship, recruitment agency, advertisement in the press, cooperation

with a high school in which the respondent was trained for the company. The internal source of employees was cited by respondents in senior and middle management positions. When applying for a vacancy, the most frequently requested the document was a CV, with 41% of respondents indicating this option. Educational documents came second, 30%.

Most respondents, 29%, cited the opportunity to gain new work experience. 25% of respondents cited the location of the job that influenced them in applying for the job. Salary remuneration was not very appealing to respondents as only 8% mentioned this option. More than half of the respondents indicated a selection interview. With almost 60% of production workers participating in the survey, it is not surprising that 24% of respondents were selected based on job tests. Testing forms part of the company´s selection interview process and the testing is used to decide whether to fill the production worker position. Based on an examination of the documents submitted, 25 % of the respondents were selected. In this case, the position is more of a non-production worker position, which does not require as thorough an examination of the candidate's knowledge as the other positions. When respondents were asked how the selection interview was conducted, the first option, an interview with one member of the HR department was most frequently mentioned. This option was mentioned by 46 % of respondents. A selection interview in front of a panel was conducted by 29 % of respondents. In this case, the panel consisted of the HR manager and the manager of the department in which the post was to be filled. 25 % of respondents did not attend the interview. This means that they could only have been selected based on an examination of the documents submitted, which could have been CVs, educational documents or certificates. We were interested in how satisfied respondents were with the interview process and overall satisfaction. The results showed that respondents were satisfied with the interview process, as only 6% of respondents indicated that they were not dissatisfied. The respondents were satisfied with the interview process, i.e. duration of the selection interview, the waiting time, the environment of the selection interview, the communication and the information given by the recruiter. Further we investigated how satisfied they are overall with their work. Approximately 76% of respondents indicated that they were either very satisfied or satisfied. 13% of respondents were neutral on this question.11% of respondents were dissatisfied. A significant factor influencing employees´ satisfaction is performance-based monetary compensation. This shows that the performance-based evaluation system is quite well set up if neutral respondents are not taken into account. In terms of employees´ benefits 37% of respondents were neutral and 19% of respondents are not satisfied with the benefits provided. Some form of benefits also recognition of personal achievements and praise. Also within this satisfaction factor, respondents are mostly neutral (35%). In the case of personal development and employee training, again the majority of respondents were neutral. We set hypotheses, the first hypothesis:

H0: There is no statistically significant relationship between an employee's job position (non-production and production worker) and the method by which they were selected for that position.

H1: There is a statistically significant relationship between an employee's job position (non-production and production worker) and the method by which they were selected for that position.

We used the Chi-squared test, the p-value of $0.022 < \alpha$ 0.05, that is, we reject H0 and accept H1, which means that there is a statistically significant relationship between the employee's job position and the method by which he or she was selected for that position. In case we would like to find out the strength of dependence between variables, we need to calculate Pearson's contingency coefficient. The closer the value of this coefficient is to 1, the greater the dependence. The value of Pearson's contingency coefficient is equal to 0.268, which means that it is a weak dependence. The first hypothesis was to determine whether

there is a statistically significant relationship between the job position of technical-economic, non-manufacturing, and manufacturing worker and the method by which he or she was obtained for that position. Using the Chi-Square test, the hypothesis we established was not confirmed, which means that the company does not choose the source of informing applicants about the vacancy according to the position filled. Most often, applicants are informed about the job position from their acquaintances or through job portals, but this fact does not depend on the specific job position.

Hypothesis 2:

H0: 50% of employees found out about the vacancy through e-recruitment.

H1: More than 50% of employees found out about a job vacancy through e-recruitment.

First, we determined whether the basic condition of test (4) holds, i.e. 28.5 > 5, which means that the condition holds and we can use the test. Using formula (5), we calculated the value of the test criterion T = -5.2449 and compared it with the critical value calculated using Excel z2α = 1.6449. Since the inequality does not hold (-5.2449 > 1.6449) we do not reject the hypothesis H0, i.e. we cannot claim that more than 50% of the employees found out about the vacancy through e-recruitment. E-recruitment is considered to be a popular way of recruiting employees, so we assumed that the company makes heavy use of job portal and social networking sites and the company's website to attract applicants. The suggestion for the recruitment was that the company should focus more on e-recruitment using social networks and its website.

4 Discussion

The success of a company in the market depends primarily on its employees, and therefore the company should pay attention to the process of recruiting and selecting the most suitable candidates. Employee knowledge, skills and work abilities help a business to succeed in an increasingly competitive market. The first suggestion for the recruitment was that the company should focus more on e-recruitment using social networks and its website. An important suggestion for streamlining the recruitment process is to maintain a database of applicants via software. If the company foresees an increase in the number of employees in the future, it would be more difficult to work with the documents and documents of the applicants. Therefore, the acquisition of software for maintaining a database of applicants would make it easier for the company to keep records of applicants. As part of the recruitment process, we have developed a model of how the process should work from the entry of an applicant into the company through the dispatch of normative documents to the recruitment. Recruiting and then selecting employees is a challenging process for the enterprise to deal with. While the enterprise may succeed in filling vacancies, it must strive to retain qualified and capable employees in those positions. As part of recruited employee retention, we focused on the company's evaluation system. We proposed to provide employees with bonuses based on their loyalty and to introduce a Cafeteria system, which would be an important motivational tool. We also focused on the management of interpersonal relationships, where we developed an employee code of ethics for the company, which would be an appropriate tool for maintaining professional and fair relationships in the workplace.

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Genesis of Centres of Excellence in Shipbuilding: since the end of XVIII century to the present

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Abstract

Research background: Most studies on the history of high-tech development do not address the issue in the context of the formation of Centres of excellence in line with the national priorities. Thus, the potential of generalising existing historical experience to form a systematic view of the processes of establishing such centres remains untapped.
Purpose of the article: To gain a systematic view of the processes of development of Centres of excellence in shipbuilding in Russia since the end of XVIII century, which will provide a methodological basis for the formation of such centres.
Methods: The study provides a comprehensive historical and logical analysis of the works of Russian scientists devoted to the genesis of shipbuilding and the emergence of Centres of excellence in Russia for the period since the end of XVIII century to the present. The analysis is based on the author's chronology of the development of Centres of excellence and typology of the key tools driving the emergence of relevant centres.
Findings & Value added: Author's periodisation of the evolution of Centres of excellence in shipbuilding since the end of XVIII century to the present. Typology of key incentive instruments for the formation of Centres of excellence in shipbuilding in the USSR and Russia. Findings on the impact of the various instruments for supporting the emergence of Centres of excellence in shipbuilding in each period.

Keywords: *science, technology; centres of excellence, shipbuilding; genesis*

JEL Classification: *B52; O31; O33*

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1 Introduction

1.1 Research background

Obviously, the establishment of Centers of Excellence, especially strategic ones, is impossible without the use of the state mechanism and tools for stimulating science and technology. The typology of Centers of Excellence was proposed by Zaichenko S. (Zaichenko, 2008), this approach is further developed in (Korostyshevskaya, 2018). Some aspects of the problem of the establishment of Centers of Excellence in the historical context are disclosed in the following works (Klepach and Kuranov, 2013; Korostyshevskaya et al., 2021; Alpatov et al., 2021) and others. There are a lot of historiographic studies on the development of science in general and its individual areas. An example is the work of L. Graham (Graham, 2014)   which analyzes the three-hundred-year history of technological discoveries in Russia.

A number of studies are devoted to the evolution of certain key industries. The history of the establishment of Centers of Excellence in a high-tech complex is presented in the works, (Fortov and Makhutov, 2016) and a number of other researchers. The development of such a high-tech industry as shipbuilding is considered in (Tulyakova et al., 2019; Tulyakova et al., 2017) and others.

The analysis of publications showed that there are no comprehensive studies of the evolution of Centers of Excellence in Shipbuilding in Russia, including an analysis of the tools to stimulate such centers during the whole period from the birth of the industry to the present. In this way, there is a need to gain a systemic view of the processes of development of Centres of Excellence in Shipbuilding in Russia since the end of the 18th century.

1.2. Purpose of the article

To gain a systemic view of the processes of development of Centres of Excellence in Shipbuilding in Russia since 1896, which will provide a methodological basis for the establishment of such centers.

2 Methods

The study provides a comprehensive historical and logical analysis of the works of Russian scientists devoted to the genesis of shipbuilding and the establishment of Centers of Excellence in Russia for the period from 1896 to the present. The analysis is based on the author's chronology of the establishment of Centers of excellence and typology of the key tools driving the establishment of relevant centers.

3 Results

3.1 Author's periodisation of the evolution of Centres of excellence in shipbuilding

The main milestones (change of mechanisms and tools for stimulating the development of shipbuilding) in the historiography of the industry are taken as the basis for periodization. The results are divided into the following periods:
1696-1855 – "forerunner"
1856-1920 – "birth"
1921-1937 – "revival and strengthening of the fleet"

1938 -1945 – "great shipbuilding program"
1946-1963 – "shift of priorities" in shipbuilding"
1964-1980s – "golden time of shipbuilding"
1990-2006 – "lost years and projects"
2007-2019 – "on the way to renaissance"
2020-present – "the renaissance of shipbuilding"

3.2 Forerunner of the establishment of Centers of Excellence in Shipbuilding

The title of the creator of the Russian fleet rightfully bears Peter the Great, since it was he who created the fleet as a permanent regular structure already at the end of the 17th century. The next milestone was the foundation in 1856 of the Baltic Shipyard in St. Petersburg, which is now a world-class center of excellence in shipbuilding. And already in 1862, the first local metal ship was built at the plant. Thus, in just six years, a full cycle of creating new high-tech products was completed, which, given the level of development of the technological base that existed at that time, is a record.

In tsarist Russia, shipbuilding was one of the priorities of the country's economic development: the first scientific and engineering society in this area, the "Society of Marine Engineers", was founded in 1896 in St. Petersburg. In 1899, a qualification society was created, which at different times bore the name Russian, Russian Register and, finally, the Register of the USSR, and in 1915 – the "Union of Marine Engineers". The vigorous activity of the Register, its technical council, as well as scientific and engineering societies, contributed to the fastest restoration of the domestic fleet. As an illustration of the highest level of scientific and technical developments of engineers of that time, let's take the example of Erast Evgenievich Gulyaev (1851-1919). According to experts, "his main achievement – the system of underwater structural protection of ships – remains relevant in our time" (Rassol, 2014).

In addition to the development of the surface fleet, systemic work was carried out to create submarines. Already in 1900, the idea of developing such vessels found practical implementation in the creation of a diving department at the Baltic Shipyard, on the basis of which the Rubin Central Design Bureau arose in the future.

3.3 Establishment of Centers of Excellence in Shipbuilding in the USSR

1920-1937 – "revival and strengthening of the fleet"

In the USSR, the priority of the development of shipbuilding and the fleet was preserved, evidence of this is the numerous initiatives of the country's leadership. So only in 1921 were adopted:

- Decree of the Council of People's Commissars signed by Vladimir Lenin on the creation of a floating marine scientific institute for the study of the Arctic basin from 1921.
- The decision of the 10th Congress of the Russian Communist Party (Bolsheviks) on the revival and strengthening of the Red Navy.
- Resolution of the Council of People's Commissars signed by Vladimir Lenin "On State Shipbuilding" and the establishment of a shipbuilding department (Tsentrsudostroy), under which many shipbuilding enterprises were transferred.

In 1926, the first program of Soviet military shipbuilding was approved by the Council of Labor and Defense. In the same year, six diesel tugs were laid down. In the first five years, only the team of the Admiralty shipyards gave the fleet ahead of schedule over 50 ships, incl.

the first Soviet icebreaker "Toros". In 1937, the construction of the steamships Dezhnev and Levanevsky began. Thus, the strategic potential of the USSR in the Arctic zone was formed.

Thus, the Admiralty Shipyards can be called a strategic center of excellence, since their activities were aimed at ensuring national economic security and parity of the country with the advanced countries of the world. Izhorskiye Zavody, which took an active part in the implementation of the country's industrialization plan, can be called another strategic center of excellence. In 1931, the first Soviet blooming was created. In 1933, the plant began designing tugs, and since 1935, the company has already switched to their mass production. The rapid pace of implementation of all plans and programs was largely ensured by the alignment of research and production chains: from research and development to engineering testing and serial production. Let us note that the first Russian center for engineering tests in the field of shipbuilding was the Experimental Basin of the Maritime Department, the official start of which dates back to 1894. Around it design bureaus and research institutes (now the Krylov State Research Center) were created.

1938 -1945 "great shipbuilding program"

In February 1938, the "Program for the Construction of Combat and Auxiliary Ships for 1938-1945" was presented for the first time. According to the Program, by January 1, 1946, it was planned to build 424 ships of the main classes. The peculiarity of the plan for the implementation of this program was the all-Union division of labor and industrial cooperation. For example, "if earlier almost the entire ship was built directly at one shipbuilding plant (even its steam power plant was created in one of the workshops of the same plant), and only armament came from other enterprises, then when implementing a new shipbuilding program, the plant only formed the hull, but saturated its already "foreign" mechanisms. So, 122 counterparty enterprises were involved in the construction of the lead battleship pr.23 (Platonov, 2017). Thus, the implementation of the program stimulated the processes of division of labor between regions and their cooperation, but at the same time, a number of its projects were not completed on time due to failures in supply chains.

As part of the program, the largest competence center Krasnoe Sormovo actively worked. So in 1939, "despite the absence of assembly and delivery shops, slipways, launching devices and embankments, it confidently went to the construction and delivery of at least 5-6 submarines of each project per year." According to experts, "the Navy met the beginning of the war the most prepared in comparison with other branches of the armed forces. Thanks to this, there were almost no losses in the fleet at the beginning of the war" (Chernoverkhsky, 2016). During this period, the Baltic Shipyard actively continued its work.

1946 - 1963 "shift of priorities" in shipbuilding

Immediately after the end of the Great Patriotic War (in August 1945), a plan was developed aimed at restoring the country's navy. During the implementation of this plan, the fleet was completely updated. Along with this, activities in civil shipbuilding intensified. In particular, on May 19, 1947, the Council of Ministers of the USSR adopted a resolution on the resumption of river shipbuilding and the production of passenger steam locomotives at the Krasnoye Sormovo plant. At the Admiralty shipyards, the first post-war orders included: ship-lifting pontoons, river trams, tankers, dry cargo barges and tugboats. In 1951, the lead tanker Kazbek was launched at the Black Sea Shipbuilding Plant. The creation of a series of these ships marked the beginning of the extensive construction of tankers in the USSR

Close attention was paid to the development of the Arctic region. The need for the development of the northern sea route predetermined the creation of an icebreaker fleet. In

1947, by a decree of the Government, the Central Design Bureau of Icebreaking Construction was established – later the Central Design Bureau "Iceberg", in which projects were developed for powerful icebreakers and icebreaking transport ships. A great achievement of Soviet science and technology was the creation of the world's first nuclear-powered icebreaker "Lenin", which was launched on December 5, 1957. 500 enterprises and organizations of the USSR participated in the construction of the nuclear-powered icebreaker (Bogatyrev, 1979).

1964-1980s – "golden time of shipbuilding"

In 1964, a decision was made to return to the sectoral scheme of managing the national economy. At the beginning of 1965, the Ministry of the Shipbuilding Industry was formed, which included all the plants and organizations in this industry. Thus, organizational structures were aligned with the full life cycle of products, which significantly reduced the gap in the triad "science-technology-production". The principle of triads was founded in an earlier work (Korostyshevskaya et al., 2017).

During the period under review, the Arctic program continued. In 1964, the Government issued a task to design two powerful nuclear icebreakers, and already in 1974 the Arktika icebreaker was commissioned, in 1977 the Sibir icebreaker was handed over to the customer.

The establishment of sectoral competence centers continued. Rubin Central Design Bureau has turned from a highly specialized bureau into a diversified enterprise engaged in the design of marine equipment for the development of the shelf and other civil offshore structures. Thus, in contrast to many industries in shipbuilding, there was a trend to strengthen the civilian component in the industry's products.

3.4 Development of centers of excellence in shipbuilding in Russia

1990 - 2006 – "lost years and projects"

Despite the crisis situation in the economy that developed after the collapse of the USSR, the issues of priority development of the Arctic remained on the agenda. In 1990, the commission on transport problems of the USSR Academy of Sciences approved the development of underwater vehicles for the Arctic. In 1992, the Nuclear Shipbuilding Center of the Russian Federation was established in Severodvinsk. Of the 44 shipyards that existed in the USSR, 35 remained in the Russian Federation. In 1992, the modernized nuclear icebreaker Yamal was built.

As an attempt to revive the merchant fleet in Russia in 1993, the Program for the renewal of the fleet for 1993-1998 was adopted. The goals of the program were achieved by 38%. State support for the program activities over the years of its implementation amounted to 0.88% of the planned figures, and its share in the total funding amounted to 4% (Sea News of Russia, 1995).

The construction of new sea transport vessels was mainly carried out as part of the Federal Target Program "Modernization of the transport system of the Russian Federation in 2002-2009." In fact, in 2002-2009 146 transport vessels were built with a total deadweight of 10 million tons. At the same time, it should be noted that only 4% were built at domestic factories. About 95% of all ships built during the analyzed period were registered under foreign flags (Peresypkin et al., 2011).

In 2001, the Maritime Doctrine of the Russian Federation for the period up to 2020 was approved, aimed at ensuring the national interests of the Russian Federation in the World Ocean, and the goals and principles of the national maritime policy were formulated. In accordance with the doctrine, in 2007 the "Strategy for the development of the shipbuilding

industry for the period up to 2020 and beyond" and the FTP "Development of civil marine equipment for 2009-2016" were adopted. All of these programs have become the first step towards the revival of domestic shipbuilding.

2007 - 2019 – "on the way to renaissance"

In March 2007, a decision was made to form the United Shipbuilding Corporation, which became the new center of excellence in the industry. Starting from 2010, the Federal Target Program "Development of the Transport System of Russia for 2010-2015" came into effect. The federal budget funds planned for the construction of marine facilities, however, were reduced (Peresypkin et al., 2011).

According to the results of 2011, Russian shipbuilding ranked 20th in terms of tonnage of ships built (less than 0.1% of the total volume of world shipbuilding). In the 1980s, domestic shipbuilding was in 9th-10th place, producing approximately 4% of the volume of world civil shipbuilding (Logachev, 2013). The reason, in our opinion, is the transfer of heavy high-tech industries, incl. shipbuilding on market rails, i.e. the state stopped financing the construction of ships and modernizing shipyards.

The Russian Federation has a special shipbuilding niche that needs to be provided in the first place: the construction of icebreakers, ice-going vessels, research vessels, ships and watercraft for working on the Arctic shelf, as well as floating nuclear thermal power plants. To implement these tasks in 2014, the State Program "Development of shipbuilding and equipment for the development of offshore fields for 2013-2030" was approved. The program includes the FTP "Development of civil marine and river equipment for 2009-2016". The planned values of the indicators of the state program for 2020 were achieved for all indicators, except for the indicator "Export volume of civil products of the shipbuilding industry".

Since 2012, a new tool for the development of the industry has been used – the cluster component of industrial policy. The formation of clusters in shipbuilding began in connection with the implementation in 2012 of the program of the Ministry of Economic Development to support pilot innovative territorial clusters. For example, in 2012 a shipbuilding cluster was created in the Arkhangelsk region.

2020-present – "the renaissance of shipbuilding"

Russian shipbuilding, most of which is consolidated in the United Shipbuilding Corporation (USC), is experiencing a renaissance. Launching of the nuclear icebreaker "Ural", laying of the icebreaker "Yakutia", entering the final stage of testing the lead icebreaker – "Arktika". In May 2020, an unmanned Vityaz dived to the bottom of the Mariinsky Trench – the world's first autonomous vehicle that descended more than ten thousand meters. In July-September 2020, Russian shipbuilders reached the level of 860 thousand registered tons (CGT), ahead of China and Japan, the other two representatives of the "big three" of global shipbuilding, in this indicator. In the total volume of industry orders on a global scale, the share of Russia over this period amounted to 27% (South Korea – 45%, China – 26%)» (PORTNEWS, 2020).

In the current period, the cluster approach continues to be used to form centers of excellence in the industry. In 2021, a territorial shipbuilding cluster was created in the Leningrad Region. JSC Baltiysky Zavod, JSC Admiralty Shipyards, PJSC Severnaya Verf, PJSC Vyborg Shipbuilding Plant are located in the region. Combining these companies into a single cluster will allow, according to experts (Toropchin et al., 2021), to solve many problems of scientific and technological development, reflected in the "Strategy for the development of the shipbuilding industry until 2035". It should be noted that when

developing a project to create a cluster, such a tool as long-term planning with a horizon of more than 30 years was used, in particular, a promising production program for the enterprises of the North-West cluster for 2027-2059 was created. Thus, it is in shipbuilding that we see a return to the "forecasting-planning-programming" triad, since without its use it is impossible to make long-term decisions in such a period (Korostyshevskaya et al., 2017).

4 Discussions

The high engineering potential of the industry, formed back in tsarist Russia, ensured the development of shipbuilding in the USSR. Comparing the above facts, we can conclude that the measures to stimulate the development of shipbuilding in the USSR are more effective than in modern Russia. So, using the example of the establishment of the Russian icebreaker fleet, we see that the period from the moment decisions were made at the state level to the delivery of finalized products to the customer was only 10 years.

In modern Russia, the example of the Federal Target Program "Development of Civil Marine Engineering for 2009-2016" illustrates low performance expressed in actual production indicators. As part of the program implementation, more than 60 billion rubles were allocated in the complex of technological areas and 680 R&D were performed. By 2016, the program brought 1505 new technologies, about 1040 patents have been issued, 734 of which were assigned to the Russian Federation (Sudostroenie (editorial), 2017). At the same time, the share of domestic civil shipbuilding products decreased by 30% by 2016 over three years (from 70% in 2013 to 40% in 2016). It should be noted that by 2019, the volume of production of civilian ships with a tonnage of more than 50 tons reached the level of 2013, while a decrease in production was noted for small ships and boats (MASHPORTAL, 2019).

However, in 2020, Russian shipbuilding emerged from the most colossal crisis in its history. In the third quarter of 2020, it ranked second in the world in terms of shipbuilding orders, second only to South Korea, one of the global leaders in this industry (Park et al., 2021).

Our further research in this direction will be aimed at comparing the experience of reforming Russian shipbuilding with the experience of solving similar problems faced by other world leaders in the field of shipbuilding (Hess et al., 2020), (Hadžić et al., 2015), (Panchuk et al., 2021).

5 Conclusion

During the survey, the following main results were obtained:
- Developed the author's periodization of the development of shipbuilding from the end of the 17th century to the present.
- Typology of key incentive instruments for the establishment of Centres of Excellence in Shipbuilding in the USSR and Russia.
- Findings on the impact of the various instruments for supporting the emergence of Centres of excellence in shipbuilding in each period.

Directions for further research:
- Review of centers of excellence in shipbuilding at the regional level (clusters).
- Study of the mechanisms for the development of centers of excellence in shipbuilding in the global economic space.

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The Level of Digitization and the Use of Innovative Technologies in Tourism Enterprises

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Abstract

Research background: In today's dynamic, globalized and digitized world, new technologies, enable the development of applications that contribute to the success of entrepreneurs, companies and organizations across all industries. With the constant development of innovative technologies, the tourism industry is also gradually changing. At the same time, the use of mobile technologies, augmented reality, data analytics and others also has a significant effect on changes in the consumer behaviour of customers who are practically always online. On the one hand, every company and organization needs to keep its data safe on the other hand, it wants to provide maximum information in a friendly environment to potential clients, who also emphasize safety when using the Internet and privacy protection. This requires the necessary legal framework and a significant emphasis on secure digitization. In the tourism industry, as in other sectors, digitization has found and is increasingly finding its place. There are gradually more entities, that use new technologies with the aim of improving the quality of their services and innovating their offer in order to make it easier and more pleasant for their potential customers to decide on the purchase of their tourist product.
Purpose of the article: The aim of the contribution is to map the factors affecting digitization and the introduction of innovative technologies in tourism enterprises.
Methods: Primary data obtained from controlled interviews with representatives of professional associations and operators of monitored facilities and secondary data from publicly available sources were used.
Findings & Value added: The contribution contains model examples of the use of innovative technologies in tourism enterprises and the level of ensuring the security of their data in the Czech Republic.

Keywords: Tourism; digitization; innovative technology; data security

JEL Classification: *A10; M31; O33; Z32*

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1 Introduction

We live in a dynamic, globalized and digitized world. This places new and higher demands on us. Currently affected by a number of significant changes in society, emphasis is placed on the need to make greater use of innovative technologies. COVID-19, which significantly influenced the behavior of all companies and organizations, including tourism service providers, on the one hand, and consumer behavior, on the other, contributed to the acceleration of their implementation. Even those companies that resisted technological innovation introduced at least some of the options offered in their processes and began to use them in practice. Most tourists usually move in an online environment where they choose a destination, book transportation, accommodation and other services, pay through internet banking. In this way, potential customers can plan their holidays and conveniently arrange them from home without having to visit any intermediary or service provider. If existing and new companies providing services in tourism want to reach increasingly demanding clients, they must focus on a friendly user environment, quality and stability, communicate through social networks, get feedback directly from visitors, get data from search engines, monitor, web traffic pages etc.

In tourism, as in other industries, digitalisation has found and is increasingly finding its place. Gradually, more entities are using new technologies in order to improve their services and innovate their offerings in order to make it easier and more pleasant for their potential customers to decide on the purchase of their tourist product. For example, the use of virtual reality in order to motivate the client to a real visit to the destination, digitization of routes for tourists, where you can use a smart device or computer to view interesting places on the route (Zelenka and Kysela, 2013). However, tourism businesses are increasingly using many other innovative technologies that are in demand among clients.

The customer journey is affected significantly more factors than in the past. Digitization helps to better understand, changing consumer requirements and providing more efficient solutions customer problems (Rusu et al., 2020). Hence technology can fundamentally change the way tourist flows are managed and experience. Smart technology and personal mobile devices provide new contact points. Consequently, they have points of contact and multidirectional influence on purchasing decisions and also enable direct interaction (S, 2018). For linking digital and physical distribution channels effectively, systematically and holistically point of contact with the customer management is essential. The challenge in digital transformation is to create digital and ecosystem in which tourism service providers develop holistic and valuable or intelligent tourism experience enhancing personalization, contextual awareness and real-timeinformation (Shafiee et al., 2021). Successful digital transformation in companies will depend on adaptability providers of tourism services, their cooperating partners and consumers (Abraham et al., 2022).

The following Figure 1 by the author Reinitz shows the development stages and concepts from digitization to digital transformation.
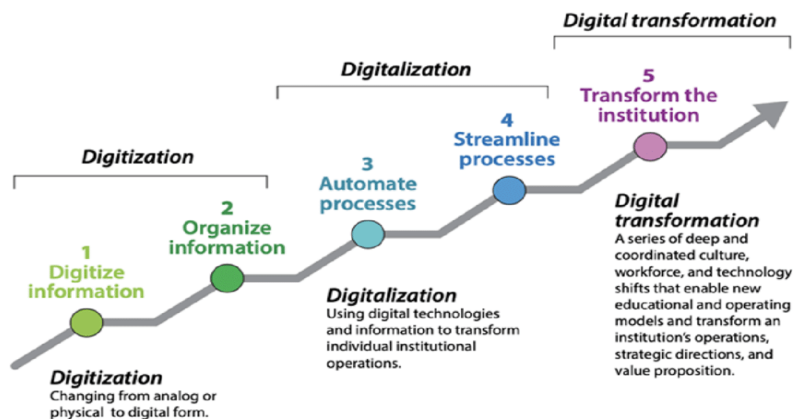
Figure 1. Difference between digitization, digitalization and digital transformation

Source: Reinitz (2020)

2 Methods

Comparisons and in-house research were used, with primary data obtained from controlled interviews with representatives of professional associations and tourism operators in order to map safety in the use of innovative technologies. The survey was conducted in February 2022, the target group was the operators of travel agencies, spas, accommodation and catering facilities in the number of 21. The research tool was a questionnaire and telephone questioning. Secondary data were obtained from publicly available sources, especially from the survey of Hotel.cz and from the results of 2 surveys "Marketing, technological and digital trends" and "Innovation with emphasis on digitization, automation and robotics", which for the Association of SMEs and sole traders The Czech Republic implemented IPSOS. The target group were: self-employed with employees and owners, executives, directors of small and medium-sized enterprises with a size of 4-250 employees. Data collection method: telephone and online survey. Data collection took place on: 25.8. - 19.10. 2021. Research tool: structured questionnaire. Sample size: 300 companies.

3 Results

3.1 Innovative technologies in tourism

Tourism has been closely linked to the development of ICT for more than 30 years. The emergence of computer reservation systems (CRS) in the late 1970s, global distribution systems (GDS) in the late 1980s, and the Internet in the late 1990s dramatically changed operational and strategic practices in tourism. Tourism first focused on the application of computer systems (eg CRS, GDS) in order to increase the efficiency of international information processing and distribution management. Today, the Internet and ICT are important both at the operational level and at the structural, strategic and marketing levels, as they facilitate global interaction between suppliers, intermediaries and customers worldwide (goodfellowpublishers.com, 2017). In the so-called smart region, the citizen can also use the new SMART technologies in communication with the providers of common public services that he needs for his daily comfortable life. Smart solutions in public services

are developing very fast, in some areas one of the most progressive sectors is the implementation of the concept of smart cities and regions.

The most important innovative technologies

Modern technologies are increasingly penetrating people's lives and taking their permanent place in them. There is a large number of them, so in the following text we list only those that are used most often.

Mobile application. Smartphones that can be conveniently carried and used anywhere in the field without the need for complex assembly or connection have stimulated the development of applications that provide users with rich content of online animations, sounds, videos and interactivity (Chatfield, 2013). There are a number of applications containing online animations, videos, sounds, interactivity. The most frequently used mobile devices are mainly smartphones or "smartphones" (Šobáňová & Lažová, 2016), but it is also possible to include, for example, tablets or navigation. Carriers, hotels, gastronomic facilities, monuments, etc. have their own mobile applications.

Web presentation. The Internet played an important role in the development of tourism not only due to the possibility of fast and cheap dissemination of information, but a well-designed website has become a powerful marketing tool, which has had and continues to affect the economic growth of companies. The use of presentation or promotion through websites is a matter of course for entities operating in the field of tourism. Therefore, more and more emphasis is placed on the content, updating of information, creation of product databases with the possibility of their reservation, flexibility and effectiveness of these supporting means of promotion or easy orientation in the structure of the site. Individual companies and places can communicate on the Internet (Pilný, 2016). The website is one of the basic parts of the tourism information system. Internet presentations became an important marketing and communication tool for tourism entities several years ago. The advantages of the presentation on the Internet include: thematic offer differentiated by type of visitor, the possibility of targeted information retrieval, constant availability of web pages and economic aspect of their use, as they replace some expensive printed materials with cheaper and more up-to-date digital information, often with significantly higher incentive effect on the client (Zelenka & Kysela, 2013). From the point of view of users in tourism, webcams are also a valuable source of information within the web presentation. They allow you to look into the real environment at a specific time. They are therefore an important source of information, for example, about the weather, the occupancy of water parks or the occupancy of mountain ski resorts.

QR codes. "Quick Response" is characterized by the fact that they are written in a square. QR code scanning is enabled using a special device or mobile application (Šobáňová & Lažová, 2016). They can be found in many places on the table in restaurants for easier order processing, in spas, in the field, for example on nature trails, where it is possible to take information with you on the phone, read it during the trip or work with them, which will be used by students or families with children who can prepare for the trail in advance (Cata et al., 2013).

Virtual reality. It is one of the major modern technologies that embodies new possibilities through digitization. According to Zelenka et al. (2014) virtual reality in tourism so far plays a rather "supporting" role as a source of information and impressions before visiting the destination, even though its potential is great. The client can move to the destination from the place of residence, has the opportunity to view the hotel, restaurant, historic building, etc. Virtual tours are one of the key ways to promote the site for use in tourism. The biggest advantage is the ability to view the object of interest before the visit. The emphasis is mainly

on quality. Today's technologies also enable panoramic tours that can use a 360 ° viewing angle. Some providers also add information about the location to the virtual tours, including maps, or accommodation, transport and other services. Increasingly, companies are also using virtual assistants for customers, so-called chatbots. As virtual reality continues to evolve, the number and importance of these applications will undoubtedly increase in this area.

Information kiosks. The automated availability of information, especially at the gathering places of tourism participants and other passengers, is increasingly ensured by information kiosks (also referred to as infoboxes or information stands) and other similar information system terminals. Their main advantage is that, unlike various information offices and centers, they do not have opening hours and are available or usually 24 hours a day. Of course, this does not mean that infoboxes can replace the verbal transmission of information, but they can represent it with some dignity. (E-tourism, 2021)

Robotization. We do not only find robots in production plants, but now also in a number of tourism companies, for example in some accommodation establishments they are at the reception, where they communicate with clients, measure their temperature or clean their rooms, especially during pandemics. Contactless technologies use, for example, Vouch's digital reception system, which allows hotels to receive and answer any guest questions - from the need for more towels, to ordering room service or making spa reservations - without the guest having to pick up the room phone or stand in line in the lobby. Guests access the robot using their personal mobile device, and either scan the QR code or place the phone near the NFC tag.

Digitization. Digitization can be perceived in terms of documentation of not only printed materials and documents, but it is also possible to digitize, for example, routes for tourists who can use smart devices to view interesting places on the route for tourists, skiers, cyclists, etc. (czechtravelpress.cz, 2017). The digitization of all processes and value chains in the tourism, travel, hospitality and catering sectors, which will enable organizations to maximize their efficiency and effectiveness, is referred to as E-tourism. (https://www.chytryregion.cz/cs/chytre-sluzby)

Location-based services (LBS). These geolocation applications work online and offline, the most well-known include GPS or Galileo and are used not only for leisure activities such as trip planning, geocaching, tourist guides, but in many other situations, such as emergency calls, tracking persons / vehicles, at rescuers. (Zelenka and Kysela, 2013).

3.2 Factors influencing the use of innovative technologies in tourism

Theres is a large number of factors that influence the use of innovative technologies. First of all, it should be borne in mind that the main stimulus is not just the need to digitize, in strategy papers at all levels, but to create the conditions for not only public but especially private actors to be motivated to innovate in technology. When these entities have enough information about the possibilities of using the given tools, the next step is their application in practice. However, there is usually a problem with considerable financial demands (Kaiseršotová, 2016). Lack of resources results in insufficient use of innovative technological tools. Other important factors include the opportunity to gain a competitive advantage and be among the first to offer customers an interesting application. However, the need to train staff so that they can use established technologies cannot be overlooked. Therefore, a good internet connection is needed for everything to work. When everything works, there is time savings, more efficient use of human resources, and especially to meet customer needs (Prem, 2021). At the same time, it is necessary to ensure the security of data, clients and employees, and the socio-psychological aspects related to the large amount of time spent using innovative

technologies and extreme cases leading to the so-called digital dementia of some people cannot be neglected.

A central tool that bridges all stages of the customer journey are platforms in different ways settings, especially by connecting service providers and communicate effectively and transparently with customers as seen in Table 1. In addition, a couple of pulses are related to the background processes according to the framework shown in Table 1. The most critical issue is the provision of know-how, data management and the need for strategic impulses.

Table 1. *Design of Digitalization, problems and solutions*

Customer Journey					
Communication/ Information	**Distribution/ Booking**	**Transportation**	**Accommodation**	**Activities**	**Aftercare**
• Timeliness of data across all channels • Data availability and security as a basic service • Fit of channel and target group • Integration of new content: VR, 3D hotel, etc. • Providing information frequently • Information overload • Knowledge about information needs • Potential of chatbots • Need for joint platforms	• Occupancy management on different scales and channels • Insufficient customer-centric booking engines, increased individualization • Service providers' tendency to quite DMO booking tools -> growth in booking.com -> loss of contact, know-how transfer more difficult • Technical infrastructure for dynamic booking • Cross-provider cooperation	• Existing guidance systems based on motorists only • Need for flexible systems in excursions • Need for integration of alternative transportation • Support of reliability by digitalization • Need for real-time information on mobility streams	• Stringent implementation of electronic registration forms • Self-check-in/check-out available only in a couple of hotels	• Increased bookability • Realtime information on opening hours and cuing • Monetization • Heterogeneity of services, which makes data complex • Fulfillment of spontaneous needs/customer satisfaction	• Definition of channels and responsibilities • Already high interaction via other business models: FB, Google, etc. • Lack of customer data • Unclear dealing with customer ratings • Reviews, complaints, and loyalty, for which data and management are needed
Secondary Activities					
Data Management			Know-How		
• Multi-channel/interfaces, connectivity analog (digital) • Data availability, visibility of offers • Networking of the data pools, also at the organizational level • Digitization of paper data • Different data qualities • Storage of customer data • The need of a platform for each DMO level • Broadband connectivity across the customer journey			• Qualification of small service providers • Interaction between DMO and service providers • Professionalization of DMOs • DMO as a supporter for all SMEs		
			Payments, Identity		
			• Progress in digital identities beyond payment • Understanding money and information flows in destinations and organizations		
Cooperation			Strategy		

• Distribution of tasks between the different levels of DMOs
  • Federal DMO: Interfaces and technical prerequisite, knowledge provider
  • Local DMO relationship management, knowledge diffusor
• Startups: Stronger cooperation on a project basis
• Networking of tourism professionals, new collaboration, away from parochial thinking
			• Agile structures
			• Analysis of international best practices and definition of own position and aims in a transparent way
			• Digital maturity, which also includes leadership, knowledge management, and developing products
			• Lack of a decision support platform		

			R&D		
			• Combining big data and own market research to get the big picture		

Source: Thees et al. (2021)

Figure 2 shows the digitization business model, which includes individual steps and activities associated with digitization in relation to costs and revenues.
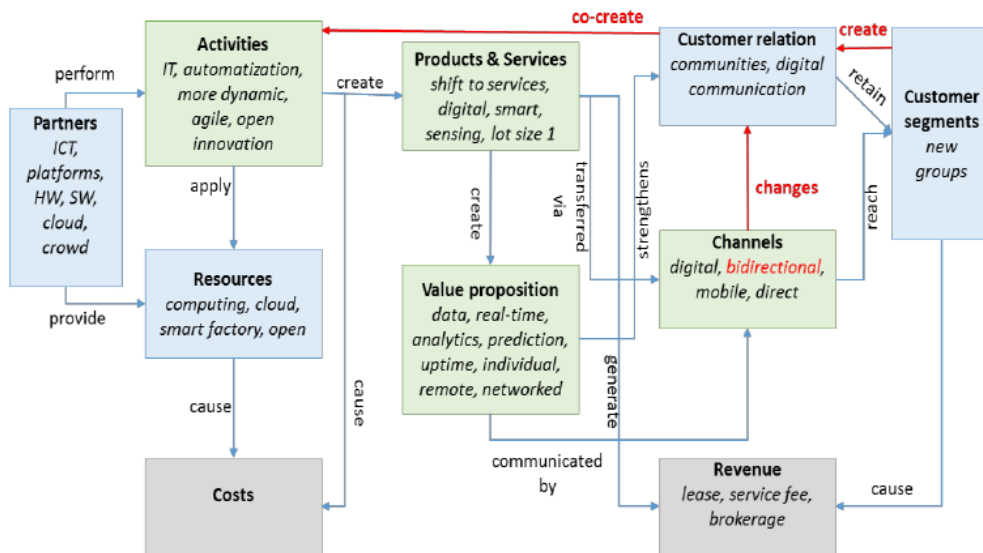
Figure 2. The Digitization business model framework

Source: Prem (2021)

3.3 Legal norms

As there is a large amount of sensitive information and data files in the virtual environment, these also need to be ensured by legislation. The Personal Data Protection Act No. 101/2000 Coll. Is intended for this purpose, in addition to which there are other legal norms concerning the accessibility of websites and mobile applications both at the EU and national levels, which use the harmonized standard EN 301549 V2. 1.2 (2018-08) referring to internationally recognized standards, in particular the Web Content Accessibility Guidelines (WCAG) 2.1. In the Czech Republic, Act 99/2019 Coll. on the accessibility of websites and mobile applications, which has been updated to make the collection of information or the provision of various areas of life accessible to blind people, of whom there are over 80,000. But because these technologies facilitate faster orientation and access to information, they also serve users who have no health restrictions. Directive (EU) 2016/2102 of the European Parliament and of the Council on the accessibility of public sector websites and mobile applications sets out, inter alia, the need to comply with legislative procedures, in particular: The trend towards a digital society provides users with new ways of accessing information and services. Providers of information and services, including public sector bodies, are increasingly using the Internet to create, collect and provide a wide range of online information and services that are essential to the public. (mvcr.cz)

One of the key findings is that the current level of digitization in the Czech Republic is generally relatively low. However, the situation should improve. A survey of the Hotel.cz portal by Szallas Group and Nielsen IQ shows an increase in interest in introducing innovative technologies in tourism companies. The survey also shows that higher interest in travel is expected in 2022 than in the pre-pandemic period and a significant acceleration in the digitization of tourism operators. It is important not only to digitize, but to digitize securely. According to the National Office for Cyber Security (ÚKIB), as many as 40% of Czech companies faced ransomware alone, ie encryption of company data. And virtually

every company has encountered other forms of cyber threats. The weak point of the corporate network is the end stations. Mobile phones, laptops and tablets often leave the corporate network and your employees often use them from home, without any security. The same results emerged from our own survey, according to which only 37% of the addressed companies have secured data against ransomware, against theft or copying 52%, protected access to documents 29% and a backup source in case of internet, business application or mail failure 23% of respondents.

4 Discussion and Conclusions

The motto of today is online. Not only the vast majority of reservation processes or business transactions, but also marketing and communication activities have moved into the virtual environment. Speed and efficiency of communication are the bearers of change. The information printed a week ago is out of date today, so after 24 years, the most widely read COT professional title in the field of tourism will be transferred to the Internet. Digitization of tourism in the Czech Republic is also a priority of the CzechTourism agency, for this reason an online professional portal was created, designed for entrepreneurs, professionals and travelers, in order to facilitate their access to information, audio and video content and find ad. CzechTourism employees are currently working on two eTurista digital projects, where the supply and sale of experiences will be concentrated in one place, among others it will provide municipalities with a simple tool for collecting local fees and GDS (Global Distribution System) they could reach not only domestic but also foreign visitors with an online offer (CzechTourism, 2022). The goal of the strategy of the Ministry for Regional Development is, among other things, for the Czechia to be at the forefront of the global Tourism Competitiveness Index within ten years. In 2019, ie before the pandemic, the country ranked 38th in the ranking. According to the Minister for Regional Development Ivan Bartoš, digitization in the Czech Republic will be actively addressed, it presupposes the introduction of a European digital identity and the involvement of artificial intelligence (MMR, 2021).

The main emphasis should be on secure digitization. On the one hand, every company and organization needs to keep its data secure, on the other hand, it wants to provide maximum information in a friendly environment to potential clients, who also emphasize safety when using the Internet and privacy. The necessary legal framework is needed for this.

Another question is whether new technologies and their use in tourism companies influence customer behavior or whether their increasingly demanding requirements put pressure on companies to change their behavior. There is probably no clear answer, but it can be stated that the influence of customer and company behavior is two-way. The customer, his behavior, the way he works with information, his decision-making process and his behavior on the spot are changing (Palatková, Zichová 2014). Also his communication with friends, sharing experiences and the need to show off what he did, what he achieved, where he spent his vacation and what a great experience he had and what he saw. All these activities are being digitized. This leads to a change in the behavior of destinations, regions, tourism service providers, if they have not already started, they must start to deal with digitization and think best about digital transformation (UNWTO, 2022).

With the continuous development of the economy, changes in society or in the political sphere, globalization and the constant development of new technologies, tourism is also gradually changing. With changes in consumer preferences and their ability to easily inform and compare individual services or destinations, the possibilities of offering and using services are constantly being innovated. Closely related to this are the changing trends in tourism. It can be stated that the optimal functioning of tourism depends on timely and

relevant information and at the same time on the use of modern technologies for their provision, transmission and sharing. In this context, digitization is an important tool for the renewal and development of tourism. The Czech legislation must also be prepared for this. However, it is important to realize that no technology will replace the human factor in the services sector in particular and not underestimate the socio-psychological aspects of digitization.

Acknowledgements

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Marketing communication of local producers in the context of social responsibility in the process of globalization

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Abstract

Research background: Achieving success in the market is becoming increasingly difficult for local producers due to globalization and growing competition. Local manufacturers are one of the important contributors to economic growth, development and employment, but their business activities are constantly influenced by the evolution of new technologies and the trend of globalization. Consumers requirements for companies are growing every day and they expect from the company not only to sell products, but also to take responsibility for the protection of economic, environmental, and social interests of society. However, corporate social responsibility is not mandatory, so many companies do not feel the urge to engage in this area. But the pressure on businesses, to not only operate for profit at the expense of the environment, society, economy, consumers and employees, is growing every day. For the success of local producers, it is important to adapt the company's marketing communication to the current market's situation and consumer needs, which means that it should not be only effective, but also socially responsible and sustainable.

Purpose of the article: The main aim of the paper is to find out the attitude of consumers towards the initiative in the field of socially responsible marketing communication of local producers.

Methods: General scientific methods were used for data processing, and the data obtained from the conducted survey were evaluated using mathematical-statistical methods and statistical hypothesis testing.

Findings and added value: The benefits of socially responsible marketing communication for local producers are formulated based on the analysis of the theoretical background of the solved issue and the results from the conducted questionnaire survey.

Keywords: *globalization; social responsibility; marketing communication; local producers; SMEs (small and medium-sized enterprises)*

JEL Classification: *M14; M31; Q01; F60*

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1 Introduction

Marketing communication is currently one of the key factors influencing the success of any company. It provides local producers the opportunity to reach new customers, inform them about the products they sell and convince them to buy it. Marketing communication is essential for the success of local producers, because without it, most customers would not know about the business or the products it sells. Choosing the right tools and forms of marketing communication is therefore very important for them. Due to globalization and the advancement of technology, the number of marketing communication tools that can be used to communicate with consumers has increased significantly over the years. For local producers, these new marketing communication techniques provide a number of benefits, including increased company exposure, cost efficiency, the potential to reach new clients and improve competitiveness of company (Taiminen and Karjaluoto, 2015). However, consumer demands have also increased. More and more consumers are interested not only in the product, but also in whether the company applies the principles of corporate social responsibility in its activities. Socially responsible business represents an organization's commitment to minimize or eliminate the harmful effects of its activities and maximize the long-term positive impact on society. The concept of socially responsible business became popular as early as the 1950s, when Bowen (1953) called out entrepreneurs to contribute to community development through corporate policy. Despite the significant contributions of local producers in the socio-economic field, in the past not much attention was paid to corporate social responsibility in such enterprises. After 2000, however, interest in this issue began to grow. Jenkins (2006) states that researchers have begun to understand the importance of business ethics and social responsibility of local producers, due to the significant scale of their operations and collective achievements to the economy. Despite this, most of the literature that deals with the mentioned issue today focuses primarily on large companies, due to the power and influence that such companies have (Amaeshi et al., 2016). However, in the process of development and globalization, local producers play an important role, given that small businesses currently make up more than 90% of businesses worldwide and create 50-60% of employment (Raynard and Forstater, 2002). When creating marketing communication for local producers, it is necessary to realize that such businesses also have their own specifics, and it is often difficult for them to navigate new tools and trends in the field of marketing communication. Also, compared to large companies, they often only have a limited budget and are more likely to face bankruptcy problems (Dvorsky et al., 2021). For that reason, it is very important for local producers to be able to adapt marketing communication and its tools to the possibilities of the company and thus ensure the greatest possible efficiency of the resources spent, despite the limitations (Gamage et al., 2020). The aim of this article is therefore to find out how consumers perceive marketing communication in the context of corporate social responsibility at local producers.

2 Literature review

Effective communication with customers and the public is one of the important factors affecting the company's success. Marketing communication can be characterized as a means by which companies directly or indirectly try to inform, persuade and alert customers to the brands or products they sell (Kotler and Keller, 2021). In an effort to establish lasting relationships with consumers, marketing communication is a key component of any company's efforts. In the last decade of the twentieth century, the importance of marketing communication has grown significantly, and thanks to the rapid development of information technology, almost no area of business has experienced such a significant transformation as

marketing communication. In the past, businesses communicated with consumers through printed marketing communication materials such as brochures, posters, local newspapers and business cards. With these marketing communication tools, the company was able to inform customers about its product line and increase brand awareness. However, significant advances in technology have created a number of technology-enabled marketing communication tools that companies can use to interact and communicate with their clients (Kim, 2016). As reported by Robul et al. (2020), when traditional marketing techniques are combined with digital marketing channels, the development of new products is also accelerated. For example, social networks are technologically supported marketing platforms that encourage users to purchase new products and services (Chia-Liang, 2018). By researching selected businesses, Barna and Semak (2020) found that the use of current technologies in marketing tools allows businesses to attract customers' attention and motivate them to buy, and at the same time has a positive effect on customer loyalty, brand image, and company revenues.

Local producers belong to the group of micro, small and medium-sized enterprises (SMEs), which in terms of the Slovak Republic can be defined as "business entities that employ less than 250 people, while their annual turnover does not exceed EUR 50 million and/or the total annual balance sheet does not exceed 43 million Euros" (Staněk and Ivanová, 2017). Many economic, cultural and social differences between different countries of the world are reflected in the definition as well as in the classification of SMEs. Despite some differences, the typologies of most countries are based on the number of employees, the industry or the achieved turnover of the company (Robu, 2013). One of several factors that contribute to the success of local producers is the ability of the company to provide information about the products they offer, their features, quality and benefits. Although marketing communication is considered a key component of success, previous research has shown that local producers often lack marketing communication skills (Jayawardena et al., 2022). According to studies, local producers often have a lack of marketing competence, financial resources for the implementation of the company's marketing communication and also knowledge in the field of marketing communication. In addition, these businesses compete with big corporates that have access to much greater resources for that activities (Hassan et al., 2015). Given limited resources (human, financial, time), local producers must operate as efficiently as possible if they want to survive in a turbulent and hyper-competitive market. The issue of using new tools of marketing communication is relatively little known in business in Slovakia, especially in small and micro enterprises. Companies are only gradually starting to use the Internet and benefit from the possibilities it offers (Dorcak et.al, 2015). In recent years, more and more attention has been paid to the concept of socially responsible business, which is based on the assumption that companies make money by using natural resources, either directly or indirectly, which ultimately has an impact on these resources, and through continuous production, companies damage the ecosystem and the environment. It is therefore necessary for companies to take responsibility towards the community of which they are a part of and focus their activities not only on production but also on environmental protection and regeneration of ecosystems (Tiep et al., 2021). In order to understand how corporate social responsibility works for local producers, it is important to understand that most of these businesses are run by their founders or owners. For this reason, decisions regarding socially responsible business and marketing communication are often made only by the owner or the founder, who may not have sufficient knowledge in the given field, and therefore implements decisions based only on his intuition. However, it was found that, compared to large companies, the well-being of employees and relations with the nearby community are more prioritized at local producers. It is these relationships that cause local producers to be more interested in socially responsible business activities (Amaeshi et

al., 2016). Due to the influence of globalization, the topic of socially responsible business is coming to the fore not only in Slovakia but also in the whole world. Companies are expected to have a certain ethical and social approach towards people and nature. Constantly developing globalization creates the need and necessity for mutual understanding and therefore socially responsible cooperation (Sundstrom, 2020).

3 Methods

The aim of this article is to identify the attitudes of consumers towards marketing communication of local producers and their initiatives in the field of corporate social responsibility. Theoretical background and analyses of marketing communication of local producers and corporate social responsibility from the perspectives of Slovak and foreign authors are included. Main sources of secondary data for this paper were scientific studies and published professional papers. A questionnaire survey was conducted among Slovak consumers in order to find out about consumers attitudes toward the marketing communication of local producers in Slovak Republic and their initiatives in the field of corporate social responsibility. Based on the analysis and questionnaire survey results, advantages of implementing new trends of marketing communication and corporate social responsibility are emphasized, including establishing a competitive advantage, improving brand image and increasing company recognition.

Both general scientific procedures and mathematical-statistical techniques were used to analyze the data, evaluate the information gathered from the questionnaire survey results, and test statistical hypotheses. The aim of the survey was to find out how Slovak consumers perceive the marketing communication of local producers and their initiatives of corporate social responsibility. Using the Sample Size Calculator, a free tool included in Creative Research Systems' survey software, the sample size was established. The calculator indicates how many respondents must be interviewed in order to obtain answers that as accurately as possible represent the target population. This is important to prevent survey data from being distorted. It is necessary for the procedure to begin with a base file, which in this case was a set of population data for the Slovak Republic, particular people who are 15 years and older. With a 95% confidence level, the confidence interval was determined at 5%. This indicates that a 5% margin of error is assumed for the questionnaire survey. The minimum sample of respondents required for the survey is therefore 384 respondents. Total of 390 respondents took part in the survey.

The survey was conducted in the form of a questionnaire and was conducted in the period from January 2022 to March 2022 within the Slovak Republic. The information gathered from the questionnaire survey was processed using the quantitative assessment approach. With further written comments and comparisons, the data were processed empirically and converted to percentages.

In order to achieve the main aim of the article research hypotheses are formulated:

- *Hypothesis 1*: More 50% of Slovak consumers didn't notice any advertisement of local producers' products.
- *Hypothesis 2*: More 50% of Slovak consumers didn't buy products from local producers because they don't know any.
- *Hypothesis 3*: More 50% of Slovak consumers would be willing to try product from local producers if their favorite influencer would recommend its socially responsible nature.

We utilized one-tailed testing to determine the test statistic for hypotheses 1 – 3, because it is a regularly used approach. (Ruxton and Neuhauser, 2010; Lombardi and Hurlbert, 2009). A significance level of 0.05 was used.

4 Results

The questionnaire was filled by total of 390 respondents, from which women made up 69% (268) of respondents, men made up 31% (122) of respondents. Questionnaire survey results show that 74% respondents find internet advertising, such as social media advertising the most effective. Most used social media were according to our questionnaire Instagram (54%) and Facebook (22%). We also find out that when it comes to the other tools of marketing communication, such as personal selling, 45% of respondents don't like being directly approached by seller, respectively they find it disturbing and only 15% of respondents stated that they find it beneficial. The majority of respondents stated that they don't buy products from local producers. The main reason for this is that more than half respondents (65%) didn't know any local producer. Also, the 69% of respondents didn't notice any type of advertisement for local producer's products. According to respondents they find the most important for local producer to provide product samples, coupons and discounts (42%), have good reputation (28%) and to have account on social media like Facebook and Instagram (27%). Based on our survey, we also found out that 61% of respondents would try a product from a local producer if it was recommended by their favourite influencer, who pointed out the socially responsible nature of the product.

To verify the statistical hypotheses 1 – 3, we used the method testing a single proportion. Results of verification these statistical hypotheses are shown in Table 1. Significance level α was determined at 0.05. The test criteria were calculated according to:

$$T = \frac{p - \pi_0}{\sqrt{\frac{\pi_0 * (1 - \pi_0)}{n}}} \tag{1}$$

By using the tables of the normalized normal distribution, we find the critical value for the right-tailed test (2) for hypotheses 1 – 3.

$$T > z_{2\alpha} \tag{2}$$

Table 1. Verification of statistical hypotheses

Calculation of the sample proportion: $p = \dfrac{m}{n}$	Satisfaction of the condition $n * \pi_0 * (1 - \pi_0) > 9$	Test criteria	Critical field	Inequality	Acceptance or rejection of the hypothesis
Hypothesis 1: H_0: 50% of Slovak consumers didn't notice any advertisement of local producers' products. H_1: More than 50% of Slovak consumers didn't notice any advertisement of local producers' products.					
p = 0.69	97,5 > 9	7.504	1.645	7.504>1.645	H_0 rejected
Hypothesis 2: H_0: 50% of Slovak consumers didn't buy products from local producers because they don't know any. H_1: More than 50% of Slovak consumers didn't buy products from local producers because they don't know any.					
p = 0.65	97,5 > 9	5.925	1.645	5.925>1.645	H_0 rejected
Hypothesis 3: H_0: 50% of Slovak consumers would be willing to try product from local producers if their favorite influencer would recommend its socially responsible nature. H_1: More than 50% of Slovak consumers would be willing to try product from local producers if their favorite influencer would recommend its socially responsible nature.					
p = 0.61	97.5> 9	4.345	1.645	4.345 >1.645	H_0 rejected

Source: Own processing.

Table 1 shows, that in hypotheses 1 – 3 the inequality applies, so we reject the hypothesis H_0, and accept the alternative hypothesis H_1.

5 Discussion

Based on the analysis and results of survey we found out that majority of Slovak consumers didn't notice any advertisements from local producers, which points to insufficient or inefficient use of this tool by local producers. Even through local producers face some barriers compared to the bigger companies, advertisement as a tool of marketing communication offer many forms, which can be both economical and effective, if they are used right.

The main reason why more than half of Slovak consumers doesn't buy products from local producers, is because that they don't know any. Consumers don't notice local producers and their products.

With the advancement in technology over the years, the number of marketing communication tools that can be used to communicate with consumers has significantly increased. Social media and influencers gained lot of popularity and many famous companies use it as a way to communicate with their customers. According to our results Slovak customers would be willing to try product from local producers if their favorite influencer would recommend its socially responsible nature. In these days more and more consumers are pushing companies to be environmentally aware, and the corporate social responsibility of business has gained its importance.

When we compare the findings of our survey with previously completed research, we can identify some similar characteristics. Although small and medium sized enterprises are more flexible than bigger companies, the majority of them suffer from a lack of knowledge and financial resources for marketing activities. Due to lack of knowledge, those firms are often more oriented on traditional marketing tools. Information and communication technologies, as well as advancements in platform-based technology, offered more affordable yet innovative marketing options for this companies to compete with their bigger rivals, but they often have a problem with implementing it (Ključnikov et al., 2022). In the process of creating marketing communication for local producers, it is important to realize, that such businesses have their own specifics, and it is often difficult for them to navigate new tools and trends in the field of marketing communication. Each of the tools has different characteristics, and some forms of marketing communication also require significant financial costs, which can negatively affect the effectiveness of the marketing communication of such companies (Dvorsky et al., 2021). Therefore, it is important for local producers to have sufficient knowledge in the field of marketing communication.

6 Conclusion

From the given data and earlier surveys, it is clear that marketing communication it's an important part of success for local producers. Main reason why Slovak customers don't buy products from local producers is that they don't know any, which only pinpoint the importance of marketing communication in business. Based on our survey, we found out that in Slovak Republic consumers don't notice the advertisements of local producers and for advertisement purposes they find the social media Instagram and Facebook the most effective. For local producers it would be according to Slovak consumers beneficial to offer coupons and discounts, to have account on social media and to have a good reputation.

In recent years also the concept of corporate social responsibility gained lot of importance and for Slovak consumers being ecologically aware became one of the aspects that can

influence their purchasing behavior. If local producers want to promote corporate social responsibility of their businesses and products, influencers are, based on our survey, very effective method. Slovak consumers are willing to try product from local producers if they recommend it and highlight the socially responsible nature of product. For local producers influencers can offer effective method to raise awareness of business and products that they sell.

When we were conducting our research, we had to deal with two barriers. The first is that our findings are limited to Slovak consumers and cannot be generalized and used without the change. Our results can be applied to another country only when we take in account the specifics of purchasing behavior in this country. We also can't apply our findings to local producers in every sector. Some sectors have their own unique characteristics and the type of effective and appropriate marketing communication for these businesses can be different, therefore we must take the characteristic of sector and potential customers in account.

Acknowledgements

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Psychological aspects of the impact of the Covid 19 pandemic on employees

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Abstract

Research background: The work process comprehensively affects the psychological integrity of the employee; it is a decisive component of the production process consisting of the action of labour on the means of production. Working conditions are created by the working environment, work and rest regime, the state of the workplace, the structure of the work process, the organization of work, the knowledge level of employees, etc. The situation of the Covid-19 pandemic places high demands on the mental health of individuals of all age groups and has also affected the world of work to a great extent. From a psychological point of view, the global pandemic can be considered a traumatic event, the consequence of which is restrictions that dramatically affect the psyche of people and their quality of life. Disruption of previous routine activities, normal daily regime, unpredictability of the situation and uncertain prognosis, despite the introduction of strict measures, threaten the feeling of security and force employees to adapt to new, very rapidly changing conditions.
Purpose of the article: The aim of the research is to analyse the impact of Covid 19 pandemic on working conditions from the psychological aspect of view.
Methods: Review of the Literature, Analysis, Synthesis, Case study, Questionnaire.
Findings & Value added: Identification of problem areas in the management of working conditions from the psychological aspects of view under Covid 19 conditions in the practice of an industrial enterprise.

 Keywords: psychological aspects; work condition; employee; management

JEL Classification: *J21; J24; J28*

1 Introduction

The work process comprehensively affects the employee's psychological integrity. Working conditions can be defined as conditions that affect the safety, health and work performance

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of the employee in the work process, and also conditions that affect the level of safety and health protection at work and also the work performance of the employee in the work process. Working conditions are created by the working environment, work and rest regime, the state of the workplace, the structure of the work process, the organization of work, the knowledge level of employees, etc. They consist of a set of physical, chemical, biological, psychosocial and other factors in the work environment and the way work is performed. An important element is the effect of working conditions on the psyche of a person and his well-being at work. Human resources management should strive to achieve harmony between management practices and corporate objectives in the area of individual human resources management functions so that these objectives are met. It should also focus on their behaviour and its impact on business performance. (Tashtoush & Eyupoglu, 2020) Efforts in this direction are always closely linked to working conditions. The work environment is a summary of all material conditions of work (machinery and equipment, handling equipment, personal protective equipment, other workplace equipment, raw materials and materials, construction solutions), which together with other conditions (technology, work organization, social conditions of work) create factors - physical, chemical, biological, socio-psychological and other, affecting the worker during the work process. The composition and level of the working environment affect the well-being, performance, but also the health status of the employee. Challenging adaptation to an unfavourable work environment causes dissatisfaction or even resistance in the worker, which is usually reflected in his relationship with the employer. Personnel work in connection with the working environment should focus primarily on the spatial solution of the workplace, physical working conditions as well as socio - psychological working conditions. We define working conditions as a set of factors directly or indirectly affecting a person's health and work performance in the work process, which directly or indirectly condition the course and results of the work process, are influenced by the work regime, rest and the state of the work environment. The aim of our paper is to analyse the changes in the world of work and the impact of work condition on employees in industrial company.

2 Methods

The methodology of research includes literature review; desk review (to analyse secondary data, to research the latest theoretical and practical developments in management), analyse of company documents. Primary data were collected by self-administered questionnaire consisting of thirty two questions, with verbal scale (Likert scale), as well as open questions focused on demographics, ageing, work conditions, work organisation, psychosocial aspects of work, work protection, technical aspects of work. The Case study is based on the questionnaire survey. 234 regular employees work in the company; of which 90 are women and 144 are men. In principle, we can divide all the positions mentioned above into two groups - employees working in production and non-production workers. Due to the different working realities of these two groups, a different approach is needed throughout the entire analysis of the company. The number of employees in production positions is 179 people (questionnaire was received by 168 workers); the number of employees in non-production positions is 55 (questionnaire was received by 50 workers); the research results are statistically significant. The study was focused on selected aspects of working conditions management from the psychological point of view.

3 Results

The world of work is constantly changing, and these changes have a serious impact on the psyche of a person at work.

3.1 Changes in the world of work

The world of work is undergoing dramatic changes. New forms of employment, the revolutionary impact of communication and information technologies, social networks, the arrival of generations Y and Z and the new problem of the Covid 19 pandemic pose huge challenges for business managers. The psychological demands on employees are increasing, and a good knowledge of psychology will become a key condition for success. Work is an important condition for an individual's dignified existence; it provides him not only material benefit, but also a sense of self-realization and social usefulness. The psychological meaning of work is given by the fact that it shapes a person intellectually, emotionally, mentally and physically. It is known that people prefer a pleasant working environment even at the price of a lower salary. The costs invested in the recovery and rationalization of the working environment has an economic return, which has positive effects on the psyche and health. Integrity is considered an important aspect of personality, which mainly reflects the original meaning of the term integrity (from Latin) – completeness. Therefore, the integrity of the personality can be defined as "wholeness, inviolability, intactness of all structures and functions of the personality and is considered the basis of mental health (Hartl & Hartlová, 2010, p. 224). In the context of overall globalization and societal trends, changes have been taking place in the world of work in recent years, which bring increased demands on workers, especially on the psyche due to the expectations of their higher flexibility on the part of employers and requirements in this direction (on the variability of types of employment contracts, on adjustments to working hours, on the way tasks are performed, on qualification requirements, etc.). Changes were   also resulting from the intensification of work (higher performance of workers is expected, there are shorter deadlines for completing tasks) and from greater uncertainty regarding keeping a job. Very important is also harmonizing and balancing work and personal life.

3.2 Mental wellbeing

The mental well-being of employees is one of the fundamental topics in the field of psychology, given that it is directly linked to so-called "performance metrics", i.e. performance indicators such as: productivity, turnover, but also, for example, overall employee satisfaction (Bakker & Oerlemans, 2011), (Keeman et al., 2017). It follows that cultivating the well-being of its employees should be one of the key tasks for employers. Dewe & Cooper (2012) describe that the success of a company and its very competitiveness will be largely derived from the satisfaction of its employees. If we take into account that on average a person spends roughly one quarter of his life at work, we can assume that the need to feel good at work will be key (Keeman et al., 2017). A corporate culture that supports the well-being of its employees is therefore a win-win strategy that leads to higher employee satisfaction at work, which in the end results in greater commitment and effort to the employer, as well as loyalty and a willingness to "do something extra". (Canaff & Wright, 2004; Day & Randell, 2014). Exhaustion, depressed mood or anxiety and stress tend to reduce cognitive capacity and, as a result, lead to reduced work efficiency of employees due to devoting their attention to negative or unimportant information. We have traditionally encountered a form of individual stress management as a way to support the well-being of

employees, however, in the long term, this method seems to be less effective (Vanhove et al., 2015). Well-being as a psychological construct "exists" outside of stress. Therefore, we cannot assume that the absence of stress necessarily means the overall satisfaction of the employee. On the other hand, promoting well-being can have an impact on reducing or better coping with stressful situations (Hone et al., 2015). At work, the employee is often exposed to psychosocial risks and stress. Added to this is the psychological burden in family and social life, which affects his personal limits. Psychosocial risks are risks related to negative psychological, physical and social factors that result from inappropriate organization and management at the workplace, as well as from poor social relations at work. Psychological factors of work include psychological workload, psychosocial stress at the workplace and various pathological relationships – e.g., mobbing, bossing, bullying. In developed countries, psychosocial factors and factors related to the organization of work become the main occupational risks.

3.3 Role of the management

The work of management has a decisive influence on the well-being of employees. Hajduová & Sebestyén (2021) identified individual factors leading to employee satisfaction, motivation for better performance or the reward system. They consider human resources as a key element of business development, which changes the competitiveness of enterprises. In their work, they stated that an effective reward system increases the loyalty and quality of employee performance and consequently increases the competitiveness of companies. If the needs of employees are accurately identified, personal development takes place, resulting in increased efficiency and better performance. Bieńkowska & Kuzńicka (2019) also deal with the motivation of workers in their article, which examines its impact on the work performance of employees. The analysis focuses on the characteristics of the worker and their impact on the results achieved in the organization. In their work, they distinguish between the term motivation, which they define as internal energy and personal will to act, and work motivation, which is understood as a measure of the employee's self-motivation to perform work effectively.HRM could play an important role as an intermediary in furthering societal and environmental sustainability outcomes. The link between sustainability and HRM has the potential to transform the role of HRM. At a broad level the purpose of HRM is to manage people in such a way that the organisation furthers sustainability goals through a multi-stakeholder, multi-layered, collaborative approach (Stankeviciute & Savaneviciene, 2018).

3. 4 Covid 19 – global problem

Among the factors that in recent years have significantly affected not only the state of human resources and the management of human potential, but also the entire economic environment, is the ongoing global pandemic of COVID-19. The coronavirus (COVID-19) is a disease caused by the SARS-CoV-2 virus and was discovered in December 2019 in the Chinese city of Wuhan. The virus is highly contagious and has spread rapidly throughout the world. As of July 3, 2020, 217 countries and regions have been affected and more than 10,710,000 cases have been confirmed worldwide, with 517,877 deaths (Chen et al., 2020). Among the most frequently described symptoms that appeared in patients with SARS-CoV-2 were fever, which is the most common symptom and occurred in more than 90% of patients, more than half have cough (69.8%), followed by shortness of breath (34.5%), muscle pain (27.7%), pharyngeal pain (17.4%), headache (7.2%), diarrhoea (6.1%), sore throat (6.1%), and snot (4.0%). These clinical symptoms are similar to other respiratory viral infections. Therefore, it is difficult to determine, based on examinations and history, the specific type and number

of viruses with which the patient was infected. This can lead to a misdiagnosis of these diseases (Nicola et al., 2020). The first (global) level depends on the reaction of the government of each state. One of the first reactions to the rapidly spreading virus was the introduction of some measures such as: travel restrictions, recommendations for social distancing, closure of shops and other service providers, the obligation to wear masks, recommendations for working from home, and other restrictions1. The highest level (that is, the government's response to the crisis) has two conflicting tasks. Slow down the spread of the disease, taking into account the capacities of medical facilities, so as not to overload them. On the other hand, there is an effort to preserve a functional economy (Kirk, 2020). The measures issued, related to the above-mentioned goals, directly affect the well-being of employees.

3.5 Covid 19 and itś consequences

The situation caused by the pandemic therefore means for most companies to adapt and find new ways to reach their customers who, as a result of the economic recession, are becoming more and more conservative and rather trying to save their finances in case of an emergency. Otherwise, it can mean collapse for the company. The goal is to adapt your business as much as possible to current possibilities. (Heinonen & Strandvik, 2020). In addition to the health consequences of this disease, consequences can be assumed that relate to the subjective well-being. It is defined through two components - affective and cognitive, within which people evaluate and judge their experience. The pandemic situation, in addition to the spread of the new coronavirus, has caused a parallel increase in the occurrence of intense anxiety and fear. In a population group very sensitive to stress, it can lead to psychological disorders. (Yao et al. 2020) The study by the authors Zhou et al. (2020) conducted in the USA shows that there was a worsening of psychological experience - specifically, a higher degree of stress, anxiety, depression and post-traumatic symptoms - in younger people, in people with other pre-existing diseases and in people who perceived the risk of the disease to a greater extent, had higher levels of rumination, social tension and less social support. Conversely, positive psychological experiences were supported by future-oriented coping strategies and a higher level of compliance with health regulations. In addition, higher rates of violence, self-harm and suicidal thoughts were reported during the first month of the pandemic in Great Britain (Iob et al., 2020). A higher level of anxiety is also caused by "proximity to the pandemic", i.e. the state when a person personally knows a person infected with the coronavirus, be it a family member, friend or acquaintance (Cao et al., 2020; Wang et al., 2020). The covid-19 pandemic is not only a huge test of resilience for the world of work, which results from the need to maintain a functional business as such, but also the ability to adapt to the new situation on the part of the employee. The third – personal level determines specific impacts on the individual's well-being. We could consider a leadership style that plays a key role in employee performance during a pandemic (Bartsch et al., 2020)

3.6 Impact on human potential

Changing the working environment, adopting new work procedures, layoffs, and others are only at the discretion of the management and the company. The uncertain situation created by the pandemic is still questionable and unfathomable. Human resources management, like other organizational components, dynamically reacts to the influences of the external environment. It is one of the areas in which there are constant changes and new procedures. Among the factors that in recent years have significantly affected not only the state of human resources and the management of human potential, but also the entire economic environment,

is the ongoing global pandemic of COVID-19. Due to the emerging exceptional and uncertain circumstances, extensive discussions are being formed about the functioning of businesses. Many of the comments on these topics are general in nature and try to define a "new normal of operation". The changing economic environment requires deep thinking and flexibility. Companies face several challenges, the management of which affects the survival of the company in the current situation (Carnevale & Hatak, 2020). Due to the necessary measures, in many cases, organizations had to invent and implement many times simple or popular solutions. Those in which it was possible resolved the issue of work in the form of "home office" (according to the Labour Code in § 250b paragraph 2, which allows the employer to order work from home due to extraordinary circumstances). Such work is specific to its working regime and working environment – the employee's household. The work schedule during work from home is left to the agreement between the employee and the employer. For the needs of such work, the Labour Code does not define any conditions necessary for compliance. It is recommended to agree in advance certain rules described in the internal regulation informing the employee of his rights and obligations. In the same way as when working in a company, when working from home the emphasis is placed on compliance with safety, health and safety at work. Employees in the home environment must have suitable and safe working tools. The National Labour Inspectorate has issued an opinion, from which it follows that if an employer provides an employee with a laptop for working from home, he should also supply it with a suitable keyboard, mouse and monitor, since those already incorporated in the laptop do not meet the ergonomic parameters for safe work (Fuksová et al., 2021). Psychosocial risks arise as a result of poor planning, organization and management of work as well as a poor social work context and can have negative psychological, physical and social consequences such as work-related stress, burnout or depression.

3.7 Research results and discussion

The research was carried out on the example of an industry company that deals with the food production. As for other businesses, the arrival of the pandemic complicated the functioning of the organization. Production could not be stopped, but the health of the employees was and is always a priority for the employer. That's why the company was looking for the most efficient ways to operate. The emphasis on the unwanted impact of the Covid-19 disease on our company is also highlighted by the fact that the company is a food business. For companies in this industry, the impact of the Covid-19 disease can be very unfavourable. When preventive measures are neglected in connection with all diseases, not only with Covid-19, we can talk about a disaster caused by human activity. In enterprises of this type, it is therefore necessary to constantly check the health capacity of employees and verify the fact that their health condition is problem-free to work with food. In the event of detection of an infection in the work team, an immediate response by the employer is necessary to protect the health of its employees and to prevent product contamination. As a result of the Pandemic Plan, the company established a pandemic planning and coordination unit. According to management and recommendations, it was also necessary to adjust working hours, work and contact between employees. As mentioned above, work from home was introduced wherever technology and the nature of work allowed it. This was mostly the case for non-production employees. However, if it was not possible to introduce working from home in this group of employees, then the number of employees at one workplace was limited to the maximum permissible number of people in interiors; shift operation was introduced to reduce the number of people working at one time; flexible working hours were created to limit the possibility of workers meeting at the workplace; some employees were set aside for backup, e.g. for maintenance. Employees of the personnel department outlined that the pandemic has

significantly affected labour relations in collectives at workplaces. The reason is situations, such as when a new employee was hired during the Covid period, which had no way to meet or get to know his new colleagues while working from home. These facts affected the efficiency of the organization. It can be noted that work cooperation between friends and colleagues is significantly more effective than in situations where we do not know a colleague and do not know, for example, his weaknesses and strengths. During the pandemic, all team building events, which serve to bond teams together, were also cancelled. At the beginning of 2022, when the situation with the pandemic was significantly better, the pandemic measures gradually began to be relaxed. However, there is tension in the company between the workers. After spending a long time in isolated households, people naturally keep more distances and are more cautious. In the research, we also used a questionnaire survey. When compiling the questionnaire, we were based on the current legislation and recommendations of the National Labour Inspectorate. The questionnaire was created in order to find out the opinions and to check the situation in the company during the pandemic. The questionnaire survey was created in two levels, according to the well-known redistribution of employees - into production and non-production parts. The full number of employees in these two groups was determined as a complete sample - i.e. j. 179 production and 55 non-production employees. The questionnaire for production employees was filled out by 145 respondents. Thus, we can claim that our sample of employees is statistically significant. The studied sample had the following representation. 34% of the sample was women, which represents 50 female respondents. 66% were men, which represents 95 respondents. When asked how changes in the work environment due to the arrival of the pandemic affect their psyche. 39% of respondents said that the introduced changes had no impact on their mental health. 2% of respondents, i.e. three, said that the arrival of the pandemic had a positive effect on their mental health. The remaining 59% of respondents said that the pandemic situation and the necessary changes in the company had a negative effect on their psychological health; their stress increases and they also noticed physical effects (insomnia, headache, loss of appetite). The new organization of work also brought negatives in the field of work-life balance; 36% of respondents had serious problems with reconciling private matters with work. The overall atmosphere at the workplace was perceived negatively by 33% of respondents, which was caused by the necessity to work for absent sick colleagues, 24% of respondents felt insufficient support from superiors. 41% of respondents said that their workload has increased during the pandemic. Again, even with the questionnaire for non-production employees, it was necessary to determine the size of a statistically significant sample. We used the Sample Size Calculation calculator again. From the determined size of the population (employees) of 55, we found that the required sample size, which must fill out the questionnaires, is at least 49 respondents. A total of 50 employees completed the questionnaire, which meets the above-mentioned requirement and means that our results will be statistically significant. In the statistical sample, there were significantly more women - 74% (37 respondents) than men, who occupied 26% (13 respondents). The goal of the questionnaire was to find out the opinions of the company's employees on the psychological aspects of work depending on the changed working conditions. From the processed answers, we can outline problem areas that require increased attention. Thanks to a diverse sample, not only from the point of view of gender and age, but also from a wide range of job positions in the company, we can claim that the shortcomings identified from the survey appear across the entire company, not only in individual positions. From the answers, it can be said that the unexpected occurrence of the pandemic made work easier for some and, on the contrary, complicated for others. Many employees had to work much more than they normally would. In the questionnaire for non-production employees, we found that the employer did not provide employees with any service aimed at psychological help, which could be beneficial

for managing difficult situations when employees spend whole days only in their homes, sometimes together with their entire families. Such situations can be very exhausting and stressful for the worker, which can bring him psychological damage. This would mean a less efficient workforce for the business. However, we do not have to understand the provision of professional psychological help as help in problematic situations that have already disappeared, but we can only talk about prevention to protect the psychological health of employees. Many times the work was also complicated by the technological connection; a shortcoming identified from the survey was the fact that some employees had to use their personal technology to perform their work. 13% of respondents perceived the new work organization positively; 28% were dissatisfied with their work. 41% reported increased stress due to loss of contact and support from colleagues and management. Employee dissatisfaction was also influenced by the family situation and the occurrence of illness in loved ones. Increased control of work by managers was also perceived negatively. Mental discomfort was caused by 24% of those interviewed by fear of their own health and that of their family, and by 36% by fear of loss of income. 37% cited inappropriate working conditions at the home office as the reason for psychological and physical effects. The most frequently mentioned were an inappropriate table, chair and sharing a home workplace with studying children. Only 13% would positively perceive the home office even after the end of the pandemic. In our survey responses, we found that more than 3/4 of employees who worked from home admitted that their work engagement had decreased. The reason can be considered that most of them worked only a few hours, necessary to fulfill work tasks, and did not work fixed working hours. Or just the opposite, they performed the work in a rush in a short time, which could cause many defects. Working from home is difficult for employees because they do not feel the organizational climate at home, they are unfocused as a result of frequent disturbance by family members, and for this reason conflicts arise between work and private life. (Chanana & Sangeeta, 2020) I tis necessary to pay attention to the involvement of workers and unions in the process of creating workplace-specific COVID-19 Safety Plans, or health and safety procedures. Stronger, enforceable health and safety protections for workers that include workplace-specific COVID-19 Safety plans designed in collaboration with workers. (Sugerman-Brozan, 2020)

4 Conclusions

Our research has shown the negative psychological effects of the pandemic on production and non-production employees of the company. Employees are more aware of the need to reconcile work and private life, the interdependence of physical aspects of work with psychological ones, and the negative effects of psychological discomfort on physical health and work performance and job satisfaction. The need for psychological support at the workplace and the requirement to improve the psychological aspects of the manager's work were shown. Employees are more sensitive to disturbed relationships with colleagues and superiors during the pandemic. The management managed to cope with demanding anti-pandemic measures and the preservation of economic activity, but the crisis situation has a serious impact on the psyche of employees and therefore it is necessary to face new meanings in this area, because in such recurring situations there would be consequences in the economic area as well. On the basis of the case study, we can conclude that in crisis situations, professional psychological help or psychological counseling is also needed in the company. Such a role is performed in practice by business psychologists.Among the most important tasks of a psychologist is advising company managers about the situation in the work team. Mapping employee satisfaction, motivation levels, conflicts at workplaces, or employee stress levels are precisely the activities a psychologist deals with. It evaluates how resistant

they are to conflicts and stress in the workplace. It also assesses whether the employee is able to comply with social rules, what role (position) he plays in the company culture and the work team, and thus whether he can be loyal and trustworthy. It is also necessary to highlight the fact that more than half of the employees work in production. Most of them work at machines, doing monotonous work. It is clear from this that the psychological help offered to them will be more than appropriate. It is possible to speak of a tool for improving their mental health based on lengthy, monotonous work. On the other hand, it is possible to talk about the need for the presence of psychological help even for employees working in office premises. They are often in front of computer screens for whole days, where they lose social perception and the possibility of their burnout increases (burn-out syndrome, which manifests itself in a number of psychological and psychosomatic problems). In further research, it will be necessary to focus on the effects of the work of business psychologists according to individual areas of the economy. At work, the employee is often exposed to psychosocial risks and stress. According to research by the European Agency for Health and Safety, stress is perceived as a serious psychosocial risk. Added to this is the psychological burden in family and social life, which affects his personal limits. Psychosocial risks are risks related to negative psychological, physical and social factors that result from inappropriate organization and management at the workplace, as well as from poor social relations at work.

Acknowledgements

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Identification of fraudulent financial reporting using the Beneish model in the industrial production sector in Slovakia

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Abstract

Research background: To keep its accounting records correctly and honestly, a company must know its current financial situation and the state of its assets. As usual, some entrepreneurs want to make their lives easier. The most common way today is the manipulation of financial statements. However, any manipulation in business constitutes fraud for the state. Fraud is the most common alternative when companies try to minimise their costs at the expense of increasing profits and thus fight for the strongest competitiveness and become dominant in the market.

Purpose of the article: The article aims to approach the problems of economic crime using a model to detect manipulations, determine whether companies in the monitored sector are manipulating finances, and point out the presence of creative accounting.

Methods: Data on Slovak companies from the industrial production sector for the processing of this analysis were drawn from the ORBIS database. Financial fraud is identified using the Beneish model.

Findings & Value added: In the analysed industrial production sector, our expectation of increased financial manipulation was confirmed. In each period, the model identified enterprises as manipulators whose numbers varied yearly. In Slovakia, the topic of creative accounting is little discussed, and the number of manipulating companies increases every year. Like any problem, creative accounting has its solution. Introducing higher controls and measures should lead to a lower presence of this phenomenon.

Keywords: *fraudulent financial reporting; Beneish model; creative accounting; earnings management*

JEL Classification: *C52; D22; M41*

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1 Introduction

The last years 2020 – 2022, have been a big challenge for the business environment. The outbreak of the COVID-19 pandemic in 2020 had an impact on most companies around the world (Kramarova et al., 2022; Valaskova et al., 2021). The spread of this disease has been a problem for entrepreneurs until now (Svabova et al., 2022). It resulted in the economic crisis, which had an uneven impact on individual industries. Although, at the same time, the sectors of construction, tourism and art were the most affected, other sectors such as the pharmaceutical industry and communication technologies experienced incredible growth. Companies threatened with a drop in profits and staying on the market had to react to the situation(Vasenska et al., 2021). One of the ways to survive for them was the use of creative accounting. For them, it represented options by which companies could remain competitive (Durana et al., 2020). However, at the same time, the reduced number of company controls leads to an increased incidence of fraud and manipulation.

This article aims to approach the issue of fraudulent financial reporting and its detection using a detection model that detects manipulations and also to find out whether companies in the monitored sector of industrial production manipulate financial reports. We attempt to achieve this goal by analysing data distortions that can be detected using an existing model for detecting financial statement manipulation.

The article consists of four sections. The first section provides an overview of the solved problem and presents the current state of studies in this area. The second section describes the methodology used in analysis to achieve the set goal and briefly characterises the data used. This is followed by the results chapter, which mentions and evaluates the results of the application of the detection model in the selected industry. Finally, the last section presents the conclusions.

1.1 Literature review

The issue of earnings management, addressed by authors in the 1980s, mainly in America, has spread to other countries (Cugova & Cug, 2020). The techniques used by users of this phenomenon constitute a persistent obstacle to achieving a true and accurate representation of accounting (Kovalova & Frajtova Michalikova, 2020). New opportunities for the use of innovation are created by continuously modifying legislative regulations to guarantee that businesses have the best circumstances for doing business (Ervin & Hajdu, 2021). As a result, several models have been developed to identify and expose companies that commit such a crime (Strakova & Michalkova, 2020).

Companies that intentionally utilise innovative accounting are also present in Slovakia and have global public interests (Durana et al., 2022). Companies linked together form a worldwide system that negatively affects global economies (Valaskova & Durana, 2020). The state's economy and GDP suffer from economies harmed in this way, not receiving taxes from businesses appropriately (Gaspareniene et al., 2022). Because the current environment does not match the requirements for having a healthy competitive environment, this negative influence also makes the business environment undesirable. Various models have been developed that deal with detecting creative accounting to stop this bad tendency. The Beneish model is a significant model that is utilised globally (Beneish, 1999). This approach successfully detects firms with a high positive rate. Some authors (Adamikova & Corejova, 2021; Durana et al., 2022; Svabova et al., 2020) employed this model in their scientific investigations to identify businesses functioning in the Slovak Republic's commercial environment since it also includes signs of parameter manipulation.

2 Methodology and data

A company's financial performance is an important tool for many entities, such as internal and external entities. Since the company's financial performance is often the only source of information to inform the company's shareholders about the management activities of the company, it is necessary to use real numbers to present this economic performance. However, companies are more willing to achieve better results by applying creative accounting principles, thereby demonstrating better economic value during the accounting period (Blazek et al., 2020). Creative accounting uses accounting principles to transform financial accounting data from the real situation to what the user wants (MBA Knowledge Base, 2018). Creative accounting is characterised as a tool that combines creativity, adaptability and legal loopholes. It also combines accounting restrictions and accounting standards. The problem of creative accounting arises when auditors identify accounting standards gaps and use them to advance their own interests or those of directors (Renu & Sharma, 2020). The techniques used in creative accounting are mostly legal, but there are loopholes in the system when they are just on the edge of the law. It is in these gaps that it is necessary to use models that have been developed and recognised worldwide to reveal this tool (Blazek, 2021). The most famous models are the Piotroski Score, CFEBT model and Beneish model.

The Beneish model is a mathematical model created by the discriminant analysis method. It uses eight variables to identify whether a company has manipulated its earnings. The model is mainly used to detect financial fraud. The advantage of the Beneish model is its ease of use, as it is sufficient with input data from the financial statements (Kovalova et al., 2019).

The Beneish model with eight variables is given by a linear combination of variables, from which we get the estimated value of the so-called M-score for the given enterprise:

$$M - score = -4.84 + 0.92 \cdot DSRI + 0.528 \cdot GMI + 0.404 \cdot AQI + 0.892 \cdot SGI + 0.115 \cdot DEPI - 0.172 \cdot SGAI + 4.679 \cdot TATA - 0.327 \cdot LVGI \qquad (1)$$

where:

$DSRI$	-	Days Sales in Receivables Index
GMI	-	Gross Margin Index
AQI	-	Asset Quality Index
SGI	-	Sales Growth Index
$DEPI$	-	Depreciation Index
$SGAI$	-	Sales, General, and Administrative Expenses Index
$LVGI$	-	Leverage Index
$TATA$	-	Total Accruals to Total Assets

Estimates of the M-score values of individual enterprises are used to classify the enterprise into the group of those who manipulate profits and those who do not. In Slovakia, the M-score value = 2.22 is used as a dividing criterion. An M-score below -2.22 indicates that the company is not a manipulator. An M-score above 2.22 indicates that the company may be a manipulator (Beneish, 1999).

In addition, for each of the eight indicators in the model, an individual threshold is set from which the company is suspicious of fraudulent financial reporting. The company is considered fraudulent if the variable's value for an individual company reaches or exceeds the threshold value. These individual indicators serve to better identify the accounting group with a possible manipulation or error. The thresholds for the variables in the Beneish model are listed in Table 1, together with the analysis results.

In the analysis, we used data on real Slovak companies, which we obtained from the ORBIS database. This database has information on nearly 400 million companies and entities worldwide. Of these, 41 million have detailed financial information. For the analysis, we chose industrial production. To select companies from this industry in Slovakia for analysis, we set the following criteria that the company must meet:
- Minimum profit = €100,000,
- Minimum value of sales = €2,000,000,
- Minimum value of total assets = €3,000,000.

From the total number of enterprises, it turned out that 334 enterprises in Slovakia meet the criteria. For these companies, we used relevant data from their financial statements from 2017 – 2020.

3 Results and Discussion

After calculating the values of individual variables from the financial statements of selected companies, we will first focus on individual variables and their values, showing fraudulent financial reporting. The numbers of companies belonging to the group of fraudulent and non-fraudulent companies based on the values of individual indicators and the threshold value (first line of the table) of the given indicator are in Table 1.

Table 1. Number of fraudulent and non-fraudulent companies in industrial production sector according to individual indicators in Beneish model.

Variable (Threshold)	Year	DSRI (1.460)	GMI (1.190)	AQI (1.250)	SGI (1.610)	DEPI (1.077)	SGAI (1.041)	LVGI (1.111)	TATA (0.031)
Numbers of fraudulent companies	2017	33	0	30	5	105	93	63	334
	2018	32	0	31	4	89	120	71	334
	2019	41	0	18	1	82	155	40	334
	2020	61	0	28	4	70	206	57	334
Numbers of non-fraudulent companies	2017	301	334	304	329	229	241	271	0
	2018	302	334	303	330	245	214	263	0
	2019	293	334	316	333	252	179	294	0
	2020	273	334	306	330	264	128	277	0

Source: authors (2022)

Over the years, the data show an increasing trend of fraudulent companies according to the DSRI and SGAI indicators and a decreasing trend according to the DEPI indicator (Figure 1). The other variables have a stable trend with slight fluctuations in the shares or numbers of fraudulent companies.

Variable (Threshold)	Year	DSRI (1.460)		GMI (1.190)		AQI (1.250)		SGI (1.610)		DEPI (1.077)		SGAI (1.041)		LVGI (1.111)		TATA (0.031)
Percentage of fraudulent companies	2017		9.9%		0.0%		9.0%		1.5%		31.4%		27.8%		18.9%	100.0%
	2018		9.6%		0.0%		9.3%		1.2%		26.6%		35.9%		21.3%	100.0%
	2019		12.3%		0.0%		5.4%		0.3%		24.6%		46.4%		12.0%	100.0%
	2020		18.3%		0.0%		8.4%		1.2%		21.0%		61.7%		17.1%	100.0%
Percentage of non-fraudulent companies	2017		90.1%		100.0%		91.0%		98.5%		68.6%		72.2%		81.1%	0.0%
	2018		90.4%		100.0%		90.7%		98.8%		73.4%		64.1%		78.7%	0.0%
	2019		87.7%		100.0%		94.6%		99.7%		75.4%		53.6%		88.0%	0.0%
	2020		81.7%		100.0%		91.6%		98.8%		79.0%		38.3%		82.9%	0.0%

Figure 1. Trends in percentages of fraudulent and non-fraudulent companies in industrial production sector.

Source: authors (2022)

Consequently, we analysed the whole Beneish model and its results in the classification of the selected companies in the industrial production sector into groups of fraudulent and non-fraudulent companies. For this purpose, we used the M-score. The results are in Table 2.

Table 2. Number of fraudulent and non-fraudulent companies in industrial production sector according to Beneish model.

Year	Number of fraudulent companies		Number of non-fraudulent companies	
	absolute	relative [%]	absolute	relative [%]
2017	166	49.7	168	50.3
2018	173	51.8	161	48.2
2019	122	36.5	212	63.5
2020	143	42.8	191	57.2

Source: authors (2022)

It is evident from these numbers that every year, there is a large number and share of companies manipulating accounting statements. Between 2017 and 2018, we noticed an increasing trend. In 2019, the share decreased, but in the last observed year, 2020, it increased again.

4 Conclusion

The article focused on monitoring companies' manipulation in the selected industry. Using the Beneish model with eight variables, we identified high numbers of Slovak companies manipulating financial information in sector C - Industrial production. This industry is one of the most advanced in Slovakia. Its share in GDP represents the added value of industrial production up to 18.4% for the year 2020. We expected increased manipulation in this industry, and the analysis confirmed this. In each period, we identified a set of fraudulent enterprises, the numbers of which varied from year to year. In our opinion, the topic of

creative accounting is little discussed in Slovakia, and companies, therefore, continue to manipulate their financial information. Introducing higher controls and measures in this area should lead to a lower presence of this phenomenon.

Acknowledgements

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Facial biometrics as an innovative global digital trend – commercial benefits vs. legal and ethical concerns

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Abstract

Research background: Companies that would like to stay competitive on the global market should constantly innovative their products, services or processes. Technological advancements brought a new phenomenon - biometric technologies. They were firstly used in public sector and for security purposes but nowadays, they are penetrating different industries and can be used in almost any company´s processes or areas. However, commercialization and implementation of these technologies, especially facial biometrics, raise further questions with the respect to legislation frameworks of different countries and ethical concerns on personal data utilisation and protection.

Purpose of the article: To investigate attitudes of businesses towards biometric technologies considering commercial benefits vs. personal data protection, their ethical concerns and potential barriers of facial biometrics implementation.

Methods: A questionnaire survey was applied as a main methodological tool for data collection. We collected data from 521 SME and large businesses. Analyses were performed in SPSS program (Chi-square goodness of fit test, Binomial test, Wilcoxon Signed rank test).

Findings & Value added: Companies put an equal emphasis on commercial benefits of biometrics in comparison with personal data protection exceeding legislation requirements. Almost half of them think their utilization should be more strictly regulated and businesses should invest extra resources to ensure sufficient level of data protection but it was also one reason of potential disinterest in the facial biometrics implementation. These findings can be used by businesses intending to commercialize these technologies, by businesses interested in their implementation as potential customers and government and regulative institutions.

Keywords: *facial biometric technologies; digitalization; innovations; ethical concerns and regulations; globalization*

JEL Classification: *M10; M20; O30*

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1 Introduction

Companies that would like to stay competitive on the global highly competitive market should constantly innovative their products, services or processes. Technological global advancements, especially the ones related to digitalization, brought a new phenomenon - biometric technologies – used for decades in public sector and for security purposes. However, its potential is rapidly growing; they are penetrating different industries (financial sector, big retail segment or tourism) and can be used in almost any company´s processes or areas, such as security, production, human resource management, marketing or sales. They are becoming a part of everyday lives of individuals that can use them actively (facial biometrics for mobile banking) or can be an object of the tracking (e.g., in physical stores or for attendance systems). These processes are questionable, because collection of personal information in this range is typical for online shopping, while average customer does not realize degree of tracking in physical stores (Mayhew, 2016). Hence, commercialization and implementation of these technologies, especially facial biometrics, raise further concerns with the respect to legislation frameworks of different countries and questions about sufficient protection and a responsible personal data manipulation or processing. Companies developing these technologies and selling them to B2B customers from various international markets should have the knowledge about the specific regulatory environment and at the same time understand business buying behaviour and its aspects, such as decision-making process, preferences, price sensitivity, attitudes, perceived added value, expectations and many others to successfully launch them on the market. This paper presents selected results from more complex research about the perceptions of Slovak businesses towards facial biometric technologies considering their commercial benefits in comparison with regulatory and ethical limitations.

1.1 Regulatory aspects of biometric technologies

In utilization of biometric technologies it is very important to take into account what kind of data and for which purpose they are gathered, and a procedure of data gathering, which may significantly influence further processes. From the secondary research we found out that there are countries with a specific legislative regulation of biometric data protection. To name a few, there exist "Loi relative à l'informatique, aux fichiers et aux libertés ", the French Data Protection Act from 1978, which sets some specific requirements for biometrics usage (www.gemalto.com). There is no single federal law of biometric data protection in the USA but states such as Illinois, Texas and currently Washington are clearly protecting biometric data by law restrictions. These three states have already implemented law for biometrics identification and many other states are debating this issue. In their legislation, biometrics is defined as "data generated by automatic measurements of an individual´s fingerprint, voice print, eye retinas or irises, identifying DNA information, or unique facial characteristic, which are used by the owner or licensee to uniquely authenticate an individual´s identity" (Luke, 2017).

Actually, biometric data is defined according to the EU data privacy legislation as a specific category of personal data. From this reason, special focus is put on their processing for the purpose of "uniquely identifying a natural person without consent", what is strictly prohibited. Specifically, GDPR understands biometric data as "personal data resulting from specific technical processing relating to the physical, physiological and behavioural characteristics of a natural person, which allows or confirms the unique identification of that natural person, such as facial images or dactyloscopy data" (https://gdpr-info.eu). Thus, we may see that within GDPR, biometric data deserved specific determination of position and closer regulation. In general, according to the GDPR, biometric data falls under the specific

category of personal data, which is prohibited to be processed and used for authentication of physical persons. Specifically, this law says "processing of personal data revealing racial or ethnic origin, political opinions, religious or philosophical beliefs, or trade union membership, and the processing of genetic data, biometric data for the purpose of uniquely identifying a natural person, data concerning health or data concerning a natural person's sex life or sexual orientation shall be prohibited" (Capparós, 2018).

So, what exactly comes from the GDPR for biometric technologies and their usage? At first, precise definition of biometrics, position within a legislative framework took place. Biometric data become a part of sensitive personal data, which deserves robust protection and massive penalties have been established in case of their broke up. Next, due to expected growth of biometric technologies usage, compulsory privacy impact assessment was set up as a new requirement. This means that each business processing biometric data has to make this assessment, in order to evaluate possible risks and to propose activities for risk mitigation. This requirement is applied especially among cases of large-scale processing, automated processing or systematic monitoring of public areas. Finally, businesses operating with biometric data will need unequivocal consent from a data subject, unless there is specific exception set by a law (Bailey, 2017).

1.2 Ethical concerns on biometric technologies

Recently, biometric data generated by fingerprints, hand geometry, heart rate, voice patterns, facial characteristics and expressions, brain activity and body movement has increased in both volume and prominence. For the current generation of biometrics is a typical shift from a traditional view - biometric data for identification purposes to an expanded view - toward biometric profiling. Biometric data may serve dual purpose in collecting better and more detailed consumer insights. At a basic level, the collection of individual demographic characteristics, like gender and age, may be done unobtrusively, without asking customers to spend effort or time to formulate and transmit information that is relevant to the organization and acquire it without customers' active involvement (Lewinski et al. 2016). Moreover, biometric technologies allow organizations to collect previously hard-to-collect information like a customer's height, emotional state, movement and other behaviours in a retail space. All this may be of significant help for marketing research purposes such as customer segmentation, profiling and behavioural predictions (Du et al. 2021), as well as to optimize store layout and enhance environmental safety. These new options require discuss challenges related to biometric data collection and usage, privacy and security, storage and safety, and potential for reduced inclusiveness and enhanced biases. Due to the widespread diffusion of biometrics, it is important to address the ethical issues inherent to the development and deployment of the technology. Although there are many ethical concerns, privacy is the key issue, with associated themes. These include definitions of privacy, the privacy paradox, informed consent, regulatory frameworks and guidelines, and discrimination. Recently, biometric technology has been used for commercial and civil applications. With this evolution in application, questions arise about the ethical use of such technology within the broader field of technology ethics. It is its own field, distinct from other technological innovations such as artificial intelligence, three-dimensional printing, cloud technology, data analytics, nanotechnologies, and robotics. Like these technologies, biometrics is disruptive, as it has the capacity to "restructure, reorganize, disrupt current social and institutional norms and standards, operations, production, trends, not limited to a particular market or industry" (Schuelke-Leech 2018). According Royakkers et al. (2018), privacy is more of a legal than ethical issue, given the existence of regulatory frameworks to protect individual privacy. The focus on privacy is unsurprising, as Evans et al. (2017) argue that biometric data are more

sensitive than statistical data. Biometric technology is also argued to be an invasion of privacy, as it facilitates surveillance inside organizations toward their workers and outside organizations toward their customers and society (Ball 2005; Corcoran and Costache 2016; Royakkers et al. 2018). This contravenes the right to remain anonymous (Odoherty et al. 2016), which is especially the case for biometric technology embedded in wearable devices (Park and Skoric 2017). There are several notable shifts in biometric technology, from first to second generation. The latter has a greater focus on behaviours, as opposed to individual identifiers. Schumacher (2012) characterizes this shift as moving from "who you are" to "how you are." There has also been shifts in purpose and application, from security to safety (Norval and Prasopoulou 2017). With the shift to second-generation biometrics, the technology is extending beyond identity management to group analysis, in which generalizations about demographic categories can be made and behaviours can be analysed (Schumacher 2012). It has afforded the rise of what McStay (2014, 2018) refers to as emotional surveillance or "empathic media … technologies that track bodies and react to emotions and intentions" (McStay 2016). The usage of biometrics has significantly broadened beyond its initial applications. With new affordances comes the potential for new or different ethical concerns (Schumacher 2012). The abovementioned studies are lab based. However, the question arises as to what happens when first- and second-generation technology is applied to organizations without ethical research guidelines. Given the widespread use of biometrics, the role of organizations as developers and users requires scrutiny (North Samardzic, 2020).

2 Research Methodology

For the purpose of this paper, we formulated the main aim as: "To investigate attitudes of businesses towards biometric technologies considering commercial benefits vs. personal data protection, their ethical concerns and potential barriers of facial biometrics implementation.". We asked related research questions, and we formulated hypotheses:

RQ1: Which attitudes of businesses prevail – regulative and ethical perspective or commercial benefits in facial biometrics implementation?

H1: Businesses would prefer commercial benefits/effects in comparison with personal data protection considering facial biometric technology implementation.

RQ2: What are the most demotivating factors against facial biometrics implementation?

H2: Businesses more strongly agree that regulative and ethical reasons are case for disinterest for implementation in comparison with internal and external factors.

2.1 Methods

Before the quantitative research we firstly realized qualitative research as an explorative method for data collection in order to get qualitative insights, to reveal opinions, expectations and real practical experiences, and consequently to prepare relevant questions for quantitative analysis. It was realized in the form of (1) interview with the CEO of the company developing biometric solutions for commercial sector and (2) six semi-structured interviews with companies´ CEOs of different sizes and industries, operating in Slovakia as potential end users or customers for biometric solutions. Then a questionnaire survey was chosen as a main methodological approach. Its structure was focused on revealing market potential of face biometric technology; this paper presents partial results. Comprehensibility of questionnaire was confirmed by piloting and just minor changes have been incorporated. Final version of questionnaire was prepared and distributed via face-to-face personal contacts in combination with the online approach via the database of contacts through analytical portal "Index

Podnikateľa" at the end of the year 2019 and a beginning of the year 2020. For the data processing, we used simple descriptive statistics to get a general view and then we focused deeper on relationships formulated in hypotheses and their verification. For this purpose, we utilized advanced statistical methods and tests using SPSS program such as Binomial test and Wilcoxon Signed rank test

2.1 Representativeness of the sample

For the purpose of our research, we deliberately focused on businesses with at least 10 employees since the potential of this technology in micro-businesses is very small (as it was revealed during interviews). Our final sample was represented by 521 companies operating in Slovakia. We set up two main criteria of representativeness for our research to be able to generalize results on overall population of companies. Size of business and proportion of businesses according to the districts in Slovakia were chosen as criteria. In order to be able to verify the representativeness of research sample we utilized Chi-square goodness of fit test in statistical program IBM SPSS 19.0. Tables 1 and 2 represent results of Chi-square goodness of fit test. Based on test results we can state that our research sample is representative according to the number of employees and region.

Table 1. Chi-square Goodness of Fit Test for Number of Employees

Number of Employees	
Chi-square	0.014[a]
Df	2
Asymp. Sig.	0.993

Source: own processing, SPSS output.

Table 2. Chi-square Goodness of Fit Test for Region

Region	
Chi-square	0.100[a]
Df	7
Asymp. Sig.	1.000

Source: own processing, SPSS output.

3 Results and Discussions

First part of the questionnaire was related to identification of business attitudes and interest towards usage of facial biometric technology. We found out and the test confirmed that there is half of businesses that are interested in some form of implementation of this technology. It involved the ones interested in single/basic form, in advanced functionalities of this technology and the third group shown an interest even in complex solution of facial biometric technology and its integration to all business processes (Budinsky, Taborecka-Petrovicova, 2021). This question served as a filter one, hence for more detailed analyses we worked also with this smaller sample of 252 companies. Then we continued with questions about dilemma regarding commercial benefits, ethics and legislation rules when considering utilization of this technology. Question provided five options and respondent had to choose which fits the most. Next question consisted of several statements about usage of biometric technologies, their regulation, ethics and respondent expressed his/her opinion on 7-point Likert scale. Finally, the last question was related to identification of possible reasons, why businesses

were not interested in this technology. Through 7-point Likert scale were expressed answers of businesses, in order to reveal what barriers stands in between implementation of facial biometric technology. From the number of companies (252) that expressed interest in some form of implementation of facial biometrics, up to 22.22% (56) of them prioritize mainly commercial effects towards advanced personal data protection and 9.52% (24) also prioritize commercial benefits but to lower extend. The highest number 38.10% (96) of respondents consider commercial benefits and advanced personal data protection beyond the legislation minimum requirements equally important. On the other hand, 18.25% (46) of respondents inclined more to the advanced personal data protection instead of commercial benefits and finally, 11.90% (30) of respondents stated, that for them personal data protection beyond the legislation are much more important than commercial effects. When we compare these numbers, commercial benefits prioritize 31,74% (80) respondents, data protection are in favour for 30,15% (76) respondents and 38,10% (96) respondents have indifferent attitude. To test hypothesis H1, we utilized Binominal test via SPSS program. Results of Binominal test showed us that, p-value (0.811) is not lower than Alpha (0.05), so we do not reject 0 hypothesis, thus it means that there is exactly same proportion of those who prefer commercial effects and those, who prefer personal data protection above legislation. Hence, we can conclude that hypothesis H1 was not confirmed. We can explain this finding in several ways: the first is that companies are really conscious about the data of their customers (or employees) equally with the commercial benefits; the second is, that although we formulated this question the way to avoid "socially desirable answers", still businesses responded "to look better than the reality"; the third is that businesses are still not educated, competent and experienced enough in this field so they rather chose "indifferent answer". In the next step, we have created a set of supplementary statements in order to reveal respondent's attitudes towards facial biometrics from more detailed perspectives, such as ethics, security, riskiness, regulation by a law, access restriction etc. Respondents expressed their attitude to each individual statement on 7-point Likert scale, while they have additional option of "can't judge". Distribution of their responses is shown in the Figure 1.
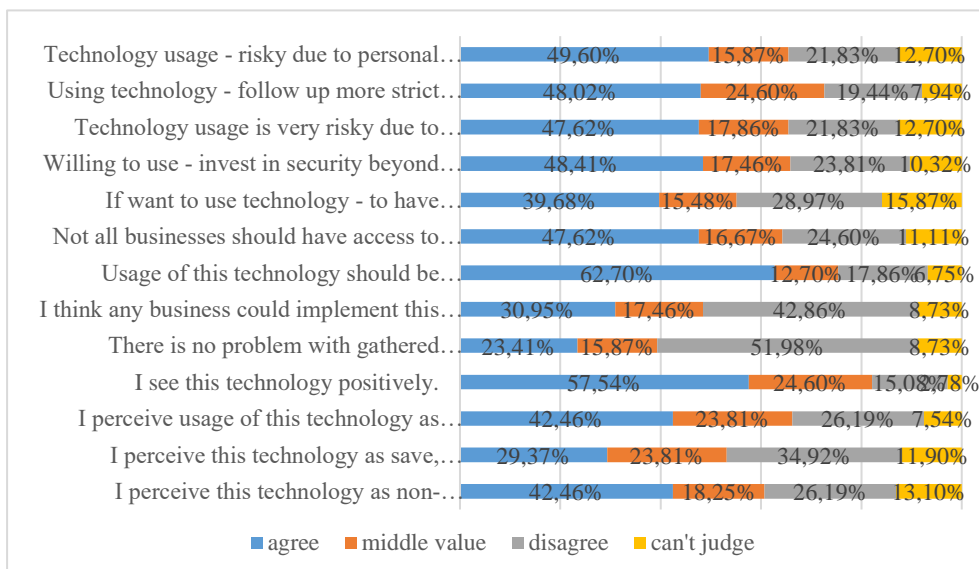
Figure 1. Distribution of Businesses by Attitudes towards Facial Biometric Technology.

Source: Own elaboration.

We can see that in general, almost 50% of respondents were rather "worried" about these technologies. We found out that they see its usage as relatively risky, especially in case of potential identity theft or personal data misuse. This fact is understandable, if we take into consideration cases in the past about personal data abuse/misuse, such as Facebook, Wiky-Leaks, Amazon, Avast etc. They think that their utilization should be regulated, not all businesses should have access to this data and businesses willing to use this technology should invest extra money to ensure sufficient level of data protection. On the other hand, research revealed that only 26% of respondents perceive utilization of this technology as unethical. Moreover, interestingly we found out that still majority of businesses (57, 54%) perceive this technology positively.

Finally, the last question of our questionnaire reveals reasons why businesses would not have interest in any form of implementation of this technology. Respondents expressed their attitudes to each possible reason on a 7-point Likert scale. Results are in Figure 2.
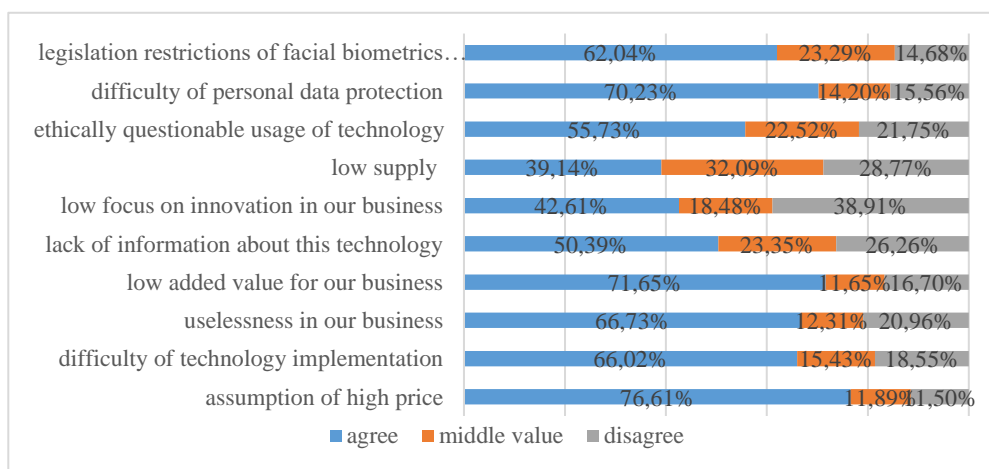
Figure 2. Distribution of Businesses by Disinterest for Facial Biometric Technology

Source: Own elaboration.

Results about potential reasons of not having interest in this technology showed that majority of respondents (76.61%) expect that implementation of facial biometric technology would be very costly. This information is quite expected, since implementation of especially high-end innovations require quite significant investments. However, businesses should trade-off benefits and added value, that would bring this technology in long term with costs and not only focus on relatively high initial costs for its implementation. From our point of view, this technology is not beneficial for all businesses in case of benefits and costs trade-off, but many businesses do not look further and do not see potential of this technology from broader perspective.

Relatively high number of respondents (71.65%) expressed that implementation of this technology would represent low added value for their business, 66.73% see this technology as useless in their business and almost same amount 66.02% of respondents see difficulties in implementation of this technology. On the contrary in practice basic form of this technology is easy and can be integrated in existing camera systems, thus, small adjustments are necessary and basic model is ready to use. However, in case of complex system implementation is necessary to link all systems with this technology and to have sufficient net of camera system. Since the diffusion of facial biometric technology among Slovak companies is still scarce, it is obvious that this topic needs education and appropriate

communication with the market. Probably if these conditions would be on higher level, interest of businesses for this technology or perceived added value and perceived benefits would increase. This assumption is confirmed by 50% of responses who agree that there is lack of information about facial biometric technology. Another reason of potential disinterest is related to the government regulations and restrictions imposed on utilization of these technologies what was perceived by more than 60% of respondents. Moreover, about 70% of businesses see difficulties in protection of personal data gathered through this technology.

Finally, we looked at answers to this question from different perspective. For this purpose, we classified individual statements into three groups: internal (statements C, D, F), external (statements A, B, E, G) and regulative/ethical (statements H, I, J). In order to identify possible statistically significant differences between these groups, we performed Wilcoxon Signed rank test. Results of this test showed that level of agreement among groups differentiate. Specifically, we found out that in case of regulative/ethical reasons (of disinterest for facial biometric technology implementation) prevail higher rate of agreement, thus businesses more strongly agree that regulative/ethical reasons are case for disinterest for implementation. On the other hand, similarly among internal and external reasons (of disinterest for facial biometric technology implementation) prevail lower rate of agreement; therefore, businesses do not perceive internal and external reasons as core disinterest factors.

4 Conclusions

Based on our research results we would recommend to *businesses developing and intending to commercialize their facial biometric technology* as the first thing proper education of the market in this field. Since most businesses – 450 out of 521 (86.37%) have just heard about these technologies (Budinsky & Taborecka-Petrovicova, 2021), they probably did not search for any further and detailed information and are not very competent in this field. Therefore, it is necessary to educate businesses on the market not only about what the facial biometric technology is, what functionalities and benefits it has, how businesses can utilize and implement this technology into their processes, but also what are the conditions and requirements for its implementation, and about legal and ethical aspects of its usage. It is up to businesses commercializing this technology to think of their way how they will attract potential customers, how they will communicate added value and benefits reflected in desired functionalities and at the same time highlight also other aspects that might influence its implementation and further utilisation, such as legislation that must be followed and ethical concerns as potential barriers. Moreover, these may differ in various countries, so businesses operating in globalized market should adjust their strategies with the respect to different cultural contexts.

Businesses interested in buying and implementation of this technology (potential customers) can be also proactive and study information about this technology from all available sources. This point is very important, because with sufficient amount of information, they would not be biased with some prejudices about this technology, such as its price, difficulty of its implementation or usefulness. Since they will be end users potentially tracking their customers or employees, they are the ones that should keep in mind all regulative and legislative aspects that must be followed up. It is very important that these businesses must think about the way how collected data will be kept and protected and about ethical perspective of the purpose for which they tend to use this technology. Again, cultural, legislative and other specifics should be respected.

According to our research, we found out that perception of businesses related to the trade-off between commercial effects and personal data protection above legislation is not straightforward. Results showed that one third of businesses prefer commercial effect, one

third prefers personal data protection and one third is somewhere in-between. We also found out that more than 62% of businesses agree that a law should regulate usage of facial biometric technology, while almost half of businesses think that not all businesses should have access to this technology. Further, almost half of respondents expressed that businesses willing to use this technology should significantly invest into the security beyond the legislation, in order to ensure sufficient security level. Same number of respondents also think that businesses using this technology should follow up/fall under the stricter legislation. Therefore, we may see a clear signal from business perspective that regulation of facial biometric technology is on a place and is required. As this topic is well discussed recently, it is necessary to check the current state and find a way how to regulate and control usage of this technology. Therefore, we suggest *government and other interested institutions* to study and analyse nature and developments of facial biometric technology, its usage and to identify possible threats and opportunities of this technology in order to understand it better and act preventively. Only after this, involved institutions would be able to create correctly a legislation framework that would regulate utilization of this technology properly, without any doubts. This fact should ensure that businesses, which will be interested in implementation of facial biometric technology, will follow up these regulations and meet security prerequisites to be able to use it. They should aim to understanding of its essence and all aspects and possibilities of usage, in order to find a proper and ethical way how to utilize it not only in favour of companies but also in favour of population.

Acknowledgements

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Financial literacy as a global issue: The outcomes of learning experiment in Latvia

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Abstract

Research background: Financial literacy is one of core competences need in a highly competitive globalized economy. It is one of the skills necessary for knowledge-based society defined by the European Commission within EntreComp framework.

Purpose of the article: The goal of the paper is to describe a unique learning 3-stage experiment and to evaluate participants' perceptions of financial issues.

Methods: Two-month problem-based learning experiment was conducted by EKA University of Applied Sciences and FinLit community (Latvia). Participants included one control group of mentors and six groups of students. At the final stage, participants provided feedback and data was processed by means of frequency analysis, two-sample Mann-Whitney-Wilcoxon test, and Kruskal-Wallis test.

Findings & Value added: Perceived usefulness of Financial Literacy Challenge activities was very high. Students stated that the project made them re-think daily expenses, plan for future savings and increased their interest to investments. Participants also emphasize that they have gained knowledge and understanding of financial planning, pension plans, stock exchanges, and cryptocurrencies. This project is one of the activities within the framework of the Latvian Financial Literacy Strategy 2021-2027, specifically, within the goal "Sustainability-oriented financial literacy culture and competence improvement", which contributes to the outcomes of the action "Provision of educational opportunities for improvement of financial competences".

Keywords: *financial literacy; higher education, survey*

JEL Classification: *I23; I31; C83*

1 Introduction

A substantial proportion of the global population experiences financial stress, for example, about 18-44% in Australia (Steen and MacKenzie, 2013) and about 50% in the USA (FINRA

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IEF, 2019). The financial stress is the stress caused by anxiety of having gaps in personal finance (Xiao and Kim, 2022), which stem from ineffective money management (Norman, 2010), low income and economic crises (Philippas and Avdoulas, 2020), lack of proper retirement plans and investment, insufficient savings, etc. Twenty eight percent of the global population have money saved only for the period of one week, and only 18% of the world population, mostly residing in China, have sufficient financial resouces to last for 6+ months (OECD, 2020). These data point not only to the lack of free money in the global population but also to the lack of financial securities (OECD, 2020) causing financial stress. This negatively affects the quality of life of the population and the socioeconomic development of the state, which might be more susceptible to macro-economic and social crises. To help the population develop proper financial knowledge, which would enable them to create financial safety nets, financial independence and some resilience to micro- and macro-economic turbulences, people should be able to develop reasonable skills of financial decision-making based on informative choices. The development of such skills is complex due to cognitive aspects of any decision-making as well as financial, economic and social aspects of financial and other markets, which according to Nicolini and Haupt (2019), are continuously expanded by new products and services. Some of these products, such as mortgages and investment products are highly complex, which leads to intermediaries' involvement in individuals' financial decisions (Guiso et al., 2022) and individuals' having less control of their financial decisions. The area of the finance science which addresses decision-making skills of financial matters and financial well-being is known as financial literacy (henceforth – FL) (Lin and Bates, 2022; Philippas and Avdoulas, 2020). While lower levels of FL can lead to a poor quality of life, higher levels of FL can help to solve financial problems, contributing to a higher quality of life. Therefore, FL is considered an important instrument of economic stability (Kaiser et al., 2022). Overall, the FL level of the world population is relatively low (Sekita et al., 2022), which has been proven by the global FL survey "Global Financial Literacy Survey" of The Standard & Poor's Ratings Services. According to this report, only 33% of the global population could be considered financially literate with the lowest distribution level having been in Yemen (13% of the total country population) and the highest in Scandinavia (71% of the total population) (GFLEC, 2014). FL has been subject to globalization processes. The issues of globalization cannot be ignored because they continuously impact societies leading to their transformations irrespective of national borders (Lentjushenkova, 2021). The post-Covid-19 times are expected to rely even more on global processes due to their capacity to reduce risks, takcle climate change, combat tax avoidance, etc. (Contractor, 2022). Some of such trends pertaining to FL include the increased life expectancy of the population, strained pension and welfare systems under the condition of the falling numbers of taxpayers (Gallego-Lasada *et al.,* 2022; Lusardi, 2019), postponing the establishment of personal saving schemes (Gallego-Lasada *et al.,* 2022), expansion and diversification of financial markets, services and products (Faulkner, 2021), the increasing share of the self-employed and gig workforce, digitalization, new global and European competence frameworks, etc. The major impact of globalization on FL could be summarized as follows: the increased personal responsibility for the retirement and financial welfare throughout life and the need to continuously expand financial knowledge and skills to reasonably handle financial products, services, transformations and activities, particularly for those in pursuit of self-employment and gigs. The importance of FL is evident not only to individuals, households and communities but also to businesses (Titko et al., 2015), governments and public authorities (Vieira et al., 2021) as some recent global financial crises have been attributed to low FL levels of the population (Prado et al., 2022). To tackle the issue of poor levels of FL, governments have been developing National FL Strategies (Titko et al., 2015). Beyond the national scope, the Organization for Economic Co-operation and

Development (henceforth – OECD) and the European Commission have attempted to stimulate the increase in FL levels by producing informative resources, FL action plans, competence frameworks, such as OECD competence frameworks for FL for youth, adults, investors, micro-small-medium-size entreprises (OECD, no date). In order to increase the level of FL in the world population, it is important to identify the components forming the FL definitions. Due to the complexity of the concept, there is neither a common view nor perspective on it (Nicolini and Haupt, 2019), which is why there are many definitions of the concept (Merkoulova and Veld, 2022). Nevertheless, it is possible to create a collective definition of FL based on the components and goals of the concept. So, FL represents a personality trait of effective practical management of various financial resources (Lin and Bates, 2022), which is formed by different types of abilities, skills, awareness, knowledge, attitudes, behavior and tools (OECD, 2018; U.S. Financial Literacy and Education Commission, 2020) that enable individuals to analyze various financial choices (Philippas and Avdoulas, 2020, p. 360) and to make sound financial decisions to attain financial goals and financial wellbeing (OECD, 2018). The content areas of FL specifying the areas of actions are suggested by the "Big Five" FL questions focusing on such concepts as inflation, compound interest, risk diversification, stocks and bonds (Nicolini and Haupt, 2019). According to the Financial Competence Framework for Adults in the European Union, the content areas are (1) money and transactions, (2) plannng and managing finances, (3) risk and reward, and (4) financial landscape (EU/OECD, 2022). These content areas are mostly consistent with macro-level topics of financial competences of the OECD/INFE (2018) Financial Competence Framework for Micro, Small and Medium-Size Businesses. One important outcome of the Financial Competence Framework for Adults in the European Union is the acknowledgement of the European Commission that personal FL of the EU citizens and of the EU entrepreneurs should converge on similar content areas, topics and dimensions (knowledge, behavior, motivation, etc.). Overall, FL is one of the core competences needed in a highly competitive globalized economy. It is one of the skills necessary for knowledge-based society defined by the European Commission within EntreComp framework and it is the focus of the Financial Competence Framework for Adults in the EU (EU/OECD, 2022).

Given the fact that the FL levels across the globe are not sufficiently high, their levels should be increased through various types of initiatives. Some of such initiatives are created as a product of a National FL Strategy. Latvia also has its National FL Strategy whose aim is to promote the economic stability, understanding of financial issues and to increase the level of FL in the Latvia population. The Strategy has been developed, implemented and coordinated by various ministries and institutions, including the EKA University of Applied Sciences (henceforth – EKA University).

As an institution participating in the promotion of the FL Strategy in Latvia, the EKA University in coopration with FinLit developed a project to promote FL in Latvian students. The goal of the new project was to measure the FL levels in students of the EKA University and evaluate participants' perceptions of financial issues. The goal of this paper was to narrowed down to reporting on the unique learning 3-stage experiment of the project and evaluating the participants' perception of FL issues.

2 Methods

To attain the goal of the paper, first, a unique 4 stage-experiment (Financial challenge) was designed and carried out on the premises of the University in 2022. Stage 1 included the development of FL tasks across four content areas - personal budgeting, loans, savings and well-being in old age (see table 1).

Table 1. The content of blocks designed for financial challenge

Block	Name of the block	Tasks within the block
I	Personal budget	• Development of a personal budget for a week • Development of an eating plan for a week • Comparison of rent and mortgage loan
II	Loans	• Calculation of personal credit amount • Credit history • Wants and needs • Application for consumer credit • Comparison of loan offers
III	Savings	• Stockpicking or index funds • Savings types and tools • Importance of savings • Selection between banks, brokers or platforms • Making an investment
IV	Well-being in old age	• Pension level • Determination of personal pension amount • Comparison of pension plans • Management of the 2nd pension plan • Inheritance of the 2nd pension plan

Source: authors

During Stage 2, project mentors (Professors of the EKA University of Applied Sciences) completed the tasks prior to the student engagement in the project. Stage 3 of project was characterized by the completion of these tasks by student participants whose performance was supervised by the project mentors. The overall duration of this stage was 4 weeks with each content area having been allocated 1 week for completion. At Stage 4, the data on the participants' perceptions of financial issues (FL) were collected via a post-project questionnaire specifically designed for this research, in which most questions were assessed on the Linkert scale (see table 2).

Table 2. Questionnaire structure

Parts	Information	Content areas	Question code	Question type (number of questions)
I	Participants' profile	Age, study program, study year, household type, occupation	-	(6)
II	Assessment of the project	Content, value, project organization, communication	A	Linkert scale 1-7 (6), open-ended question (1)
III	Assessment of the FL tasks	Personal budget, loans, savings, well-being in old age	B	Linkert scale 1-5 for 2 criteria (18)
IV	Recommendations	To other people, to self	C, D	Linkert scale 1-6 (2)

Source: authors

The mentor participants of the project were the academic staff and the directors of the study programs of the University. Their task was to familiarize themselves with the FL tasks and provide the student participants with support and supervision during the project. Their results were used as the results of a control group. The student participants included the students of the management and IT programs of the University. They were divided into two teams – the students of the age of 25 and younger and the students of the age of 26+. To

stimulate students' engagement in research and to boost their interest in the completion of the tasks, a competition was announced during which students were asked to complete these tasks. The competition was promoted as an opportunity to test own FL knowledge and to develop cooperation with other students.

3 Results

In total, 26 students participated in the research. Due to their number, they were divided into 6 groups. The obtained data were collected in one table and were analyzed using the statistical software *Minitab*. The variables of the survey were tested on the ordinal scale. To analyze the data in the software, all questions of parts II-IV were divided into four categories – A (project assessment) (see table 3), B (assessment of the FL challenge tasks) (see table 4), C (recommendation of the project to others), D (participation in similar activities in the future).

Table 3. Overall assessment of the project

Code	Question content
A1	Project idea
A2	Organization of the project
A3	Mentor competence
A4	Communication with mentor, support provided
A5	Communication with team members
A6	Practical application in everyday life

Source: authors

Table 5. Assessment of challenge tasks according to 2 criteria

Code		Question
Usefulness	Complexity	
		PERSONAL BUDGET
B1-1	B1K-1	Task (T)1.1. Develop your own personal budget
B1-2	B1K-2	T1.2. Create a weekly meal plan
B1-3	B1K-3	T1.3. Plan everyday expenses
		LOANS
B2-1	B2K-1	T2.1. Calculate how much you can afford to borrow (20-10 rule)
B2-2	B2K-2	T2.2. Evaluate the credit history
B2-3	B2K-3	T2.3. Wishes vs. needs
B2-4	B2K-4	T2.4. Create an application for a consumer credit for EUR10,000
B2-5	B2K-5	T2.5. Evaluate credit offers
		SAVINGS
B3-1	B3K-1	T3.1. "Stockpicking" or index funds?
B3-2	B3K-2	T3.2. Evaluate the types and tools of saving
B3-3	B3K-3	T3.3. Evaluate the importance of savings
B3-4	B3K-4	T3.4. Choose a bank, broker or platform
B3-5	B3K-5	T3.5. Invest EUR 10,000
		WELL-BEING IN OLD AGE
B4-1	B4K-1	T4.1. Pension level
B4-2	B4K-2	T4.2. Determine the level of own pension's savings
B4-3	B4K-3	T4.3. Compare pension plans
B4-4	B4K-4	T4.4. Evaluate the manager and plan of your second pension level
B4-5	B4K-5	T4.5. Evaluate the conditions of the inheritance of the second pension level

Source: authors

The Anderson Darling test revelead that the data were not normally distributed, which is why non-parametric methods were used for the analysis - Mann-Whitney two-group comparison method and Kruskal-Wallis multiple group comparison method. The confidence level was set at 95% (P=95%).

The data obtained from the questions of Part II, which focused on the overall assessment of the project, were analyzed using the Kruskal-Wallis method, which showed no difference in answers by question content. This means that the students' opinion about the project is generally similar. For example, Figure 1 shows the histogram of the assessment of Question A6 "Practical application in everyday life".
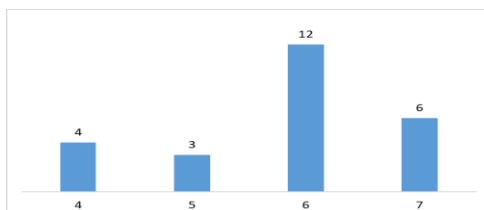
Figure 1. Assessment of the question "Practical application in everyday life"

Source: authors

The figure indicates that the participants generally tended to evaluate the project positively. Responses to Question A6 varied from 4 to 7. This trend can also be observed in the boxplot for all questions of Part II (see Fig.2). This chart shows the quartile distribution of the values. The medians are indicated with black dots.
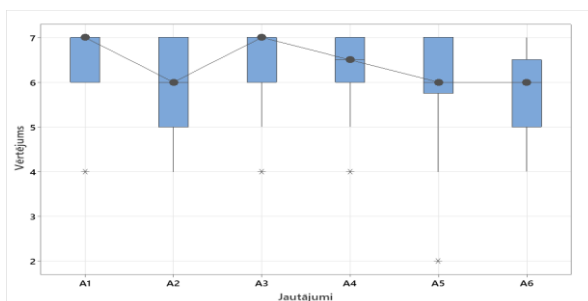
Figure 2. Overall project assessment

Source: authors

The answers to questions of Part II were divided into two categories based on the age distribution. Then, the Mann-Whitney method was used to determine the mutual differences between the age groups (see Fig. 3).
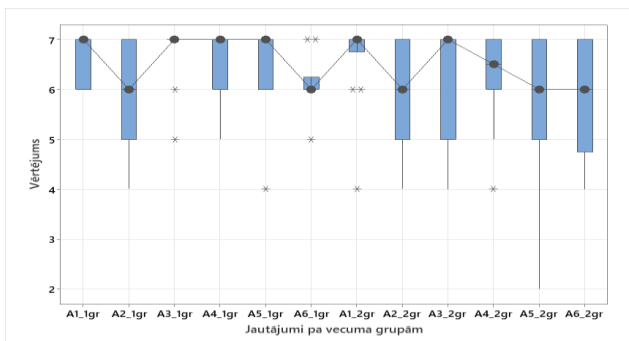
Figure 3. Overall project assessment by age group

Source: authors

As Figure 3 indicates, the answers to Question A5 were different in the two age groups (A5_gr1, A5_gr2), which is why a comparison was run using the Mann-Whitney method to determine if age affects the opinion on communication with team members. The test yielded the following results (see tables 6-7).

$$\text{Null hypothesis} \quad H_0: \eta_1 - \eta_2 = 0 \tag{1}$$

$$\text{Alternative hypothesis} \quad H_1: \eta_1 - \eta_2 \neq 0 \tag{2}$$

Table 6. Medians for both groups

Sample	N	Median
A5_gr1	11	7
A5_gr2	14	6

Source: authors

Table 7. P-values

Method	P-value
Not adjusted for ties	0,298
Adjusted for ties	0,264

Source: authors

Table 6 shows that the medians for both groups are similar. When testing the hypothesis, the average values of the numerical values of the tested variables were compared. Table 7 shows that the p-value results indicate that there is no statistically significant difference between these values. Clearly, the age of the participants does not affect the opinion about team members. Therefore, it can be concluded that the students' opinion about the project is generally similar.

The answers to questions of Part III, which focused on the FL challenges, were divided into groups by 4 weeks. The average values were calculated for each week's questions. The distribution of weekly average values of responses by quartiles is shown in Figure 4.
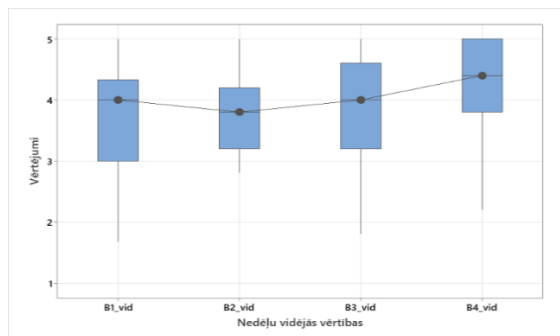
Figure 4. Averaged weekly values

Source: authors

The Kruskal-Wallis method was used to determine if these values differed by week. Indeed, they differed, which is why a between-group comparison was run using the Mann-Whitney method. The students' opinions about the second and fourth week were found significantly different in statistical terms. As Figure 4 shows, the values of the second week are the lowest. Thus, the students value the theme of loans as the least useful. Regarding the complexity of the themes, using the Mann-Whitney method, it was determined that students find the topic of savings the most difficult.

By applying the Mann-Whitney method for the group comparison tests, it was found that while the students' age does not affect the assessment of the topic's complexity, it impacts the assessment of usefulness of the theme of well-being in old age, which was valued significantly higher by students older than 25 years.

The students' occupation was not found to have a statistically significant effect on their assessments, but it affects their opinion on the complexity of the topic. For example, the students who are just studying consider the theme of the first week on personal budget more complicated than those students who combine studies with work.

The household type was not found to affect student assessments, either.

When dividing the assessment groups by study programs of students, the size of the variable groups was found too small to draw statistically reliable and significant conclusions.

4 Discussion and Conclusions

All questions of the questionnaire could be divided into two major categories – the overall perception of the project experience and outcomes (Parts II and IV) and the overall evaluation of the FL tasks (Part III). Regarding the overall perception of the project, the students' opinions converged on the positive assessment of the immediate and long-term value of the project outcomes irrespective of students' age. The students indicated that participation in the project stimulated their interest in financial issues and that they would recommend such activities to others. Some students' remarks were as follows. "The project made me think about my daily spending, plan my daily and weekly purchases, think about my savings and attempt to make some that will definitely be useful at any moment in my life. The project increased my interest in investing." The participants also claimed that they had acquired some FL knowledge, understanding of financial planning, the differences between different pension levels, investment funds, stock exchanges, investments and cryptocurrencies. Additionally, the project performed a team building function, specifically, "the project provided a good opportunity to test the abilities of your team and to get to know each other better." The students positively evaluated mentors' competences and engagement. Thus, the

outcomes of the projects' Parts II and IV point to the gaps of FL knowledge in students, to the need of organization of FL training activities for students and to students' interest in such activities.

Regarding students' evaluation of the FL challenge tasks, their opinions of the FL themes were similar and different in some respects. All answers were tested for two criteria – usefulness and complexity of tasks.

In pertinence to the usefulness criterion, irrespective of such factors as students' age, occupation and household type, "Loans" was the theme of the lowest usefulness to students. Such an outcome might be attributed to either students' good knowledge of the topic or its lowest relevance to their lives. However, the theme of "Well-being in old age" was significantly more useful to the students of the older age category. This means that the older people become, the more thoughtful they become about their financial future in the long-term.

Regarding the complexity criterion, "Savings" was perceived as the most complicated theme for students. Such factors as students' age and household type were not found to affect students' responses. The complexity responses to the "Personal budget" theme was found to be affected by students' occupation. Specifically, the students who did not combine studies with work found this theme more difficult than those students who combined the occupations. The interference of this factor might be attributed to a greater experience with budgets for the working students.

Thus, the answers to most questions were minimally related to the factors of age and occupation. None of the responses was subject to the household type effect. Therefore, it can be concluded that mostly students had similar opinions about the usefulness and complexity of tasks.

Analysing the content of the tasks and summarizing students' feedback, experiment mentors conclude that Financial challenge is appropriate for engagement of students from other countries after slight amendments, taking into account a national legislation (for instance, regarding the pension system).

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Climate change and risk in agriculture

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Abstract

Research background: In recent years, the risk in agriculture has increased mainly due to biological and climate change, which has a negative impact on the stability of production, prices and farmers' incomes. Instability leads to a reduction in investment, which worsens the competitiveness of the sector. It is therefore important to look for solutions how to manage risk in the context of open market condition and climate change effects.

Purpose of the article: The paper analyses the risk management tools aiming at decreasing or eliminating risk of farms divided into on-farm, off-farm, ex-post and ex-ante measures applied in Slovakia. EU new Common Agricultural Policy starting in 2023 also supports stability of agriculture. Member states including Slovakia can apply several risk mitigation policy interventions.

Methods: Using coefficient of variation, we compare the relative variability in price a yield of several agricultural commodities based on regional data. A value of the coefficient of variation above 20% is considered a significant degree of variability. Paper covers the period 2008-2018.

Findings & Value added: In the case of cereals, the annual yield variation is lower than the price variation. Oilseeds have higher yield variation than price variation. In terms of agricultural production, cereals, oilseeds, milk, fodder, pork and beef meat dominate in Slovakia. Decreasing risk related to these commodities is of the greatest importance. Development of risk management strategies in these sectors can contribute to the growth of these sectors, which is important for food security and rural development in Slovakia.

Keywords: *agriculture; risk management tools; price risk; yield risk*

JEL Classification: *Q02; Q18; E32; G32*

1 Introduction

Agricultural risks can be divided and classified from several points of view. Individual risks are often interconnected and it is not possible to clearly identiffy the boundaries of their effects (OECD, 2011). Based on the study of Baquet et al. (1997) Musser and Patrick (2002) define five main sources of risks in agriculture: production, marketing, financial, legal and

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human. In the study of Holzman and Jorgensen (2001), risks were divided into six basic categories: natural, health, social, economic, political and environmental. The current concept of industrialized farming is winning over small to medium-sized farming operations, which is harmful for biodiversity and environment (Muhamed and Johansen, 2022). In agriculture, several studies show the sensitivity to climate that has a negative impact on agricultural output (Rosenzweig and Parry, 1994; Mendelsohn and Dinar, 1999; Tang and Hailu, 2020). Climate change results in warmer future temperatures, changing rainfall patterns and increased frequency of extreme weather events all of which will reduce average crop yield (Weerasekara et al., 2021a, 2021b; Khanal et al., 2021)

Production (yield) risk corresponds to the variability in yiedls. Risks associated with plant and animal production mainly occur due to weather fluctuations, insufficient or excessive precipitation, hail, frost, extreme temperatures, animal and plant diseases, or mechanical errors in production processes (obsolescence of machines and technologies). The degree of yield variability caused by the same source of risk may differ among individual farmers, as it is influenced by the soil, climate in the region, and production method. The variability of yields (production) at different levels of aggregation was addressed in studies by Rudstrom et al. (2002), Popp et al. (2005), Finger (2012) and others. Harwood et al. (1999) used the coefficient of variation to evaluate yield variability and applied it to the time series of corn yields in the so-called corn belt in the US. They concluded that a higher degree of spatial aggregation causes, on average, lower yield variability. Pop et al. (2005) conducted an analysis of the yield variability of spring wheat, canola and flax in two central production regions of Canada.

Price risk is associated with changes in the prices of inputs and outputs of agricultural production, as well as other aspects of the market such as consumer behaviour or competition. In agriculture, it is more difficult to respond flexibly to market changes, given the long-term production cycle and seasonality of production. The price risk of inputs includes changes in the prices of seeds, fertilizers, feed or fuel and energy (Kimura et al, 2010). A number of studies deal with the variability and estimation of the probability distribution of agricultural commodity prices (Goodwin et al., 2000; Gilbert 2006; Huchet-Bourdon 2011; Bakas and Triantafyllou, 2018). The studies differ in the length of the monitored time, location, type of price (price of futures contracts, spot price on the domestic market, export price, etc.), time series adjustment method (deflation of nominal prices using the CPI, detrending using a trend function) and time scale price ranges (most often average annual price or average monthly price were used). In the paper we focus on yield and price risk of cereals and oilseeds in Slovakia.

2 Methodology

The coefficient of variation (CV) is used to calculate the risk. It is used for comparing the variability of several statistical features and represents a relative measure of variability. CVdoes not depend on the units in which the values of the variable are expressed. CV is the ratio of the standard deviation (s) and the average value of the evaluated quantity $\bar{x}$ (price or yield)

$$CV(x) = \frac{s}{\bar{x}} \tag{1}$$

The standard deviation s represents the square root of the variance based on individual observations x marked with the index i in the number of n.

$$s = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^2} \tag{2}$$

When analyzing the production and price risk, we focused on the calculation of the coefficient of variation of specific commodities in the regions of the Slovak Republic. A value of the coefficient of variation above 20% is considered a significant degree of variability. Paper covers the period 2008-2018 based on regional data of the Statistical office in Slovakia.

3 Results

Extend of risk in agriculture is divided into normal business risk, insurable risk and uninsurable (catastrophic) risk (OECD, 2009). Common risk is defined as a risk that farmers can deal with on their own without the help of other stakeholders (government, insurance companies) and it is part of farm management. Insurable risk management requires the existence of market institutions such as mutual funds or commercial insurance companies willing to insure farmers. In case of uninsurable (catastrophic) risks, which are of such a scale that the farmers themselves cannot manage it by themselves without external help, the participation of the government is necessary.

Table 1 Systematization of types of risks and tools for their management in EU agriculture

	Common business risks	Insurable risks	Catastrophic risks
Measures on the farm	Financial management		
	Quality and hygiene standards		
	Diversification of production and income		
	Prevention and investments		
Market instruments		Cooperation	
		Unsubsidized commercial insurance	
	Unsubsidized mutual funds		
Ex ante policy		Subsidized commercial insurance	
		Subsidized mutual funds	
	Farm income support from CAP funds		
Ex post policy			Ad hoc disaster relief

Source: Own processing

Price risk

The fluctuation of monthly prices in the years 2008-2018 (price risk) was different for each agricultural commodity. In cereals, price variability measured by the coefficient of variation was highest for corn per grain (24.05%), food wheat (22.63%) and food rye (22.64%) (Table 1). A lower price fluctuation rate was recorded in the given period for industrial wheat (20.97%), feed barley (20.62%) and feed rye (20.53%). Oats for food (12.01%) and forage (16.29%) recorded the smallest rate of price fluctuations.

In the monitored period, corn for grain also recorded the highest rate of extreme fluctuations (price fluctuation 20% above or below the long-term trend), followed by food wheat, industrial wheat, and feed barley. Extreme price drops are mainly negative for farmers. On average, oilseeds experienced lower price fluctuations than cereals. Of the oilseeds, sunflower reached the highest rate of price variability (18.70%).

Table 1. Price risk of cereals and oilseeds in 2008-2018

Commodity	CV	% above trend line +20%	% below trend line -20%
CEREALS			
Corn for grain	24,05%	20,45%	21,97%
Food rye	22,64%	18,94%	10,61%
Food wheat	22,63%	17,42%	18,94%
Industrial wheat	20,97%	18,94%	18,18%
Feed rye	20,53%	18,94%	12,88%
Food grade barley	18,84%	14,39%	12,12%
Malting barley	16,29%	6,82%	10,61%
Oats	12,01%	5,30%	4,55%
OILSEEDS			
Sunflower	18,70%	15,15%	14,39%
Winter oilseed rape	15,79%	15,91%	9,85%
Soy	13,09%	9,85%	3,03%

Source: Statistical office, own calculations

Production risk

Production risk arises mainly because of biological processes that affect the growth and development of plants and animals. Production is affected by the weather, the occurrence of diseases, the effects of pests or incorrectly applied inputs, the human factor, or problems with technology. Annual yields are therefore characterized by a certain probability distribution. With increasing specialization and intensity in production, crop uncertainty may increase.

Table 2 provides information on crop fluctuations at the level of Slovakia for the period 2008 to 2018. In the case of cereals, the annual yield fluctuation is lower than the price fluctuation (calculated from monthly data) for the mentioned period. The highest annual fluctuation from cereals is corn per grain. Oilseeds have higher yield fluctuations than prices.

Table 2. Production risk of oilseeds and cereals

	CV	% above trend line +20%	% below trend line -20%
CEREALS			
Corn for grain	23,03%	27,30%	18,20%
Other cereals	21,99%	18,20%	0,00%
Winter barley	19,70%	0,00%	9,10%
Barley together	18,56%	9,10%	9,10%
Spring barley	17,75%	9,10%	9,10%
Winter wheat	17,57%	9,10%	9,10%
Wheat together	17,39%	9,10%	9,10%
Spring wheat	16,74%	0,00%	9,10%
Rye	13,66%	0,00%	9,10%
Oats	12,62%	0,00%	9,10%
Triticale	11,48%	0,00%	9,10%
OILSEEDS			
Soy	21,73%	27,30%	18,20%
Spring and winter rape	20,01%	18,20%	9,10%
Sunflower	13,60%	9,10%	0,00%

Source: Statistical office, own calculations

Cereals

Table 3 shows the development of average cereal yields in Slovakia by region for the period 2008 - 2018. The lowest production risk in cereals was achieved in Trenčín and Žilina regions, the highest production risk was in Košice, Nitra and Bratislava regions.

Table 3 Production risk of cereals in individual regions in 2008-2018 in Slovakia

	CV	**% above trend line +20%**	**% belov trend line -20%**
Slovakia	**16,92%**	**9,09%**	**9,09%**
Kosice region	21,77%	9,09%	9,09%
Nitra region	19,21%	27,27%	9,09%
Bratislava region	19,18%	9,09%	18,18%
Banská Bystrica region	18,69%	18,18%	9,09%
Trnava region	17,22%	9,09%	18,18%
Prešov region	16,17%	0,00%	9,09%
Region of Trenčín	13,22%	0,00%	0,00%
Žilina region	12,34%	0,00%	0,00%

Source: Statistical office, own calculations

In Slovakia, the Statistical Office of the Slovak Republic collects data on the harvests of selected crops at the district level. This is the most detailed regional data. Only data on harvests at the level of individual farms are more detailed. Figure 1 shows the risk of cereal crops (measured by the coefficient of variation) by district for the period 2008-2018.

Figure 1 Risk of growing cereals in individual districts in 2008-2018 in Slovakia

Source: Statistical office, own calculations
Note: darker colour indicates higher risk measured by CV, uncoloured districts without available data

Banská Štiavnica, Čadca, Svidník, Žarnovica and Michalovce districts showed the greatest variability of cereal harvests per hectare at the district level in Slovakia in the years 2008-2018. On the other hand, the lowest variability of cereal crops per hectare at the level

of the SR districts in 2008-2018 was shown by the districts of Liptovský Mikuláš, Kežmarok, Turčianske Teplice, Námestovo and Bánovce nad Bebravou.

Oilseeds

Table 4 shows information on the risk of oilseed crops by region of the Slovak Republic in 2008-2018. The lowest production risk in the cultivation of oilseeds for the mentioned period was achieved in the Trenčín and Prešov regions, the highest production risk was in the Banska Bistrica and Žilina regions.

Table 4 Production risk of oilseed cultivation in individual regions in 2008-2018 in Slovakia

	CV	% above trend line +20%	% below trend line -20%
Slovakia	**15,93%**	**0,0%**	**0,0%**
Banská Bystrica region	19,57%	27,30%	9,10%
Žilina region	18,13%	18,20%	18,20%
Kosice region	17,69%	18,20%	0,00%
Bratislava region	17,66%	18,20%	18,20%
Nitra region	17,00%	9,10%	9,10%
Trnava region	16,15%	9,10%	9,10%
Region of Trencin	16,03%	9,10%	0,00%
Prešov region	14,82%	0,00%	9,10%

Source: Statistical office, own calculations

According to the data of the Statistical Office of the Slovak Republic, in the years 2008-2018, the production risk of growing oilseeds was regionally different. Figure 2 shows the development of the riskiness of oilseed crops by district of the Slovak Republic for the period 2008-2018.

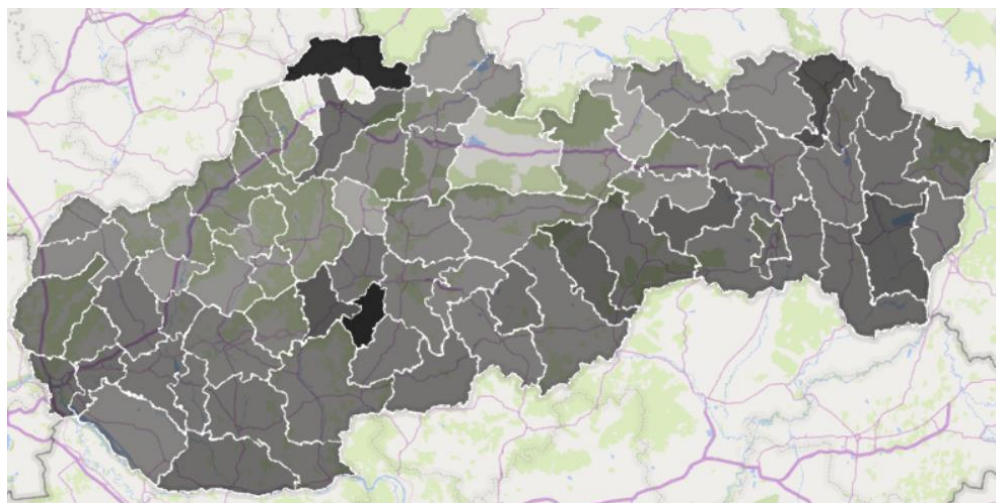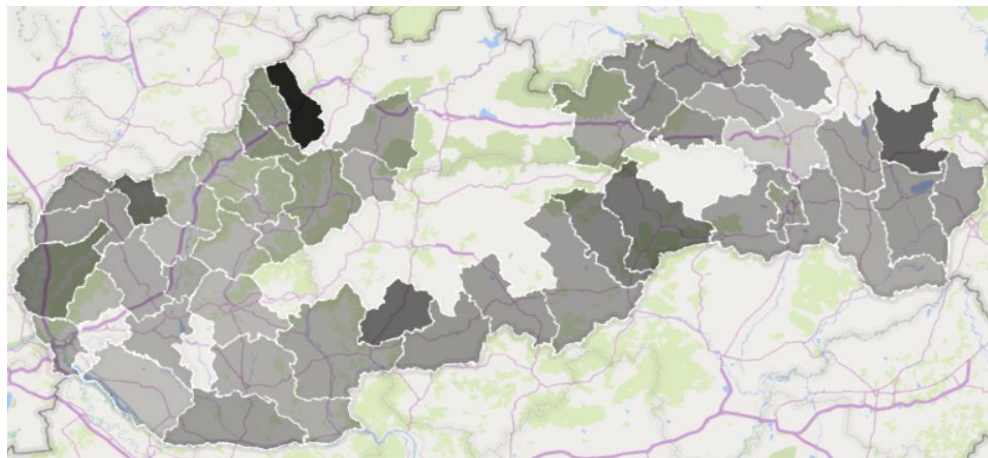**Figure 2** Risk of oilseed cultivation in individual districts in 2008-2018 in Slovakia

Source: Statistical ofice, own calculations
Note: darker colour indicates higher risk measured by CV, uncoloured districts without available data

Považská Bystrica, Humenné, Myjava, Krupina and Rožňava districts showed the greatest variability of hectare yields of oilseeds at the level of SR districts in the years 2008-2018.

On the other hand, the districts of Prešov, Dunajská Streda, Nitra, Nové Mesto nad Váhom and Piešťany showed the lowest variability of hectare yields of oilseeds at the district level in Slovakia in the years 2008-1018.

4 Discussion

In the European Union (EU), the Common Agricultural Policy (CAP) contributes significantly to the reduction and diversification of farmers' risks. Income support for farmers from the first pillar of the CAP represents a guaranteed income that significantly stabilizes individual farms and agriculture. In addition to income support, the CAP enables the use of ex ante instruments. Member States may subsidize commercial insurance and mutual funds. Investment support, support for cooperation, consultancy, education, or support for irrigation or anti-erosion activities significantly reduce the production and income risks of farms. New CAP 2023-2027 will also focus on risk management tools. Member States may grant support for risk management which help active farmers manage production and income risks. Member States may grant support for different types of risk management tool, in particular: (a) financial contributions to premiums for insurance schemes; (b) financial contributions to mutual funds, including for the administrative cost of setting up.

Support can be granted only for covering losses which exceed a threshold of at least 20 % of the average annual production or income compared to previous three-year period, or a three-year average based on the preceding five-year period excluding the highest and lowest entry. Member States shall limit the support to one or more rates not exceeding 70 % and avoid overcompensation.

5 Conclusion

In recent years, both in the EU and in Slovakia, production and price risk have been increasing. It is related to increasing weather fluctuations, fluctuations in the prices of outputs and inputs to production on the European and world markets, and changes in support policies within the EU's Common Agricultural Policy.

When analysing the price and production risk, we focused on the calculation of the coefficient of variation, and a value of the coefficient of variation above 20% is considered a significant degree of variability.

Price risk arises mainly from rising prices of inputs or changing prices of production outputs. Corn for grain, food wheat and food rye have the highest rate of price fluctuation in the monitored period. Cereals generally have a higher rate of price fluctuations than oilseeds.

The production risk is a result of changes in the amount of production per hectare. We evaluated regional volatility. Oilseeds have a higher degree of variability than cereals. The production risk of selected commodities differs significantly in the regions of the Slovak Republic.

Slovak farms can deal with common risks independently through tools such as diversification, selection of suitable varieties, etc. The advantage of Slovak farms from the point of view of risk management is their size and low level of specialization, which creates suitable conditions for risk diversification. Slovak farms are among the largest and least specialized in the EU.

The tools of the common agricultural policy of the European Union also help farmers in risk management. Direct payments, which are independent of production and therefore guaranteed even in unfavourable years, have a significant contribution to reducing farm risk. In Slovakia, direct payments make up one of the largest share in production, added value or profit.

Production and price risk can be reduced by investment support in primary production as well as in processing on the farm. Higher added value protects farms from high fluctuations in the prices of basic raw materials. Investment supports should be an important aspect of increasing added value and supporting risk management on farms.

Acknowledgements

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Big data analytics capabilities and performance

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Abstract

Research background: Previous studies indicate that it is necessary to have big data analytical capabilities (BDAC) to improve the performance of organizations. Although the potential benefits of big data for business have been widely publicized, little is known about the current cutting-edge literature on BDAC and performance of companies from different sectors in emerging economies, in this case, Brazil. As such, this relationship remains unclear. This study fills this gap. Understanding this relationship is a relevant priority for several reasons: big data analytics is one of the main determinants of business performance, drives the quality of decision-making in organizations, and helps companies build competitive advantages.
Purpose of the article: This study examines the relationship between BDAC and business performance.
Methods: Primary survey-based data was collected from Brazilian companies, where we captured data from IT professionals. We adopted multivariate analysis techniques for data analysis.
Findings & Value added: Our findings suggest that BDAC are relevant to business performance. This study advances the body of knowledge on the contributions of big data analytics capabilities to organizations. In addition, the findings serve as a guide for managers in allocating resources towards superior business performance. In short, this work provides insights that can contribute to the current debate about implementing analytic capabilities across the world.

Keywords: *analytical capabilities of big data; performance; Brazilian companies*

JEL Classification: *A11; A14; B16*

1 Introduction

This study tests a research framework capable of capturing the importance of big data analytical capabilities for the performance of companies. We analyze whether the adoption of big data analytical capabilities (BDAC) contributes to the performance of firms. We intend to shed light on the context of companies from different sectors in an emerging economy.

Thus, we offer useful insights to understand the relationship between big data analytical capabilities and company performance. In sum, this work provides insights that can contribute to the current debate on the implementation of analytical capabilities around the world. The findings of Mikalef et.al. (2020) suggest that strong analytical capabilities of big data can help firms build a competitive advantage and superior firm performance (Gupta and George, 2016).

BDAC are distinctive mechanisms for business competitiveness in highly dynamic markets, have direct and indirect positive effects on business model innovation, and play a significant role in creating value for companies and their stakeholders (Ciampi et.a., 2020). Although BDCA provide organizations with valuable insights to facilitate performance and customer value results (Wamba, 2015), the impact of BDAC on firm performance is not yet fully understood (Rialti, 2019). Mikalef et.al. (2018) highlight that big data analytics is the ability of a company to effectively deploy technology and talent to capture, store and analyze data, to generate insights. In addition, BDAC have become a relevant research topic from a variety of knowledge areas. We believe that the analytical capabilities of big data can promote the improvement in the performance of firms. Few studies address the ability to analyze data for the performance of firms. Thus, verifying which are the most relevant capabilities to improve the results of companies from different sectors in an emerging economy, such as Brazil, is the objective of this study. As far as we know, there are still no empirical studies that relate BDAC and the performance of firms of different sectors in Brazil. This article aims to contribute to the theoretical field of BDAC to improve the performance of firms.

In addition, our study aims to answer the following questions that require further analysis: How important are BDAC for firm-level performance in different sectors in Brazil? Studying companies located in Brazil can bring new insights to the debate on BDAC for firm performance. After this introduction, the remainder of the article is structured into five additional sections. Section 2 presents the theoretical concepts and research hypotheses of the study. Section 3 describes the research methodology used in the study. Section 4 reports the findings, while Section 5 discusses them. Finally, Section 6 highlights the contributions of the study and points out its limitations and some proposals for future research.

2 Literature review

There is a growing debate about the importance of big data analysis to leverage results and achieve an organization's strategic objectives (Fosso Wamba, Akter, and Bourmont, 2017 ; Gunasekaran and Childe, 2019). Several studies (Fosso Wamba, Akter, and Bourmont, 2017 ; Gupta and George, 2016, Mikalef et.al., 2017, Mikalef et.al., 2020, Mikalefi et.al., 2019) indicate gains from the insights generated by big data analytics, such as: decision making, return on investment (ROI), supply chain efficiency, generating customer information, forecasting demand, marketing strategies, optimizing e-commerce, reducing costs, increasing sales, etc. The world's most innovative companies (BCG, 2021) (Apple, Alphabet, Amazon, Microsoft, Tesla, Samsung, IBM, Huawei, Sony, Pfizer, Siemens, LG, Facebook, etc.) competitive advantage. Big data revolutionized the industry and became an important source of competitive advantage and company performance (Rialti et.al., 2019). However, big data is not a sufficient condition to generate competitive performance gains (Mikalef et.al., 2020). It is necessary to orchestrate and leverage big data to improve competitive performance.

Thus, companies need to acquire and develop a unique mix of technological, human, financial and intangible resources, which will be difficult for competitors to imitate (Mikalef et.al., 2020). Companies with these capabilities can achieve competitive performance gains (Mikalefi et.al., 2019, Mikalef et.al., 2020, Fosso Wamba, Akter, and Bourmont, 2017).

BDAC offer companies a unique ability to generate new insights into new emerging market opportunities early and ahead of competitors, enabling them to implement business strategies to meet new customer needs and generate sustainable revenue (Olabode et.al., 2022).

The dominant literature recognizes that the BDAC positively impact the generation of insights for the quality of decision making (Awan et.al., 2021) and lead to superior performance of companies (Gupta and George, 2016, Mikalef et.al., 2020, Mikalefi et.al., 2019). Thus, investing in BDAC can create value (Marshall, Mueck, and Shockley, 2015) and be a strong source of competitive advantage (Gunasekaran et.al., 2016). Big data analytics capability is the "ability of a company to effectively deploy technology and talent to capture, store and analyze data, for the generation of insights" (Mikalef et.al., 2020). Gupta and George (2016) highlight that the analytical capacity of big data is supported by tangible resources (data, technology and basic resources); human resources (technical and managerial skills); and intangible resources (data-driven culture and organizational learning).

BDAC are like "the ability of a company to effectively deploy technology and talent to capture, store and analyze data, towards the generation of insight" (Mikalefi et.al., 2019). Gupta and George (2016) suggest in their study that BDAC and firm performance is empirically validated. Thus, using the resource-based view (RBV) theoretical lens, some studies have examined the relationship between BDAC and competitive advantage (Mikalefi et.al., 2019, Gupta and George, 2016); firm performance (Rialti et.al., 2019, Yasmin et.al., 2016) and signaled that big data analytical capabilities lead to superior results.

Different indicators are highlighted in the literature to measure the capabilities and overall performance of the company. For example, Mikalef et.al. (2020) adopted in their study the metrics: tangible resources (basic resources, data and technology), human skills (technical and managerial), intangibles (data-driven culture and organizational learning) to measure the analytical capabilities of big data. The authors adopted as metrics for performance, profitability, return on investment (ROI), market share growth (ROI), sales growth, rapid response to market demand, reduced operating costs, and increased customer satisfaction.

The results indicated that analytical capabilities have an indirect effect to help companies build a competitive advantage. To measure the BDAC, Yasmin et.al. (2016) adopted the following metrics: infrastructure capacity, human resource capacities, and management capacity. For performance, the authors adopted the following metrics: market share, sales growth, product development, cost saving, number of new product and service projects, return on sales – profit/total sales. The results showed that BDAC are more strongly related to operational performance than to market performance. Thus, despite the growing interest in highlighting the effects of BDAC by practitioners and scholars, we know little about the quantitative effects of big data analytics capabilities on the performance of companies in emerging economies. To measure the BDAC and performance in an emerging economy, this study adopts the metrics indicated by Mikalefi et.al. (2019, 2020).

3 Methodology

3.1 Measures and scales

A questionnaire (five-point Likert type ranging from 1 - strongly disagree to 5 - strongly agree) for data collection was developed and tested by three professionals in the information technology field. Respondents considered the questionnaire appropriate in terms of face validity and content. Few wording adjustments were considered for the final refinement of the instrument. In addition, a pilot test was applied to two professionals working in companies in the basic materials sector, who responded in the test phase. The value of Cronbach's Alpha

obtained in this phase of the test was higher than 0.70, considered satisfactory. The measures of BDAC adopted in this study followed the proposal by Mikalefi et.al. (2019). Thus, the measures of capabilities were: (i) tangible resources - basic resources, data and technology; (ii) human skills: technical and managerial; and (iii) intangibles: data-driven culture and organizational learning. To measure performance, we adopted the following metrics: market share (P1), sales growth (P2), profitability (P3), operating cost reduction (P4), number of new product and service projects (P5), return on investment (ROI) (P6) and customer satisfaction (P7) (Mikalefi et.al., 2020 ; Yasmin et.al., 2016). By way of illustration, just the metric: "profitability".

3.2 Sample and data collection procedures

LinkedIn's professional social network was used to survey respondents in the information technology area (directors, managers, supervisors, senior analysts) from companies from different sectors in Brazil. Our sample was chosen based on the presence of individuals in the LinkedIn network. After obtaining contact details, we sent the questionnaire to 42 respondents and received 18 (to date) completed questionnaires; and 2 were eliminated due to inconsistencies. Thus, we reached a sample of 16 questionnaires: financial (banks) (3), industrial goods (4), basic materials (3), cyclical consumption (2) and non-cyclical (3), oil and gas and biofuels (1). We applied descriptive statistics techniques to survey the sample's means and standard deviation. Figure 1 indicates the results of mean (M) for big data analytics capabilities: tangibles, human skills, and intangibles.

4 Results and discussions

Figure 1 shows the results of companies' big data analytics capabilities priorities based on responses from IT professionals.
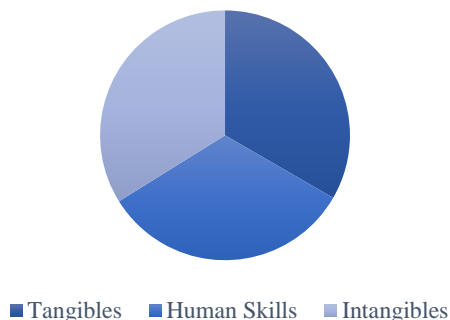
Figure 1. Big Data Analytical Capabilities

Source: authors

Analytical capabilities are relevant to company performance (profitability), with emphasis on intangible capabilities: data-driven culture (M=3.93, SD=1.20) and organizational learning (M=3.97, SD=1.28). These results are in line with the findings by Mikalefi et.al. (2020). Figure 2 shows the results of the response behavior (Mean-M) of the 24 big data analytics capabilities (Appendix A).
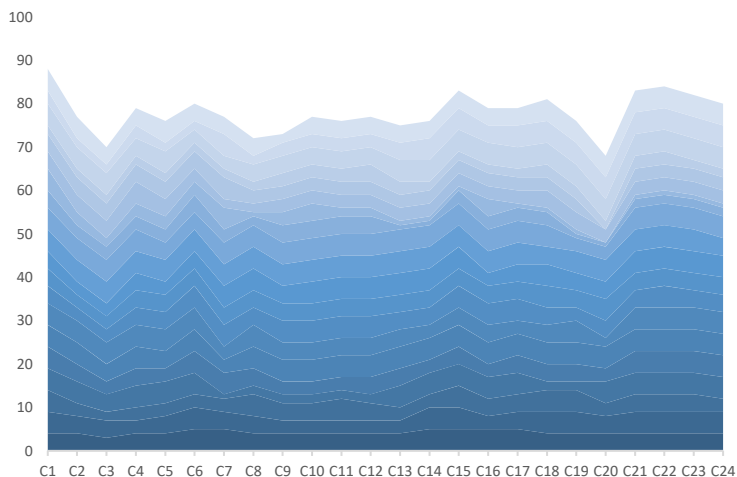
Figure 2. Big Data Analytical Capabilities - Appendix – A: Legend

Source: authors

The expected findings indicate that capabilities are relevant to achieve performance, represented by the most homogeneous area in Figure 2. Companies stand out for their ability to access data (C1) (M=4.4), adoption of big data tools (C4) (M=3.95), are able to integrate various external sources (C3) (3.5), adopt database tools (C5) (M=3.8), adopt visualization tools (C6) (M=3.8), offer training focused on big data analysis for professionals/teams (C8) (M=3.6), big data analysis teams have the right skills to do their jobs successfully (C10) (M=3.8), big data analytics managers are able to coordinate big data-related activities in order to support other functional managers, suppliers and customers (C15) (M=4.15), company culture is oriented to data (C19) (M=4.05) and have learning capabilities: share internal and external knowledge (C20), acquire (C21), absorb (C22), apply (C23), explore (C24) new and relevant knowledge. Thus, the intangibles are the BDAC that exert the most influence on the performance of companies. These findings are consistent with the dominant literature and signal the robustness of BDAC to improve business outcomes (Mikalef et.al., 2020, Oluwaseun et.al., 2022). Thus, the unique contribution of this article lies in testing empirical evidence for the theoretical relationship between BDAC and performance of companies from different sectors in Brazil. Since most research on BDAC has focused on Europe, we focus on Brazil. Thus, we offer useful insights to understand the BDAC in Brazilian companies. Therefore, this work provides insights that can contribute to the current debate about the implementation of BDAC in other locations.

5 Final remarks

In this article, we tested a research framework capable of capturing the importance of BDAC for business performance. Primary survey-based data were collected from Brazilian companies from different sectors, where we captured data from IT professionals. The results indicate that BDAC improve the profitability of companies in an emerging economy, such as Brazil. The findings indicated intangible capabilities as the most important (respondents' view), evidenced by data-driven culture and organizational learning. These results are in line with the high lineage literature (Mikalefi et.al., 2019, 2020). The most outstanding capabilities are distributed as follows: tangible – data; human skills – managerial; and

intangibles – organizational learning, with emphasis on intangibles.

5.1 Implications

Previous studies indicate that it is necessary to have BDAC to improve the performance of organizations (Mikalef et.al., 2020, Olabode et.al., 2022). Empirically, previous studies were not able to show the impact of BDAC on the performance of companies in Brazil. As such, this relationship remains unclear. Studies show that it is important to explore the BDAC for several reasons: (i) the technologies of the fourth industrial revolution have the potential to reconfigure business models, making them more successful; (ii) the analytical capacity of big data is one of the main determinants of companies' performance (Olabode, et.al., 2022), boosts the quality of decision-making in organizations (Awan et.al., 2021), and helps organizations companies build competitive advantages (Mikalef et.al., 2020). Providing evidence of big data analytics capabilities measured through performance is crucial. Revealing the relationships between these concepts is important, it extends the existing literature and suggests that BDAC affect the performance of companies. Our findings extend the literature by highlighting the effects of BDAC on performance when addressing an emerging economy (Brazil).

From a practical point of view, the results indicate that companies should focus on offering big data analytical capabilities that generate enough earnings to survive and generate return for their customers. Our study calls on managers and leaders to formulate, implement, and integrate capabilities with partners to improve the performance of BDAC. In other words, the financial return (profitability) of the analyzed companies depends largely on intangible assets. Thus, the managers of these companies must cultivate analytical capabilities oriented to intangibles, such as a culture guided by large-scale data, learning, etc. As companies manage to develop their analytical capabilities, they can be more competitive.

5.2 Limitations and suggestions for future research

The authors of this paper recognize that this study has some limitations that must be addressed. One is related to theory and the other is related to research methodology. With regard to theory, we argue that, although justified, highlighted and proposed in high-line literature (Gupta and George, 2016, Mikalef et.al., 2020, Mikalefi et.al., 2019), there may be other relevant alternatives for BDAC that were not properly addressed in this research and that may yield different results. Thus, the results of this study relate to the dimensions of this study. In future studies, it would be interesting to adopt other dimensions of capabilities to examine their effects in the performance of companies. In this study, we adopted only profitability as a measure of company performance. It would be interesting to use other financial and non-financial performance measures. It is an opportunity to expand the robustness of BDAC as a mechanism that significantly improves the performance of enterprises.

Regarding the limitations related to the methodology, in our research structure, some limitations emerged due to the sample size of this study. Future research should pay more attention to a more substantial sample. Our research design is cross-sectional. Thus, a longitudinal design would be interesting to verify the long-term behavior of capabilities. We recommend for future studies the use of more robust techniques, such as structural equations, to examine the relationship between BDAC and performance. We encourage scholars to carry out future studies with the aim of showing the effects of BDAC on the performance of companies in other contexts and different sectors in emerging economies.

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APPENDIX – A: Legend

C1 – We access large volumes of data
C2 – We integrate multiple internal data sources for analysis
C3 – We integrate multiple external data sources for analysis
C 4 – We adopt big data software/tools: Hadoop, Spark, Kafka, etc.
C5 – We adopt SQL and NoSQL relational database tools
C6 – We adopt Power Bi, Qliksense, Qliview, etc. to provide interactive visualizations and business intelligence capabilities with a simple interface for end users to create their own reports and dashboards.
C7 - Investments of financial resources in analytical Big Data projects
C8 – We offer training oriented to big data analysis for professionals/employees
C9 – We always hire new professionals with experience in big data analysis
C10 – Our big data analytics team has the right skills to do their jobs successfully
C11 – Our big data analysis team is adequately trained to perform their duties
C12 – Our big data analytics team is well trained
C13 – Our big data analytics managers understand and appreciate the business needs of other functional managers, suppliers and customers
C14 – Our big data analytics managers can work with functional managers, suppliers and customers to determine the opportunities big data can bring to our business
C15 – Our big data analytics managers are able to coordinate big data related activities in order to support other functional managers, suppliers and customers
C16 – Our big data analytics managers are able to anticipate the future business needs of functional managers, suppliers and customers
C17 – Our big data analytics managers have a good sense of where to apply big data
C18 – We have a data-driven culture
C19 – Our decisions are based on data
C20 – We share knowledge internally and externally with partners – stakeholders
C21 - We acquire new and relevant knowledge
C22 - We absorb relevant knowledge
C 23 - We apply relevant knowledge
C24 - We explore new knowledge

Source: Adapted from Mikalefi et.al. (2019,2020)

Digital platform as an element of global transport ecosystem in urban agglomerations

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Abstract

Research background: Currently, the transport problem in megacities has become one of the global problems. Its solution often involves strengthening the role of regulation, the presence of strict traffic rules and specialization of the road network. At the same time, the impact of transport on the surrounding area and the quality of life of the population is not considered.

Purpose of the article: Justification of transport ecosystem "shared space" functioning general principles in urban agglomeration and the possibility of its construction using digital technologies.

Methods: Research is based on using the comparative analysis tools for the process of transport systems digitalization and the construction of quasi-integrated structures. The research base was the data obtained as a result of summarizing the opinions of experts, got by the interview on the role of transport companies in the formation of the " shared space" of urban settlements.

Findings & Value added: The article justifies the conclusions that: the efficiency of the large cities transport system functioning should be estimated with the regard to effectiveness of the region shared space functioning in general. The goal achievement becomes possible with the construction of new business models in the field of transport, arising on the basis of quasi-integrated structures, in which applied digital platforms acquire a dominant position. The step-by-step creation of IT platforms should be based not only on the active use of state or municipal investments, but also on the opportunities of using stock capital of regional participants in the formation of a common space.

Keywords: *digital platforms; shared space of cities; quasi-integrated structures; urban public transport passenger transportation*

JEL Classification: *R14; R41; R42*

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1 Introduction

Development of informational or post-industrial economy facilitates a boost in digital technologies applied by modern market agents (Clark et al., 2020; Wade et al., 2021; Nevzorova and Kutcherov, 2022).

A digital platform is not ultimately a traditional firm, it rather represents an essential component of a quasi-integrated economic structure that takes in-company relations outside and can transform market production management in a range of directions (Tretyak and Lyakina, 2020).

Digital transport platforms are likely to make a great effect on improving available convenient transportation in urban metropolis under the concept of shared space

2 Review

The concept of "shared space" in terms of traffic management was first used by Tim Pharoah in a book "Traffic Calming Guidelines" published in England in 1991. The author stated that the aim of designing common space is to increase road safety, which shall be ensured by responsible selection of the speed and direction of movement by all traffic participants (pedestrians and drivers).

Among acknowledged specialists in traffic management is the innovative road traffic engineer Hans Monderman (Netherlands), who headed the European Shared Space Project (the part of Interreg IIIB-North Sea Project) from 2004 to 2008. The project was financed by the European Commission and aimed at developing methods to prevent traffic accidents and bring more economic activities onto city streets. Monderman proposed new approaches to city streets design in order to provide comfortable conditions so that pedestrians and motorists coexist in harmony. Prof. Jan Gehl, the Copenhagen-based architect and urban design consultant, is called the Danish guru of shared space. He has been involved in a range of urban design projects around the world, including London, New York, Moscow, cities in Australia and New Zealand.

So far, there is no unified definition of the term " shared space" or unambiguous assessments of the role of the concept in street life management. In layman's terms, common space means maximal removal of road signs that regulate and separate traffic of pedestrians and drivers in urban areas. Traffic participants should use the common space by self-organization and interacting with one another. Slow moving city streets stripped of traffic control get safer, since both drivers and pedestrians have to pay more attention to the traffic situation and be socially responsible.

A broader interpretation of shared space implies a new approach to urban space management in order to make a modern city comfortable for living and friendly towards its residents; this approach involves more active and harmonious use of territory and reduces separation of the urban traffic system from the city life.

The concept of shared space does not hinder development of high-speed urban highways that ensure quick travel from one city end to the other, but rather complements it. It should primarily apply to traffic management in tangle small and slow streets in residential areas and old house neighborhoods in the historical part of the city. Priority that motorists usually have should be abandoned in favor of equal relations for all traffic participants.

Wisely-designed streets can ensure conditions and provide opportunities for recreation, social communication and physical exercises, while wrongly-designed streets seem inhospitable, lack conditions for social life, and limit travelling on foot or by bicycle. They can also have a negative impact on local economic performance.

The above-mentioned concept has been widely applied in practice in European cities, in Germany (Bompe was one of the first cities in the projects), Sweden, the Netherlands, Denmark, and England. Similar projects were implemented in the USA, Australia and New Zealand. One of the goals pursued in the projects was to improve traffic safety. In 2011, the UK Department for Transport issued a guidance on the design of shared space.

Advocates of shared space see a number of benefits in this form of traffic management, including:

- Reduced number of accidents, compared with usual streets with the same shared space usage rate.
- Reduced speed of traffic, while also shorter travel time to get to the destination (Moody and Melia, 2014).

It should be remarked that the shared space concept has been regularly criticized by the bodies representing interests of people with disabilities, primarily vision-impaired ones, who will face many problems in such situations, and by urban planners who reprove lack of traffic information for motorists. In some cases, even positive outcomes of this urban traffic management system were subjected to critical analysis (Scott et al., 2020).

The analysis shows that the term "shared space" in passengers transport services is rather ambiguous. We believe that it is valid to apply a broad interpretation of the term, treating shared space as an opportunity to get high-quality transport services while maintaining the same comfort of life. Use of shared-space principles in development of urban transport systems in the Russian Federation appears relevant due to a number of challenges that exist in this sphere (Zhuravleva and Poliak, 2020).

The multiplicative effect of urban development relies upon traffic infrastructure of urban agglomerations (Gulyi, 2020). A rational territorial location of economic resources is accompanied by increased investment attractiveness of territories, labor productivity and incomes of residents (Vorontsovskiy, 2020). Mostly, these effects are associated with increasing mobility of residents and development of mass passenger flows; therefore, there are special requirements to development of traffic systems in these areas and a number of social and environmental challenges (Shestakova et al., 2020).

Urban traffic systems have some special characteristics:

- The bulk of residents use services of high-performance public transport, primarily where it comes to intensive passenger flows, for example, resulting from commuting.
- Modern transport systems of cities have passenger flows of varying intensity, so final services to passenger require close interaction of various modes of transport, including personal one.
- Multimodal transport service is impossible without relevant infrastructure, including transport hubs, and information support, which should ensure comfortable change from one mode of transport to another.
- Transport infrastructure is developing in established urban planning of historical and cultural centers and residential areas, that is, has a number of territorial restrictions.

Growing urban agglomerations make the issue of comfortable living and mobility even more relevant. On the one hand, a developing transport infrastructure is an essential factor ensuring easy access to the territory and mobility of residents (Marusin and Ablyazov, 2019). On the other hand, its development is more and more accompanied by environmental problems, when large territories no longer present a comfortable space for living.

Quite often, modern transport infrastructure aimed at support of intensive passenger flows does not fit into existing urban areas in any way and destroys the local way of life.

3 Methods

This paper researches application of tools for comparative analysis of transport structures digitalization and use of quasi-integrated firms. The research is based on results of collective expert assessments of urban residents expectations focused on development of shared space. The data is a summary of expert opinions, collected during in-depth interviews about the role of transport companies in development of "shared space" in municipalities.

4 Results and discussion

As mentioned above, shared space implies high-quality transport services while maintaining the same comfort of living. It can be facilitated by new technologies inherent in the emerging sixth technological paradigm. This is the first result of our research, which shall be explained below.

Ideas of comfortable living environment vary. In order to reach agreement among resident in the region, we propose to conduct a Foresight project, which can find points of consensus between all parties concerned in terms of their expectations about improvements in this area.

First of all, let's focus on benefits of urban transport system that shall arise when using digital-based business models.

Some researchers treat digital platforms as a key tool for digital transformation of traditional industries and markets, a central concept of the global digital agenda, which distinguishes between digitalization strategies (digital automation) and digital transformation (Geliskhanov et al., 2018).

Table 1 presents classification of currently operating digital platforms, developed by participants of the "Digital Economy of the Russian Federation" program guided by B.M. Glazkov.

The table shows that instrumental digital platforms ensure development of software and hardware solutions based on the current technological background while maintaining the same business model. Infrastructure digital platforms offer new IT services supporting non-standard management decisions; which require adjustments into existing industrial technologies. Thus, the first two types of platforms only improve existing business structures.

The applied digital platform, to the contrary, demands intensive involvement of innovative technologies inherent in post-industrial technological structures. It directly interferes into exchange of economic values in markets, that is, it modifies traditional markets and encourages transition to information economy (Tretyak et al., 2021).

We believe that a key element in urban transport systems management must be a functioning mechanism similar to the one of the applied digital platform that puts into effect the potential of assets quasi-integration based on post-industrial technological structures.

Economic nature of the applied digital platform is backed by the value created during a direct interaction of several business entities on it. The platform itself, without firms it attracts, cannot be treated as a separate market agent. The applied IT platform is just an element of a quasi-integrated structure, which, in its turn, represents an active agent of the industrial market, meaning it is an entity with market power. Thus, it can take in-company power relations outside and make an effect on the market structure. Usually, such opportunities occur in an active firm as a result of quite high level of market concentration and a large market share covered by the firm.

Table 1. Classification of digital platforms (Mesropyan, 2018).

Feature	Instrumental digital platform	Infrastructure digital platform	Applied digital platform
Main activity on the platform	Development of **software** and hardware solutions	IT **services** and information for decision making	**Exchange** of certain **economic values in markets**
Result of activity on the platform	Product (software or hardware) for information processing, as a tool	IT service and result of its work - information necessary for decision-making in a business	Transaction. A deal of exchange of goods/services between participants in a market
Level of information processing	Technological operations of information processing	Development of information for decision-making at a corporate level	Processing of information about execution and performance of a transaction between several business entities
Main beneficiary and its requirements	Developer of applied software or hardware solutions, technical requirements	Customer of IT service for a final user (productologist), functional requirements, requirements to the content of information	End user in the market, who solves business problems, business requirements. Regulator (optional) - legal requirements
Examples	Java, SAP HANA, Android OS, iOS, Intel x86, Bitrix, Amazon Web Services, Microsoft Azure, TensorFlow, Cloud Foundry	General Electric Predix, ESRI ArcGIS	Uber, AirBnB, Aliexpress, Booking.com, Avito, Boeing suppliers portal, Apple AppStore, , AviaSales, FaceBook, Alibaba, Telegram, Yandex Taxi, Yandex Search, Facebook

Source: authors

A good example of quasi-integrated structures based on the applied digital platforms is clusters of corporations uniting several small independent firms that create services for their benefits in order to successfully combine efforts in economic areas and reduce risks of small business.

Inside a digital quasi-integrated structure there is a system of relations different from market ones, since the platform does not work for unknown demand and is characterized by effective consolidation of assets used upon request of a pre-known consumer; the assets get involved as the need arises. The system of relations inside the platform demands that quality criteria and customer service standards should be determined. Here an in-company power mechanism for resources redistribution, different from the market one, is developed in a special form, with voluntary consent of participants working on the platform. The platform can generate demand as a flow of orders comes directly from consumers. Organizational management can ensure a fairly complete control over assets of the firms in the integrated structure, even if such platform is not legally registered.

Thus, the applied platform acts as a digital unit of quasi-integrated assets, and the structure built in it is a flexible form for attracting and using assets that affect the market

relations system both within the structure and outside it, and, among other things, facilitates application of modern innovative technologies.

We think that development of the territory as a single space, intensive interaction between different modes of transport, a complex mechanism for urban transport system managing serve as objective conditions for using applied digital platforms. Since the platforms involve all elements of the transport industry, use such elements with due regard to the needs of residents, and promote innovative technologies, they can ensure high-quality transport services while maintaining a comfortable living environment in urban agglomerations.

Nowadays, digital technologies are widely used in urban transport systems as electronic services for communication between market participants and consumers (for instance, YandexTaxi) that help analyzing ongoing processes and making necessary adjustments. The digital ecosystem can include several monitoring elements for traffic simulation and management, among which are:

- Monitoring of intersections, delays, traffic jams.
- Monitoring of traffic intensity and categories of traffic participants.
- Determination of average cars speed and speed that 85% of drivers do not exceed.
- Accurate movement trajectories and positions.
- Heat-maps of traffic speed and frequency.

These elements can be used to analyze road traffic, develop digital models of the traffic situation, and build optimal urban transport routes (Zhuravleva et al., 2020).

Western European cities see a great popularity of the so-called MaaS technologies (Mobility-as-a-Service), which are successfully applied there. They combine offers of providers of various urban transport services and give access to such services through a digital service to end users, prompting them to select the best route and use the list of additional services.

The above-listed shows that digital technologies are becoming a link not only between market participants and consumers, but also between all parties of social-economic relations. (Efimova et al., 2020).

We believe s that use of digital technologies and, first of all, applied digital platforms in monitoring, modeling and managing of an urban transport system should focus on the shared space concept. That is, the ultimate goal of their use shall not be intensity of traffic routes, but rather high-quality transport services to residents while maintaining a comfortable living environment.

5 Conclusion

In the conclusion, it is worth noting that principles of the "shared space" transport ecosystem in the area must be developed after the thematic Foresight is over. Results of the Foresight project will allow us to formulate principles of the "shared space" transport ecosystem in a municipality or region more accurately. Consequently, any transport IT platform, be it services, digitization of information flows, or Peer-to-Peer applied IT platforms, should become an integral part of shared space.

Digital big data monitoring requires a unified comparison style in terms of efficiency of not only transport, but also of shared space in the area. Besides, a step-by-step development of IT platforms should be based not only on state or municipal investments, but also on opportunities for investments from regional participants of shared space.

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Decision-making support of sports organizations via modern information systems and ICT tools

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Abstract

Research background: The constant progress of ICT and information systems (ISs) is also one of the numerous demonstrations of globalization. ISs are increasingly used to support decision-making in various sectors of the world economy. Such sectors, using specifically designed SW tools and modern technologies, include the field of sports and sports management.

Purpose of the article: The main objective of our article was to create an overview of current knowledge and options available to managers of sports organizations to support their decision-making. Based on this knowledge, recommendations were proposed for the effective implementation of ISs in sports organizations.

Methods: The methods applied included the identification, analysis, and synthesis of the theoretical background as well as legislative regulations and valid guidelines, comparison of available solutions, and summarization of examples of the application of specific ISs and ICT elements in the operation of sports organizations.

Findings & Value added: One of the key results was the description of the steps that will make the implementation of ISs in sports organizations more effective. These steps will truly contribute to the improvement of their operation in an environment influenced by the effects of globalization, creating multiple connections between individual countries. In fulfilling the set objective, mainly the following aspects of globalization were considered: application of knowledge from foreign research; application of solutions developed abroad into the practice of Slovak sports organizations; the need to harmonize information support for Slovak sports organizations with the international environment requirements (legislative regulations, rules of international competitions) and the latest trends (monitoring and evaluation of data on athletes' performance).

Keywords: *decision-making; sports organizations; sports management; information systems; ICT*

JEL Classification: *Z20; L83; M15*

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1 Introduction

Sports represent physical activity to use, maintain or improve physical abilities of the participants and provide entertainment (Ferenc et al., 2017). Modern elements are slowly entering sports as well. The developing trend of information systems (ISs) in sports can offer several opportunities for improving performance, health, or experience. Within sports, there are numerous data sources that contain significant information. These are, e.g., sources of data on the athletes, data on sports equipment, audio-visual recordings, etc. Therefore, with the rapid development of the sports industry, traditional decision-making methods are no longer suitable. The amount of data can be efficiently processed using ICT, e.g., in an IS. It is a tool used to acquire, process, store, and disseminate all kinds of digital information via a combination of computer and telecommunication technologies. Currently, IT can significantly improve the efficiency of work. The article presents possibilities of using ICT to support the decision-making in sports organizations. It also presents an overview of how IT change the nature of processes in modern sports (Chuang, 2012; Konstantis et al., 2017).

1.1 ISs used in sports

The main purpose of the IS in sports was to ensure centralized collection of information, simplify administrative processes, make the reporting of spent funds transparent, provide statistics on athletes, sports experts, sports organizations, clubs, events, and to make information available to the sports public. During the creation of the system, the greatest emphasis was put on its simplicity, clarity, and provision of sufficient user comfort. Similarly, to any IS, the one created for sports has its goals. These include (Itretisektor, 2017, A):

- creation and management of key registers,
- collection and publication of information on activities in individual areas in sports with the possibility of creating extensive statistical outputs within individual registers,
- creation of a public portal to satisfy the needs of professionals and non-professionals,
- creation of a module for ensuring safety at sports events,
- records of financial resources allocated in sports.

1.1.1 Key features of the IS in sports

The IS for sports has key features so it can fulfil its tasks and help creating a proper operation in sports. These features include (Itretisektor, 2017, A):

- simplification of administrative processes,
- providing transparent, relevant, up-to-date statistics,
- following trends in sports,
- the possibility of integration into public registers.

Several specialized providers offer IS solutions designed to process data from various sources and make this data available to various users in a sports organization. Many clubs (especially abroad) and associations are currently in the process of transitioning to sports information systems, looking for a suitable solution for their requirements. However, there are no clearly defined criteria that would be approved by experts in the field and that would relate to the general requirements for these systems. Nor has a systematic review of existing systems been conducted (Blobel et al., 2021; Sohail et al., 2022).

1.1.2 Available ISs applicable in sports

There are many terms for sports ISs, as well as great variability in the range of products available. However, there is no binding definition of what exactly the term IS means in sports. It is not clear which areas such systems must cover. Some of the products were developed based on a specific application, which were extended to other areas in sports. Additionally, complex ISs were applied to sports. As a result, different products can be found, including different architectures. This makes it difficult to unambiguously compare the systems. This led to the frequent use of the term athlete management systems without its clear definition. Due to the novelty and diversity of ISs systems in sports, there is not even a systematic overview of various products and their functions (Blobel et al., 2020; Hammes et al., 2022).

Experts point to the need for sports organizations to combine pieces of data from different fields to provide specific information to individual users. They have developed a concept aimed at all sports-related organizations (e.g., sports clubs, sports federations, and sports institutes). It deals with the problem of connecting data sources processed in training systems (Balsalobre-Fernandez and Torres-Ronda, 2021; Wu, 2022).

Considering the number of different concepts, it is necessary to define an IS in sports (Yang, 2011). Professor Baca, from the University of Vienna, defined the IS in sports as: "information processing system based on IT, which, together with related sports-organizational resources, serve to process data from various sources in sports organizations within a single system and to make these pieces of information available for a specific user, regardless of location." (Perl, 2006). We can divide the systems into categories for individual organizations. The IS for associations and for clubs are similar, mainly differing in their structure (Fig. 1).
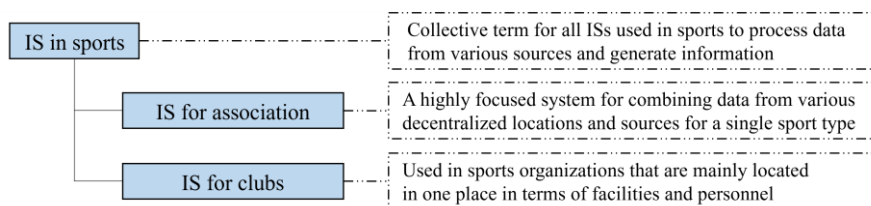
Figure 1. Division of sports information systems according to use

Source: adjusted according to Perl (2006)

1.2 ICT application possibilities in sports

For athletes to be able to achieve better results, specialized ISs were developed. They present data from various sources and create information with advanced analyses, usually narrowly specialized within a specific area. These systems include match, medical, or training ISs.

1.2.1 Match information systems

The use of technology in the analysis of sports performance has become a common practice of professional teams. Monitoring the physical activity of athletes allows clubs to know their current physical condition and play style, as well as to identify the players' fatigue during training or matches. Due to all kinds of sensors and cameras, real-time pieces of information on players' position, speed and heart rate are being recorded. These can be processed to analyse trends or possible improvements in the game (Wang and Jia, 2020).

1.2.2 Medical information systems

Athletes' health has always been pivotal in professional sports where serious head concussions occur. For this reason, a team of engineers and neurosurgeons from Cleveland developed a special mouthguard that can record any impact and evaluate whether the concussion may have a potential effect on the athlete's health. AI performs the subsequent evaluation and creates a list of recommendations so that the athlete can get back into shape as soon as possible. Due to this, the coach has an immediate overview of the health of the athletes. Another example of a useful device is represented by smart shoe inserts for athletes who walk a long-distance. However, medical ISs are financially demanding. Therefore, they are fully used only by the top world clubs (Kent, 2020; Guang, 2022).

1.2.3 Training information systems

All activities during the training serve to improve the athletes' competitive abilities. The training IS is a system for achieving common set goals. It can cover the training planning and analysis. For this purpose, it contains a database of training exercises, while importing and combining data from tracking systems or other sensors. Based on them, it recommends improvements or compares the performance between individual actors. Modern training theory states that the training process is a systematic project that includes multidisciplinary integration of the best combination of factors. One example of its application is described in a study conducted by Usman, which uses AI and big data to search for errors and create recommendations for a professional golfer (Usman, 2021; Li and Cui, 2021).

In addition to the systems listed above, recruitment ISs for "talent scouting" are also starting to be used. These integrate large player databases and support talent scouts in planning and analysing scouting data for their decision-making (Marković et al., 2020).

2 Methodology

The goal of this article was to create an overview of the current knowledge and options available to managers of sports organizations to support their decision-making. Documents, professional literature, case studies, and scientific articles were used as data sources.

To process the data, several methods were used, such as: qualitative data evaluation method, modelling, database creation, and others. The thought processes of induction, deduction, and synthesis were used while drawing conclusions.

These methods led to the summary of the current state of the ISs in sports organizations in Slovakia. As part of the analysis, definitions of the most frequently used terms were selected. These have been collected as a starting point for the selection of a suitable IS for the decision-making support. The methodological procedure included the creation of a list of strengths and weaknesses of selected ISs.

3 Results and discussion

The creation of an IS for sports in Slovakia was a response to requests for transparency, fairness, and efficiency. It was created for the National Sports Centre, which required that: "authorized persons effectively fulfil the provisions of the Sports Act." Among the main goals of the IS in sports, in addition to decreasing the administrative burden, there is also the creation of a transparent environment in Slovak sports with the possibility of checking individual processes by the Slovak public (Sports IS, 2019).

3.1 Information system for sports in Slovakia

Based on the data available, the sports IS in Slovakia was defined as a system with the aim of ensuring a centralized collection of information on sports, simplifying administrative procedures resulting from legal obligations, making the reporting of expenses more transparent, providing clear statistics on athletes, sports experts, sports organizations, events, and publishing relevant information. When creating the system, emphasis was put on its simplicity, clarity, and provision of sufficient comfort to users for the collection and provision of information (National Sports Centre, 2022).

The system is built on Microsoft technologies; thus, it can be easily expanded. The database is stored in the data centre of the Ministry of Education, Science, Research and Sport of the Slovak Republic, divided into four parts (Itretisektor, 2017, B):

- *Slovak sports portal* – a publicly available portal (www.sport.iedu.sk), showing information from the registers in accordance with the law. It contains these sections: Registers, Documents and Regulations, Sports Funding, Information Centre, and Contacts.
- *Application portal* – publicly available portal (www.ziadosti-sport.iedu.sk), serving for application submission and management by registered users. It contains the main parts called the Application (entry in the register of natural/legal persons) and the Contract (management of sponsorship contracts in sports).
- *The intranet part of the IS in sports* – access to the system is based on user rights; it serves the administrators of sports organizations to keep the data constantly up-to-date and correct.
- *Integration interfaces* – allowing connecting external systems and obtaining, sharing, or evaluating data from them (National Sports Centre, 2022).

The presented components were also captured below (Figure 2.).
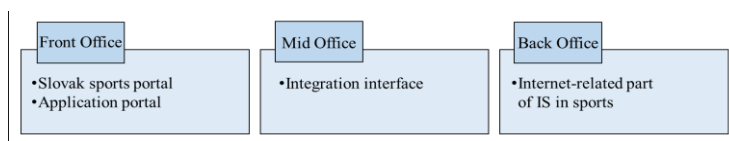
Figure 2. Components of the IS in sports

Source: Itretisektor (2017, B)

According to the latest data, more than 215,000 natural persons and more than 5,000 legal entities are registered in the sports IS. Sponsorship contracts worth several hundred thousand euros are also registered in the system (National Sports Centre, 2022).

3.2 Decision-support systems available in sports

The Slovak information company dealing with ISs for sports has been helping Slovak sports for more than 20 years. Their main products include: *Metering2me, Webgis2me, Sport2me, Educate2me, Jastrab* (Stengl, 2022).

3.2.1 The IS for ice-hockey in Slovakia

Sports in the world and in Slovakia receive great popularity among fans. For Slovak ice-hockey, within the framework of digitization, the Stengl a.s. company created a central system for the development of the youth training process. This supports the planning of trainings and exercises with their mapping and evaluation in more detail. The system provides

an assessment shared between coaches and players. Its important part is the camera system, offering many functions. The last part is the video analysis, using which coaches can analyse the selected training or match. (Slovak Ice Hockey Association, 2022; space2me, 2022)

It is a platform called *Space2me,* which works as a tool for automation of recordings, online streaming and archiving of trainings. The goal is to increase the quality, efficiency, and transparency of training processes. It helps individual clubs and managers of winter stadiums to cooperate. The complex IS from Stengl a.s. connects all ice rinks and hockey clubs in the Slovak Republic with centralized management. The main benefits, captured in Figure 3, include:

- transparency of the training process and a more transparent methodical assessment,
- possibility of additional analysis of trainings and matches,
- information sharing among trainers and methodologists,
- a support for disciplinary committee (Slovak Ice Hockey Assoc., 2022; space2me, 2022).
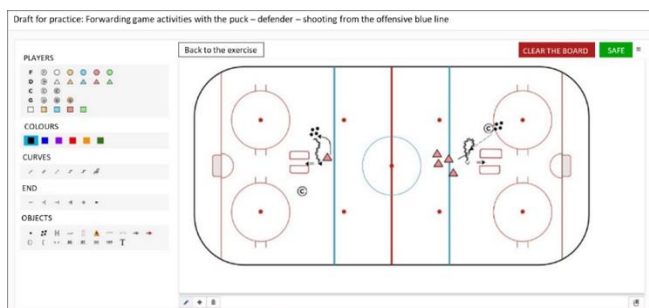
Figure 3. Information platform Space2me

Source: space2me (2022)

3.2.2 IS Sport2me

This system represents a model solution for sports and their agendas in Slovakia. Due to its modular architecture, it enables the addition of other modules that are intended for the administration and organization of competitions, registration of results, etc. The main target group includes sports organizations ranging from associations to clubs. The main advantage is direct integration with other ISs, which significantly reduces the administrative burden of sports organizations (sport2me, 2022).

Figure 4. Sport2me information system

Source: sport2me (2022)

The main benefits of Sport2me include the *central registration, modern interface, modularity, integration with other ISs, accessibility, and security.* The solutions include:
- management of sports organizations' members and subordinate sports organizations,
- records of all data in accordance with the Sports Act,
- creation and management of competition schedules,
- registration for competitions,
- a way for entering the results,
- automatic generation of outputs in the form of reports,
- automatic synchronization and the possibility of expansion by additional modules,
- the possibility of presenting data on the sports organizations' websites (sport2me, 2022).

3.2.3 IS for basketball in Slovakia

In addition to ice-hockey, Stengl brought a solution for Slovak basketball. The goal was to optimize processes concerning the members of the Slovak Basketball Association, competition management, nominations and rewards for the referees, disciplinary committees, and daily activities of these sports organizations. Currently, more than 5,500 members are registered in Slovakia in more than one hundred clubs (Slovak Basketball Association, 2022).

The IS for the basketball association was developed using the latest framework, built on Microsoft ASP.NET and SQL. It is a web application that does not require installation. This ensures high availability, security, and topicality. In addition to the security standards, responsiveness has been implemented to facilitate the access for mobile users. With the help of an innovative platform, individual users can perform actions based on the assigned authorizations. Another part of the implementation was the migration of data on members and clubs of the Slovak Basketball Association and the linking of the association's IS with the sports IS (Slovak Basketball Association, 2022).

The basketball IS contains four main parts, which include: *current overview, list of registered players, list of sports competitions, and the competition application.* The primary focus of this IS was to provide the customer with the control over processes, due to which they gain absolute oversight over all the actions. Additionally, the system serves as a tool for creating new competitions and leagues, including the possibility of their registration, while providing a way to record online statistics for matches (Slovak Basketball Association, 2022).

3.3 Benefits of using the ISs for sports organizations

The IS for sports offers many ways for its application. Sports associations, federations, and clubs use it to collect, store, process, and share important pieces of information. However, it is necessary to emphasize that for an effective operation of the system, a coordination with other associated ISs and the definition of clear goals are necessary. Since organizations must operate in a changeable environment, there is a need to build an IS that would quickly meet new requirements. Building suitable solutions for complex organizational systems, such as sports, is not an easy task. This requires an understanding of the goals and the ways the sports organizational system operates.

Nowadays, ISs for sports do not only serve to simplify administrative tasks. They are very *complex systems* that help improving athletes' performance and health or support the coaches' decisions. However, the application of these systems is financially demanding. Therefore, only the biggest organizations can use them. This fact is probably the only barrier the associations need to cope with. On the other hand, these systems offer several advantages. Focusing on the athletes' health should be a priority. *Medical information systems* can assess

the condition after an impact in real time and determine the next steps for the fastest recovery possible. There are short-term as well as long-term positive effects for the athletes' health.

Training ISs are becoming more and more popular. They can effectively evaluate what to change. They are used in connection with match ISs to provide data with a high value. These systems began to be actively discussed after the fantastic performance of the runner Eliud Kipchoge, who was the first in the world to run a marathon under two hours, with these systems helping him adjust his running speed. However, this milestone was accompanied by mixed feelings from the public. Although the benefit to athletes' performance is clearly proven, it is still unknown when these systems are going to become more accessible and therefore more popular. It is also unclear how the fans and athletes will accept them.

3.3.1 The future of ISs in sports

The development of technology in the field of sports is an ongoing process. Companies are constantly coming up with new options aimed at athletes, referees, or fans. For example, the Hawk-Eye system is already being actively used in the world. But the company wants to go much further. The vision is to completely replace human referees. The company Automated Insights has a similar intention. They are trying to completely replace the commentators of matches with the help of the system. The people who could lose their jobs because of the systems are starting to come forward. Even if their objections are justified, there is still a huge number of leagues in the world that suffer from a lack of the manpower. It is the space where the technology could be actively applied to bring greater interest in local sports events.

3.3.2 Current situation of applying ISs in sports in Slovakia

Slovakia has established the foundations for the operation of the sports IS. It has undergone several improvements during its application. The system makes it possible to work with registers of natural and legal persons in sports and to communicate with relevant registers. These include the Central Portal of Public Administration or the Social Insurance. It is also possible to submit, modify, or delete applications for sports sponsorship in the system. The system also brings several advantages for sports associations and clubs, which can relieve them of administrative tasks and make it easier to submit, edit, or delete individual applications.

However, the problem is that associations and clubs are not actively using these possibilities. The data entries in the database are often out of date and inaccurate. The lack of the system's utilization may be caused by the relatively low number of functions. This could be solved by the next upgrade, which would add new options. An example can be seen in the creation of a system for funding sports, offering the possibility of applying for a contribution to a national sports project. Other functions can include the expansion of the lists of recipients of public funds and their providers. Finally, the system could be linked with the anti-doping agency. New functions could act as a motivation for the competent bodies.

4 Conclusion

The article presents the findings on the ISs in sports. It deals with the possibilities of this issue's development. The current situation in Slovakia was described. It can be concluded that even though ISs are being actively used, the professional community still has not determined the exact definition for them. For this reason, it is not specified what these systems must contain. Since the exact definition of the sports IS is not clear, it can be divided

into several levels. There are systems used by the state bodies and associations or the club systems. In addition, there are also specific systems that can improve sports performance.

In the era of the Internet and digitization, the decision-making in sports will be influenced by the data. Storing results and information on paper or in text editors caused several issues. Despite the abundance of data, it was difficult to evaluate them correctly. The procedures of trainings were determined based on intuitive feelings, which was certainly not efficient. This is also why ISs in sports were created. Development in this area is constantly progressing. One of the areas tackled is doping, when the IS is supposed to help associations with transparency. The article presents the use of ICT in sports in Slovakia. The IS was launched in 2010 at the request of the Ministry of Education, Science, Research and Sports. Over the years, it has undergone several changes. Slovakia has created viable foundations for the system. Individual components are interconnected and express elements of interoperability. However, in its current state, this system only serves as a database for sports clubs and associations and does not have any advanced functions. This situation is even deteriorated by the current state of the data stored in the system. Up-to-date and accurate data could enable strategic planning of sports in Slovakia, but the unattractiveness of the functions offered could not convince competent persons to use the system more.

The IS in sports has a significant potential. The biggest barrier are currently the funds. Therefore, the best systems are used only by the top organizations. However, with increasing development, these systems will become more accessible. In relation to the situation in Slovakia, the current IS has its potential, but it requires constant development, modification, and updating. Currently, the usability of the system for the decision support is limited. This leads to a decrease in its attractiveness among the organizations.

The limitations of this research can be found in the application of the secondary data and the narrowing of the research to only some sports in Slovakia. In the future, we will build on the findings and examine primary data collected. It would also be possible to use the researched methodology for other countries. The novelty of this article lies in the summarization of knowledge related to ISs in sports in Slovakia.

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Sustainable Development Goals as the Embodiment of the Globalization (mathematical evaluation of RF results)

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Abstract

Research background: The course towards achieving the sustainable development goals has reached the middle. The new technologies of global and public administration tested in it should and are under the close attention of scientists. They analyse a set of indicators, methods for comparing the results of countries in their implementation and the position of states, highlighting successful and unsuccessful goals.

Purpose of the article: Having selected key indicators, assess the reality of their implementation for Russia. The indicators are divided into two groups: proposed by the UN and included by the Russian Statistical Committee, which makes it possible to evaluate the achievements of the country in complex.

Methods: The work is based on global methodological assessment approaches with a focus on identifying correlation coefficients. A total of 62 indicators were analyzed: 24 - recommended, 38 – added. Indicators were identified in 3 groups: where the achievement of the goal is real, where the trend is positive or negative.

Findings & Value added: Indicators of the implementation of the SDGs in the RF were identified, reflecting the 3 named trends. In parallel, it was found that, in general, the flexibility of the UN in monitoring the results of the SDGs allows managing the development of all 190 states that have signed the SDG 2030 Agenda agreement, but softness prevents the achievement of the "opportunity ceiling" from each country.

Keywords: *max SDG indicators in the Russian Federation; correlation analysis of indicators dynamics; ratio of recommended and added indicators*

JEL Classification: *C22; O11; P21*

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1 Introduction

The course towards the implementation of the SDGs, proclaimed by the UN, means a change in the value orientations of development, which should affect almost all states of the world. It presupposes the recognition of equal economic development and care for the environment, the elimination of hunger and poverty, the minimization of social inequality within and between countries. Forming a reassessment of values, which should be realized through the transformation of state policy, it means new goals for the development of states, new criteria for the functioning of enterprises, new models of people's behavior. Since the formulation of the SDGs in the form of the UN Resolution "Agenda for Development until 2030" (in June 2012) a little more than 10 years have passed, and since the beginning of implementation (01.01.2016) - 6 years, i.e., almost halfway done. It is possible and necessary to evaluate the results, determine successes and failures, identify difficulties and obstacles on the way to achieving the goals. The purpose of our study is to evaluate the results of the Russian Federation on the path to implementing a new course, simultaneously identifying and evaluating the structure of SDG indicators in the Russian Federation and recommended by the UN.

2 SDG Assessment Methodology

The significance of the SDGs as a course towards a global transformation of values predetermined the abundance of works on this topic. Thus, the library of St. Petersburg State University contains an indication of more than 2 million publications on the topic, of which a tenth (267,700) are identified as devoted to the problems of evaluating results. In terms of the subject of evaluation technologies, at least three areas of classification can be distinguished. The first is the development of assessment methods and indicators, the second is a comparative analysis by assessment areas: a general assessment of the degree of implementation (Measuring Distance to the SDG Targets, 2019; Filho et al, 2021), economic (Rendtorff, 2019; Galperina and Kyian, 2021), environmental (Uitto, 2021; Lehmann, 2020), social (Kharas et al, 2020; Chaves-Avila and Gallego-Bono, 2020) etc. The third is the assessment of national results and the identification of features of the development trajectories of states. Given the limited scope of the publication, we'll present the first approach - the formulation of assessment methodologies as the deveopment of a system of assessment indicators, showing the stages of the process. The first stage was embodied in the creation of a block of indicators for assessing the course of the SDGs, including the development of a methodology for their calculation, as well as the dissemination of statistical monitoring rules for data collection for the countries. The United Nations Inter-Agency Expert Group on SDG Indicators (IAEG-SDG) has taken on the basis of this work. As our analysis showed, the work is not finished - data collection methods for some indicators have not been formulated up to the present moment. The list of indicators continues to grow. Lets inficate: new ones are identified not by digital, but by alphabetic indices. Criticism of both the system and individual indicators still continues (Stiglitz et al. 2016 ; Doumbia and Lauridsen, 2019 ; Allen, 2019 ; Hák et al. 2015 ; Sachs, 2020), etc. During the second stage, the attention of scientists was focused on the development of technologies for comparative analysis of countries' results. So, at first a proposal was made to adjust the results taking into account the size of the territory (number of residents) - UN Global list indicator (United Nations, 2019), then OECD experts proposed to rank the indicators according to their significance (Measuring Distance to the SDG Targets, 2019), (Guidance on audit for the Development, 2016). Further, appeared a system of the ranking of countries according to the Progress Index - SDG Index (Sachs et al., 2017), but it was also criticized (Diaz-Sarachaga

et al., 2018). Reputable independent audit firms, including INTOSAI, have joined in assessing the results of the SDGs. The third stage focuses on identifying the conditions for achieving the SDGs, especially assessing the political will of the country's leadership. Scientists founded ways to increase the degree of implementation SDGs in national development trajectories. (Faust, 2018) etc.

3 General results

In order to assess the reality of the fulfillment by the Russian Federation (RF) of the UN plans for the implementation of the SDGs, we identified indicators of dynamics based on correlation models. To expand the base, statistics for 2010-2020 were taken. It was based on an Excel table constantly updated by the Committee on Statistics of the RF (The List of National Indicators, 2021), as well as the UN Global Indicators System (Global Indicators framework, 2020), where the tasks set for each indicator are recorded. The criteria for selecting indicators were economic content, the availability of a sufficiently complete base for evaluation. Let us .point out the features of the data: a short time series, in most cases 10 observations, only 11 indicators have annual data; many ones have no observations; for some - there are only 2-3, so the dependence could not be built; in several cases over a number of years, t0he indicator is a constant; The analyzed period includes the crisis of 2014-/2015, because of this, the trend in many indicators in this period is reversed. We did not consider the data for 2020, they appeared recently, again, taking into account the pandemic, their parameters could significantly change the estimate

Table 1. Indicators included in the UN list for which the implementation plan is realistic

Indicator	Regression Equation	Interpretation
3.1.1. Maternal mortality, per 100 thousand live births, people	$Y8 = 15,8 - 0,820*time$ $(0,947)(0,153)$ $T = 10$, R- R square $=0,783$	Annual decrease by an average (approximately) of 1 person per 100 thousand births. Given the initial level - 16 below the planned (70) guarantees the implementation of the plan.
3.6.1. Mortality from traffic accidents, per 100 thousand population, people	$Y9 = 15,7 - 0,625*time$ $(0,625)(0,101)$ $T = 10$, R- square $= 0,828$	Annual decrease by an average (approximately) of 1 person. per 100 thousand population, The downward trend is stable, the UN plan is to halve by 2020, i.e. reach 7% - the probability is real.
6.3.1. Share of standard treated wastewater, %	$Y13 = 8,83 + 0,499*time$ $(0,431)(0,0694)$ $T = 10$, R- square $=0,866$	Annual increase by an average on 0.49%. The trend is steady, given that the wording of the UN plan is uncertain, the implementation is real.
8.6.1 Youth who do not study and work,%	$Y20 = 13,6 - 0,320*time$ $(0,410)(0,0662)$ $T = 10$, R- square $=0,745$	Annual decline by an average of 0.32%. Stable positive dynamics. Given the absence of a specific indicator of the plan, it is feasible.
9.4.1 Greenhouse gas emissions per unit of GDP, tons per million rubles	$Y21 = 41,0 - 2,42*time$ $(2,18)$ $(0,387)$ $T = 9$, R- square $=0,848$	Annual decrease by an average of 2.42 tons per million rubles. Sustained positive dynamics. Given the lack of a specific formulation of tasks, it is feasible, however, it is not known how Covid will affect on it.
9.c.1. Households with access to the Internet, in total, %	$Y25 = 61,7 + 1,67*time$ $(1,67)$ $(0,229)$ $T = 7$, R- square $=0,914$	Annual increase by an average of 1.67%. Sustained positive dynamics. Given the lack of a specific indicator, it is feasible.
17.1.2. The national budget formed by taxes,%	$Y67 = 50,9 + 1,38*time$ $(2,27)$ $(0,366)$ $T = 10$, R- square $= 0,64$	Annual increase by an average of 1.38%. In general, the trend is positive and stable. The UN plan is not specific and therefore realistic.

Source: calculated by the authors

In this study, the authors tried to track the dynamics of SDG indicators over time, so regression dependences of each indicator on T (time trend) were built. During the analysis, the indicators were divided into 2 groups. The first is those recommended by the UN (Tables 1 - 4) and therefore the tasks for implementation were more or less specifically designated for them. The second ones are those that were independently added by Russian statisticians. In general, this is a common practice, as a number of UN indicators are designed to reveal trends in developing countries that prac0tically do not exist in other states; Again, countries are allowed to use their own indices, which adequately specify their situation (Table 5).

Table 2. List of indicators, the dynamics of which is positive, but not enough

Indicator	Regression Equation	Interpretation
7.2.1 Electricity from renewable energy sources %	Y15 = 15,1 + 0,238*time (0,603) (0,0875), T = 8, R- square = 0,552	Annual increase by an average of 0.238%. Considering that the UN plan is to double by 2030, its implementation is not realistic
7.3.1. Energy intensity of GDP, kg of standard fuel per 10 thousand rubles, in 2012 prices	Y14 = 125 + 0,799*time (2,20) (0,348), T = 7, R-square = 0,513	Annual increase by an average of 0.8 kg. The UN plan to double the rate, i.e. reach 260 kg, seems to be not realistic.
8.5.2 Unemployment rate %	Y19 = 6,81 - 0,226*time (0,311) (0,0502)T = 10, R- square = 0,717	Annual decline by an average of 0.226%. Sustained positive dynamics, but given the situation with the pandemic, it will not last.
12.2.1. Consumption of fuel and energy resources per employee, tons of standard fuel	Y43 = 13,0 - 0,0107*time (0,281)(0,0445) N= 7, R- square = 0,011	E Annual reduction by an average on 0.01 tons of reference fuel. The trend is unstable, generally positive, but very far from the fulfillment of the UN plan
17.1.1. Net official development assistance to gross national income, %	Y68 = 0,0187 + 0,00679*time (0,0142) (0,00228) T = 10, R-square = 0,525	The dynamics are unstable but generally positive. The UN plan - 0.7% of GDP is unlikely to be reached by the RF (and other countries as well).
17.2.1. The volume of financial and technical assistance todeveloping states, $ mlln	Y69 = 371 + 91,6*time (116) (18,7) T = 10, R-square = 0,751	Annual increase by an average of $91.6 million. The trend is generally stable positive. Given the high bar of the UN, the plan is not realistic.

Source: calculated by the authors

Thus, out of 16 selected, i.e. such, where the regression coefficient can be established, indicators for 7 ones show, that the implementation of the plan is realistic, though without taking into account pandemi. For another 6 indicators, positive trends are stable, but insufficient. The Covid situation can't but make things worse.

Table 3. UN indicators with negative dynamics

Indicator	Regression Equation	Interpretation
8.3.1. Informal employment in the non-agricultural sector, %	Y18 = 12,7 +0,516* time (0,439) (0,0707), T = 10, R-square = 0,869	Annual increase by an average of 0.516% - a steady negative trend
9.5.2. A number of researchers per million inhabitants, people	Y22 = 3,23e+03 - 47,0*time (42,5) (6,85)T = 10, R-square = 0,854	Annual decline by an average of 47 people - a steady negative trend.
11.3.1. The ratio of the rate of commissioning of residential buildings to the rate of population growth	Y33 = 1,06 - 0,00509*time (0,0493) (0,00795) T= 10, R- square = 0,049	Annual decrease by an average of 0.005. The trend is unstable, but even in the absence of a clear formulation, it is not feasible.

Source: calculated by the authors

Indicators with a negative, i.e. opposite to the one desired for the UN, there is relatively little - 3, which is 16.7% in the total number of analyzed indicators

For 8 indicators that are simultaneously present in the statistical tables of the RF and the UN, the trends are unstable, so the regression coefficient is not calculated, see Table 4

Table 4. Indicators with unstable dynamics

Indicators
1.2.1. Population living below the national poverty line, in % %. Sharp rise in 2014-15, but now is gradually declining
2.3.1 Index of agricultural production. In general, there is growth, but very unstable.
8.2.1. Labor productivity index. Decrease until 2015, rise until 2018, decline again. The trend is not sustainable.
10.4.1. Compensation of employees in GDP. The trend is positive, but unstable
10.7.4.Amount of foreign citizens and stateless persons. The trend is positive, but unstable.
10.4.2. Social payments to the people with the lowest incomes. The trend is positive, but unstable.
10.2.1. Population with income below 50% of median equivalent disposable cash income - unstable dynamics.
15.3.1. Reclaimed lands. The trend is not stable, but generally positive. The tasks of the UN are not very specific.

Source: compiled by the authors

Let's analyze the indicators supplemented by the Committee on Statistics of the RF, see Tables 5-7, again broken down into the same 3 groups, reflecting trends of dinamics. Note that there are significantly more of them, i.e. in general, in the RF the number of own indicators exceeds those recommended in the reporting.

Table 5. Additional (Russian) indicators with stable positive dynamics

Indicator	Regression Equation	Interpretation
1. Households with insufficient money for emergency payments %	Y2 = 29,7 - 1,76*time (1,31) (0,152)T = 4, R-square = 0,985	Annual decline by an average of 1.76%
2. Households with a lack of money for food, %	Y7 = 1,79 -0,116* time (0,0789) (0,0127) T = 10, R- square = 0,912	The annual decrease by an average of 0.116%, given that there are only 0.4% of the total, it is significant
3. Mortality of the able-bodied population, per 100 thousand population, people	Y11 = 641 - 17,5*time (7,63) (1,23) T = 10, R-square = 0,962	Annual decline by an average of 17 people per 100,000 population. The trend is stable and positive
4. Women with children of preschool age who have completed advanced training, people	Y12 = 8,51e+03 + 1,20e+03*time (1,87e+03) (271) T = 8, R- square = 0,766	Annual increase by an average of 1203 people. The trend is stable, although the pace has slowed down, again the total number is small
5. Researchers under 39 years old in the total number of Russian researchers, %	Y23 = 35,8 + 0,971* time (0,631)(0,102) T = 10, R- square = 0,919	Annual increase by an average of 0.971%. Steady positive trend, but its growth does not change the situation with the aging of personnel in science
6. Density of paved roads, km per 1000 sq. km of territory	Y26 = 52,5 +1,20*time (1,27) (0,185) T = 8, R-square = 0,875	Annual increase by an average of 1.2 km per 1000 sq. km. Sustained overall positive dynamics, however, suggesting the aging of roads.
7. Gini coefficient	Y30 = 0,421 -0,00110*time (0,00117)(0,000189) T = 10, R- square = 0,808	Annual decline by an average of 0.0011. The trend is generally positive, but very slight.

8. The ratio of the average salary of 10% of the most to 10% of the least paid workers, times	Y31 = 17,1 - 0,395*time (0,283) (0,0427) T = 5, R-square = 0,966	Annual decline by an average of 0.395 times. The trend is positive, but unstable,
9. Illumination of cities, %	Y35 = 65,8 + 0,415*time (0,258) (0,0416) T = 10, R-square = 0,926	Annual increase by an average of 0.415%. The trend is stable, positive, but insufficient.
10. Cities with high air pollution, units	Y37 = 148 - 12,6*time (15,5) (2,49) T = 10, R-square = 0,761	Annual decline by an average of 12 units. The trend is stable and generally positive.
11. Ecological and educational facilities in nature reserves and national parks, units	Y39 = 1,42e+03 + 48,8*time (27,6) (4,45)T = 10, R- square = 0,937	Annual increase by an average of 48 units. The trend is stable and positive.
12. Natural emergencies, units	Y44 = 122 8,99*time (20,6) (3,32) T = 10, R-square = 0,479	Annual decrease by an average of 9 units. The trend is not stable, but generally positive.
13 Budget expenditures for protection against emergency situations and civil defense, billion rubles	Y46 = 110 + 2,01*time (9,00)(1,45) N= 10, R- square = 0,194	Annual increase on 2.01 billion rubles. The trend is stable, generally positive
14. Area of land plots within the boundaries of forestries and forest parks, %	Y57 = 50,9 + 0,0410*time (0,0348) (0,00561),T = 10, R- square = 0,870	Annual increase by an average of 0.041%. The trend is stable, positive
15. Area of reforestation and afforestation to the area of felled and dead forests, %	Y61=51,1+ 2,03*time (5,75) (0,927) T = 10, R- square = 0,376	Annual increase by an average of 2.03%. The trend is not stable, but generally positive, although not enough
16. People receiving public services via the Internet, in % of the total population (from 15-72 years old)	Y64 = -30,6 + 8,90*time (6,23) (0,856) T = 7, R square = 0,95	E Annual increase by an average of 8.9%. Sustained positive dynamics
17. Position of the country in the ranking of «Doing business»	Y65 =137- 12,4*time (7,24)(1,17), T = 10, R-square = 0,933	Annual increase by an average on. 12 positions; sustained positive dynamics. RF rose from 129 to 20th place
18. Position in the rating "Getting credit".	Y66 = 119-10,3*time (10,9)(1,76)T = 10, R- square = 0,810	Annual increase by an average of 10 positions. Not stable, but generally positive dynamics.
19. Share of developing and least developed countries in Russian imports	Y71 = 28,2 + 1,19*time (0,738) (0,119) T= 10, R- square = 0,926	Annual increase by an average of 1.19%. The trend is positive, generally stable, but it can't be estimated good from the point of national interests.
20. Share of products of high-tech and science-intensive industries in GDP, %	Y24 = 19,8 + 0,200*time (0,411) (0,0629) T = 9, R-square = 0,591	Annual increase by an average of 0.2%. Steady positive trend.
21. Share of developing and least developed countries in exports, %	Y70 =19,3+ 1,54*time (0,845) (0,136)T = 10, R square = 0,941	Annual increase by an average of 1.5%. The trend is positive (growth from 22 to 34%), but for the RF it means the loosing of competitiveness.

Source: calculated by the authors

The common property of the given indicators is positive dynamics but not enough. The achieved level, as a rule, assumes a qualitative change in 10 years, but often does not cover

the pace required for natural recovery. The very fact of actualizing attention to them deserves a positive assessment, since it fixes the fact that Russians will have to wait a long time for serious changes in improving the quality of life.

Table 6. Additional (Russian) indicators with a positive, but insufficient dynamics for generally accepted world standards

Indicator	Regression Equation	Interpretation
1. Income of the poor people to the subsistence level, %	Y4 = 64,3 + 0,737*time (1,37) (0,204) T = 6, R-square = 0,765	Annual increase by an average of 0.73%; but still at the moment, 73% of the poor live below the subsistence level.
2. Life expectancy, years	Y10 = 68,7 + 0,469*time (0,117) (0,0189),T = 10, R- square = 0,987	Annual increase by an average of 0.469 years (172 days), so it is impossible to reach the 80 years level
3. Investments in the production of electricity from renewable sources, thousand rubles	Y16 = -1,87e+07 + 6,29e+06*time (1,06e+07)(1,71e+06) T = 10, R- square = 0,628	Annual increase by an average of 629 thousand rubles. The trend is positive and stable,

Source: calculated by the authors

These three indicators reflect important aspects for the RF: social inequality, lack of investment and low life expectancy. However, there is no hope that their positive dynamics will change the situation.

Table 7. Additional indicators with negative dynamics

Indicator	Regression Equation	Interpretation
1. Area of green spaces within the city limits, %	Y36 = 25,9 - 0,171*time (0,424) (0,0683),T = 10, R- square = 0,439	Annual decline by an average of 0.171%. The trend is negative, though not sustainable.
2. Greenhouse gas emissions in % by 1990, excluding LULUCF,	Y47 = 64,8 + 0,347*time (0,921)(0,164), T = 9, R- square = 0,391	Annual growth by an average of 0.347%. The trend is generally negative, i.e. emissions are on the rise
3. Greenhouse gas emissions in % by 1990, taking into account LULUCF, %	Y48 = 43,1 + 0,900*time (0,965) (0,171),T = 9, R- square = 0,797	Annual growth by an average of 0.9% The trend is generally negative, i.e. emissions are on the rise
4. Scientific expeditions in the seas of Russia and the World Ocean, units	Y55 = 43,3 - 2,79*time (2,87) (0,462), T = 10, R- square = 0,820	The annual decline is an average of 3. The trend is negative and, although progress has been made, their number is far from the level of the USSR.

Source: calculated by the authors

These figures reflect the negative trends that Russian statistics decided to reveal.

Table 8. Additional indicators with unstable dynamics

Indicators
1.Real cash income. Sharp drop in 2014-16, but then gradual rise.
2. The share of social payments in % of GDP. Sharp increase in 2014-17, now gradually declining. Although there were separate periods of growth, they stopped after 2017.
3. The share of population with income below 50% of median equivalent disposable cash income. Unstable dynamics, but there is no specific indicator in the UN plans.
4. Households indicating cramped living conditions. The trend is not stable, although generally positive.
5. The population living in emergency housing stock. The trend is not stable, but in general negative.

6. Consumption of fuel and energy resources per employee. The trend is unstable, generally positive,
7. Amount of those who died as a result of natural disasters. The trend is stable, generally positive, but not enough.
8. Budget expenditures for protection from emergencies and civil defense. The trend is generally positive, but not staible.
9. Production of fish stock for aquaculture. The trend is unstable, but generally positive.
10. Index of environmental expenditures for biodiversity conservation. The trend is not stable, but in general positive.

Source: compiled by the authors

4 Discussions

The analysis carried out gives rise to an ambivalent assessment about the technologies for introducing reporting on SDG indicators used by the UN. On the one hand, the use of soft technologies to influence countries is the only possible way to regulate the actions of states with such different economic and political structures, as well as cultural values; on the other hand, it allows you to hide the insufficiency of the results obtained. Thus, our analysis showed that the tasks for most of the recommended indicators are not concreate, which predetermines the possibility of achieving them (practically without any significant changes in reality). Thus, in the UN assignments, in most cases, quantitative indicators are replaced by the words: ensure growth, achieve reduction, etc. The possibility of countries using their own indicators instead of the recommended ones is also alarming, especially where reaching the recommended indicators is not a particular complication of statistical activities to collect information, but a variant of arithmetic operations. In particular, countries can vary the absolute and relative measurements of the same phenomenon, choosing the one whose values are outwardly more attractive. In particular, in Russia they often show growth rates, rather than absolute values, or they refuse to use relative indicators, in particular, "per capita". These simple tricks help to qualitatively change the assessment and hide the presence of real problems. It is obvious that both the UN and the countries are no longer interested in the actions themselves, but in receiving favorable assessments, which experts are paying attention to (Ishak at al.2016), Fukuda-Parr, McNeill, 2019), (Vandemoortele, 2018). (Forestier, Kim, 2020)

5 Conclusions

Let's summarize the data obtained in the final table, which characterizes the ratio of the number of indicators of the economic and managerial direction according to 4 trends (Tab. 9).

Table 9. The reality of fulfilling the tasks set by the UN in the course of the SDGs for the RF according to the recommended and self-selected additional indicators

Base for compa-rison	positive trend		positive, but not enough		negative trend		unsustainable trend		total number of indi-cators
	number of indicators	%	number of indi-cators	%	number of indicators	%	number of indicators	%	
UN	7	29,2	6	14,4	3	7,2	8	33,3	24
Added by RF	21	55,3	3	7,8	4	10,5	10	26,3	38

Source: compiled by the authors

The table shows that, in general, the course towards the SDGs in the RF is being implemented, i.e. positive trends dominate. It is clear that in the indicators selected by the countries' statistics the success is more evident.

Some discrepancy in the statistical, in our opinion, more favorable assessment system and the actual one, reflecting the spread of SDG ideas in the media and education, indicates the Soft-technologies used to manage UN courses. Both the permission to combine mandatory and voluntary indicators and the vagueness of the assessment criteria for 2030 lead to more favorable estimates.

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Factors Influencing the Scope of the Code of Slovak Companies Regarding to COVID-19

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Abstract

Research background: The COVID-19 pandemic has hit the society and force it to act. Businesses have had to take various measures to protect the health and lives of their customers, employees, and other stakeholders. The use of some, such as airway obstruction, was mandatory by a temporary amendment to the law. Other, as extra customer service were voluntary. Adherence to these measures was often left to level of ethical feelings of corporate management formally published in the form of Code of Conduct/Ethics as official document. Therefore, it is essential to find out which factors influenced this level in the connection with the scope of this code and why some companies were more ethical than others in applying pandemic measures.
Purpose of the article: The aim of this study is to determine factors influencing Scope of the Code of Slovak companies regarding to COVID-19 pandemic.
Methods: The Chi-square statistic as a non-parametric test to analyze group differences was used on the attained questionnaire and an adjusted residuals interpreted to see the association between the data after the significant Chi-square results has been obtained.
Findings & Value added: The Scope of the Code of 1-5 pages indicated as significant within all the hypothesis tested and results as the most unexpected one while looking at the adjusted residuals. Codes of 11 to 20 pages and the longest one with more than 100 pages were the least significant ones, while in only two hypotheses from six the differences were found.

Keywords: *business ethics; actions; Slovakia; multinationals; COVID-19*

JEL Classification: *F23; J81; M14*

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1 Introduction

The global pandemic has been a huge stress test not only for companies, but for humanity. The crisis has shown which companies can take care of their employees even with reduced or zero income. Sewing workshops stopped sewing covers for car seats and readjusted machines to cotton masks, disinfection was produced by companies that do not deal with this field at all. The bonding was huge and showed the need for Social Responsibility. Just as people cannot think only about their needs, companies must behave in the same responsible way.

CSR, especially in the last 2 years, has become an interesting and discussed topic with the onset of the Covid-19 pandemic, which has had an impact on the whole world, from the general population, through companies to world leaders. The pandemic has hit the world both from a health care perspective and from an economic or environmental perspective. COVID-19 is leading to a strengthened need for companies to integrate sustainability into their policies and strategies and become more efficient and effective. (Pelikanova et al., 2021)

The COVID-19 pandemic has been found to have had significant impacts and consequences for most spheres or sectors of the business world. Employees, consumers, and communities were hit hardest. The global pandemic is testing CSR, and emerging evidence supports the idea that many companies are trying to reset their CSR thinking and initiatives to adapt to this crisis and meet what the public expects of them. (Carroll, 2021) CSR activities are carried out by companies around the world in response to COVID-19, regardless of the country's level of development. (Navickas et al, 2021) CSR activities can thus be beneficial not only for the companies themselves, but also for society.

Socially responsible companies are characterized by altruism, which manifests itself in volunteering and donation even in times of crisis, as is the case with the Covid-19 pandemic (García-Sánchez et al., 2020). Socially responsible behavior can also be deduced from the activities of some companies that did not hesitate to transform their production into the production of medical and hygienic aids and devices, while providing a significant part of these products free of charge in the form of a donation (He & Harris, 2020). Companies also provide donations in the form of funds, free internet services, nutritional products, masks, and medical supplies. Abbas 2020 Although the current pandemic has brought great financial losses to many businesses, they have not hesitated, despite the financial risk, they have transformed their factories into the production of ventilators, respirators, or disinfectants. These products were often not intended for sale – that is, for profit, but were donated (He & Harris, 2020)

CSR shows the direction that business needs to take to address the biggest challenges of our time, which include the global Covid-19 pandemic. Codes of ethics are a practical tool for corporate social responsibility. The field of ethical corporate governance and social responsibility is still a very young and underdeveloped scientific discipline.

2 Literature review

Sustainable socially responsible business is becoming a lifeline for businesses. (Sedlačíková et al., 2021) Companies with many years of experience in the field of CSR act responsibly towards their communities and society. The concept of CSR is still evolving, but the main goal remains the same at any stage of development - to contribute to public safety and well-being. (Navickas et al, 2021)

Mahmud et al. (2021) expressed the belief that crisis periods, such as the Covid-19 pandemic, also provide an opportunity to build stronger links between employers and employees that facilitate the implementation of philanthropic activities. This was confirmed,

for example, during the Covid epidemic, when companies with well-established CSR did not experience such a significant decrease in employee productivity compared to companies where this was not the case (Lee & Singal, 2021). With threats to health and job security, employees' psychological capital was unlikely to recover naturally on its own, so the next activity that companies took was in supporting employees: self-efficacy, hope, resilience, and optimism. Mao at al. (2020) Businesses that have behaved responsibly towards their suppliers and employees throughout their existence have been at a slight advantage during the pandemic. If the company got into financial difficulties, due to closed establishments, if until now it paid its obligations on time, it was not a problem for it to ask its suppliers for an extension of the due date of invoices or special additional discounts. It was more advantageous for their suppliers to comply with the request so that the company could continue to do business. Similarly, in the case of employees who were forced to stay at home on obstacles to work on the part of the employer for a long time, even for only 60% of their salary, it depended largely on what employment policy the company applied before the pandemic. Companies that did not care about their employees, did not pay fair wages, did not have loyal employees, and their willingness to "wait" for the situation to improve was almost zero.

Mahmood et al. (2021) identified, based on the thematic analysis method, the five most significant barriers that occur in the implementation of CSR: lack of financial resources, lack of knowledge of CSR issues, reluctance of senior management, lack of regulatory framework on the part of the government and authorities, and failure to include problematic CSR in strategic planning on the part of enterprises. However, during the Covid 19 pandemic, companies overcame individual barriers and became more involved in CSR activities. (He & Harris, 2020). companies have also tried to stay in touch with their customers through e-mail correspondence, trying to express cooperation by e-mails assuring them that they are there for their customers. (Winet & Winet, 2021)

2.1 Impact of the pandemic on customer behavior

Negative emotions can trigger natural disasters and pandemics in a person, which are very stressful for a person. Stress is a crucial factor in a person's shopping behavior. Thus, individuals can withdraw and become passive, resulting in a decrease in purchases. However, due to depression, the opposite phenomenon can occur, namely excessive shopping in order to stock up on essential things such as water, food, hygiene items, pharmaceutical products, etc. (Di Crosta et al., 2021). But many changes in consumer behavior will persist long after the pandemic, according to experts. Moreover, the crisis is causing people to consider the impact of their purchases on health and the environment, reduce food waste and shop healthier. As the world gradually recovers from the crisis, marketing specialists are increasingly asking whether the consumer changes made over the past year will continue. It is not appropriate to divide the pandemic period into 'pre-pandemic' and 'post-pandemic', as consumers have always been exposed to change. Getting into the life that people were used to easily and quickly will not be so easy, which most people realize. People are increasingly following the behavior of companies, their responsible approach to the environment, ethical conduct and involvement in activities supporting the overcoming of the consequences of the Covid 19 pandemic.

2.2 Code of Ethics and Responsible Behavior of Companies Not Only during the Covid 19 Pandemic

Theadoption and implementation of corporate social responsibility is associated with the changing personal values of individual managers. Value changes have occurred more significantly in recent years as part of the Covid 19 pandemic and in response to increasing customer demands in the area of ethical conduct of companies. The Code of Ethics should be introduced by the company primarily for altruistic reasons, since the presence of the Code of Ethics shows acceptance of the moral and social responsibility of the company.

Ethical management and ethical codes of organizations are related to procedures or programs referred to as corporate compliance, i.e. compliance of corporate practice, respectively the conduct of the company, its management and employees, with the established rules of its business. Business ethics seeks to find the "correct and proportionate" behaviour of business entities. It therefore addresses topics such as decency and full respect for the law, the emergence and impact of conflicts of interest including their resolution, fairness of work or employment relationships, including workplace health and safety, honesty in business and marketing practice, i.e. relations of companies to suppliers and customers, "fairness" of prices, the use of bribes, the protection of the environment, the acceptance of working conditions that are contrary to the rules of ethical conduct (e.g. human rights violations), the provision of unethical and false information in the context of whistleblowing in order to harm another person or company. (Haque et. al. , 2020, Skýpalová et al. 2021, Šafránková et al., 2020) The Covid 19 pandemic has affected areas of socially responsible and ethical behavior, which also focused on direct assistance in the fight against the pandemic (masks, production of disinfection, provision of additional protective equipment for employees), health care of employees (home office, regular health checks, increased hygiene measures, social distance, extra authorization – restriction of entry of the permision), community support (drinks and protective equipment for health care workers and people on the "front line" free of charge, concerts for the elderly, equipment for sanitary stations in the form of a donation), customer service support (extra customar service). (García-Sánchez, 2020; Mahmud et al., 2021)

An ethical approach in business promotes open communication, easier problem solving, knowledge sharing and creativity among employees, strengthens interaction and relationships with suppliers, customers and other stakeholder groups, thereby increasing the social capital of companies. Su et al. (2014) argue that the benefits of introducing ethical management are higher employee loyalty, customer satisfaction, a better company image, investor loyalty followed by higher productivity, higher economic efficiency and the ability to reduce transaction and information costs.

3 Methodology

Research was conducted in the form of a questionnaire study aimed at the Business ethics in Slovak companies. The paper shows partial outcomes of broad study and uses just a part of obtained data, specifically the part of general characteristics of business ethics and the scope of the code in relation to COVID-19 pandemic. Data was obtained by trained interviewers aiming Slovak companies (companies recorded in Slovak Business Register) who are connect to foreign multinational company as its daughter company in Slovakia and who formalize company's ethical attitudes in the form of Code of Ethics/Conduct or similar document. The nature of this relationship, type of investment in Slovak economy or other characteristics were not prerequisite for inclusion in the study, given that they were determined as classification characteristics. A study was conducted on the sample of 179 companies who

match our conditions and were willing to cooperate. Representativeness of this sample is not verifiable, given that the total population of businesses connected (in various forms) to foreign multinational companies is unknown in Slovakia. This can be considered as limitation of this study. But we believe that our sample truthfully describes the situation in Slovak business sector considering fact, that formalization of ethical attitudes in the form of code is an uncommon practice in Slovakia. Therefore, only a limited number of companies had information for our research and were willing to cooperate.

The aim of study is to determine factors influencing Scope of the Code of Slovak companies regarding to COVID-19 pandemic.

The statistics used in the paper was calculated by XLSTAT software, which was used to find link between data of the survey and to bring statistical point of view on the issue. In the first step, the null hypotheses H0 and alternative ones were stated. Next step consists of verification of hypotheses calculated by chi square (Tallarida and Murray, 1987) as the first statistical test of association between chosen variables and those significant ones according to the p-value level were chosen for further tests and interpreted. The adjusted residuals were calculated after and they shows, which cells have larger or smaller counts than expected. The adjusted residuals with a standard normal distribution under the null hypothesis that the 2 variables are independent will show the significant cells while the result of more than 2 (used by convention) will indicate that the number of cases in that cell is significantly larger than would be expected if the null hypothesis were true, with a significance level of .05. An adjusted residual smaller than -2.0 indicates that the number of cases in that cell is significantly smaller than would be expected if the null hypothesis were true (Sharpe, 2015).

From all the survey questions tested in relationship with Scope of the Code, results of 6 of them were significant, namely variables: Establishment of the parent company, Registered office of the parent company – region, Total number of countries in which the company operates, Legal form, Year of origin, Headquarters in Slovakia. Therefore, only these will be further interpreted.

H0: There is no association among Scope of the Code and survey questions.

H1: There is association among Scope of the Code and Establishment of the parent company.

H2: There is association among Scope of the Code and Registered office of the parent company.

H3: There is association among Scope of the Code and Total number of countries in which the company operates.

H4: There is association among Scope of the Code and Legal form.

H5: There is association among Scope of the Code and Year of origin.

H6: There is association among Scope of the Code and Headquarters in Slovakia.

The study is conducted on the sample of companies connected to foreign multinationals which can be considered as second limitation. Therefore, we recommend for future research also include companies which are not under control of foreign mother company. This can bring interesting outcomes according to the role of this control in the business ethics since similar research is missing in Slovak conditions.

4 Results and discussion

Variables included in the study were transformed from sorting questions of conducted survey. These can be seen as general characteristics of the monitored sample. The first was establishment of the parent company. According to these characteristics, we monitored 21.2% of companies established from 1800 to 1900, 33.5% companies established from 1901 to 1950 and 45.3% established from 1951 to 2000. Out of 179 monitored, 70.9% has

registered office of the parent company in European Union and 10.1% in Europe outside of the EU. Additional 12.8% has headquarters in North America and 6.4% in Asia. Monitored companies operates mostly in less than 10 countries (21.3%), from 11 to 20 countries (15.1%) and from 21 to 30 countries (17.3%). But 13.4% of them operates from 51 to 100 countries. In Slovakia they run mostly under the legal form of Limited liability company (68.7%) and Joint stock company (25.1). The Public company is represented only of 5.6% and Limited partnership by 0.6%. Majority of monitored companies were established in Slovakia from 1990 to 1995 (31.8%), then from 1996 to 2000 (24.6%) and from 2001 to 2005 (19.6%).

More than a half of them (55.9%) has in Slovakia headquarters located in Bratislava, additional 20.1% in the district of Nitra. Other district had less than 10% representation which corresponds to the general composition of the business sector in Slovakia.

Table 1. Chi-square statistics between the Scope of the Code and chosen variables.

Scope of the Code	Establishment of the parent company	Registered office of the parent company - region	Total number of countries in which the company operates	Legal form	Year of origin	Head-quarters in Slovakia
Chi-square (Observed value)	19.256	32.496	59.570	39.942	47.965	62.623
Chi-square (Critical value)	18.307	24.996	55.758	24.996	37.652	55.758
DF	10	15	40	15	25	40
p-value	**0.037**	**0.006**	**0.024**	**0.000**	**0.004**	**0.013**
alpha	0.05	0.05	0.05	0.05	0.05	0.05

Source: own processing.

As the computed p-values are lower than the significance level alpha (0.05), we reject the null hypothesis H0, and accept the alternative hypothesis H1- H6 (Table 1).

Table 2. Residuals (Adjusted) (Establishment of the parent company / Scope of the Code

	Code of 1 to 5 pages	Code of 6 to 10 pages	Code of 11 to 20 pages	Code of 20 to 50 pages	Code of 50 to 100 pages	Code of more than 100 pages
Establishment of the parent company 1800-1900	**-2.197**	1.651	0.655	0.525	-1.107	-0.738
Establishment of the parent company 1901-1950	-0.485	-1.000	0.915	-1.179	**2.615**	-1.010
Establishment of the parent company 1951-2000	**2.265**	-0.408	-1.405	0.687	-1.570	1.564

Values displayed in bold are significant at the level alpha=0.05
Source: own processing.

The Establishment of the parent company affects Scope of the Code in a way that in Establishment of the parent company from 1800 to 1900 less entities has the Scope of the Code of 1-5 pages as expected. In case of the establishment of the parent company from 1951 to 2000 more entities has the Scope of the Code of 1-5 pages as expected and for the establishment of the parent company from 1901 to 1950 more entities has the Scope of the Code of 50-100 pages as expected (Table 2). The risk to reject the null hypothesis H0 while it is true is lower than 3.71% (Table 1).

Table 3. Residuals (Adjusted) (Registered office of the parent company/ Scope of the Code)

	Code of 1 to 5 pages	Code of 6 to 10 pages	Code of 11 to 20 pages	Code of 20 to 50 pages	Code of 50 to 100 pages	Code of more than 100 pages
Registered office of the parent company in EU	**2.402**	0.873	1.564	**-3.576**	-0.969	0.910
Registered office of the parent company in Union outside the EU	-1.760	-1.391	-1.074	1.330	**3.462**	-0.476
Registered office of the parent company in North America	-0.710	0.600	-1.150	1.904	-0.975	-0.546
Registered office of the parent company in Asia	-1.347	-0.744	-0.008	**2.442**	-1.145	-0.364

Values displayed in bold are significant at the level alpha=0.05
Source: own processing.

From Table 3 we can conclude that more companies with registered office of the parent company in EU has the scope of the code of 1-5 pages than expected and at the same time there were less expected in case of scope of 20- 50 pages. Furthermore, more companies with registered office of the parent company in Union outside the EU than expected has a code of 50- 100 pages and also more of those with parent company in Asia than expected has 20- 50 pages code.

Table 4 shows that for companies which operates in less than 10 countries number -2.25 indicates that the number of companies with the code of 20 to 50 pages is significantly smaller than it would be expected. On the other hand, there are much more companies operating in 101 to 150 countries then expected, which have the same page range. The most significant result can be seen in the companies who operates in more than 200 countries where we can conclude from the number of 4.43 that number of companies with the shortest code is significantly larger than expected.

Table 4. Residuals (Adjusted) (Total number of countries in which the company operates/ Scope of the Code)

	Code of 1 to 5 pages	Code of 6 to 10 pages	Code of 11 to 20 pages	Code of 20 to 50 pages	Code of 50 to 100 pages	Code of more than 100 pages
Less than 10 countries in which the company operates	1.022	0.202	1.885	**-2.249**	-0.499	-0.738
11-20 countries in which the company operates	0.846	-0.373	-1.120	-0.587	1.587	1.387
21-30 countries in which the company operates	-0.091	-0.714	-0.215	-0.225	1.237	1.228
31-40 countries in which the company operates	-1.031	1.237	-1.074	1.869	-1.496	-0.476
41-50 countries in which the company operates	-0.434	-0.744	**2.086**	-0.256	-1.145	-0.364
51-100 countries in which the company operates	-1.428	0.489	0.212	0.773	-0.302	-0.560
101-150 countries in which the company operates	-0.534	-1.641	-0.861	**2.146**	0.788	-0.381
151-200 countries in which the company operates	-1.473	**2.092**	-0.361	0.003	-0.294	-0.398
More than 200 countries in which the company operates	**4.432**	-1.038	-1.392	-0.527	-0.758	-0.241

Values displayed in bold are significant at the level alpha=0.05
Source: own processing.

Table 5. Residuals (Adjusted) (Legal form/ Scope of the Code)

	Code of 1 to 5 pages	Code of 6 to 10 pages	Code of 11 to 20 pages	Code of 20 to 50 pages	Code of 50 to 100 pages	Code of more than 100 pages
Joint stock company	**-2.040**	**-2.182**	1.036	0.812	**2.564**	-0.824
Limited liability company	-0.706	**2.428**	-0.242	-0.277	-1.806	0.960
Public company	**4.450**	-0.629	-1.268	-0.757	-1.088	-0.346
Limited partnership	**2.548**	-0.459	-0.616	-0.668	-0.335	-0.107

Values displayed in bold are significant at the level alpha=0.05
Source: own processing.

In case of joint stock companies there were less companies than expected with codes of 1-5 and 6-10 pages, but more than expected with 50- 100 pages.

For the limited liability more of the companies has 6-10 pages than it was expected and for two last cases of companies in both more companies than expected has a code of 1-5

pages only. For the public company the highest significance is seen among the legal forms, and we can say that there are much more public companies with the shortest code range than it would be expected. The same applies for the limited partnership.

Table 6. Residuals (Adjusted) (Year of origin/ Scope of the Code)

	Code of 1 to 5 pages	Code of 6 to 10 pages	Code of 11 to 20 pages	Code of 20 to 50 pages	Code of 50 to 100 pages	Code of more than 100 pages
1990 to 1995	0.168	1.326	0.143	-1.222	0.143	-0.972
1996 to 2000	**2.089**	**-3.037**	-0.407	0.557	1.487	-0.812
2001 to 2005	-1.489	-0.031	0.177	0.917	-0.326	1.092
2006 to 2010	-0.925	**2.521**	1.371	-1.834	-1.139	-0.586
2011 to 2015	-1.211	-1.409	-1.123	**3.139**	0.108	-0.327
2016 to 2020	0.985	0.587	-0.965	-0.359	-0.968	**3.134**

Values displayed in bold are significant at the level alpha=0.05
Source: own processing.

Year of origin from 1996 to 2000 resulted significant for the scope of the code from 1-5 and 6-40 pages, while there were more companies than expected to have the shortest code and less than expected to have one with 6-10 pages. This resulted opposite for the companies originated from 2006-2010 where more than expected has code of 6-10 pages.

Table 7. Residuals (Adjusted) (Headquarters in Slovakia/ Scope of the Code)

	Code of 1 to 5 pages	Code of 6 to 10 pages	Code of 11 to 20 pages	Code of 20 to 50 pages	Code of 50 to 100 pages		Code of more than 100 pages
Bratislava region	0.703	-0.922	0.211	-0.237	0.973		-1.600
Banská Bystrica region	**3.101**	-1.038	-0.375	-0.527	-0.758		-0.241
Košický region	**2.548**	-0.459	-0.616	-0.668	-0.335		-0.107
Nitriansky region	-1.000	0.870	0.897	-0.429	-0.384		-0.714
Prešovský region	-0.560	-0.651	0.722	0.594	-0.476		-0.151
Trnavský region	-0.957	-1.310	1.342	-0.123	0.246		**1.965**
Trenčiansky region	-1.281	**3.671**	**-1.998**	-0.757	-0.006		**2.750**
Žilinsky region	-0.980	-0.043	-1.530	**2.841**	-0.833		-0.265
Without main headquarters	1.527	-0.651	-0.873	0.594	-0.476		-0.151

Values displayed in bold are significant at the level alpha=0.05
Source: own processing.

5 Conclusion

Using the chi square test on the sample of 179 Slovak companies which are connected to foreign multinationals and formalize their ethical attitudes in the form of Codex we examined

factors influencing Scope of the Code of Slovak companies regarding to COVID-19 pandemic. Study enclosed that the Establishment of the parent company effects mostly the Scope of the Code of 1-5 pages, and Code of 50 to 100 as well. Same scopes are affected by the registered office of the parent company but with the additional scope of Code of 20 to 50 pages. Total number of countries in which the company operates affects mostly the scope of Code of 20 to 50 pages, but all the shortest ones as well. In case of legal form the Code of 1-5 pages is significant over all the tested ones, but Limited liability company which makes it the most unexpected. Code of 6 -10 and 50 -100 shows the significancy for some legal forms as well. Code of 11 to 20 pages and 50 -100 pages did not show any significance for the zear of origin and similarly the code of 50 -100 was the only unsignificant one among all the ranges tested for the Headquarters in Slovakia.

Acknowledgement

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IFRS disclosure checklist as a global tool for verification of the financial statements by the statutory auditor in practice

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Abstract

Research background: The role of the statutory auditor is to verify the financial statements of the accounting unit, which is also connected with the supervision of whether the accounting unit is proceeding in accordance with the given financial reporting framework. It is a very important global process, on the basis of which the statutory auditor can get a better image of the financial statement of the accounting unit in which he performs the statutory audit.
Purpose of the article: The paper will be focused on global auditing companies that perform statutory audits in accounting units proceeding in accordance with International Financial Reporting Standards. We will analyse the so-called IFRS disclosure checklists compiled by selected auditing companies. They contain the requirements of individual IFRS standards for disclosures in the financial statements. This is detailed information on whether accounting units are proceeding in accordance with International Financial Reporting Standards.
Methods: Based on the analysis of the so-called IFRS disclosure checklists of selected audit companies and subsequent comparison, we obtain a summary of the most important information that must be verified by the statutory auditor in the financial statements prepared according to IFRS.
Findings & Value added: The aim of this paper is to create a guide to the so-called IFRS disclosure checklist with the most important information that the statutory auditor in the accounting unit should verify. The procedure will be carried out on the basis of information from IFRS disclosure checklists compiled by selected auditing companies in practice in worldwide.

Keywords: *IFRS disclosure checklist; financial statements; statutory audit*

JEL Classification: *M40; M41; M42*

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1 Introduction

The IFRS Disclosure Checklist serves the statutory auditor as a tool for verifying the financial statements. It is a set of individual circuits that the statutory auditor verifies in the accounting unit. The statutory auditor keeps such a checklist of publication of financial statement according to IFRS, on the basis of which he can subsequently evaluate whether the accounting is proceeding in accordance with the given financial reporting framework. This is a very important process, as thanks to it the auditor can get a better picture of the financial statement of the accounting unit in which he performs the statutory audit. (Domaracka and Knazkova, 2020)

Each audit firm has its own IFRS Disclosure Checklist, with its own structure that depends on the accounting unit. For each IFRS Disclosure Checklist, however, there is the same way of marking the correct boxes. Each item is answered by ticking the corresponding column, while there are always the same options: yes = it was published and then there is the "comments" column - there is a link to the page or section in which the related publication was made; no - the disclosure was not made, in this case each item should be explained and the reason should also be given in case of omission in the checklist, but if this disclosure is insignificant and does not affect a faithful and true picture of the financial situation of the accounting unit, the omission of such disclosure does not constitute an incorrectness; N/A = the question does not apply to the given accounting unit. The statutory auditor is obliged to always tick one of these options, while great emphasis is also placed on the comments to this statement that confirm this fact.

2 Methods

In this contribution, an analysis of IFRS disclosure checklists in practice will be carried out. These will be selected auditing companies whose IFRS disclosure checklists are publicly available. We will then compare them between individual auditing companies, as their content is different. Based on the analysis of the selected circuits and subsequently special topics, we will create a guide to the so-called IFRS disclosure checklist with the most important information that should be subject to verification by the statutory auditor in the accounting unit. However, it always depends on the given accounting unit, which means that not all items of the IFRS disclosure checklists always have content. (Monsen, 2022)

3 Results and Discussions

This chapter is focused on individual areas of IFRS disclosure checklists in practice. In each circle, we will focus on selected important information that the statutory auditor should find out about the accounting unit in which he performs the statutory audit. (Beck et al., 2022)

GENERAL - In this section, the statutory auditor verifies general information. For example, whether the accounting unit publishes a complete set of financial statements - we can find a description in the IAS 1 standard – Presentation of Financial Statements; or a set of abbreviated financial statements - we can find a description in the IAS 34 standard – Interim Financial Reporting. If a complete set of financial statements is published, the form and content should comply with the requirements of IAS 1 standard, but should also include all disclosures required by IAS 34 standard, as well as those required by other standards. However, if a condensed set is disclosed, the disclosures required by IAS 34 standard should be included. Disclosures required by other IFRSs are not required, unless they are relevant to an understanding of the current accounting period. In the event that the last financial

statement was a consolidated financial statement, the statutory auditor informs whether the current financial statement is also drawn up on a consolidated basis.

FIRST TIME ADOPTION - First adoption of international financial reporting standards (IFRS 1 standard) – the statutory auditor is obliged to verify whether the accounting unit is in the current period a first-time adopter within the meaning of the IFRS 1 standard. The aim of this standard is to ensure that the financial statements of such an accounting unit contain quality information that is transparent for users, comparable for all periods presented, provide a starting point for accounting in accordance with IFRS and can be made at reasonable costs, or those that do not exceed the benefit. In accordance with this standard, the statutory auditor verifies, for example, whether the accounting unit: concluded business combinations before the date of transition to IFRS; concluded insurance contracts; reported items of real estate, machinery and equipment / intangible assets other than goodwill in the opening statement of financial position according to IFRS; reported any investments in subsidiaries, joint ventures or associates; has outstanding government loans as of the date of transition to IFRS; has uncertainty in the area of income tax and others.

STATEMENT OF FINANCIAL POSITION - With regard to the statement of financial position, the statutory auditor ascertains information, for example, on whether the accounting unit presents each significant class of similar items separately in the statement of financial position and also whether it presents separately those items that are not similar, unless they are immaterial. It further focuses on whether the accounting unit presents assets and liabilities separately and does not offset them, if no other IFRS standard requires or permits this.

STATEMENT OF PROFIT OR LOSS AND OTHER COMPREHENSIVE INCOME - In this section, the statutory auditor ascertains information on whether the accounting unit presents in the statement of profit and loss and other comprehensive income, among other things, profit or loss, other comprehensive income together and complete result for the accounting period (that is, the sum of profit or loss and other comprehensive income result). It also determines whether the accounting unit reports items such as the distribution of profit or loss and other comprehensive income for the accounting period, so for example profit or loss attributable to non-controlling interests and owners of the parent company and also full income for the period attributable to non-controlling interests and owners of the parent company. (Farkas, 2013) It also deals with whether the accounting unit, in case it presents profit or loss in a separate statement, presents the distribution of profit or loss between non-controlling interests and owners of the parent company in this statement. Also important is the question of whether the accounting unit presents each significant class of similar items separately in the statement of comprehensive income and whether it presents items of a different nature separately, unless they are immaterial. It is also important for the statutory auditor to know about the accounting unit whether the accounting unit presents revenues and expenses separately and does not offset them, unless required by another IFRS standard. (Gluzova, 2015)

STATEMENT OF CHANGES IN EQUITY - Regarding the statement of changes in equity, the auditor determines whether the financial statement contains the statement of changes in equity that shows all changes in equity or, for example, whether this statement includes all items and subtotals included in the last financial statement. However, it is also important whether the financial statement also includes a comparative statement of changes in equity for the comparable period from the beginning to the date of the immediately preceding accounting period.

STATEMENT OF CASH FLOWS - In the case of the statement of cash flows, the statutory auditor mainly focuses on whether it contains all the items and subtotals included in the last financial statements, as well as other line items, without which this statement would be misleading. It is also important whether this statement shows comparable information for

a comparable period from the beginning to the date of the immediately preceding accounting period. (Mullins, 2020)

FINANCIAL REVIEW BY MANAGEMENT - An accounting unit may present a management financial overview outside of the financial statements. Such an overview explains the main features of the financial performance of the accounting unit, as well as the financial situation and the main uncertainties that the accounting unit faces. The task of the statutory auditor is to determine whether the accounting unit compiles such an overview. It also finds out, for example, what changes have occurred in the accounting unit's environment, the accounting unit's reactions to these changes and their impact.

NOTES TO THE FINANCIAL STATEMENTS - In the notes to the financial statements, the accounting unit states the basis for compiling the financial statements; accounting principles; information required by IFRS that is not presented in another statement; and information not included in any other statement but relevant to an understanding of any of them. The statutory auditor determines whether the accounting unit presents the notes to the financial statements in a systematic manner, with the effect on the comprehensibility and comparability of its financial statements. An important area of verification by the statutory auditor is also the fact that the accounting unit refers to each item in the statements (statement of financial position, statement of profit and loss and other comprehensive income, statement of changes in equity, statement of cash flows) to related information in the notes.

SPECIAL TOPICS - Another point that the statutory auditor deals with in IFRS disclosure checklists are special topics. We can designate special topics as any information in accordance with International Financial Reporting Standards that is relevant for a given accounting unit. We will deal with special topics in the next subsection.

NEW PRONOUNCEMENTS - The statutory auditor determines whether the accounting unit discloses the required items according to the latest accounting declaration that were released after the closing of this checklist.

APPENDIX – NOTES - The last circuit of the so-called the IFRS disclosure checklist is focused on additional notes on individual items. The statutory auditor indicates the number of the item in question, a link to a specific working document, while providing a comment on the given item, which additionally explains the information on the individual items.

3.1 Special topics

In this subsection, we will focus on selected special topics that the statutory auditor can deal with. However, this is only a sample of special topics, as it always depends on the given accounting unit.

Business Combinations (IFRS 3 standard) - for each business combination that was affected during the period, it is necessary to disclose in particular the name and description of the acquiree, the date of acquisition, the percentage of acquired shares as well as the main reasons for the business combination with a description of how the acquirer gained control over the acquired. In addition, however, the statutory auditor verify about all facts related to the business combination that occurred during the accounting period. (Krimpmann, 2015)

Consolidated Financial Statements (IFRS 10 standard) - this is information about whether the reporting entity controls one or more entities within the reporting period and also whether there was a loss of control when the accounting unit's ownership interest in the subsidiary accounting unit changed. However, it is also important whether the reporting accounting unit is an investment unit. (Bedford et al., 2021)

Operating Segments (IFRS 8 standard) 12 - in this case, the statutory auditor verifies whether, for example, revenues from external customers and intersegment revenues are part of the financial statement, if these revenues are included in the measurement of segment

profit or loss provided to the main operating authority with decision-making authority, or also, for example, the measure of segment profit and loss. In the event that the structure of the internal organization has changed in the accounting unit and subsequently the composition of its reportable segments has changed, the relevant information for previous periods as well as the current period should be revised. And in such a case, if this information is not available and the costs of creating it would be disproportionately high. Subsequently, the accounting unit should disclose whether, after changing the segments, it also revalued the corresponding amounts. The task of the statutory auditor is to determine whether the accounting unit has proceeded in accordance with this standard. (Saleh et al., 2022)

Revenue from Contracts with Customers (IFRS 15 standard) - an important point in this section is to verify information on whether the accounting unit is applying the IFRS 15 standard for the first time. It also includes information on whether the subject has concluded a contract based on which the customer can return a defective product in exchange for a functional one, whether another third part also participates in the provision of goods or services to the customer or, for example, whether the accounting unit charges the customer at the start contract, a non-refundable fee in advance, or whether the accounting unit concluded a buyback agreement with its customer. (Napier and Stadler, 2020)

Leases (IFRS 16 standard) – in this case too, the auditor should verifies information in the IFRS disclosure checklist as to whether the accounting unit is applying the IFRS standard for the first time. In this case, we consider the following questions to be important selected information - whether: the accounting unit has a contract that can be a lease (or contains a lease); have changed any terms of the contract, is the entity a lessee or a lessor or, for example, has the given accounting unit entered into a sale and leaseback transaction. (Fahad and Scott, 2021)

Inventories (IAS 2 standard) – especially if it is an accounting unit that, for various reasons, accounts for inventories, so it follows the IAS 2 standard, it is important to find out information about whether the accounting unit purchases goods for resale; manufactures supplies; purchases some material to be subsequently used in the provision of services or holds agricultural products, but which are valued in accordance with IAS 2.

Accounting Policies, Changes in Accounting Estimates and Errors (IAS 8 standard) - in accordance with the IAS 8 standard, the statutory auditor determines whether the accounting unit has voluntarily changed any accounting policies during the given accounting period, in addition to changes resulting from the adoption of a new standard, or occurred during the accounting period period to change the accounting period, or discovered errors during the current accounting period when compiling the financial statements of previous periods.

Events after the Reporting Period (IAS 10 standard) – after the accounting period, but before the date of approval of the financial statements for publication, some favorable or unfavorable event may affect the accounting unit. The duty of the statutory auditor is to verify information on whether such an event has occurred in the accounting unit, and if so, what kind of event it is.

Income Taxes (IAS 12 standard) - with regard to income tax, the first information that the statutory auditor should verify in the IFRS disclosure checklist about the accounting unit is whether it is subject to the income tax laws that apply in the domestic market or by foreign legislators, including withholding taxes paid by a subsidiary, associate or joint venture on distributions to the reporting entity. Other important information is, for example, whether: there are taxable temporary differences, deductible temporary differences, or whether the accounting unit had unused tax losses or tax credits in the accounting period.

Property, Plant and Equipment (IAS 16 standard) - focusing on the IAS 16 standard, the statutory auditor verifies information in particular on whether the accounting unit held property, plant or equipment during the accounting period, or whether it bought, built or

acquired it in exchange for another asset . It is also important to know whether the accounting unit incurred other expenses during the accounting period associated with an already existing property, plant or equipment. It is also important to verify whether the accounting unit sold or otherwise disposed of property, plant or equipment during the accounting period.

Employee Benefits (IAS 19 standard) - if the accounting unit has employees, it is important to verify whether it has expenses that can be assumed to be fully settled within twelve months after the end of the accounting period in which the service was provided on the part of the employees, it can be for example - wages, social security contributions, paid vacation or sick leave, profit sharing, bonuses, non-monetary benefits (medical care, housing, car) for current employees. An accounting unit may provide post-employment benefits such as pension benefits (retirement payments) or other post-employment benefits (life insurance or medical care). It is too important to verify all the necessary information about this. (Core, 2020)

Separate Financial Statements (IAS 27 standard) - under the IAS 27 standard, the statutory auditor verifies information on whether the parent accounting unit has chosen the option of not preparing consolidated financial statements but instead preparing separate financial statements and also, for example, whether the parent accounting unit is an investment unit in accordance with IFRS 10. (Hvozdarova et al., 2014)

Impairment of Assets (IAS 36 standard) – information in accordance with IAS 36 is the focus of the statutory auditor in the event that the accounting unit incurs a significant impairment loss or reversal of an impairment loss. In this case, the required disclosures are mainly the events and circumstances that led to the creation or reversal of the impairment loss.

Provisions Contingent Liabilities and Contingent Assets (IAS 37 standard) – the statutory auditor is obliged to report whether, in accordance with the IAS 37 standard, the accounting unit has current liabilities with indefinite timing or amount and it is expected that they will lead to a reduction in economic benefits or any contingent liabilities, or contingent assets. Furthermore, it can verify information, for example, about whether the accounting unit is a party to any disadvantageous contracts or whether it has planned restructuring (or started this process). (Bohusova et al., 2022)

Intangible Assets (IAS 38 standard) - in the case of intangible assets, the accounting unit is important, for example this information - whether: the accounting unit had any intangible assets in its possession during the year or reports intangible assets created by its own activities in the statement of financial position (for example, proposal, process, list of customers, etc.); the accounting unit incurred additional expenses in the accounting period associated with an already existing item of intangible assets; the accounting entity incurred expenses related to research or development; the accounting unit has sold or otherwise disposed of an intangible asset during the accounting period, or there is an intangible asset from which no further economic benefits are expected. (Mazzi et al, 2022)

Investment Property (IAS 40 standard) - with the IAS 40 standard, it is important to verify whether the accounting unit applies this standard for the first time. Other information can be, for example, information on whether: the accounting unit had property from the right of use during the year or acquired land/real estates; the accounting unit owns property that meets the definition of investment property; or, for example, whether the accounting unit disposed of any investment real estate or permanently retired any investment intangible asset during the accounting period. (Sangchan et al., 2020)

Agriculture (standard IAS 41) – in the case of agriculture, it is important information about the accounting unit, whether it is involved in agricultural activities involving live plants or animals, or whether it owns any biological assets. Information about the accounting unit is also important if it is unable to reliably value some of the biological assets at fair value at

initial reporting and about government subsidies or subsidies related to biological assets or agriculture.

Distribution of Non-cash Assets to Owners (standard IFRIC 17) – the statutory auditor verifies information about the accounting unit that distributes assets other than cash as dividends to its owners and also whether there is a difference between the book value of the distributed assets and the book value of dividends payable.

4 Conclusion

Based on the analysis of individual IFRS Disclosure Checklists, instructions for its creation were created, while we focused only on selected areas. We were based on real IFRS Disclosure Checklists of selected auditing companies in practice. It is a very important process for the statutory auditor, as it helps him to create a better picture of the financial statement.

In the event that the statutory auditor discovers serious deficiencies in the accounting based on this checklist, we distinguish between two options. If the financial statements have not yet been drawn up, the management of this accounting unit can be approached to eliminate these deficiencies. However, if the financial statements have already been drawn up, approved and published, the statutory auditor will consider the seriousness of the identified deficiencies and the subsequent statement about this fact in the auditor's report.

Acknowledgements

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Impact of covid-19 on social entrepreneurship in Latvia in the European Union context

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Abstract

Research background: One quarter of all companies in the world are social enterprises, in Latvia this number is only 0.05%. According to a study published by Intrum, Europe's leading credit management company, the pandemic has had a negative financial impact on business prospects. The global pandemic has created a risk of unforeseen job losses and rising unemployment in various and unrelated sectors, as well as it has brought about certain positive changes.
Purpose of the article: The purpose of the article is identify the impact factors of Covid-19 on social entrepreneurship in Latvia. To attain that the following tasks were set: (1) to analyse the theoretical basis of the social entrepreneurship and current research regarding Covid-19 influence factors; (2) to develop research methodology; (3) to carry out the empirical research and interpret results.
Methods: The non-purposive survey using 5-point Likert-scale questionnaire (number of respondents – 424) was carried out. The results were processed by SPSS, and the factor analysis was performed.
Findings & Value added: The main findings of the research – identification of 10 most important factors of the Covid-19pandemic on the social entrepreneurship in Latvia

Keywords: *Covid-19; Social Entrepreneurship; negative impact of Covid-19*

JEL Classification: *A13; L31; M14*

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1 Introduction

1.1. Theoretical background

Social entrepreneurship is seen as important in the diversity of the common European market economy. It is based on respectful unity and responsibility, for the goals set to promote social responsibility and universal inclusion. Various intractable life situations have shaped the development of social entrepreneurship - non-standard situations, non-standard and innovative solutions. Social entrepreneurship means that it produces and provides various services with the primary goal of solving a social problem or providing some benefit to society or a part of society, rather than generating as much profit as possible. Social entrepreneurship has different formats, social enterprises vary widely in size and ownership, but all share a common and common goal, to deliver and create the best (Association of Social Entrepreneurship of Latvia, 2022). Social entrepreneurship provides an opportunity for anyone whose opinion does not correspond to certain forms and frameworks of society's opinion to create their own directions of development and unite like-minded members. On the way to a better goal, solving both the problems of various risk groups exposed to social exclusion, and solving environmental problems, is planning the production of various goods and services from raw materials that will have less impact on nature, producing various energy resources, which are consumed more as society grows.

The emergence and first appearance of the disease spread of the Covid-19 virus was not perceived responsibly by society. The symptoms of the illness were similar to a seasonal illness, which flared up in varying degrees every year, in autumn and winter. The non-serious attitude did not stop the mobilization of the society and it continued to move around the world, without foreseeing that it is possible to transfer the symptoms of the disease to a third person without experiencing them. A global economic pause and psychological catastrophes took hold, causing irreversible damage to the entire world. As the first decisions to stop the spread of the pandemic, various restrictions were adopted, such as closing borders, closing trade places. Creating a huge domino effect, the whole world was forced to stop.

Although previously there were already various organizations that had a defined social goal for their core activity and they existed since the 18th century, information about social entrepreneurship has been widely spread since 2006, when businessman, banker, activist and economist Muhammad Yunus and the Grameen Bank he founded, won the Nobel Peace Prize for his contribution to the economy and social development by issuing small financial loans to economically less able citizens since 1983. Yunus invested all the obtained profit in the further improvement of the organization. Economic and social development has been one of the priorities of the European Union's development plan for a long time, emphasizing the need for social integration in the economic environment, with special emphasis on groups at risk of social exclusion. The difference between entrepreneurship and social entrepreneurship can be explained by the company's values and goals. An entrepreneur usually works to cover some pre-defined market segment, offering goods or services and making a profit, but social entrepreneurship determines that all the earned profit will be returned to the investors and everything else remains in the company and its development, the most important goal is the benefit that the specified target group will receive. Yunus (2007) has formulated 7 basic principles of social entrepreneurship:

- The primary goal is to alleviate one or more problems that are oppressing some society's risk groups, to receive and improve - educational opportunities, health, access to technology, environmental and natural issues, profit is secondary.
- Social enterprises must be financially stable and economically viable,

- Each of the investors when investing is aware that they will get back as much as they had invested, dividends are not paid in this industry.
- By repaying all the investments received, the profit is further invested in the company itself so that it can develop.
- Gender equality in the company's operation and structure is ensured.
- Employees must receive a competitive salary, but the general working conditions must be better than those of competitors.
- The work must be done with personal investment, it must bring joy.

In Latvia, social entrepreneurship is regulated by the Social Law, which has been in force since April 1, 2018. The social entrepreneurship has respectable goals, to which it must strive and fulfill certain norms, in accordance with the procedures established by law. The social enterprises are limited liability companies that have acquired the status of a social enterprise by carrying out economic activity corresponding to the status granted, which provides a positive and important social impact on certain social groups, as well as by improving the well-being of life and solving problems. Areas of activity cover sectors such as education, social and health care, specialized services and goods, and environmental well-being. (Ministry of Welfare, 2022).

Despite the fact that social entrepreneurship in Latvia is regulated by a legal framework, it is necessary to promote a positive social entrepreneurship ecosystem in which a general exchange of information is promoted, providing social entrepreneurs with all current information, as well as a stable ecosystem would promote the growth of potential entrepreneurs if the support system from the industry were popularized representatives and partners. At the same time, it is important to mention that not all entrepreneurs who define themselves as social entrepreneurs have obtained the status, for various reasons and considerations, but they need to be. The European Social Fund (ESF) project "Support for social entrepreneurship" in cooperation with the financial development fund *Altum* supports entrepreneurs who want to invest for the benefit of themselves and society. In order to receive up to 200,000 euros, a business plan must be submitted for the grant application that meets the requirements for the implementation of business projects. It is possible to receive financing for long-term investments, both material and non-material, working capital, various training courses and professional consulting, compensation payment. Labor integration companies can receive up to 100% of the average salary in the market, for the specified profession or for the development of a business plan, in a period of up to 2 years, on the condition that the compensation paid to the salaried employees of the target groups reaches at least 40% of the total required financial support, during the initiation and development of the business plan. Other targeted social enterprises can receive compensation for up to 6 months, not exceeding 80% of the average salary for the specific profession. Long-term investments in work integration companies are awarded to those long-term material investments that are most directly related to the performance of the work of the specified target groups (Altum, 2022).

The pandemic became a threat and an enemy to every entrepreneur, each country had different rules, not all countries immediately introduced restrictions or some other rules that citizens had to take into account, but the viral disease spread very quickly and soon the first factors affecting business development were identified. According to Weaver (2020), Bacq and Lumpkin (2020), Bacq and others (2022), and Weller and Ran (2020), the main challenges that the social enterprises have to face currently are related to financing, balancing social and economic goals, organizational models, as well as to the institutional (governmental and non-governmental) collaboration.

Table 1. Statistical data on social enterprises and their financing

		Financing (thousand EUR)
SOCIAL ENTERPRISE STATUS		
Ministry of Welfare has granted the status of a social enterprise	227	-
Active social enterprises	**200**	
Canceled or revoked SE status	27	
SE status has not been granted (rejected) or the applicant has withdrawn the application	69	
ALTUM GRANTS		
Submitted grant applications to *Altum*	278	-
Altum grants awarded	162	10,043
Rejected grants or applicants have withdrawn their applications	102	-
Concluded grant agreements	157	9703
Carried out business projects	**81**	4807

Source: Ministry of Welfare (2022)

Despite the fact that the experience of the pandemic caused various emotional and physical trials for everyone, both in the professional and private spheres, it was the social entrepreneurs who were able to prove that they are able to change their daily habits, while at the same time continuing to fulfill their direct social purpose and choose. Social entrepreneurs were able to accept all the guidelines set by the new restrictions and willingly stepped in to help others in need (Coustic-Deal, 2022). As the pandemic spread around the world, countries and organizations created various guidelines on how to improve the situation and stop the spread. The first year of the pandemic created the greatest chaos and confusion in public life. Different scales of restrictions had to be adopted, which differed drastically between countries. The most drastic restrictions meant that the entire country's economy was stopped for an indefinite period, countless curfews during which no one was allowed to go outside the house without an acute need and more, countless measuring instruments restricted every inhabitant of the world and everyone's reaction was different.

The positive impact can be divided into 3 categories, evaluating personal, business and global benefits. Global benefits are primarily assessed as environmental health benefits. Personal benefits can be characterized as intentional and unintentional ones. Part of society was forced to learn new technical skills in order to adapt to the "new normal" rhythm of life. Teachers and lecturers taught their pupils and students in the e-environment, this was the only way to ensure the continuation of learning, avoiding direct contact as much as possible. Although such a learning process was burdensome, the availability of technology over time became an advantage, the part of society for which the new technologies and work style did not cause additional complications, chose to further improve their professional knowledge by raising their qualifications, as well as by changing profession branches, choosing another one which was relevant and continued to operate during the pandemic, while at the same time promotions were also received to reduce the number of employees.

According to the research "Innovation and resilience. A Global snapshot of social enterprise responses to Covid-19" (British Council, 2020), the main aspects to be stressed are the following: business operations shake-up (over 90 per cent of social enterprises are running quite different businesses to the ones they operated pre-crisis, and for almost half this change is significant and may be permanent); effect of Covid-19 restrictions on movement and well-being (although some of the business sectors, e.g., education demonstrate a sharp decrease in demand, others, e.g. health and social care organizations

experience the increase of demand); effect on staff (almost a third of social enterprises have had to lay off their employees); availability of government and non-government support (there is a high variability of the support programs depending on the location of the enterprise and overall economic well-being of the respective country; thus, the South East Asia and European enterprises report a higher level of support funds accessibility). The specific developmental trend to be mentioned regarding the Covid-19 situation is that many businesses have joined nonprofit organizations and governments in their socially oriented activities, that is, expanded into the social domain (Bao et al., 2020). Besides that, the pandemic situation stimulates thinking about social value creation and co-creation through innovation, digital transformation, leadership, and social inclusiveness (Ratten, 2020; Ratten, 2021; Silva et al., 2021; Zahra, 2021).

1.2. Research aim and objectives, research questions

The aim of the article is identify the impact factors of Covid-19 on social entrepreneurship in Latvia. To attain that the following objectives were set: (1) to analyze the theoretical basis of the social entrepreneurship and current research regarding Covid-19 influence factors; (2) to develop research methodology; (3) to carry out the empirical research and interpret results.

The research questions posed is the following:

RQ (1): What are the main challenges the social enterprises in Latvia face during the Covid-19?

RQ (2): What are positive and negative effects of Covid-19 on social entrepreneurship in Latvia?

RQ (3): What are the main Covid-19 impact factors in the field of social entrepreneurship in Latvia?

The author's assumptions were based on the analysis of literature on the development of social entrepreneurship and comparing financial data. It was suggested that the development of social entrepreneurship could be affected by: unstable business, environment, insufficiently available human resources, social division, and insufficient financial support for entrepreneurs and migration of residents to other countries.

2 Methods

In order to find out what are the impact factors of Covid-19 on social entrepreneurship in Latvia, a survey questionnaire - was developed. The questionnaire was distributed in the Internet environment by sending its active link to the participating organizations (listed in the register of social enterprises) by e-mail, as well as it was distributed via various social platforms. The survey period was from April 11 to April 25, 2022. The data to determine the sample size was obtained from the Central Statistical Office. According to the data of the Central Statistics Office, by 2021, 1,534,689 residents have reached the age of 18 (Central Statistics Bureau, 2022). Using the amount of data to calculate the sample, it was determined that with the reliability of 95%, at least 384 respondents had to be reached. The number of respondents was 424, so the reliability error was within the acceptable limits and the data could be evaluated as reliable.

The 5-point Likert scale questionnaire consisted of 4 sections, a total of 27 statements: section A – socio-demographic information about respondents; section B – questions to find out the public's knowledge about social entrepreneurship and its goals; section C - questions to find out what impact the pandemic had on society and business and the restrictions it created; section D - questions to find out which industries were affected positively and

negatively during the pandemic, as well as questions regarding the main challenges the social enterprises face during the pandemic situation.

The analysis to determine the internal consistency of questionnaire characteristics was performed. The Cronbach's Alpha (α) method was used as a reliability analysis model. Cronbach's alpha method is suitable for calculating studies that are composed of Likert scale responses. According to the reliability testing of the questionnaire by the Cronbach's alpha method, all blocks demonstrated a sufficient value, corresponding to the range between 0.7 $< α < 0.8$. Thus, it was not necessary to delete any of the statements, and questionnaire was admitted to be internally consistent.

After that the factor analysis in order to determine the impact of the pandemic on the social enterprises in Latvia and to identify the impact factors was performed using the SPSS program.

3 Results and Discussion

The questionnaire reached a total of 424 respondents, of whom 83% or 352 were women, and 17% or 72 were men. The authors believe that the reason for such division was the following: women usually pay more attention and willingly get involved in various studies and surveys. The age of the survey respondents fell into 4 categories: 18-25 years, represented by 51 respondents or 12%; 26-40 years, represented the largest number of respondents, 223 or 52.6%; 41-55 years, represented the second largest number of respondents, 120 or 28.3%; the number of respondents aged 55 or older was 30 or 7.1%.

Section B of the questionnaire contained statements regarding the goals of social entrepreneurship (the purpose of this section was to clarify general public's attitude towards social business). The of the respondents majority pointed out that social entrepreneurship was innovative as well as socially oriented, that the nature of social entrepreneurship had comprehensive goals, including both profit making and solving social problems. As for the number of social enterprises, 46.7% or 198 respondents gave a neutral answer to the statement that there were enough social enterprises in Latvia, which indicated that the public did not know how much of the business market was being occupied by social enterprises.

Section C was made up of 3 sub-sections - questions about the impact of the pandemic on society and on respondents' personal lives. According to the obtained data, regarding the impact of the pandemic on society, the opinion of the respondents can be obtained that the majority of respondents, 44.1% or 187, admitted that the pandemic affected the unemployment rate in the country, and also admitted that part of the society was forced to retrain in order to remain employed in the market. Likewise, 28.8% or 122 and 24.1% or 102 respondents admitted that society reduced its daily spending, directly under the influence of the pandemic. The authors concluded that there had had been several reasons for this, but mostly it was based on the widespread uncertainty of the situation and the unknown future, about what the pandemic could bring and what changes should be made. The respondents admitted that their daily spending and habits were affected, a total of 287 respondents or 67.6% stated that they rather agree and completely agree, while 40.6% or 172 respondents indicated that they did not agree with the statement that their employment was negatively affected. By comparing these figures, it can be concluded that habits and spending were reduced, not just due to loss of employment. Comparing all the data, it can be concluded that the pandemic has also made a positive contribution to the life of society and some people have received a promotion at work, it is possible that under the influence of the pandemic, knowledge and qualifications were improved, which could result in a promotion at work.

Section D of the questionnaire consisted of statements regarding the most affected industry sectors, both positively and negatively. Regarding the positive impact of Covid-19

the respondents especially emphasized the field of information technology sector, which was mentioned by 344 or 81.1% respondents. It should be mentioned that during the pandemic, it was the digital environment that was able to provide education and organize various events remotely giving the opportunity to socialize. Accordingly, the IT was the industry that developed various platforms and services. The second most nominated sector, positively affected, the Medicine/Health/Social care one, was mentioned by 170 or 40.1% of respondents. The Sales/Trade sector was mentioned as the third by 156 or 36.8% of respondents, since a variety of new internet sales sites were opened, new delivery services were introduced by retailers during Covid-19. At the same time, according to the respondents, the most adversely affected sectors are: the Tourism/Food/Hospitality - 397 or 93.6%; the Culture/Art/Entertainment - 378 or 89.2%; the Education/Science - 198 or 46.7%, and the Services ones - 169 or 39.9%.

The respondents were also asked to state the most pressing challenges posed by the pandemic for social entrepreneurs. Ensuring the remote work was raised as the biggest challenge, indicated by 266 or 62.7% of respondents. During the pandemic restrictions, a large number of companies were forced to accept this restriction in order to continue their economic activities. Such a work format certainly created various complications for many employees. 220 or 51.9% of respondents indicated that the second challenge was receiving a government support. The support mechanisms introduced by the government were slow to introduce and payments were delayed, making it impossible to plan for even near future. The pandemic shook the financial grounds of the companies, and their development also was slowed down. The next challenges met by the social enterprises were: ability to sell their idea 128 or 30.2%, ability to attract qualified employees 118 or 27.8%, ability to compete equally with other companies in a similar industry -117 or 27.8%. Providing remote work has created the greatest complications. The society was used to its work mode and rhythm, by moving all the devices necessary for work to the house, the society had to find an opportunity to set up a partial workplace in their homes, but not everyone was able to do it immediately. There was not enough technical equipment to be taken home by every employee. Also, employers and employees had to invest funds to create workplaces at home, in a successful case, both parties managed to agree on covering the costs of the workplace, but there were situations where it was not possible to find a compromise, which strained the situation accordingly.

In order to obtain the impact factors of the pandemic on the development of social entrepreneurship, the factor analysis was performed using the SPSS statistical program. Factor analysis was performed on the 27 most important factors, dividing them into 4 factor groups. The result obtained by KMO (*Kaiser-Meyer-Olkin*) and Bartlett's test was 0.849, which corresponded to the explanation that the appropriateness of the proposed factors was high. Analysing the obtained data, all the proposed factors exceed 0.5 or 50% of the variance model value. Most of the factors showed a sufficiently high loading criterion. 10 factors with the highest value loading are depicted in the Table 2.

Table 2. Covid-19 impact factor loading

Factors	Explanation	Factor loading
Personal involvement	The assertion that if there had been no pandemic, the respondents as a part of society would have started their own businesses	0.867
General involvement	The statement that respondents as a part of society could engage in social entrepreneurship	0.840
Business support	The claim that respondents as entrepreneurs would financially support social entrepreneurs	0.829
Mood	The claim that the pandemic caused an unpleasant change in the emotional mood of the public	0.829
Own business	The statement that the respondents plan to start their own business in the near future	0.817
General effects	The claim that the pandemic has affected every entrepreneur	0.800
Community involvement and benefit created	The statement that the purpose of social entrepreneurship is to maximally involve society and create some benefit for it	0.800
Socially oriented	The statement that society needs socially oriented companies and entrepreneurs	0.798
Chaos in business	The claim that the pandemic created a lot of chaos in business	0.793
Innovation	The claim that social entrepreneurship is creative and innovative	0.790

Source: Authors'

The authors divided the factor analysis data, which indicated the 10 most influential factors, into 2 categories, i.e., into factors affecting the development of the external and internal environment (see Table 3).

Table 3. External and internal influence factors

FACTORS OF EXTERNAL ENVIRONMENT INFLUENCE	FACTORS OF THE INTERNAL ENVIRONMENT INFLUENCE
General involvement	Personal involvement
Business support	Own business
Mood	
General impact	
Community involvement and benefit created	
Socially oriented	
Chaos in business	
Innovative	

Source: Authors'

By summarizing the factors according to the environment of their influence and comparing them with other data obtained in the study, factor categorization is carried out, it can be concluded that some of the 10 factors proposed exhibit a dual nature.

External environment factors. Support of entrepreneurs - every business sector solves its defined development goals by engaging in various cooperation projects, priorities are set for achieving goals, not all entrepreneurs choose to support other entrepreneurs, especially situations when there is no predictable profit, nor can it be determined whether the profit would be obtained at all. By choosing to invest only in stable projects and companies, many social enterprises, especially during the crisis, cannot fulfil their mission of social business. Such decisions are influenced by various factors of the external environment, based on society's recommendations, experience and circumstances. Mood, respondents put this impact factor as one of the leading ones, indicating that the overall mood in business during the pandemic has worsened. The disproportion of the different restrictions and the rapid changes in the daily rhythm have created an impact on the business - a chain reaction By summing up these factors, we can conclude that the pandemic affected every entrepreneur, the consequences were felt by the entire society, the strength of the impact on each part of the society was different, but they can be identified as external environmental impact factors.

Internal influence factors. The authors describe the influence of the internal environment as the personal involvement of society in various life situations and in the promotion of entrepreneurship. Analysing the answers given by the respondents, the absolute majority of them stated that the pandemic had no effect on their decision to start their own business, that it would be possible to do that under any circumstances. This factor indicates that it is essential for every future and existing entrepreneur to create a structured plan of action, on how to act or, on the contrary, how not to act, setting a period of time and proceeding accordingly.

External and internal influence factors. The authors identified 4 factors, which can be characterized as factors of external and internal environmental influence, indicating that the involvement of society and the benefit created are promoted both by society and individuals choosing to promote the common good, guided by their personal goals, and by joining several like-minded people. Both external and internal environmental factors have influenced their point of view and goals set, and choice to solve a social problem that could not be solved in another way by founding a social enterprise. This is of a special importance in the situation of Covid-19 pandemic. Innovations in social entrepreneurship are created and proposed due to the absence of certain products and services, or an insufficient segment of the offered products.

4 Conclusions

The purpose of the current research was to determine the main factors that have an impact on the social entrepreneurship in Latvia during the Covid – 19 pandemic. The research consisted of both theoretical and empirical investigation. The main methods used were the survey using 5-point Likert-scale questionnaire divided into four sections and according subsections. The data was processed by SPSS program, and the factor analysis was performed in order to determine the most important factors – both related to the external and the internal environment. Three research questions were put forward. The answers to them are as follows. RQ1. The main challenges faced by the social enterprises during the Covid-19 crisis are: ensuring the remote working, receiving government support, and attraction of financing, following by ability to sell, attraction of skilled employees and competitiveness.

RQ2. The positively affected sectors during the pandemic are: internet technologies, medicine and health, as well as sales due to the innovative solutions of problems. The most negatively affected sectors are tourism and hospitality, art and entertainment, education.

RQ3. The main Covid-19 impact factors with a high value loading were the following: personal involvement; general involvement; business support; mood; own business; general effects; community involvement and benefit created; socially oriented; chaos in business, and innovation.

The direction of the future research: the follow-up survey, tracking the changes in the post-Covid-19 situation.

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Comparison of marketing strategy elements before and during the COVID-19 pandemic of an international brand

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Abstract

Research background: Through the research, we identify the international elements of marketing strategy implementation in the market environment of an international brand and its impact on the market position during the Covid-19 pandemic. In the article, we also identify the impact of the current marketing strategy on the purchasing behavior and decision-making of consumers.

Purpose of the article: In the article, we will analyze a company that operates in the field of sales of various sweet products. We identify the penetrations and differences of the application of new trends in the implementation of the marketing strategy in the market environment. We analyze the market parameters, the segmentation structure and define the basis for identifying the marketing strategy. Through research, we identify elements of sustainability in a demanding market environment and describe the strategic outputs.

Methods: To assess the theoretical assumptions of the marketing strategy, we used the methods of analysis, synthesis, comparison and generalization. By comparison, we will compare economic indicators and market quantities. We identify the differences between individual brands in relation to the creation of a marketing strategy. In the discussion section, we compare the results and identify new trends in the application of marketing strategy in a changing market environment.

Findings & Value added: We identify changes and new trends in the application of marketing strategy before and during the Covid-19 pandemic. We will find out what changes occurred when applying elements of the marketing strategy and how customer behavior has changed.

Keywords: *international marketing strategy, consumer behavior, global brand, competitor*

JEL Classification: *M32; M37*

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1 Introduction and methodology

The current market environment is very dynamic and differential for business entities. Businesses must constantly adapt to changing market conditions and current trends. The pandemic caused by COVID-19 has identified ways in which businesses can proceed to change their marketing strategy. According to the authors Nikbin et al. (2021) claim that one of the main changes in the business environment and customer behavior is COVID-19. According to the authors, it is important for businesses to strengthen their marketing strategy. Gavurova et al. (2018) also agree with the stated statement. Therefore, it is important to perceive marketing as a part of the existence of the company in the market environment. The importance of marketing in the market environment was also confirmed by the authors Scott et al. (2020). The authors stated that marketing should currently be viewed as an innovative approach not only in relation to the external but also the internal environment. So we can say that marketing is an important component of the functioning of the company as a whole. In a differential market environment, it is important to compare different information obtained about products, market variables, customers, competition, and the like. The authors Worimegbe et al. (2020) stated that all data on customers, market variables and other indicators are necessary for various strategic analyses. Based on the correct data, it is possible to identify the determinants of the marketing strategy.

Part of our article is to specify the elements of the marketing strategy of the international Nestle brand operating in the market segment of sweet products. In the article, we will compare Nestlé's performance from a marketing point of view in its most important marketing strategy indicators. The priority in solving the problem is the disclosure of weak and strong points, market variables, information about customers and competitors. Based on the given data, we will carry out strategic analyses with definitions of the marketing strategy in the current global market environment. Individual circuits will be processed systematically in such a way that they follow each other and thus create a logical connection in relation to the investigation in question. In the discussion part of the article, we will summarize the analysed data that will determine the independent position of Nestlé and its marketing strategy in the market environment during the COVID-19 pandemic.

In defining the current state of Nestlé's marketing strategy, we used the methods of analysis, synthesis, comparison and generalization. We used the mentioned methods in defining the current market position of Nestlé. We compared the economic indicators and profitability of the company over a certain period of time. We identified the differences between the brands in relation to the creation of the company's marketing strategy, which we compared in the discussion section.

2 The current position of the Nestle brand in the changing market environment

Nestlé is currently a producer of more than 2,000 brands in 187 countries with a differentiated assortment for children, bottled water and beverages, cereals, coffee, confectionery, dairy products, ice cream, sports and healthy nutrition, spices, frozen and chilled foods, but also pet food. In the category of sweet products, the company produces Jojo, Lentilky, Bon Pari, but also brands such as Orion, Kit-Kat, Zora, Milena, Kofila, Lion and many others. (Nestlé company report, 2015).

The current market environment is very dynamic and the rapidly changing mission of Nestlé is categorized into three basic areas. These areas are families, individuals and the planet. Based on its own values, the company tries to promote the improvement of the quality of life, to contribute to a healthier future for individuals, the planet and families. It tries to

provide consumers with the best taste, quality drinks and food with high nutritional values. Nowadays, the company pays more attention to customers, has an understanding for them, asks them various questions in order to perfectly understand their needs and requirements (Mission and Vision company, 2020). In this context, the authors Nippa and Reuer (2019) also commented, who claim that the current complex trend is to understand the purchasing behavior of customers. Nestlé strives to continuously improve its products in order to achieve a certain level of customer satisfaction, which can only be achieved if the company understands not only its employees, but also its customers. It is with the use of the best procedures, processes and with the use of the maximum potential of its own brands that it can provide customers with reliable and fast services that satisfy their needs at a higher level. (Mission and Vision company, 2020)

In connection with the mission, it is also necessary to define the current vision of the company. The company's vision is aimed at strengthening the market potential in the segment of food products with an emphasis on current trends in purchasing behavior. In this context, it is necessary to identify the scientific need for investments in research and development. The company invests an average of 1.7 billion Swiss francs in research and development in its food segment every year (Nestle Mission and Its Vision Statement analysis, 2021). According to internal documents, Nestlé has set a vision for 2050, the goal of which is to achieve zero emissions. In this way, the company wants to fight against climate change. In order to fulfill this vision, the company established the Packaging Development Institute in 2019, the aim of which is to ensure that product packaging is 100% recyclable, usable and compostable. (Mission and Vision company, 2020)

Understanding the behavior of its customers is part of Nestlé's core values. From a psychological point of view, the company tries to adapt as much as possible to the needs and trends of customers. In this context, the company set two long-term goals in 2020, which it plans to achieve by 2025. The first goal is aimed at supporting online sales. This means that from the current 13% market share in online sales, the company wants to achieve a 25% share in the online sales market segment by 2025. The second goal is to increase investments in research and development by 195 million from the current 205 million € to a minimum value of 400 million € by 2025 (Meier, Borliny, 2020). In this way, the company tries to adapt to current trends, values and needs of market segments.

Based on the defined data on the mission and vision of the brand, it can be argued that Nestlé's vision is to strengthen market growth in the form of a stronger competitive position in the field of current trends in purchasing behavior such as healthy nutrition and bio-waste recycling. That is why we can also identify honesty, understanding of customers' purchasing behavior and integrity among the core values of Nestle.

2.1 Economics indicators of Nestle

As part of the economic indicators, we will evaluate the total sales of the company, the prices of various products and the value of shares. Nestlé's total sales for 2021 increased by 3.3% compared to 2020, to the value of 87.1 billion Swiss francs, which translates to approximately €86.6 billion. The basic operating profit margin reached 17.4% in 2021. Cash-flow decreased by 14.9% compared to 2021, to 8.7 billion Swiss francs, which was mainly reflected in higher capital expenditures. In the case of the company's shareholders, the value of the shares in 2021 reached a value of approximately 13.9 billion Swiss francs. Nestlé's profit in 2021 increased by 38.2% compared to the previous year, amounting to 16.9 billion Swiss francs. Online sales revenue grew by approximately 15.1% in 2021 compared to 2020. In 2022, Nestlé expects sales to increase by at least 5% and core business profit margin to grow to between 17% and 17.5%.

Product prices rose by around 2% in 2021, peaking at 3.1% in the fourth quarter to offset significant cost inflation caused by the COVID-19 pandemic. The company's organic growth reached 7.2% in developed markets, the highest level in more than 10 years. By organic growth we understand the situation when the company grows only thanks to its own resources, recruitment of employees and thanks to its own profits. According to individual products, the highest contributors to organic growth were coffee brands Nescafé and Nespresso. PurinaPet Care products also recorded double-digit growth. Sales of vegetarian and plant-based foods also grew at a double-digit rate, reaching approximately 800 million Swiss francs. Sales of sweet products grew at a high single-digit rate. Of the sweet products, Kit-Kat brand products had an exponential growth. The demand for infant formula decreased, which was probably also caused by the lower birth rate compared to previous years. In total, Nestlé sold approximately 63,294,000 products in 2021, an increase of more than 1,300,000 products compared to 2020. In percentage terms, it is possible to identify an increase compared to 2020 by an average of 2.09%. Despite the ongoing Covid-19 pandemic, it is possible to identify a slight increase in Nestlé's sales indicators. (Meier, Borliny, 2020)

Distribution costs fell more significantly in 2021, which was mainly contributed by the sale of Nestlé Water brands in North America. At the same time, the company's marketing and administrative costs were also reduced. The costs associated with the restructuring of the company increased to the level of 3 billion Swiss francs. However, net financial costs remained unchanged at 873 million Swiss francs. (Meier, Borliny, 2020).

2.2 Demographic and geographic segmentation of Nestle

Through continuous market analysis, Nestlé strives to understand customer behavior, thereby asserting its competitive advantages. The company currently has a strong network of resources through which it monitors individual operations and integrates them with each other. The integration of the company's resources makes it possible to control the efficiency of the supply chain and thereby strengthen its market presence. The strengthening of the market position is also made possible by economies of scale, which are achieved by the extensive distribution network and the consolidation of resources (Huang, 2018).

From the point of view of the analysis of the Nestlé company's market values, we will follow the demographic and geographical segmentation. As part of demographic segmentation, the Nestlé company approaches defining its primary market segment based on gender and age. Corelac products are intended for children older than two months, Lactogen 1 to 3 for children from six months to one year, and Nido products are suitable for children older than two years. Other brands such as Kit-Kat or Jojo are primarily aimed at the 10-18 age group. Brands from the coffee product segment such as Nescafé or Nespresso are primarily aimed at customers aged 20-40. These products are part of every customer's everyday life. The company claims that some products are also an important part of the job performance. For example, Nescafé and Nespresso products also target working people with their promotion. Through promotion, the company claims that they cannot imagine their day at work without a cup of coffee. An important focus of the Nestlé company is the categorization of demographic segmentation according to the income group of the population. The company claims that even people with a lower salary and a limited budget can afford to buy different categories of products. (Malipatil, 2020).

Geographical segmentation is extremely important for Nestlé and essential for the implementation of communication campaigns. In various geographical areas, the Nestlé company implements communication campaigns with the aim of adapting to the customer segment as effectively as possible. Individual communication campaigns are differentiated according to region so that the company also satisfies the specific needs, trends and wishes

of its customers. Based on the financial statements of the company, it is possible to identify that, for example, sales of Nescafé products are higher in winter compared to summer. The company adapted its production to the aforementioned finding. In the winter, it specializes more in the production of Nescafé Classic products, and in the summer, the production of Nescafé Ice. The categorization of the production plan is based on customer demand and geographic segmentation. Figure 1 shows an overview of Nestlé's sales in individual regions. (Global sales share of the Nestlé Group, Statista, 2021)
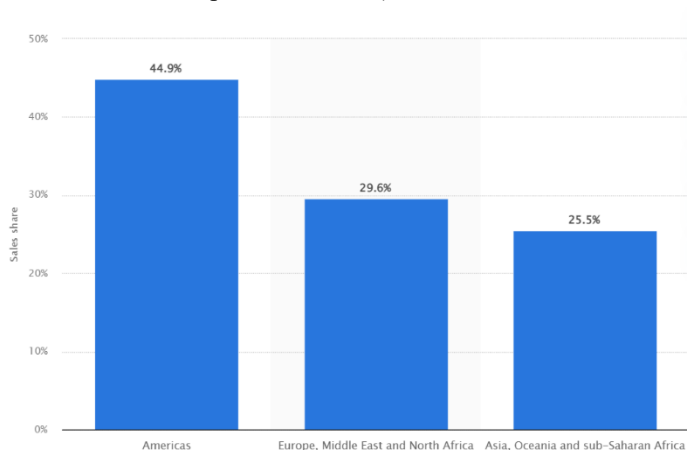

Figure 1. Nestle Group's global sales share by region in 2021

Source: Statista (2021)

The figure shows the global sales share of Nestlé for 2021. Based on geographic segmentation, the best-performing market for Nestlé in 2021 was the US market. In this market, according to Figure 1, the company achieved a 44.9% market share of sales, which translates to 26 billion Swiss francs. Converted to euros, it is a value of 25.2 billion euros. Less than a quarter of the global sales share for the Nestlé company was the Eastern market, where the share reached an average value of 25.5%. The European market and the North African market were also important markets for the Nestlé company, whose global share of product sales reached a value of 29.6% (Global sales share of the Nestlé Group, Statista, 2021). Based on the data from the figure, it is possible to identify that the most important market for Nestlé in 2021 was the US market and the European market. In the mentioned markets, the company highly categorizes individual product lines, tries to understand customer behavior and adjust the suitability of products accordingly.

2.3 Analysis of selected market variables of Nestle

As part of the analysis of selected market variables, we will assess the market capacity, market share and market growth rate.

In 2021, the company achieved sales in the segment of chocolate products of approximately 5.72 billion Swiss francs, which translates to approximately €5.59 billion. In 2021, the total sales of Nestlé's sweet products reached approximately 7.5 billion Swiss francs, which translates to approximately €7.33 billion. Between 2013 and 2020, a permanent decrease in the total sales of the segment of sweet products of Nestlé was recorded. This decrease is also shown in the following figure 2. (Sales of Nestlé's confectionery sector worldwide from 2010 to 2021, by segment, Statista 2022)
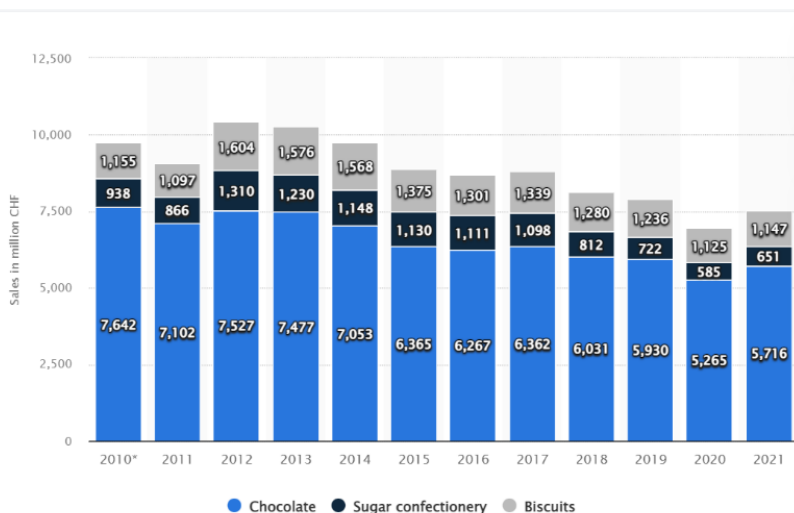
Figure 2. Share of sales of Nestlé's sweet products worldwide from 10 years

Source: Statista (2022)

The mentioned decrease, which was recorded in the years 2013-2020, was caused by a change in customer purchasing behavior. This behavior was more oriented towards healthier products, less caloric products and mainly towards the support of long-term environmental sustainability (Statista, 2022). The figure shows that in 2021 there was a growth in sales of sweet products due to investment in research and development and a better understanding of customer buying behavior, which we defined at the beginning of chapter 1.

As mentioned in the previous chapters, Nestlé is the largest global company in the field of fast-moving consumer goods. Net sales reached more than 93 billion US dollars in 2021, which translates to €87.88 billion. From the global geographic segmentation, it is possible to claim that Nestlé operates in various consumer markets. The company's global market share in 2021 reached 44.7%, which, compared to the largest competitors, is a significant indicator of a successful global company in the segment of sweet products (Nestle company, 2022).

Based on the company's internal analyses, it was defined in 2021 that the company expects organic sales growth in the range of 6-7% over the next five years. In 2021, the company's trading profit margin reached approximately 17.5%. The indicated value also includes the prediction of an average inflation value of 3% on global markets. During the nine months of 2021, the business posted sales of 63.29 billion Swiss francs, up 2.2% from the 61.91 billion Swiss francs achieved during the same period in 2020. The company's 2022 forecast expects the pace growth will decrease due to high inflation caused by the recovery of the economy after the Covid-19 pandemic. In this period, the company expects an increase in the average price of products by 8.2%, which may also be related to the expected increase in sales by an average of 2.2% based on the evaluated same period of 2021 and 2020. (Gelski, 2021)

3 Results of Nestlé's customer segmentation

Based on the analysis in the previous chapters, we proceeded to define market segmentation. When segmenting customers, we will consider the product range of sweet products.

Specifically, within the segmentation, we will define the Kit-Kat product, whose sales in 2020 and 2021 recorded exponential growth on the American and European markets.

From the point of view of promotion, the Kit-Kat brand is aimed at children and youth in the age range of 12-25 years. From the point of view of segmentation, however, the primary segment is women and men aged 30-40 who are parents and buy Kit-kat products for their children (UKEssays, 2021). We can characterize this customer segment as workers who not only buy a chocolate bar for their children, but also to satisfy their basic needs. The primary segment accounts for 53% of the total share of total customer segmentation. (Lumineau et. al, 2021)

The secondary segment of this brand is young people aged 15-28 who like the taste of chocolate. From a psychological point of view, these are customers who buy the brand as part of their normal life (for example, they are out with their friends, during breaks, they go to the mountains with their friends, etc.). The Kit-Kat brand is able to adapt to current trends with its marketing promotion because the brand's marketing strategy is mainly based on fun and playful advertisements, the aim of which is to promote the emotion of humor. It has a modern character and is aimed at a consumer segment that loves chocolate and can buy it for itself (UKEssays, 2021). Of the total share, the secondary customer segment makes up 40% of the total segmentation. Customers on this brand prefer to associate it with "breaks" through the slogan "Have a break, have a KitKat". Low prices, constant over the past 100 years, allow Kit-Kat to target the mass consumer market. (Lumineau et. al, 2021)

The tertiary segment is consumers aged 50-60 who buy the Kit-Kat brand in minimal quantities. This purchasing behavior is characterized by the fact that the tertiary segment prefers other standard brands that they know and believe to be reliable (UKEssays, 2021). From the point of view of their shopping behavior according to Musova et al. (2021) and Hanssens et al. (2016) customers belonging to generation X prefer standard products that they are used to. On the basis of the above, we can claim that these customers do not like to try new products and therefore the share of sales in the overall segment is only 7% in this segmentation category.

At the end of the analysis of the segmentation structure of the Kit-Kat product, we can say that customers who are loyal to this brand prefer a calm and modern lifestyle. They like to enjoy their days with their family or friends, for example, watching TV, hiking together, playing games, etc. They respect their family customs and traditions. On the contrary, customers focused on this segment of chocolate do not like sports, social events and various stressful news (Wickert, 2022).

4 Discussion

Based on the results of the analysis, we can state that we managed to confirm the analyzed information. As a result, we came to the conclusion that Nestlé should invest in its development. Investments should be primarily oriented towards satisfying current customer preferences with the aim of deepening not only the product portfolio, but also related aspects such as quality, distribution or technological requirements. From the point of view of a strong competitive position and attractiveness of the market, the company is an example of a successful global brand that has made its mark even during the Covid-19 pandemic. After a detailed analysis, we found that the company must invest in research and development, which should consider the current trends from the point of view of the preferred healthy lifestyle, which affects many customers (Macrotrends, 2022). In our opinion, if the company focused on the replacement of high-calorie raw materials in the production of products, its success in the market environment would be more significant, which would also gain the company

additional potential customers and thus expand the segmentation structure by new customers (Vandenbosch, et al, 2022).

A thorough customer segmentation structure, high product quality and global scope are factors that condition the elements of applying a successful marketing strategy. An extensive product portfolio can be considered an important part of a company's marketing strategy, with which the company tries to reach the mass segment. However, it differentiates the elements of communication policy in detail. In general, we can therefore claim that the basic element of the success of the marketing strategy is to understand the needs and requirements of the customer. This opinion is also shared by Aguinis and Gabriel (2021) et al. In addition to customer preferences and needs, another important element of marketing strategy is the brand itself. From the point of view of Nestlé, the brand can be classified as global and successful.

As it was already mentioned in the analytical part of the article, the company Nestlé places great emphasis on communication with customers in the form of various advertising campaigns, consumer contests, interesting videos and social networks. The differential focus of the communication policy is another element of the success of the global marketing strategy. Authors Ferencakova et al. (2020) and Feng and Whitler (2018) emphasize that an important element of the marketing strategy is also the differential elements of the applied pricing policy in relation to customers. From the point of view of the Nestlé company, the pricing policy is determined in such a way that the company's products can be purchased by customers of any age and social category. From the above, we can claim that the affordability of products from a global perspective is at an excellent level. The stated assumption fulfils another element of the success of the application of the global marketing strategy (R&D organization Nestlé, 2021).

5 Conclusion

Based on the analysed data, we found that Nestlé had a stable global market position even during the Covid-19 pandemic. This is evidenced not only by the wide range of products offered according to different categories, but also by their quality, price and geographic availability and consumer interest. The individual products offered by the company correspond to the basic corporate values. The Kit-Kat product, which we analysed in more detail with regard to the customer segment, is also proof.

Acknowledgements

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The performance of cryptocurrencies and their ability to influence the risk-return structure of investment portfolios

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Abstract

Research background: The power and dynamics of the factors influencing socio-economic structures cause a fundamental change in risk evaluations and economic mechanisms. The introduction of blockchain technology marks the next evolutionary stage in socio-economic structures after the steam engine's invention and the internet's invention. It provides a decentralized infrastructure, which empowers the collective and disempowers the individual. Risk and return anticipation on investments, on spending, or just on specific strategic management, become redefined.

Purpose of the article: This research aims to examine the extent to which cryptocurrencies can influence the risk-return profile of investment portfolios.

Methods: Through a self-created database, chosen cryptocurrencies out of the TOP 200 cryptocurrencies are added to classic index portfolios. These mixed asset portfolios are tested in terms of their risk-return structure from January 1, 2016, to November 30th, 2021. Based on the calculation of selected minimum variance portfolios, a detailed analysis of the volatility structure and systematics through the inclusion of cryptocurrencies in differently created portfolios is conducted. The risk-return constellation of the individual portfolios is statistically determined using a paired-sample t-test of moving 30-day returns and moving 30-day volatilities.

Findings & Value added: In general, the returns of portfolios with a weight in cryptocurrencies outperform the main indices. However, the results are not statistically significant for the mixed-asset portfolios. On the contrary, the paired-sample t-test for the difference in volatility of portfolios including cryptocurrencies shows a statistically significant result. Generally, adding cryptocurrencies to a portfolio increases the volatility and, consequently, the risk of the investment.

Keywords: *Portfolio management; portfolio risk; portfolio return; crypto assets*

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1 Introduction

The introduction of blockchain technology marks the next evolutionary stage in socio-economic structures after the invention of the steam engine and the invention of the Internet. It provides a decentralized infrastructure, which empowers the collective and disempowers the individual. Risk and return anticipation on investments, on spending, or just on specific strategic management become redefined by taking away individual institutions and organizations that were in control of transactions or had the power to force a specific outcome. Currencies, such as Bitcoin and Ethereum, though extremely volatile, show great potential to reshape the financial service industry while leaving banks and other institutions out. Until today, there has been no sustainable disruption in the banking system. In the context of the recent failure of Wirecard AG, trust and confidence in online applications and newly forming innovations seem to be disrupted. None of the developments of the past were able to substantially reduce cost or risk in banking. Consequently, investors increasingly invest in new asset classes to create new portfolio structures concerning the anticipated risk and return constellations. It is therefore conceivable that, given the modern portfolio theory and the work of Harry Markowitz, an optimization of the position of the efficiency curve is possible. The present article first deals with the reviewed literature and the used methodology. After that, the selection of data and portfolio composition is described ending with the risk/return constellation of the individual portfolios being statistically determined by employing a two-sample t-test of the returns and volatilities, always in comparison with the portfolios defined as a reference. The following hypotheses are tested based on the research questions:

Research Question 1: Do the mixed portfolios generate higher returns than the reference portfolios?

$H0_1$: The return of the mixed portfolio is not different from the return of the reference portfolio.

Research Question 2: Do the mixed portfolios generate lower volatility than the reference portfolios?

$H0_2$: The volatility of the mixed portfolio is not different from the volatility of the reference portfolio.

1.1 Literature Review

The following review of the literature is partially based on the contributions of Bianchi (2017) and Ankenbrand and Bieri (2018). In the field of blockchain and cryptocurrencies, the understanding of the white paper of Nakamoto (2008) is crucial. In 2008, it was the first scientific paper regarding a decentralized ledger system based on blockchain technology. It was published because of the economic situation present at the time when the banking crisis was responsible for significant distrust in the sector. Nakamoto, a pseudonym for the group of programmers who invented blockchain technology, saw the need for an improved payment and banking system without having to trust an independent third party. Using the blockchain method, the traditional centralized data and information storing system began rethinking. Buterin (2015) further developed blockchain algorithms by setting regulations and adding abilities such as smart contracts. In his publications, he stresses the potential of blockchain technology when it is implemented into many applications in the real world where no intermediary, who is not adding any specific value to a transaction, is needed. Cryptocurrencies are nowadays not only used in e-commerce, but also in our daily lives. Hileman and Rauchs (2017) give a general overview of the cryptocurrency industry. Their

study is based on a survey among nearly 150 cryptocurrency companies and individuals to systematically analyze the four key sectors in the cryptocurrency industry. Furthermore, it sheds light on the numbers of companies, employees, end-users, etc. in the individual sectors, without investigating the cryptocurrency market from an investor's point of view. When trying to apply Markowitz's portfolio theory to portfolios (1952) including cryptocurrencies, the modern development of the theory must be taken into account. Diversifying a portfolio into such different asset classes, where the correlation of movements is in the same direction, rather than in opposite directions, leads to a differentiated market portfolio view. To evaluate the risk and return structure of portfolios including cryptocurrency, the risk structure of such currencies has to be analyzed. Some of the existing studies in economics related to Bitcoin and cryptocurrencies are mostly focused on operational features of cryptocurrencies, such as the likelihood of exchanges default (e.g. Moore and Christin, 2013), the possibility of mining manipulation, and illegal uses of bitcoins (e.g. Eyal and Sirer, 2014 and Foley, Karlsen, and Putnins, 2018), the reconstruction of transaction networks, (e.g. Kondor et. al. 2014), the efficiency of a decentralized public ledger for conducting financial transactions (e.g. Evans, 2014 and Dwyer, 2015), and the implications for central banks and monetary policy (e.g., Bordo and Levin, 2017). However, Melki and Nefzi (2022) recently found that certain cryptocurrencies, depending on the market, can act as safe-haven assets. Bakry et al. (2021) and Akhtaruzzaman et al. (2020) found that Bitcoin works as a portfolio diversifier. Ma et al. (2020) conducted similar research and concluded that Ethereum provides better diversification opportunities than Bitcoin. Damianov and Elsayed (2020) concluded that Bitcoin is a relatively isolated asset from traditional industries and thus has some diversification benefits. Though, the high volatility of Bitcoin often counterbalances the benefits of the asset according to them. However, only little has been published about the risk and return structure of cryptocurrency-containing portfolios. Platanakis and Urquhart (2020) suggest that Bitcoin could be included in portfolios as it generates substantially higher risk-adjusted returns. This paper intends to contribute to the literature in terms of the validation of the risk reduction of portfolios through adding cryptocurrencies.

2 Methodology

To test the given hypothesis, first, portfolios with different asset classes are prepared. Two-asset portfolios are formed by combining the returns and volatilities with different periods of the individual asset classes in a portfolio using the following formulas:

$$\sigma_{PF}^2 = x_A^2 \sigma_A^2 + x_B^2 \sigma_B^2 + 2x_A x_B \sigma_A \sigma_B p_{A,B} \qquad (1)$$

Where:
PF Portfolio
A Asset class A
B Asset class B
σ Standard deviation of the returns of the respective asset classes
X Respective weighting of the asset class in the portfolio
ρ Correlation of the returns of the asset classes in the portfolio

$$\Gamma_{PF} = x_A r_A + x_B r_B + x_n r_n \qquad (2)$$

Where:
PF Portfolio
r Return of asset

A   Asset class A
B   Asset class B
X   Respective weighting of the asset class in the portfolio

In the case of a two-asset portfolio, the variance is calculated as follows:

$$VaR_p = \sqrt{VaR_A{}^2 + VaR_B{}^2 + 2 \cdot VaR_A \cdot VaR_B \cdot k_{A,B}} \tag{3}$$

In the case of more stock portfolios, later mentioned as all-asset portfolios the following formula is used:

$$VaR_p = \sqrt{\sum_{i=1}^{n} x_i^2\, \sigma_i^2 + 2 \cdot \sum_{i=1}^{n}\sum_{j<1}^{n} x_i \cdot x_j \cdot \sigma_{i,j}} \tag{4}$$

$$VaR_p = \sqrt{[x_A, x_B, \ldots, x_n] \cdot \begin{bmatrix} \sigma_A^2 & cov_{A,B} & \cdots & cov_{A,n} \\ \vdots & cov_{n,B} & \cdots & \sigma_n^2 \\ cov_{A,B} & & & \end{bmatrix} \cdot \begin{bmatrix} x_A \\ \vdots \\ x_B \end{bmatrix}} \tag{5}$$

The returns of the different asset classes are calculated daily with the logarithm function.

$$r_{i,t} = \ln\frac{K_{i,t}}{K_{i,t-1}} \tag{6}$$

Where:

$r_{i,t}$ Discrete return of security i at time t
$K_{i,t}$ Price of security i at time t
$K_{i,t-1}$ Price of security i at time t-1

The determination of the actual returns can be evaluated on a daily, weekly, or monthly basis. While older studies more frequently used monthly data, more recent studies tend to use daily data points. Consequently, this study uses daily data to calculate the respective returns through the logarithmic function. The datasets are set up for every day and year individually – resulting in the calculation of the variance, as well as the volatility for every respective period. The root of the variance corresponds to volatility, which represents portfolio or investment risk. Statistically, volatility is a measure of the dispersion of returns for a given security or market index. To calculate and identify the minimum variance portfolio of the combination of the two asset classes, the individual asset classes are weighted. The weighting of the individual asset classes is done in 1% steps, in which one is initially set to 100% weight in the portfolio and is then reduced to 0% in 1% steps. The second asset class in the portfolio gradually increases in 1% steps. At first, bigger intervals, for example, 5% steps, were tested, however, the results showed mostly unusable values since most of the time 100% weight was in the non-crypto asset. Smaller than 1% steps did not add value to the results, since only incremental changes were recorded. Per calculation, the minimum variance portfolio is at 93% S&P 500 COMPOSITE and 7% Bitcoin weighting. This weighted portfolio has a return of 0.14294 and volatility of 0.12551. In this study over 90 combined portfolios for the chosen indices and cryptocurrencies with a period of 2016 until 2021 are tested and evaluated every year. The results showed for 50 portfolios a 100% weight in the non-crypto asset. Those portfolios, that have no admixture of crypto stocks, are eliminated. The remaining 40 portfolios are further statistically analyzed for a significant influence on the risk-return correlation. To further examine the influence of the addition of cryptocurrencies to portfolios regarding the risk-return correlation, an average weight for the entire period is determined for cases in which the addition of a cryptocurrency led to the minimum variance portfolio. Consequently, 15 newly created portfolios are built, with an average weight assumption over

the period 2016 until 2021 (Table 1). For every single portfolio composition, the daily returns are calculated with the continuous return function.

Table 1. Average weight cryptocurrency portfolios 2016-2021.

	Weight Asset I	Weight Asset II
STOXX EUROPE 600 & Bitcoin 2016-2021	94.33%	5.67%
DAX PERFORMANCE & Bitcoin 2016-2021	94.80%	5.20%
MSCI WORLD U$ & Bitcoin 2016-2021	96.67%	3.33%
CDAX GENERAL'PERF' INDEX & Bitcoin2016-2021	95.60%	4.40%
S&P 500 COMPOSITE & Bitcoin 2016-2021	95.75%	4.25%
DAX PERFORMANCE & Ethereum 2016-2021	97.50%	2.50%
CDAX GENERAL'PERF' INDEX INDEX & Ethereum 2016-2021	98.00%	2.00%
MSCI WORLD U$ & Ethereum 2016-2021	99.00%	1.00%
S&P 500 COMPOSITE & Ethereum 2016-2021	98.50%	1.50%
STOXX EUROPE 600 & Ethereum 2016-2021	98.00%	2.00%
S&P 500 COMPOSITE & Stellar 2016-2021	98.50%	1.50%
MSCI WORLD U$ & Stellar 2016-2021	98.50%	1.50%
DAX PERFORMANCE & Stellar 2016-21	97.50%	2.50%
CDAX GENERAL'PERF' INDEX & Stellar 2016-2021	98.00%	2.00%
STOXX EUROPE 600 & Stellar 2016-2021	98.50%	1.50%

Source: Own (2022)

The MSCI World index as one of the most relevant international indices is chosen as the reference or benchmark portfolio. The respective daily and yearly returns, as well as the daily and yearly volatilities, are calculated for the benchmark portfolio to compare the respective results of the created and weighted two-asset cryptocurrency portfolios. To further differentiate the results and increase the sample size N with regards to the periods, a moving 30-day average return and volatility for the 15 built-up portfolios as well as the benchmark portfolio is calculated. This includes 2,131 moving volatility values per single portfolio increasing the sample size extensively. The methodology of the all-asset portfolio is analogous to the methodology of the two-asset portfolio.

2.1 Data preparation

For every index, stock as well as cryptocurrency, data points for every single day as of January 1st, 2016, are derived and put together on a timeline. Due to the long period of observation and the high number of assets compared, about 35,000 single data points are included in the complete study. Since cryptocurrencies are traded 24/7 all over the world, whereas stock values and indices have trading gaps due to weekends and holidays, both data time series must be adjusted to each other. In this work, the adjustment is done by adding the missing prices for such days – weekends, holidays, and no-trading days – to the time series of the indices. This is done by continuing the last known price value until a new day's end value is recorded.

3 Results

The first SPSS analysis is made by comparing the 30-day moving cumulative return and 30-day moving volatility calculations of the two asset portfolios that show weight in a

cryptocurrency to the returns of the benchmark portfolio. The second stage of the SPSS analysis involves a paired-sample t-test with paired variables. Variable I is stated as the cryptocurrency portfolio return and the cryptocurrency portfolio volatility while variable II is stated as the benchmark portfolio return and the benchmark portfolio volatility. The correlation of the 30-day moving returns is in general high during the compared periods and can be stated as statistically significant. The movement of the variables follows in the same direction as the respective systematics. However, the STOXX Europe 600 & Bitcoin 30-day moving returns show a rather lower correlation. In this specific case, the correlation factor lies in 10 out of 15 cases below the value of 0.5.

For the paired differences calculations, the cryptocurrency portfolio's 30-day moving returns are subtracted from the 30-day moving benchmark portfolio returns. The calculations show that the addition of cryptocurrencies increases the average return by 2.396% (Pair 1 calculation MSCI World vs. STOXX Europe 600 & Bitcoin). Considering all compared pairs, the cryptocurrency portfolios outperform the benchmark portfolio on average by 0.234% with 7 out of 15 results showing higher returns than the benchmark portfolio. The highest difference is observed through the addition of Bitcoin to the portfolio with an average increase of 1.276%. It can also be stated that all results except for pair 2 are statistically significant. The $H0_1$ hypothesis therefore must be rejected, since the 30-day moving returns show higher returns with statistical significance than the 30-day benchmark portfolio. The correlation of the 30-day moving volatilities is in general high during the compared periods and can be stated as statistically significant. The movement of the variables follows in the same direction as the respective systematics. However, as the return analysis already indicates, the STOXX Europe 600 & Bitcoin portfolio shows a rather low correlation when compared to the other portfolios. The correlation factor lies in 12 out of 15 cases below the value of 0.5. For the paired differences calculations, the cryptocurrency 30-day moving portfolio volatilities are subtracted from the 30-day moving benchmark portfolio volatilities. The calculations show that the addition of cryptocurrencies increases the volatility with a spread of 7.882% (Pair 1 calculation MSCI World vs. STOXX Europe 600 & Bitcoin). Considering all compared pairs, the benchmark portfolios outperform the cryptocurrency portfolios in terms of their volatility on average by a spread of 1.604% with 14 out of 15 results showing higher volatilities. The highest difference is observed through the addition of Bitcoin to a portfolio. It can also be stated that all results are statistically significant. Consequently, the $H0_2$ hypothesis must be rejected. The analyzed data indicates with statistical significance that the volatility of two asset portfolios including cryptocurrencies in general exceeds the volatility of the benchmark portfolio. This study also includes the analysis of the second type of asset portfolio composition. To further support the results of the first part, additional scientific research is conducted. For the following calculations, the indices are restricted to the main five indices used in the two asset portfolios. To increase the variety of cryptocurrencies, out of the top 200 cryptocurrencies eight further currencies are added – Ripple, Dogecoin, Litecoin, Monero, Dash, Nem, Digibyte, and Siacoin. Based on the results a variance-covariance matrix is set up and the minimum variance portfolios for the respective years are calculated with the solver function in excel (Table 2). By creating an average weight of the different minimum variance portfolios over the years 2016 until 2021, a newly created weighted all-asset portfolio is set up and used for the statistical SPSS analysis. Assets that receive zero weight are not further considered. The assumption is made, that these weights are constant over the years.

Table 2. Minimum variance portfolios 2016-2021 all-asset portfolios.

	Portfolio weight 2016-2021	Portfolio weight 2016	Portfolio weight 2017	Portfolio weight 2018	Portfolio weight 2019	Portfolio weight 2020	Portfolio weight 2021	Average weight
S&P 500 COMPOSITE	0.000%	46.5068%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%	7.7511%
STOXX EUROPE 600 E	33.172%	0.0000%	3.9399%	51.6970%	20.5195%	60.8083%	34.1555%	28.5201%
CDAX GENERAL'PERF' INDEX	0.000%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
DAX PERFORMANCE	0.000%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
MSCI WORLD U$	66.400%	41.3765%	95.3541%	47.9754%	76.3294%	38.9629%	65.8445%	60.9738%
Bitcoin	0.369%	2.4980%	0.6276%	0.0000%	2.4377%	0.0000%	0.0000%	0.9272%
Ethereum	0.000%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
XRP	0.000%	3.4337%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%	0.5723%
Dogecoin	0.000%	1.8687%	0.0000%	0.0000%	0.0000%	0.2288%	0.0000%	0.3496%
Litecoin	0.000%	0.9756%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%	0.1626%
Stellar	0.000%	0.3169%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%	0.0528%
monero	0.000%	0.1675%	0.0000%	0.1831%	0.7134%	0.0000%	0.0000%	0.1773%
dash	0.058%	2.0783%	0.0784%	0.0000%	0.0000%	0.0000%	0.0000%	0.3594%
nem	0.000%	0.0000%	0.0000%	0.1445%	0.0000%	0.0000%	0.0000%	0.0241%
digibyte	0.000%	0.6312%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%	0.1052%
siacoin	0.000%	0.1468%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%	0.0245%
	100.000%	100.00%	100.00%	100.000%	100.000%	100.000%	100.000%	100.000%

Source: Own (2022)

The second analysis, as it was done in the first part of the empirical analysis, includes the calculation of the correlation of the 30-day moving volatilities for the all-asset portfolio to the volatilities of the benchmark portfolio.

Table 3. SPSS 30-day moving volatility correlation analysis.

		All Asset Index incl. Crypto [30 Days Moving Vola]	MSCI [30 Days Moving Vola]
All Asset Index incl. Crypto [30 Days Moving Vola]	Pearson Correlation	1	.961[**]
	Sig. (2-tailed)		0.000
	N	2131	2131
MSCI [30 Days Moving Vola]	Pearson Correlation	.961[**]	1
	Sig. (2-tailed)	0.000	
	N	2131	2131

Source: Own (2022)

The correlation of the 30-day moving volatility of the two asset classes is high. The movement of the variables follows in the same direction as the respective systematics. The results are stated as statistically significant (Table 3). The second stage of the SPSS analysis involves a paired-sample t-test. Variable I is stated as the cryptocurrency portfolio return and the cryptocurrency portfolio 30-days moving volatility while variable II is stated as the benchmark portfolio return and the benchmark portfolio 30-day moving volatility.

Table 4. SPSS return, moving 30-day volatility paired sample t-test.

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	All Asset Index incl. Crypto [Return]	0.00041	2131	0.00886	0.00019
	MSCI Return	0.00032	2131	0.00815	0.00018
Pair 2	All Asset Index incl. Crypto [30 Days Moving Vola]	0.00705	2131	0.00532	0.00012
	MSCI [30 Days Moving Vola]	0.00630	2131	0.00518	0.00011

Source: Own (2022)

The SPSS output shows that the average return for the cryptocurrency portfolios amounts to 0.041% while the average return for the benchmark portfolio amounts to 0.032%. The volatility for the cryptocurrency portfolio amounts to 0.705% while the volatility for the benchmark portfolio amounts to 0.630%. The results support the findings of the first two-asset portfolio analysis. The average return of the cryptocurrency portfolio exceeds the return of the benchmark portfolio, while the 30-day moving volatility of the benchmark portfolio lies below the 30-day moving volatility of the cryptocurrency portfolio (Table 4). The paired difference calculations of the returns of the respective portfolios show similar results to the first study part. The average return increased through the addition of cryptocurrencies by 0.009%. However, the results are not statistically significant as the SPSS output states. Therefore, the $H0_1$ hypothesis cannot be rejected. For the paired differences calculations, the cryptocurrency portfolio's 30-day moving volatilities are again subtracted from the benchmark portfolio's 30-day moving volatilities. The calculations show that the addition of cryptocurrencies increases the volatility slightly by a spread of 0.075%. However, equal to the results of the first study part, the increase is to be stated as statistically significant (Table 5). Consequently, the $H0_2$ hypothesis is to be rejected.

Table 5. SPSS moving return, 30-day volatility paired sample t-test.

Paired Samples Test

| | | Paired Differences | | | | | | | |
| | | | | | 95% Confidence Interval of the Difference | | | | |
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	All Asset Index incl. Crypto [Return] - MSCI Return	0.00009	0.00309	0.00007	-0.00004	0.00022	1.373	2130	0.170
Pair 2	All Asset Index incl. Crypto [30 Days Moving Vola] - MSCI [30 Days Moving Vola]	0.00075	0.00148	0.00003	0.00069	0.00081	23.440	2130	0.000

Source: Own (2022)

4 Discussion and Conclusion

The goal of this study is to validate a risk-return-efficiency increase, thus a shift of the efficiency line, through the inclusion of cryptocurrencies as a new asset class. Based on the calculation of selected minimum variance portfolios, a detailed analysis of the volatility structure and systematics through the inclusion of cryptocurrencies in differently created portfolios is conducted. Periods, as well as weights and set-ups, were differentiated and adjusted. The risk/return constellation of the individual portfolios is statistically determined using a paired-sample t-test of the 30-day moving returns and 30-day moving volatilities.

Research Question 1: Do the mixed portfolios generate higher returns than the reference portfolios?

H0$_1$: The return of the mixed portfolio is not different from the return of the reference portfolio.

The null hypothesis cannot be rejected due to no statistically significant results for the all-asset portfolios even though the two-asset portfolios showed a statistically significant increase.

Research Question 2: Do the mixed portfolios generate lower volatility than the reference portfolios?

H0$_2$: The volatility of the mixed portfolio is not different from the volatility of the reference portfolio.

The null hypothesis is to be rejected due to statistically significant results for the two-asset portfolio and the all-asset portfolios. Summarizing the findings, it can be stated, that in general, the returns of portfolios with a weight in cryptocurrencies outperform the main indices. However, the results are statistically not significant for the all-asset portfolios. On the contrary, the paired-sample t-test for the difference in volatility of portfolios including cryptocurrencies shows a statistically significant result in both cases. In general, it can be stated, that the addition of cryptocurrencies to a portfolio increases the volatility and consequently the risk of the investment. Based on the statistical findings it can be assumed that cryptocurrencies seem to be well suited for a momentum strategy. The returns are high and jump in a short amount of time. However, it remains a highly speculative investment strategy that does not support a shift of the efficiency frontier left upwards. The financial performance of cryptocurrencies as an addition to an index portfolio in terms of risk and return differs from established asset classes: An investment in cryptocurrencies comes with a comparably high risk, which, however, as indicated in this study is not compensated by a statistically higher return. This study investigates the period from January 1st, 2016, to November 30th, 2021. On November 10th, 2021, Bitcoin as well as most cryptocurrencies marked their all-time high values. In the case of Bitcoin, its price fell over 43% from November 2021 until January 31st, 2022. However, this study included only the extreme increase in price from June 2021 (34,287€) until November 2021 (59,900€) when it more than doubled. Taking the period until January 31st, 2022, into account, it can be assumed, that the volatility increase through the addition of cryptocurrencies would have been even more significant. In terms of returns, the results would have probably changed in a different direction as well. This development should be further investigated in future studies. Combining the statistical results with the current challenges of cryptocurrencies, as described in the first part of the study, it becomes scientifically difficult to support the addition of cryptocurrencies to investment portfolios. The current media perception promises differently with cryptocurrencies being a way to balance inflation and market volatility while achieving higher returns. This study proves statistically, that returns during the analyzed period do not offer higher returns, and volatility increases through the addition of cryptocurrency. Furthermore, the correlation is statistically significant when compared to the benchmark portfolio, indicating the development in the same direction.

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Energy balance of Slovakia – impact of the Russian oil and gas supplies limitation

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Abstract

Research background: CEE countries are those the most impacted by energy crisis caused by energy prices boom and shortages of Russian oil and gas supplies. After several decarbonization initiatives, possible solutions to keep the energy balance secure, sustainable and supplying customers with cost competitive energy are very limited.
Purpose of the article: To outline possible scenarios for the Slovak energy system – replacement of oil and gas imported from Russia, based on shortages of oil and gas, and confronted with huge electricity prices.
Methods: Based on Energy Balance Sheet (EBS) to analyse and subsequently design three major scenarios (reference, green and autarky) for possible development of the Slovak energy system in the field of oil, gas and electricity. Gretl software will be used for the calculations and simulations.
Findings & Value added: The authors suggest basic balance and shortages of possible three scenarios which will be adopted by the Slovak government to some extent. Determined shortages and threats have to be taken into account when forming the standing point of the Slovak government at the EU and international level. Secondly, authors also identify some specifics of the Slovak energy system intensively supplying industrial sector comparing to some other CEE countries.

Keywords: *energy security; Slovak energy market; Russian oil and gas*

JEL Classification: *F10; F13; F60*

1 Introduction

Several statistics from the field of international business and the position of individual national economies in the world economy show that the EU states are losing their once dominant position in the world economy. One of the key determinants of this situation has become and still is energy costs resulting from energy security and energy balance. The Slovak Republic is among the most industrialized countries in the EU (the share of industry in the creation of GDP is up to 35%), which only confirms the existential need for the correctness of the energy policy setting and the impact of the rise in the prices of energy

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carriers on the critical macroeconomic parameters of the Slovak economy (producer price index and overall inflation).

The energy policy of the Slovak Republic is based on two key conceptual documents - the energy policy of the Slovak Republic and the energy security strategy of the Slovak Republic. However, these documents are ~~still~~ relicts from 2014 and thus did not reflect the sharp drop in energy prices since July 2014, their unprecedented decline during the pandemic period of 2020 and the beginning of 2021, and also do not respond to the development during the energy crisis from the end of 2021 and especially the unprecedented situation on the European energy market in 2022. It is also necessary to state, especially after the start of the military operation in Ukraine, that the decision-making sphere of the Slovak Republic and its leading political representatives did not even learn from the critical January 2009, when the transport corridor for natural gas from the Russian Federation to the Slovak Republic was shut down and thus caused by the gas crisis with a negative impact on Slovak GDP growth at the level of several tenths of a per cent (up to 1.00% of GDP due to the activation of the standby mode for gas supplies to industrial customers). This situation should already have indicated politogenic instability and the significant influence of political developments on energy security, particularly the stability of oil and natural gas supplies to the Slovak Republic.

However, since the gas crisis and especially since 2014, many strategic documents forming a new European energy policy have been adopted at the EU level with the dominant goal of reducing the volume of consumption and decarbonising both the industry and power generation (the concept of the energy union, the winter package and finally Fit for 55 packages in 2021, as well as a system of changes building more excellent immunity to energy shocks for the economies of EU states, although with relatively little success). The set of policies, especially the latest one, aimed to build a climate-neutral economy from the EU by 2050. This brought fundamental questions as to whether it is (1) feasible within the EU (energy systems and competitiveness) and especially at the V4 level, (2) what are the possible implications in terms of asymmetric shocks (different impact of strict environmental policy in more prosperous and less developed EU countries) and above all in time of unprecedented price shocks of energy carriers which have been on the stock exchanges since 2021 and particularly since March 2022.

The EU economy is undoubtedly too dependent on the import of energy carriers from the Russian Federation. At a time of politically stable relations between the EU and the Russian Federation, it was considered a natural international division of labour and a compelling setting of the structure of international trade. In recent months, however, the involvement of energy as part of a geopolitical struggle has made EU economies extremely vulnerable, especially concerning the combination of the economies' industrial orientation and the intensity of import dependence on energy supplies from the Russian Federation. A typical example of such vulnerability among EU states is the Slovak economy.

EU economies and the European Commission are formulating basic policies that aim to minimize the impact of energy shocks, albeit with very low effectiveness. Without a doubt, the Slovak economy is hugely dependent on energy supplies from the Russian Federation, and changing the import structure of these vitally important resources for industrial production will not be easy and short-term. The authors of the submitted contribution aim to characterize the possible changes and impacts on the energy balance that the restrictions on imports into the EU and the Slovak Republic have caused and will cause in the near future. Analytical naming of critical risks in the energy balance and individually satisfying measures at the level of the member states, therefore, appear to be the only possible way to minimize damage, not excluding the extremely industrially oriented economy of the Slovak Republic. The era of the cheap and abundant energy supply in Europe and Slovakia is over. There are

some long-term relevant factors which are leading to this situation. The article aims to try to analyze the recent development of the energy (not just electricity) supply from the point of view of the factors influencing the recent development of the supply and pricing of energy. The primary factor is, without any doubt, the (1) decarbonization policy of the European Union. The second significant factor is the (2) ageing of the existing production base and the (3) lack of new generation capacities in the structure of the Energy that is needed (windmills and photovoltaic units are not sufficient to guarantee a stable energy supply).

European policy leading to (4) **restructuring of the supplies** of nuclear fuel, coal, gas and crude oil is another significant factor, maximising the effects of the aforementioned factors. The mix of the burdens, as mentioned earlier, falling on the energy sector in Europe (and Slovakia as an integral part of the European energy system) is creating a murderous environment, which the European energy – and as a consequence – the whole European economy cannot stand for long term. The turmoil in the European Energyland is starting to have its victims in closing or disinvesting the factories and moving them out of Europe. Moreover, the **friend shoring policy,** under implementation in the USA, is nearing the possibilities for the production and services provisioning units from Europe. Mixed with the massive subsidies provided by the US federal government, the most likely location for investment is the US, with a lower regulatory burden than EÚ and significantly lower energy prices than Europe.

2 Literature review and Methodology

In the case of nuclear energy, there is a fierce discussion between pro and anti-nuclear countries about its future. In 2050 Europe, as the first Continent, should reach carbon neutrality. The precondition is to leave coal and - as it appears from the last development – also gas, not saying about crude oil. As a result, the purpose is to leave Europe literally without classical energy sources. The question is if this goal is feasible especially after the energy shocks caused by the post-pandemic revitalisation of the economy and after the price pressure caused by the war in Ukraine. The year 2022 gave many answers to what Europe is aiming for. The decision to switch off what recently exists and is providing a reliable energy supply, combined with the decision to sanction Russia and stop imports of gas and crude oil, has created turmoil in the European energy land resulting in skyrocketing energy prices and creating shortages. The absence of a realistic long-term energy policy threatens to change Europe not just into a carbon-neutral continent but also into a continent without reasonable economic activity, which might be critical not only for the industrial member countries but also for an undesired change of the political climate within the EU.

Moreover, if not appropriately addressed, an unmanaged energy crisis from the European Commission may cause a change in the political environment and the political setting of the member states to the detriment of deeper integration of the member states, which could have adverse effects on the EU's already declining geopolitical influence. Therefore, the management of this energy crisis appears to be critical for the further development of the EU's industrial competitiveness, but also for the overall perspective of European economic (and political) integration on the old continent. The influence of energy policy or the specificity of foreign trade in energy carriers and their impact on the competitiveness of EU economies (especially CEE) is not new and has been addressed by several authors (Baláž, 2009; Zábojník and Hričovský, 2021; Obadi and Korček, 2020). The issue of dependence of EU states on the import of fossil resources from the Russian Federation is not new. Reducing dependence on the import of energy carriers from the Russian Federation was one of the key starting points of the European energy policy concept from 2013 or 2014.

Some authors point to the general impact of the supply of energy carriers and their balance on the structure of foreign trade (Workie et al., 2017). Various factors have an influence the productivity of industry in EU countries (Fojtíková, L. and Staníčková, M.). Steinhauser et al. (2020) lean towards the export performance indicator as an indicator through which export competitiveness can be evaluated. Based on work since 2020 focusing on the energy costs of EU industrial producers induced by environmental measures, decarbonisation itself and energy costs can have a significant impact on export performance (including industrial exports) across EU countries (Zábojník & Hričovský, 2021). Mišík (2014) points out that it is particularly difficult to incorporate energy policy challenges for small EU states successfully. Using the example of the Slovak Republic, he demonstrates that the gas crisis in 2009 was the first time when foreign trade cooperation in the supply of natural gas from the Russian Federation was disrupted, and it was after 40 years of successful cooperation. In this context, the author emphasizes that energy security is a vague concept that is hard to define appropriately; nevertheless, uninterrupted, continuous and sufficient availability of all forms of energy a given entity requires. The author states that Slovakia is much more active in proclamations of this goal at the EU level than concrete activities leading to an increase in energy security. However, there are few projects within the Visegrad four framework where Slovakia is actively taking part in increasing the region's energy security.

Within the regional context, fundamental changes were brought about by the EU's even greater orientation towards the import of Russian gas and the resulting question of the necessary diversification of transport routes and sources. Yakovenko and Mišík (2020) state that Ukraine sees transit predominantly through the lens of cooperation with the EU and other actors; the Slovak political discourse considers gas transit in terms of energy security and the availability of gas for the national economy. Valuable insight and analysis of the position of the Russian Federation in the energy balance of the V4 states was prepared by the authors Tichý and Dubský (2020), while the huge importance in the import structure is also proven by statistics after 201 (ITC, 2022). Among the four countries, only the Czech Republic emerges as a member of the EU, against which the Russian Federation does not have a significant position in energy cooperation in the period before the war in Ukraine. However, the authors emphasize already in this period that Russia acts as a reliable supplier and energy partner and emphasizes long-term relations and contracts. However, the stress on the economic extent of the relationship (its profitability) and the pursuit of depoliticization do not reflect the actual interests. Russia's energy policy has more political objectives (Tichý and Dubský (2020). Brodny et al. (2021) stressed that the issue of ensuring climate-neutral energy security is of great importance, especially in the "New" EU countries, where the energy transition started later than in the rest of the countries (the so-called Old EU).

A fundamental change in the direction of energy cooperation between the V4 and the Russian Federation was the geopolitical battle over the future security-political direction of Ukraine and the invasion of Russian troops into this country in February 2022. In this context, some essential works from 2022 point to the assumption that the rest of Europe, especially the countries of CEE, will experience significantly higher inflation and some financial contagion. The inflationary impact across the EU will further depend on the willingness (or otherwise) to cut oil and gas imports from Russia. If that happens, EU growth will suffer significantly (Astrov et al., 2022). The second significant consequence, specifically in energy policy, is the pressure for faster decarbonization in the form of a more massive deployment of RES as an alternative to importing fossil resources from the Russian Federation.

Cebotari (2022) stressed that the conflict sounded the alarm for the EU over the need to create a unified energy policy despite previous warnings related to the gas transport crisis in 2009. Although the EU has tried to reduce its dependence on Russian gas after the 2014 Ukrainian crisis, Russia continues to supply about 38% of EU gas consumption (in 2020).

Cebotari (2022) stresses that thanks to proximity, existing infrastructure and Russia's ability to export large quantities will enable Russia to continue to be the EU's leading natural gas supplier, at least in the short term. On the other hand, in the long run, it is possible to eliminate the EU's and CEE's dependence on Russian oil and natural gas, but it will come with additional costs. There are many challenges to the diversification of the CEE's crude oil and gas imports. According to the most recent study provided by Lambert et al. (2022), taking into account the current industrial capacities of the main gas exporting countries, their contractual engagements, and growth strategies depicts an impossibility of achieving the REPower EU's short-term policy to phase down the traditionally massive gas imports from Russia by two thirds in 2022 The major alternatives should be LNG and piped gas (USA, Qatar, Australia, Azerbaijan, Algeria) what makes the cost of importing energy carriers. Nevertheless, it is not possible to replace the fossil import in the short run, even massively engaging the new requirements of the EU, which shades some pessimism on the political will of the European Commission (Zábojník et al., 2022). Besides technological changes and innovations (Nagy & Lazaroiu, 2022), another possible source of immunity related to massive imports from Russia represents the implementation of renewable energy sources. Despite evidence in favour of higher RES potential in the CEE countries (Lazaroiu et al., 2018), the alternatives for Russian massive fossil import seem to be not achievable in the short run (Baláž & Zábojník, 2009).

Based on the above overview of dynamic changes after the invasion of Russian troops in Ukraine, the transition of CEE and V4 economies to energy systems less dependent on Russian imports will be extremely difficult, especially in the short term. Nevertheless, from December 2022, several restrictions and embargoes on the import of Russian oil (mainly by sea) and natural gas will apply, and the V4 countries must prepare for this new geopolitical reality imposed by Brussels in order to eliminate significant damage to the price (mainly export) competitiveness of its industry. Based on the above, the authors set a goal to examine alternatives for the development of the energy balance of the Slovak Republic until 2030, specifically using the example of electricity. Based on Energy Balance Sheet (EBS) to analyze and subsequently design three major scenarios (reference, green and autarky) for the possible development of the Slovak energy system in the field of electricity based on different volumes of oil and gas imports from the Russian Federation. The authors take into account the valid energy policy and strategy for the energy security of the Slovak Republic, but also the new measures proposed by the EU for the next couple of years.

3 Results

The countries of the European Union produce **about 18% of their energy from coal** (2019), employing 230.000 people and having power plants and coal mines in 31 regions in 11 Countries. The European Initiative "Coal regions in transition" is expecting to switch the coal power plants in Slovakia (2023), France (2024), Greece, Hungary, Italy and Ireland (2025). Later follows Denmark, Finland, Spain, Netherlands (2030), Romania (2032), Slovenia and Czech Republic (2033) and Germany (2038). Some EU countries are already "coal-free" (Austria, Belgium, Cyprus? Estonia, Latvia, Lithuania, Luxemburg, Malta, Sweden and Portugal). The Polish "coal regions in transition" policy is missing from the list.

Slovakia is expected to decommission two power plants – Nováky Power plant with an installed capacity of about 260 MW and Vojany about 100 MW generation unit is about to be decommissioned). The heat-producing power plants were transformed into gas-powered or gas -biomass-powered units. The share of coal-produced electricity in Slovakia is (1) negligible (about 8 %). Moreover, the power generation units that are about to be decommissioned are (2) old and would be switched off due to technological

outdating. Regarding coal mining, which was non-efficient and needed state subsidies for its economical existence, the step Slovakia is doing is logical and gets along with the long-term strategy of modernising the power generation base in Slovakia. In addition, the expected commissioning of the 3rd Power generation unit in the Mochovce nuclear power plant, with an installed capacity of about 500 MW, will quickly replace it.

Slovakia consumes more than 50 TWh of gas (51,9 TWh in 2019). Destruction of the Nordstream 1 and 2 left only way for gas from Russia to Central Europe through Ukraine. To not underestimate the extent of the conflict on its territory, there could be an interruption in supply at any (unexpected) time. If we look at the European Union, some countries were entirely dependent on the LNG supply (Spain, Portugal), and some were strongly independent (Netherlands). On the other hand, Central Europe and Germany strongly depended on Russia's supply. If European Union prevents the Gas supply from Russia, Slovakia will, in the short term, rely on gas storage. The world´s largest LNG exporters (USA & Qatar) cannot supply the necessary volumes to Europe. Not even close to it. That means Europe may continue or will continue to face a massive shortage of the gas supply in the years to come (even under the precondition of activation of the coal-powered electricity and heat generation units and cancellation of the climate policy goals).

To some extent, Slovakia may be able to import gas from Croatia (Omišalj PNG gasification terminal) or Poland (Swinoujscie LNG gasification terminal). A country with no access to the high sea will be dependent on the goodwill of the Polish and Croatian policymakers. An increase in demand and competition will lead to the rise of gas prices and also the costs of transport capacities (LNG tankers), which Slovakia will pay. Slovakia depends on crude oil imports from Russia (transport of the crude and its processing technology) more than 78,4%. The limitation or complete stop of imports of oil from Russia could be deadly for the Slovakian economy and society. The logistic (transport ways) and technological (refining technology built upon the specification of the URALS crude) obstacles have no real solution in the short term.

Based on the fundaments described above, the authors designed three basic scenarios:

- **Reference scenario** – authors expect dramatic decrease of coal power plants and committed by the government, stable imports and gas consumption for electricity generation, stable generation of electricity from biomass, new nuclear sources (Mochovce 3 and 4 from 2023 and 2024 respectively), slightly increased photovoltaic production, more than three times higher production from wind, other sources at stable levels.
- **Green scenario (ecological)** – expected dramatic decrease of coal power plants to zero levels in 2030 due to decarbonization policies, dramatically lower imports of gas for electricity generation, stable generation of electricity from biomass, new nuclear sources (Mochovce 3 and 4 from 2023 and 2024 respectively) balancing the electricity network (RES volatility) and stable imports of nuclear fuel from Russia/USA (modified), dramatically increased photovoltaic production, much higher production from wind, other sources initiated at political level (e.g. geothermal).
- **Continual energy crisis scenario** - expected half level production of coal power plants in 2030 due to lack of coal, dramatically lower imports of gas for electricity generation due to permanent shortages from Russia, stable generation of electricity from biomass, despite new nuclear sources (Mochovce 3 and 4 from 2023 and 2024 respectively) balancing the electricity network (RES volatility) electricity generation danged due to slightly lower import of nuclear fuel from Russia, increased photovoltaic production, doubled production of electricity from wind, stable other sources (e.g. geothermal).

Based on the assumptions explained above, there are three possible scenarios of electricity production in Slovakia determined by Russian oil and gas supplies limitations:

Table 1. Scenarios for the electricity generation in Slovakia impacted by Russian supply cuts (in 2030)

Source of electricity generation	Share on production in 2020	Electricity production (TWh)	2030 (scenarios)		
			Reference	Green	Energy crisis
Coal	8.0%	2.27	1.00	0.00	1.20
Gas	12.0%	3.41	3.50	1.50	1.00
Biomass	6.0%	1.70	1.70	1.90	1.90
Nuclear	54.0%	15.34	23.24	23.24	20.00
Water	16.1%	4.57	4.50	4.70	4.70
Photovoltaic	2.1%	0.60	0.70	2.00	1.00
Wind	0.1%	0.03	0.10	0.40	0.20
other	1.9%	0.54	0.50	1.00	0.50
Total		28.46	35.24	34.74	30.50
Net export		-1.70	2.44	1.94	-2.30

Source: processed by authors based on data from the Ministry of Economy of the Slovak Republic (2022)

As seen from the projected scenarios above, there are no serious cuts in the electricity generation for the Slovak industrial producers within the first two scenarios. In the case of the „energy crisis "scenario, the Slovak Republic would be dependent on the imports of electricity from abroad, or industrial production would be endangered. However, the authors do not expect any severe limitations of nuclear fuel (about 54.0 % of electricity production in Slovakia for 2020). Other essential implications and assumptions are analysed in the next part.

4 Discussion

The European energy market price volatility has recently impacted Slovakia. In the case of industrial production, the authors observed one of the most severe impacts and did not address sufficient countermeasures from the Slovak government. The prices rose sharply, reaching the highest industrial price increases within the European Union. Fuel (diesel, gasoline) prices also rose sharply, though the prices are comparable with those in other European countries. On the other hand, electricity prices for households are the lowest within the European Union thanks to relatively strong regulation and its scheme in the segment and liberalized pricing.

The research primarily focused on potential changes evoked by the changes brought by fundamental changes in Slovakia's fossil fuels import structure. Direct impact on industrial prices and potential export competitiveness can be derived from the electricity market and gas market price volatility. The authors characterized potential changes in the electricity

balance as a crucial part of the general energy balance through simulation within three scenarios. All the conditions related to the different scenarios are described in chapter 3.

The first, the reference scenario, brought several vital implications and recommendations level. The Slovak government decided to phase out coal mining, the domestic coal power plant, within a few years. Surprisingly, the situation in the European energy market can potentially adjust the time frame of the implementation, though domestic coal reserves are minimal, and the quality of the commodity for electricity generation is relatively low. Gas consumption is crucial when discussing decarbonization and the potential transition of the electricity system onto one based more on RES. This assumption is in confrontation with the situation in Ukraine and imposed sanctions on the Russian Federation and the desired change of the gas suppliers' structure. Suppose the reference scenario share of 3.50 % is achieved. In that case, massive changes of the import partners in favour of Qatar, USA, Algeria, or even Australia bring additional costs, questionable prices, and access to the gas infrastructure (via Czechia, Poland or Hungary and Croatia). The most feasible source for electricity generation remains the nuclear power plant, with expected generation within Mochovce 3 and 4 in 2023 and 2024, respectively. Even in this case, the usage of Russian nuclear fuel seems to be inevitable. The best case scenario till 2030 expects that the Slovak Republic will be able to export about 2.44 TWh to southern markets since the spread towards the western markets is expected to be negative as recently.

As for the "green" (ecological) scenario, the usage of nuclear power plants is crucial since being a rarely stable sources in terms of low volatility generation. Especially volatile sources of electricity generation (photovoltaic, hydro and wind) are balanced by nuclear fuel-generated electricity. Thanks to the war in Ukraine, and questionable access to the pipeline infrastructure from the LNG ports, gas consumption is expected to sharply decrease up to 1.5 TWh. One of the key conditions of the future decarbonised European energy market – e-mobility – seems to have a minimum impact on the volume of produced electricity till 2030. Additionally, oil and gas savings also seem to be relatively low, as Zábojník et al. (2022) found, primarily due to the slow spreading of BEV and PHEV sales. Additional 0.5 TWh of electricity is expected from the geothermal sources, which has been only symbolic meaning in the energy policy of the Slovak Republic for the last eight years. Nevertheless, thanks to nuclear sources, Slovakia could export 1.94 TWh of electricity to foreign markets with disposal interconnection capacities.

The most pessimistic, long-term "energy crisis" scenario outlines no bright future for the energy market and industrial production prices in Slovakia until 2030. Due to missing electricity generation capacities, the Slovak economy will have to import as much as 2.3 TWh of electricity, what is barely possible due to bottlenecks on the borders – transmission capacities. Authors expect a massive decrease in the coal power plants and no replacement for these sources (due to environmental commitments and minimal domestic coal reserves). Gas imports are expected to be radically decreased, comparing the volume of imports for 2020. Even the nuclear sources production could be endangered due to technical types of the reactors based on the Russian fuel and uncertain capacities of US suppliers or possible modification from France. Due to the high dependence on nuclear sources, this remains one of the most critical challenges for the Slovak government and a new design of the energy policy till 2030. Facing the crisis, we also expect not a high increase in water sources due to missing capacities, the political will of the Ministry of the environment of Slovakia and minimum new disposal capacities on the Slovak rivers. The continual energy crisis on the European continent can also bring higher procurement costs for photovoltaic panels, which would hamper new capacities realized in Slovakia till 2030.

5 Conclusions

After the gas crisis impacting Slovak industrial sector in 2009, in 2014, European Commission prioritized environmental issues as a strategic doctrine of its agenda and goals for member countries for the next decades. This was accelerated via the Winter and Fit for 55 packages in 2021. Nevertheless, the ambitious European plan for a carbon-neutral continent till 2030 has been challenged from February 2022 by an unprecedented energy price bubble primarily caused by the EU sanctions on Russia and Russian oil and gas cuts as well as European ambitions to decentralize the generation of electricity in the short run with a crucial role of gas to balance the electricity network. In two of our scenarios, the Slovak electricity sector will be able to be self-sufficient; in the most pessimistic scenario, up to 10 % of the electricity consumed in Slovakia will have to be imported from other European countries if possible. One of the crucial conditions to sustain electricity generation in Slovakia will be a transformation of technologically suitable nuclear fuel as a possible replacement for the Russian one in case of persisting or even escalating geopolitical tension towards the Russian Federation. Massive replacement by other volatile sources (renewable energy sources) will not be possible due to limited capacities in Slovakia. Therefore, from the carbon footprint and price competitiveness point of view, the government recommends continual prioritization of nuclear sources to minimize the negative impact of the geopolitical and international energy market changes.

When assessing the impact of the limited volume of Russian oil and gas on the market, the Slovak Republic has to rely vastly on electricity from nuclear sources since there are no new facilities on the energy market in the short run. A massive investment in DSOs and TSO is expected to challenge the balance and new situations connected to the prices and missing volume of gas in the European energy market. Additionally, a new customer approach seems to be essential in the case of households´ electricity consumption and new innovative technological solutions and energy savings initiatives within the Slovak industrial sector. Thanks to massive measures and funding from the European Commission and the Slovak government, industrial exporters can sustain their export competitiveness (primarily price competitiveness) when competing with the US or Asian manufacturers.

Acknowledgement

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Strategic Management in Global Economy

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Abstract

Research background: Various empirical studies have been done to investigate the relationship between strategic management, and global economy, and globalization process. In this research study, strategic management was investigated as a factor influencing the business success of enterprises. A key component of strategic management involves the development and implementation of specific strategies.

Purpose of the Article: The objective of this paper is to evaluate the strategic management in selected enterprises in the Czech Republic.

Methods: The strategic management in Czech enterprises has been researched with the method of oral questioning, and the main instrument was a questionnaire. The analysis began by examining the correlation between variables. In next step, hierarchial regression analysis was performed to test hypotheses.

Findings & Value added: Czech enterprises mainly apply a narrow focus strategy in their business activities on the global market. The selection of business strategy is affected by several variables, but some variables are no statistically significant for the decision-making about business strategy. Further the study contrbutes to understanding of the relationship between strategic management and business success in global economy.

Keywords: *business strategy; business success; previous experiences; global market; globalization*

JEL Classification: *F60; L25; M16*

1 Introduction

Majority of Central and Eastern Europe companies' field of activity operates on local, regional, or domestic level, these companies are a part of the European economic environment. It means that they will necessarily be influenced by all the consequent changes not only in national but also in European and global environment. The entrepreneurial subject which applying the growth strategy must decide soon or later about the internationalization strategy if they plan expansion not only on the domestic market but also on the global market. The entrance of a company on the global market itself allows for a significant opportunity,

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so long as the said company possesses the proper readiness which grants it the chance to develop entrepreneurial activities (business) in the global market.

Changing conditions and market structures demand that many companies devise new strategies, as they search for a competitive place in their home markets and take advantage of emergent market opportunities. So a company may succeed, its strategy must be consistent with the new environment in which it will operate. The company concept emphasizes that companies must consider both their customers and their competitors when developing a strategy. The globalization of economy offers new opportunities to companies, resulting from their access to bigger markets, scale economies and exposure to best practice management and technology. However, globalization also poses and invites new competitive challenges, either by local and international competitors, with new production processes and innovative products and services. In response to these challenges, companies try to conquer new international markets and expand their presence and operating in the global market. Internationalization is an important factor of competitiveness for companies, reflecting on the performance, determined by own business, industry and environment factors.

The objective of this paper is to evaluate the strategic management in selected enterprises in the Czech Republic. In the research study strategic management was investigated as a factor influencing the business success of enterprises. The study is based on primary data collected from a recent survey of Czech companies between Octorber 2018 and May 2022. The strategic management in Czech enterprises has been researched with the method of oral questioning and the main instrument was a questionnaire. The relationships of interest are analyzed using appropriate regression techniques.

The paper is organized into three parts. The first part of the paper outlines selected theories dealing with the company strategy and globalization. The second part of the paper aims to present and then interpret the results of the survey carried out among Czech entrepreneurial subjects. Finally, the last section provides the conclusion of the research and offers a discussion of the most important implications. The results of the analysis are discussed and further recommendations are provided for managers in the last section.

2 Theoretical Framework

A global economy is one in which goods, services, people, skills, and ideas move freely across geographic borders. The global economy, which changes rapidly and constantly, increases the scope of the competitive environment in which companies compete (Hitt et al., 2019). A key megatrend in the global environment is globalization. Globalization is commonly defined as the process of increasing interdependence among nations (Chase-Dunn et al., 2000; Rugman & Verbeke, 2004; Verbeke et al., 2018; Witt, 2019). To be competitive in the twenty-first century in the global economy, companies need to continuously improve and perform to an excellent standard to improve quality and performance. The success of a business doesn't happen by accident, it requires careful thought and strategic planning. Companies must study the global economy carefully as a foundation for learning how to position themselves successfully for competitive purposes. Companies operating globally must make sensitive decisons when using the strategic management process. (Hitt et al., 2019) Additionally, highly globalized companies must anticipate ever-increasing complexity in their operations as goods, services, people, and so forth move freely across geographic borders and throughout different economies. Going back to Rugman (1976), international business scholars have argued that multionality provides risk-diversification opportunities (Amore and Corina, 2001). Operating in multiple countries allows firms to manage unsystematic risks (Hitt et al. 2006), for instance by holding back projects in countriesthat become more uncertain and exploit investment opportunities elsewhere (Sarkar, 2020).

Strategic management is a set of managerial decisions and actions, and these decisions determine the long-term performance of business entities (Peleckis, 2015; Tseng and Hung, 2014; Şentürk, 2012) and company strategy. The organization sets effective strategies by considering where the organization has come from, what it has learned, and where it is going. The includes consideration of the context in which it operates, knowledge of customer groups and market segments, past performance, discharge of legal responsibilities and minimization of harm. Companies practically apply the strategy seriously as a tool that can be utilized to fast track their performances. According to Hoskisson et al. (1999), the goal of strategic management studies is to understand business concepts that affect firm performance such as firm´s internal strengths and weakness relative to their opportunities and threats. Each of the three dimensions of complexity plays a critical role (Aguinis and Gabriel, 2021). Regarding multiplicity, strategic management studies researchers have sought to explain firm heterogeneity for decades, and these efforts have required theoretical and methodological pluralism given that differences among firms depend on many factors (Durand et al., 2017) For example, research on strategic alliances and networks has shown that inter-organizational ties enable firms to access and use each other´s complementary assets and resources (Das and Teng, 2000).

The strategy is a process that can allow an organization to concentrate its resources on optimal opportunities with the objectives of increasing sales and achieving a sustainable competitive advantage (Kotler, 2012). Greenley (1986) noted that strategic planning has potential advantages and intrinsic values that eventually, translate into improved company performance. According to Kotter (1996), the strategy can be used as a means of repositioning and transforming the organization. Porter (1996) has defined strategy as a creation of a unique and vulnerable position of trade-offs in competing, involving a set of activities that neatly fit together, that are simply consistent, reinforce each other and ensure optimization of effort. The essence of optimal strategy making is to build a market position strong enough and an organization capable enough to produce successful performance despite potent competition and internal difficulties. According to Chaffee (1985), the strategy is the determination of the basic long-term goals of the enterprises, and the adoption of courses of action and allocation of resources necessary for carrying out these goals.

According to Aaltonen and Ikåvalko (2002), the outcome of all of the company´s operations and strategies is company performance. Company performance refers to the metrics relating to how a particular request is handled, or the act of performing; of doing something successfully; using knowledge as distinguished from merely possessing it. The success of a business is obtained through a competitive business strategy. Business strategy is then used as an umbrella term to denote the broad range of strategic options open to the company, including both organizational and functional management strategy, product/market strategies, and diversification strategies (Barringer and Greening, 1998). It consists of integrated decisions, actions or plans that will help to achieve target goals. A business strategy is a set of fundamental choices which define its long-term objectives, its value proposition to the market, how it intends to build and sustain a competitive business system and how it organizes itself. If the market in which the company operates is foreign, it's business strategy will be an international business strategy that defines the way to compete across the word (Lasserre, 2007).

A success company continually reinvents strategies to gain better performance and competitive advantages in today´s dynamic competition. Thus, the following hypothesis is formulated:

H1: Business strategy is positively related to business success.

The globalization of world economy offers new opportunities to companies, resulting from their access to bigger markets, scale economies and exposure to best practice management and technology. Globalization is the process leading to the mutual integration of society on global level. International Monetary (1997) fund defines globalization as the growing economic interdependence of countries worldwide brought about by the increasing volume and variety of cross-border transactions in goods and services and of international factor flows, and also through the more rapid and widespread diffusion of technology.

The process of has been viewed as one of the most significant processes typical of modern world economy. However, globalization also poses and invites new competitive challenges, either by local and international competitors, with new production processes and innovative products and services. In response to these challenges, companies try to conquer new international markets and expand their presence and operating in the global market. Internationalization is an important factor of competitiveness for companies, reflecting on the performance, determined by own business, industry and environment factors.

Strategic decisions involve a change of major kind since an organization operates in the global business environment. In a globally competitive environment, strategic planning is essential for enterprises to develop competitiveness and market potential. Thus, the following hypothesis is formulated:

H2 : Previous experiences from foreign markets (a) and strategy for global market (b) are positively related to business success.

3 Methodology

The analysis is based on the data from a standardized empirical study, which comprises research questions on the management of Czech enterprises. To analyze the management of Czech enterprises, some questions of the impact of strategic management on the business success of Czech enterprises we asked in the survey. The objective of the paper is to evaluate the strategic management in selected enterprises in the Czech Republic. The research was carried out in the Czech Republic between October 2018 and May 2022.

3.1 Sample and Procedure

The strategic management in Czech retail enterprises has been researched with the method of oral questioning, and the main instrument was a questionnaire. The research design is based on the collection of primary data from top managers of selected Czech enterprises. The sample consisted of 491 Czech enterprises which are located in the Czech Republic. The enterprises under research were selected with the method of non-probability purposive sampling, or more precisely by assumption and occasional selection. The enterprises included in the study are incorporated in the Czech Republic, and all of them are private enterprises.

The structured questionnaire contained two fields of varying degrees of complexity relating to the area of strategic management. The questionnaire consists of closed, semi-closed, and open questions. The questions are based on information offered via personal communication with selected business and university experts, any by former researchers. In some questions, simple and complex scales were used, mostly the Likert-type scale (5 = strongly agree to 1 = strongly disagree). The questionnaire was pre-tested for instrument validity with 20 participants-managers who were asked to respond to the items measuring the theoretical construct. These participants were also asked to identify any ambiguities that may reveal in the questionnaire draft. Based on their feedback, some minor changes in wording were made.

Due to a relatively low response rate in email surveys in the Czech Republic, and because most Czech managers fear that revealing the corporate data is putting their organizations at security risks, it was necessary to make use of a high level of personal involvement consisting of telephone calls, personal distribution of and collecting questionnaires. First, telephone calls were placed to general managers or CEOs of the Czech enterprises to explain the purpose of the study and to request their participation, after those questionnaires were hand-distributed to the general managers and CEOs. Trained research assistants helped the managers and CEOs complete the questionnaire, and explained any items that the respondents wished to have clarified. This procedure resulted in 500 matched questionnaires, of which 9 were eliminated because some responses were incomplete. Thus 491 (a response rate of 98.2%) questionnaires were used in the subsequent data analysis and statistical processing. The representativeness of the research sample was verified by using the criterion of territorial representation of businesses in the present research. The representativeness of the research sample was also verified by a chi-square test. Based on the level of significance $\alpha = 0.05$, the p-value accounted for 0.128.

3.2 Variables and Measurement

The *dependent variable* business success was measured by subjective ratings. We asked the respondents to evaluate the present enterprise performance and its performance 3 years ago, relative to other enterprises in the same industry, using a five-item, five-point Likert type measure adopted for this study. The question was "The present enterprise strategy can be characterized as successful and fulfilling enterprise objectives, and enabling the achievement of long-term sustainable competitive advantage and had a positive impact on turnaround over the last 3 years: (1=totally disagree; 5=totally agree)". The Cronbach´s α of this measure was 0.84. The mean rating by top managers was 4.02, with a standard deviation of 0.819.

The *independents' variables* (strategy, previous experiences, and strategy for global market) were measured by subjective indicators included using a five-item, five-point Likert type measure adopted for this study (1=totally disagree; 5=totally agree).

Guided by current research and empirical evidence, we have included several *control variables*. Among the enterprise-level determinants of performance, the enterprise´s size and enterprise age are the two widely used demographic characteristics of enterprises. Therefore, we include enterprise size (which is measured as the natural logarithm of the number of employees) and enterprise age (in years). Statistical organizations classify enterprises by a wide range of variables such as sales revenues and the number of employees. This research study follows the conventional European idea that the size of enterprises is defined according to EU norms. An enterprise, which has 1 to 9 employees and 2 million euros of turnover per year, is referred to as a microenterprise. An enterprise, which has 10 to 49 employees and at most 10 million euros of turnover per year, is called a small enterprise. An enterprise, which has 50 to 249 employees and at most 50 million euros of turnover per year, is called a medium enterprise. An enterprise, which has more than 250 employees and more than 50 million euros of turnover per year, is called a large enterprise. In line with this, we classify our research sample by the number of employees so that 35.9 % of the sample consists of microenterprises and 37.4 % small enterprises, and 26.7 % of medium ones. The average enterprise age of the respondents is 17 years.

3.3 Data Analysis

The data obtained from the empirical research on a selected sample of 491 enterprises were processed by SPSS. The analysis began by examining the correlation between variables. All

variables were screened to reveal their distribution through Pearson correlation coefficient deviations for the variables Correlations obtained from the Pearson Correlations Matrix indicating intercorrelations among the predictor's variables were low, ranging from 0.255 to 0.823 ($p < 0.05$), thus indicating the independence of the variables used for measuring the predictors. Since the descriptive data revealed a promising variation as well as the correlation among the variables included in the model, the results seem to support the hypotheses.

The second phase of research includes the analytical method: Hierarchical Regression Analysis. We used hierarchical moderated regression analysis (ordinary least-square OLS regression techniques) to test hypotheses.

4 Results

The business strategies of Czech enterprises on global market were monitored regarding Porter´s competitive strategy (generic strategies). The author found out that Czech enterprises mainly apply a narrow focus strategy in their business activities on the global market (62.8%). The differentiation strategy is used by 23.6% of Czech enterprises in their activities. And only 13.6% of the Czech enterprises surveyed apply a global strategy.

Hierarchical regression has been used to test the hypotheses with business success as the dependent variable. We tested the impact of strategy, previous experiences and strategy for global market on business success of enterprises, controlling for enterprise size, and enterprise age. Before testing the hypotheses, multicollinearity in the dataset we controlled. For this purpose, the VIF values for the independent variables we calculated. In our analysis, the VIF values were all below 1.1, which is a relatively low and acceptable level. Consequently, there is no reason to believe that there is any major multicollinearity in the regression that could lead to misinterpreting or overestimating the final model and its predictive ability. The results of the analyses are presented in Table 1.

Table 1. Regression Results for Business Success

	Model 1	**Model 2**	**Model 3**
Size	0.002(0.001)	0.001(0.001)	0.001(0.001)
Age	-0.002(0.002)	-0.003(0.002)	-0.002(0.002)
Strategy H1		0.472(0.068)**	0.407(0.070)**
Previous experiences H2a			0.166(0.050)*
Strategy for global market H2b			0.060(0.052) *
Model R^2	0.014	0.301	0.336
ΔR^2	0.014	0.287	0.035
F	1.844	33.989**	26.346**

[a] Unstandardized coefficients are reported, with standard errors in brackets. The changes in R^2 in Models 2-3 are in comparison with the value of R^2 in the model to their left.
Value of Durbin-Watson is 1.936
Significance level: *$p<0.05$; **$p<0.01$
Source: own research

We entered the control variables as the first block, Model 1. The regression equation in Model 1 is not statistically significant (F = 1.844, p > 0.05). Model 1 in Table 2 shows that none of the selected control variables is not significantly associated with the business success of Czech enterprises. The independent variable (strategy) was entered into the regression as the second block, Model 2. The incremental explanatory prediction on business success was significant in the regression, $\Delta R2$ was 0.287. The regression equation in Model 2 is statistically significant (F = 33.989, p < 0.01). The independent variables explain 30.1 % of the variance in Model 2. The multicollinearity test showed that the VIF of independent variables in the final model ranged from 1.089 to 2.154 and the factor of tolerance range from 0.764 to 0.918. These values indicate no serious problems with multicollinearity. Hypothesis 1 claiming that the strategy is positively related to business success was supported.

The independent variables (previous experiences, strategy for global market) were entered into the regression as the third block, Model 3. The incremental explanatory prediction on business success was significant in the regression, $\Delta R2$ was 0.035. The regression equation in Model 3 is statistically significant (F = 26.346, p < 0.01). The independent variables explain 33.6 % of the variance in Model 3. The multicollinearity test showed that the VIF of independent variables in the final model ranged from 1.180 to 2.355 and the factor of tolerance range from 0.864 to 0.950. These values indicate no serious problems with multicollinearity. Hypothesis 2 claiming that the previous experiences (a) and strategy for global market (b) are positively related to business success was confirmed.

5 Discussion

The above results show that business strategy choices of Czech enterprises vary according to various internal factors. The research results suggest that we must be careful in making overall conclusions even if based on the investigation of entrepreneurial activities in general or of a single activity. The results of the research study show business strategies of Czech enterprises. The majority of Czech enterprises chose the narrow focus strategy as their business strategy. The selection of business strategy is affected by several variables, for example company size, company age, industry, family/nonfamily character, ownership structure, competitive advantage, competitive scope, and international activities. But the variables such as company size and company age are not statistically significant for the decision-making about business strategy.

Further the study contributes to our understanding of the relationships between strategic management and business success. According to Chaffee (1985), strategic management is the determination of the primary long-term goals of the enterprises, and the adoption of courses of action and allocation of resources necessary for carrying out these goals. We can state that this statement was also confirmed by Czech enterprises. The study informs enterprise performance research by examining the effects of selected factors on the relationship between strategic management and business success. We hypothesized that there are positive relations between business strategy and business success. The first hypothesis was confirmed. The second hypothesis that the previous experiences and strategy for global market to have positive relationships with business success was partially.

The entrepreneurial subject who applies the growth strategy will have to decide soon or later about the form if his/her expansion not only on the domestic market, but also on the foreign market. A similar situation will occur also at the moment when the economic situation or other circumstances force the enterprise to carry out some restructuring, which could bridge the danger of the loss of competitiveness, the decrease in profitability, solvency, and the threat of bankruptcy. The entrance and activities of entrepreneurial subjects on the markets can be complicated owing to a number of factors that are given by the environment

on one hand and the position and situation of the entrepreneurial subject itself on the other hand. The entrance of a company on the market itself allows for a significant opportunity, so long as said company possesses the proper readiness which grants it the chance to develop entrepreneurial activities.

It is important to note some of the limitations of the research. The research model can be redesigned by adding some other variables which are taught to antecedents of business strategy and company performance.

Several other implications also emerge from the research study findings. For business researchers, the results suggest that investigation of the decision-making process in a single activity provides the best and multifaceted picture of multinational managerial decisions. The paper contains information on the entrepreneurial activities of Czech enterprises. There appear to be some potential areas for further research work such as performance in the Czech market. The research could be focused on activity located in one region of the world with a good deal of variation regarding market size, growth rates, levels of development, openness, tax rates, and other features.

6 Conclusion

The globalization of economy offers new opportunities to companies, resulting from their access to bigger markets, scale economies and exposure to best practice management and technology. However, globalization also poses and invites new competitive challenges with new production processes and innovative products and services. In response to these challenges, companies try to conquer new competitive strategies. The present paper investigates the determinants of the business strategies of Czech enterprises on the global market. Porter`s generic competitive strategy is the basis for a variety of modern business business strategies. The results indicate that the strategy of most Czech enterprises is driven by the narrow focus strategy.

The increase of the competition in Europe is a great opportunity for Central and Eastern Europe entrepreneurial subjects to improve both their efficiency and effectiveness resulting in better competitiveness. Therefore the study contributes to our understanding of the relationships between strategic management and business success. The study investigates enterprise performance research by examining the effects of selected factors on the relationship between strategic management and business success.

The European marketplace is a continually changing and evolving entity. The changing face great new challenges and opportunities coming from the Single European Market, which will represent approximately 450 million European consumers. On the other hand, they have to cope with very strong, new competition represented by 18 million European entrepreneurial subjects. As well as the intensification of competition in Europe, there is an increase in worldwide competition. The necessity of active participation of Czech entrepreneurial subjects at global market is conditioned primarily by the character of Czech economics and its foreign political orientation. The results of this paper contribute new insights on the internationalization process of SMEs in the post-communist country. In the country, where were held significant changes in the economic system 30 years ago and where the majority of companies have a history shorter than 30 years.

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Groundswell monitoring as a supposition for successful brand communication with social media users

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Abstract

Research background: As a result of the growing popularity of social media, especially over the course of the last two years, the number of social media users has grown significantly. The latest statistics show changes in population behaviour on a global scale. As consumers tend to shop online more, the popularity of reviews and opinions of "common people" is growing. As more and more people spend time on social media, businesses increasingly communicate with their customers online. It is very easy for anyone to create a discussion forum on social media in a very short time. It should be noted that opinions presented on these forums have the power to influence other social media users, or visitors of webpages. The groundswell concept plays a crucial role here as in its simplest form it is a tool capable of disseminating information coming not from official institutions but from common people. The impact groundswell has is not negligible, since the activities of opinion leaders can be destructive for businesses. The paper presents the findings of the research into the activities of social media users in terms of the groundswell effect.

Purpose of the paper: The aim of the paper is to use content analysis to identify and point out the presence of the groundswell in the social media environment, and to identify benefits it brings to the communication mix of business entities.

Methodology: In order to fulfil the stated goal of the research, the authors made use of analytical-synthetic methods, deductive and comparative research methods, especially in the second part of the analysis. In order to preserve opinion objectivity, the authors referred to several scientific studies as well as data from research studies from renowned research agencies from Slovakia and abroad.

Findings & Value added: The paper analyses the increasingly frequent groundswell effect (especially in the last two years). The authors point out not only the importance of involving social media users in discussions with businesses, but also of keeping track of such discussions.

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1 Introduction

With regard to the trend of using digital technologies in various sectors of economy, the society faces new stimuli and social challenges (Pacalajova, Kubinec, 2021) especially in the online environment. In connection with the transition to digital solutions (Chen, Wang, Tarry, 2019) in many areas, new opportunities are opening up for businesses, especially in terms of improving the quality of not only the production processes and service provision, but also the communication with the public. Humanity is gradually adapting to the digital revolution, as confirmed by the increase in searches in the Google search engine, as well as the increased popularity of social media and social networks. However, the reasons why people spend more time online these days could not be ascribed only to their need to relax and or be entertained. For an ordinary user of online social platforms such as Facebook, Instagram, YouTube or discussion forums such as *Modrý konik* and *Živé.sk*, these networks mainly represent a communication platform where interactions between friends and strangers take place (some of which might lead to new bonds). According to the research by Boegershausen, online social platforms are one of the key platforms for spreading marketing messages. The strongest tools here are comments under social media posts and tweeting (Boegershausen et al., 2022). With regard to the ever-growing user base of social networks such as Facebook, it is time to discuss the impact the groundswell has on business entities operating on social media - commenting, liking, sharing (Liadeli et al., 2022; Svec, Horecky, 2019). The access of social media users to various data about business entities, as well as "digital activities" of these entities might be a driving force behind users' willingness to engage in discussions (Tiggemann, 2022). All these activities are a driving force behind the groundswell – the concept which affects business entities not only in terms of sales and the overall economic activity, but also in terms of a fan base, as fans may become potential customers in future (Madlenak, 2020). The very communication strategy on social media (which might give rise to groundswell) is heavily influenced by the cooperation between business entities. In particular, business entities should strive to create opportunities for building relations with the public, so as to boost interest in their communication activities (Dufour et al., 2017). With regard to fan base, businesses entities may consider paying people to write comments so as to boost positive image of the business entity and inform the general public about their positive customer experience (Lemon, Verhoef 2016). The positive groundswell and word-of-mouth are likely to transform a passive recipient of information into an active creator of content. The expansion of the groundswell effect is mainly facilitated by the intensive development of information and communication technologies, as a result of which many communication activities take place online, thus spreading among people even faster (Scepkova et al., 2021). In order to grasp the essence of the groundswell and use it to their advantage, businesses must not only map and analyze the behavior of users of social communication platforms, especially with regard to their ever-changing aspects and needs of their users, but they also have to study issues related to cyber security, especially bullying and trolling, as these might open doors to the negative effect of the groundswell (Bezakova et al., 2021).

2 Methodology

The purpose of the paper is to point out the importance of establishing cooperation with communities able to create the groundswell. In this context, the groundswell can be characterized as the activities of individuals (not official institutions) who have gained the support of communities and can influence the opinions of many people in a short time through the use of digital technologies. The impetus for investigating the issue of the groundswell is mainly the increasing number of social media users and members of online discussion groups who can influence and shape public opinion on various social problems. It is the mutual interaction of communities and the groundswell effect that create opportunities for business entities to present themselves without the direct intervention of the business entity. Not only robotization and digitization, which are related to the change in consumer habits (as a result of the coronavirus pandemic, people had only limited options for communication), but also the increasingly popular trend of engaging in and starting online discussion, has taken the virtual world by storm. The groundswell effect has been discussed by leading scientific experts since 2008, but in recent years, the interest of the general public in sharing information and opinions for their own profit has contributed to the growth and importance of groundswell effect, especially in the online environment (Madhavi, Akbar, 2011). Business entities which strongly believe in the quality of their own brand and present themselves with excessive enthusiasm should start paying attention to the groundswell effect. Online communities can provide businesses entities with a new insight into the problems being solved and provide business entities with new opinions and practical advice for improving the product or service provided. In order to carry out an in-depth analysis of the issue, analytical-synthetic methods were implemented. These methods helped us create a logical overview of the problem and allowed us study the issue from several points of view so as to find connections between them and bring a new perspective. The research also made use of inductive and deductive reasoning so as to evaluate individual connections between the investigated phenomena. The method of analogy and generalization allowed us to make certain predictions of the future state of the addressed issue, while taking into account current findings and limitations. Given the cyclical nature of the development of social communication platforms, as well as changes in the habits and behaviour of users of social networks, the terminological basis connecting theoretical as well as practical starting points of the investigated issue has been drawn up. Main information sources include monographs and peer-reviewed papers from abroad as well as opinions of Slovak experts on the issue. The opinions of the authors of the paper are based on several years of experience and the results of the research in the field of innovative online communication tools.

3 Results and discussion

The groundswell can be described as a dominant factor not only in marketing communication but also in other activities of business entities. Monitoring and evaluating the activities of social media users can be a challenge for today's business entities. The communication of business entities and other social media users (whose primary purpose of visiting the social media platform is not to read and share the promotional outputs of business entities) differs significantly. While business entities' communication activities on social networks aim at building awareness of their business activities, maintaining and acquiring customers, presenting new products and services, a common user of a social network usually logs into his or her account for completely different reasons (Wang, Carte, Bisel, 2020). It is assumed that the increased interest of users in social media is not down to the increased presence of business entities on these platforms. Baumann clarifies that users of social networks could be

divided into those who are able to search and assess relevant information by themselves, often using foreign sources and those who do are not (Dahana, Miwa, Baumann, Morisada, 2022). It is beneficial for business entities if consumers write and share reviews based on their own experience with the product on social media or business entity's website. Therefore, after reading such comments and reviews, Internet users as well as social media users gain more confidence in the given business entity (Nawi et al., 2019) and, in some cases they are also able to build their social status and climb up the virtual social ladder, as everyone wants to be part of a community where they feel respected and their opinion matters. In the online environment, acquiring customers and fans is a simple activity. The best way to maintain the attention of a user of a particular social network is to interact with him and address his needs (Gómez-Urquiza et al., 2020; Kanaveedu, Kalapurackal, 2022). The groundswell trend is sometimes accompanied by eWom (electronic word-of-mouth), which, in view of negative reviews shared online, might offer business entities several opportunities (Hasan et al., 2021). With regard to the customer's purchasing process, it is necessary to include the time spent on social networks in this process, as we are currently observing the trend of purchases directly via social networks, so leaving the social network page is no longer necessary for the purchase.

It is therefore appropriate and even desirable to create a space for users of social networks to express their own opinions and ideas. If the business entity offers its customers and fans the opportunity to share their own thoughts, customers can get the feeling that their opinion is important (Quach et al., 2021). This can bring the desired effect in the form of building and maintaining a relationship between the customer/fan and the business entity. Discussions led by social media users might help potential customers to make an informed decision. Social media users also have their place in citizen journalism as they share tips, experience, comments and also help building brand awareness and increase traffic to the business entity's website. Social networks keep offering new tools not only to users to keep them entertained but also to businesses to help them reach target audience. It is important that business entities create and distribute brand-related content in a way that satisfies one or more consumer motives for interacting with the brand. The more the consumer's needs can be satisfied through specific media content, the higher the perceived value of the content. Furthermore, the importance of regularly rewarding visitors and fans of businesses' social network should be highlighted (Katsikeas et al., 2019; Rocha et al., 2019). The effect of message communicated through social media can be felt immediately compared to mainstream media. It is important to note that social media platforms are able to boost brand reputation in two ways - business entities can build their reputation themselves by interacting with their fans directly, thus creating groundswell effect; or social media users can initiate communication themselves, thus creating groundswell effect.

The motivation of social media users to engage in communication with business entities should ideally be based on their own convictions. Social media communities may start engaging in communication with business entities based on their own convictions or based on an input from the business entities themselves. It should be noted that community members can join the discussion anytime and anywhere key role in the communication between social media users and businesses entities is played by audience interaction (Wong, 2023). Businesses should communicate in such a way and create such content that would appeal to the audience so much that they start interacting with them. However, interactions with the audience on social networks are no longer evaluated only in terms of conversion rate, e.g. the number of clicks on the campaign. However, it is extremely important to motivate social media users and engage them to interact with the page and boost the groundswell effect. Menon states that in order to engage the audience (commenting and sharing the posts), business entities should make use of audience motivation and rewarding

models (Menon 2022). Social media users are often the initiators of conversations about businesses, but they usually do so because of negative reasons (Li et al., 2021). However, we would also like to point out the tools using which businesses could engage the audience and still keep communication under control. Businesses can engage the audience by encouraging them to comment on posts, thus initiating a discussion. Thanks to the discussion business entities could find out opinions of their followers on a specific issue (e.g. choosing the colour range for new t-shirts collection). Commenting on social networks is currently a widespread communication tool, which gives business entities the opportunity to engage many audiences. This audience interaction shows that social media users are willing to devote their time to contribute to the discussion (the basis of the groundswell effect). Controversial topics and posts, naturally, are commented on more often. It follows that comments on social media can create and increase the power of the groundswell on social networks. Users of social networks communicate not only with their friends, but they are increasingly asking questions, arguing with one another, name-call each other, and criticize everyone and everything, thus giving rise to the groundswell.

According to Berraies, social networks are also exploitative. As social networks provide room for the development of user creativity and further sharing of ideas, users' attention, activities and data get commodified (Berraies, 2019). When analysing content shared by opinion leaders and opinion opponents, the sentiment analysis of the feedback of individuals or communities commenting on the posts is of great importance. Sentiment analysis makes it easier for business entities to accurately identify complex business aspects with regard to opportunities for improving current communication models. In order to carry out the sentiment analysis, business entities have several tools at their disposal, e.g. Mediatoolkit, Social Searcher, Brandwatch, Social Mention and more. Analyzing the sentiment of social media users' comments can help business entities in their decision-making. The software created for this very purpose can evaluate the intention as well as the emotion or intention behind specific textual information which may not be correctly understood without additional analysis. Business entities must take into account the investment that such software requires. However, using this software business entities can better understand the needs of fans as presented in the online environment and thus change the way they present themselves to make their image more appealing. Tools such as Semrush, HubSpot Marketing or Influenex, the purpose of which is to monitor and evaluate conversions, can be included among the simpler and more affordable alternatives able to monitor the interactions of social network users. By using social media analytical tools regularly evaluating activities of fans on social networks, business entities can gather important data (e.g. who are the followers of the page, what and where they write about the business entity, etc.).

4 Conclusion

In order to remain relevant, business entities should invest in sustainable communication on social media. Groundswell activities like discussions with social media audience and evaluation of opinions' sentiment and the content of posts shared in various discussion groups can significantly improve the market position of the business entity and its perception among consumers. It is a great way to use the online environment and the tools that social media offer for the benefit of business entity's activities. With criticism, the key is the sentiment of posts shared by social media users about the business entities as these opinions penetrate into various community groups. In this regard, context in which business entities are discussed is also important. By being present on social media, business entities are able to monitor not only activities of social media users but also groundswell. By doing so, business entities are able to utilize information gained and improve their image. Thanks to the publicly presented

opinions of individuals, business entities can, among other things, solve the problem of small fanbase. On social media, individuals spark and engage in discussions focused on specific products, brands or people (especially in the context of political marketing). Commenters can share their own positive experience with the products or services of a specific business entity, share valuable information (evaluated as favourable from the point of view of sentiment) and, ultimately, can significantly improve the communication skills of business entities. Lastly, we also contend that, in the face of the continued research of groundswell effect and technological turbulence, has become increasingly more relevant and important.

Acknowledgements

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Brexit: The Disintegration of Great Britain from the European Union in the Context of the Foreign Trade development

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Abstract

Research background: Britain formally left the EU single market on January 1st, 2021, believing that backing out of integration will allow better exploitation of its trade opportunities without regulation within the common market. Pandemic has affected trade, productivity, global growth, etc. Brexit has brought new trade arrangements (documenting the rules of origin, sanitary checks, import and export declaration) and even if the trade exchange continues in free trade regime, the trade was hit significantly. UK's foreign trade with the EU depressed by 9 % in UK exports to the EU and by 15% in UK imports from the EU since the beginning of 2021 compared to 2019.

Purpose of the article: Is primarily to evaluate the trade position and attitudes of the United Kingdom towards European integration in the period before and after the disintegration from the European Union. The paper is mainly focused on the development of foreign trade in goods within a period of ten years, it monitors the complementarity of mutual trade and forecasts the possible course of development of mutual trade exchange. The intention is to evaluate the changes after Brexit in the development of exports and imports, while comparing the year 2021 with the year 2019 and monitoring the changes in the most important export commodities prevailing in mutual trade.

Methods: analysis, complementarity index, MS Excel forecast.

Findings & Value added: The Brexit and Trade and Cooperation Agreement (TCA) led to decline in mutual trade exchange. While UK export gradually recovered, import remained weaker. The selected product groups were covered by the research, the complementarity index was evaluated, and the future development was estimated.

Keywords: *Brexit; United Kingdom; European Union; integration; foreign trade.*

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1 Introduction and literature review

The United Kingdom has played a specific role in European integration process since the very beginning. In the eighteenth century the country became a world leader in international trade, it was the most economically and industrially developed country in the world, controlling more than a quarter of the world's population. Therefore, the United Kingdom is characterized by its position within the framework of integration into the European community as a nation that primarily wants to act autonomously. The UK´s position within the European Community was special. Great Britain required individual conditions already in accessing process (for example a request for preserving existing preference agreement within the Commonwealth), and even as a part of EU integration UK has struggled between deepening of integration and the conception of "UK greatness in geopolitics" and preservation of the self-protection capability. Finally Global Britain concept under Theresa May and Boris Johnson resulted in Brexit (Rogstad and Martill, 2022).

The term Brexit, associated with the disintegration of the United Kingdom from the European Community, was first used in 2012 by Peter Wilding in his blog, where he criticized the EU's stance on the financial crisis – the fact that the EU cannot create a mechanism for the successful functioning of the single market, in which the UK also participated, mainly due to the fact that the members of the Eurozone cooperate with each other in much closer contact towards the creation of a political union. In case of ever-deeper integration, this would mean that the UK could leave the EU, what he described as Brexit (Moseley, 2016).

Dhingra and Sampson (2022) studied the consequences of voting for Brexit and even if uncertainty has led to higher import and consumer prices, lower investments, slower real wages and GDP growth, on the aggregate level was small or none diversion away from trade with EU countries.

Brexit studies were either optimistic and predicted growth in UK trade, or pessimistic, expecting a slump. Latorre et al. (2019) estimated that UK will face foreign trade losses: 3.17% in case of hard Brexit, half in case of Norway like arrangement. They also predicted the decline of domestic firms' productivity and entrance of less competitive companies on the market due to protectionist measurement. Wenz et al. (2020) evaluated no agreement Brexit scenario and expected short time adverse effect on production in both UK and EU, shrinking of sales markets and finally negative long-term consequences for economic development of UK and lesser also for the EU. Stack and Bliss (2020) predicted asymmetric effect of Brexit with UK trade declining (with EU, FTA's and EPA´s); only minor changes are expected in EU trade. Srovnalikova and Razinskaite (2017) estimated positive short-term impact of the pound exchange rate fall on the growth of UK exports. In the long term, they estimated that the UK's foreign trade volume would decrease. The export growth effect was confirmed by Celebi (2021), who argues that UK exports have increased since the referendum most likely due to the depreciation of the British pound after Brexit.

Dhingra et al. (2017) found that Brexit reduces the welfare of the average British citizen, with welfare losses being lower in the case of a soft Brexit. The results will therefore depend on the future of trade relations between the UK and the EU. However, the decrease in trade with the EU (due to reduced integration) will outweigh the effect of lower contributions to the EU budget. Similarly, Chang (2018) estimates that the UK's living standards will most likely decline due to Brexit. Ortiz Valverde and Latorre (2020) estimated an impact on UK´s welfare especially in case of hard Brexit. Even if the UK abolishes all tariffs in relation to all

its trading partners, it will be difficult to cope with, or to compensate for, the losses associated with Brexit.

Anderson and Wittwer (2018) dealt with effects of Brexit on the UK´s as well as world´s wine market – and projected uncertainty and decline in UK wine market particularly as a result of real incomes fall in UK, initially because of higher import tariffs. However, even in the case of the EU-UK FTA, international trade with wine will be negatively affected as a result of Brexit.

According to Kittova and Krivosudska (2020) and Krivosudska (2021) it was necessary to preserve the preferential nature of mutual EU-UK relations, considering that they were able to increase the intensity and complementarity of their trade to a high level.

Graziano et al. (2020) argue that the uncertainty associated with Brexit does not affect only trade with the EU (the reduction), however, Brexit also affects a large part of trade with third countries by imposing new externalities associated with political uncertainty.

2 Methods

The purpose of the paper is to evaluate the trade position and attitudes of the United Kingdom towards European integration in the period before and after the disintegration from the European Union. The paper is mainly focused on the development of foreign trade in goods within a period of ten years, it monitors the complementarity of mutual trade and forecasts the possible course of development of mutual trade exchange. The aim of the paper is to evaluate the changes after Brexit in the development of exports and imports, while comparing the year 2021 with the year 2019 and monitoring the changes in the most important export commodities prevailing in mutual trade.

To achieve the main aim, several theoretical methods in form of general methods and an empirical method of the complementarity index were used. To analyse economic prediction of the complementarity index of the 2-annual period based on the polynomial of the 2nd degree and the coefficient of determination as well to project the trend of future UK-EU relations MS Excel forecast was applied.

We have analysed the level of the current UK trade and the UK-EU trade while in the field of commodities we focused on the analysis of trade on the basis of individual items in export to and import from the EU. In terms of evaluating the impact of Brexit on mutual trade we have compared the level of mutual trade focusing on the last statistically significant period of 2019 versus 2021.

As part of the analysis of mutual trade between the EU and the United Kingdom, we used the trade complementarity index to measure the extent to which two countries or "natural trading partners" have overlapping imports and exports (Kašťáková et al., 2019) – it indicates whether they are ideal trading partners or competitors. The index itself analyses, among other things, the advantage of a trade agreement for the region or the whole. Thus, the complementarity index also acts as a qualitative indicator of business expansion. Trade complementarity (TC) index between countries k and j is calculated as follows (World Bank, 2010):

$$TC_{ij} = 100x\left(1 - \sum\left(|m_{ik} - x_{ij}| / 2\right)\right) \tag{1}$$

Where:
x_{ij} – the share of good i in global exports of country j,
m_{ik} – the share of good i in all imports of country k.

When the index is zero, no goods are exported by one country or imported by the other. On the other hand, when $TC_{ij} = 100$, the export and import shares exactly match (World Bank, 2010). When the $TC_{ij} > 50\%$, the countries are ideal trading partners; when $TC_{ij} <$

50%, the countries are trade competitors. TCI thus provides a qualitative indication of the extent of trade expansion based on the preferential agreement. The higher the index, the more would both countries benefit from a bilateral or regional agreement.

3 Results and discussion

In the next part, we will present, based on the officially available data from the statistical databases of the United Kingdom, the individual consequences of the UK disintegration from the European community resulted in their mutual foreign trade.
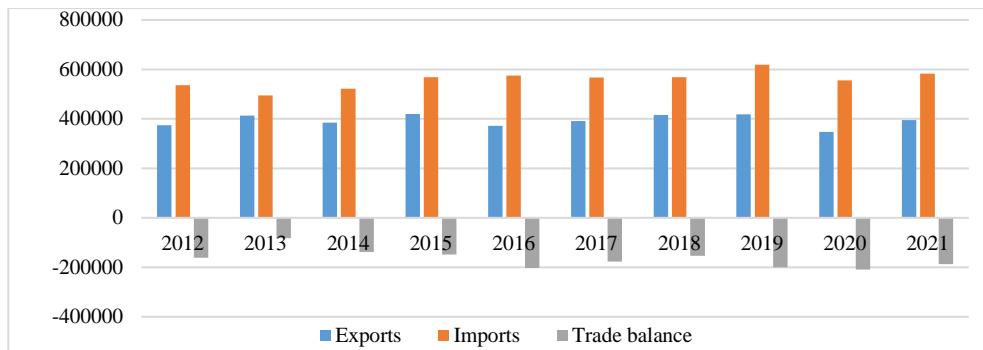

Figure 1. The development of the UK´s foreign trade (million EUR, 2012 – 2021).

Source: own elaboration based on ITC (2022)

During the period under review, the development of UK foreign trade was relatively stable, reaching its lowest values in 2013 and 2014 and the highest values in 2019, when the total trade exceeded EUR 1 trillion. During the entire period, import values exceeded export values, which resulted in a trade balance deficit. As for the year-on-year changes in the value of both exports and imports, they were most pronounced in the pandemic year 2020, when the value of exports fell by 17%, while imports fell by 10%. Export in 2021 declined by 5% and import by 6% compared to the year 2019 (Table 2).

3.1 UK – EU trade

With the expiration of the agreed transition period on 1 January 2021, the UK definitively withdrew from the EU. To the end of the transition period, both parties managed to negotiate and conclude the Trade and Cooperation Agreement (TCA) which entered into force on 1 May 2021. The TCA defines mutual foreign trade relations whereby goes beyond normal traditional free trade agreements and thus creates a basis for maintaining long-term economic cooperation (European Commission, 2021). The UK–EU trade remain quota and tariff free. However, disruption of trade has been significant, it has become more costly and time consuming to trade with EU, considering that exporters and importers must deal with bureaucratic requirements. However, it should be noted, that other factors, namely Covid-19 pandemic consequences as well as non-tariff barriers negatively affected trade.

Bennett and Vines (2022) point out that the application of Rules of Origin (RoO) and other non-tariff barriers threatens free trade. UK Trade Policy Observer reported, that to meet RoO requirements, some exporters, even if meeting the RoO, prefer to pay tariffs rather than go through paperwork and additional costs for providing proof of origin. As a result, duty-free access is not always applied, and the exporters most likely choose to pay tariffs if

difference between the most favoured nation (MFN) and zero-tariff under the TCA is low. Preference utilization rate (PUR) is 74% (more details in Table 1), which means that 26% of UK exporters are paying taxes despite of TCA preferences and their products are finally less competitive. Up to 87.19% of UK–EU trade was tariff free and the duty savings reached 1841 million pounds. The highest PUR is under the tariff rate above 20% (PUR = 91%), in tariffs ranges between 1% to 5% PUR is only 69.5% (Ayele et al., 2021).

Table 1. UK – EU trade January – June 2021.

Preferences utilisation rate	74.06%
Tariff free trade	87.19%
Duty savings	1841 million Pounds
Duty saving rate	77.5%

Source: own elaboration based on Ayele et al. (2021)

UK export of goods to the EU shows stagnation or decline throughout the whole examined period with exception of reinforcement in 2017 and in 2018, when the export value reached its highest level. In 2020 export to the EU decreased by 10%. UK imports to EU grew by the year 2015, then stagnated until significant decrease by 15% in 2020 (Figure 2 and Table 2). As the 2020 values were distorted by the outbreak of the pandemic, we also reported the percentage change in exports and imports in 2021 compared to the 2019 values. In comparison to the development of the total value of UK´s exports and imports, the decrease of the UK´s exports to the EU and imports from the EU were more pronounced, especially on the imports´ (declined by 15%). In 2021 export value increased by 6% but did not reach 2019 levels. Compared to 2019, it decreased by 9%.
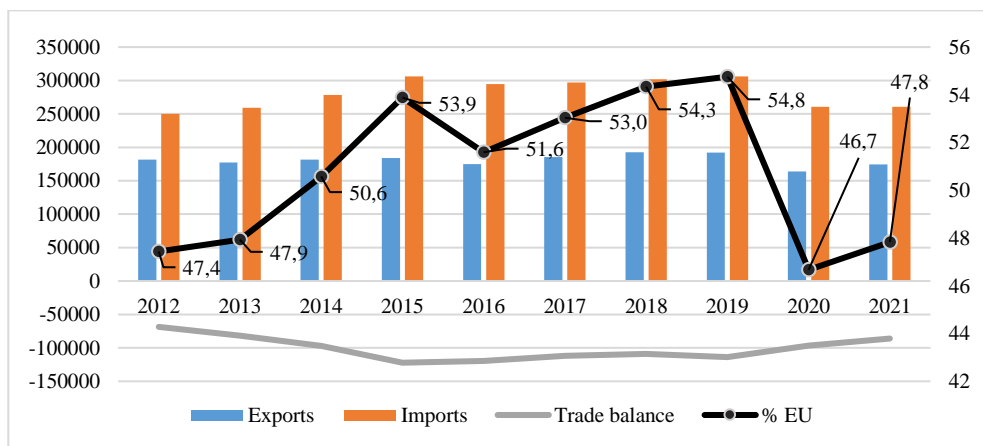

Figure 2. UK – EU trade in goods (million EUR, 2012 – 2021).

Source: own elaboration based on data from ITC (2022)

Table 2 shows the percentage changes of the UK's exports and imports to and from the EU in comparison with the changes recorded by the total exports and imports of the UK in the monitored period.

Table 2. Year-on-year changes in UK trade and in UK-EU trade – in %.

	2013	2014	2015	2016	2017	2018		2019	2020	2021	2019-2021
YoY change in UK exports	110	93	109	89	105	106		101	83	114	95
YoY change in UK exports to the EU	98	103	101	95	106	104		100	90	106	91
YoY change in UK imports	92	106	109	101	99	100		109	90	105	94
YoY change in UK imports from the EU	104	108	110	96	101	101		101	85	100	85

Source: own elaboration based on ITC (2022).

In January 2021 Britain's export reacted significantly to disintegration from the EU common market and its value declined by 47% compared to previous month. This fact can be explained by the disability of individual traders to absorb all information regarding the changes in administrative controls and additional procedures on the border with EU. However, after a strong slump in January, the trade during February and March 2021 returned to the values reached in the pandemic year 2020, and its subsequent development is relatively stable.

In imports to the United Kingdom, the decline is slower than the one in export. Overall, the return of trade to the contours of the last months of 2020 is not so significant (ITC, 2021). One of the reasons why import was more affected than export was EU exporters' giving up the problems of exporting products to UK. British Federation of Small Business presented the results of the survey concluding that 17% of export business suspended exporting activities (The Economist, 2022).

3.1.1 Commodity structure

The majority of HS2 items in UK import fell, the TCA had negative impact primarily on Chemicals (-50.3%), Animal and vegetable fats and oils (-46.1%), Footwear (-45.1%) and Leather (-41.7%) On the contrary, the export decline of dominant export item was stabilised relatively quickly, actually some items, like Wood (23.9 %), Machinery and electric equipment (3.2%), Precisions tools (14. 2%), Arms and ammunition (2.2%) and Animals and animal products (1.1%) even reinforced their position. However, the export to EU of items such as Footwear (-77.2%), Animal and vegetable fats and oils (-63.6%), Textile and clothing (-60.2%) and Vegetable products (-43.5 %) fell significantly.

For foodstuff and agriculture, the negative impact is the most probably caused by increased border inspections and increased documentation requirements within sanitary and phytosanitary norms. In other sectors the decrease is more likely driven by the low preferences utilisation. The value of UK exports to the EU in January – July 2021 without preferences was between 7.89 billion to 10.56 billion pounds, as a share of total UK exports to the EU it represents 26% – 32%. Potential duty savings under TCA could reach 2376 million pounds, but actual saving reached only 1841.6 million pounds (77.5%). The highest PUR was reached for Live animals (96.6 %), Mineral products (95.7%) and Vegetable products (91.1%), vice versa, the lowest PUR had Footwear (22.8%), Hides and skins (30.4%) and Textiles (43%) – items that has significant decline in both import and export. Table 3 shows the selected commodities by HS section and gives information on TCA effect

on export and import, PUR and rate of free trade tariffs, for the period from January to July 2021.

Table 3. TCA effect on UK export and import to EU (January – July 2021, in %, selected commodities by HS sections).

HS sections	Import	Export	PUR	Tariff free trade
Vegetable products	-24.3	-43.5	91.7	94.5
Animal and vegetable fats	-46.1	-63.6	89.19	97.65
Chemicals	-50.3	-0.5	82.77	92.28
Textile and clothing	-23.3	-60.2	43.11	51.8
Machinery and electric eqp.	-23.0	3.2	63.96	80.51
Footwear	-45.1	-77.2	22.77	34.39
Metals	-28.9	-12.9	75.36	90.26
Animal and animal products	-40.1	1.1	96.56	97.65
Wood	-1.1	23.9	81.03	93.06
Plastic and rubbers	-21.8	-11.5	79.02	81.56
Transport eqp.	-24.6	-8.3	71.03	75.22
Misc. manuf.	-30.5	-15.3	60.15	76.36

Source: Ayele et al. (2021)

3.1.2 The complementarity index

The complementarity index was used to analyse trade between EU and Great Britain. The index is indicating the extent to which the partners are competitors or ideal trade partners. The index reached following values shown in Table 4.

Table 4. UK – EU complementarity index.

Year	Complementarity index in %
2012	76.94
2013	77.05
2014	77.65
2015	79.14
2016	81.41
2017	80.94
2018	79.71
2019	79.03
2020	78.81
2021	74.68

Source: own calculation

Quantified index shows that exports and imports within grouping largely coincide – thus the EU and the UK are ideal trade partners. As a result of the Great Britain disintegration from the EU single market and customs union, the complementarity index fell by more than 4.13 points in 2021, the highest decline within the last decade. Based on previous analysis we estimated the future development of the index of complementarity for next 2 years using MS Excel forecast.
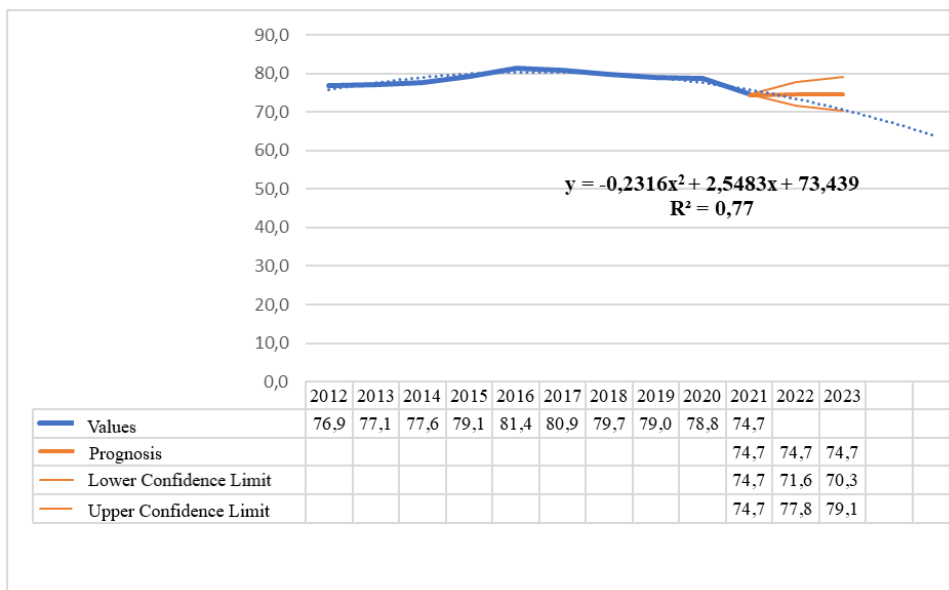
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Values	76,9	77,1	77,6	79,1	81,4	80,9	79,7	79,0	78,8	74,7		
Prognosis										74,7	74,7	74,7
Lower Confidence Limit										74,7	71,6	70,3
Upper Confidence Limit										74,7	77,8	79,1

$$y = -0,2316x^2 + 2,5483x + 73,439$$
$$R^2 = 0,77$$

Figure 3. Complementarity index development and forecast.

Source: own calculation using MS Excel

The coefficient of determination R^2 is showing strong correlation dependence and thus provide a relatively reliable estimate of the future complementary index development. The variant at the lower limit of reliability shows prognoses with a strong dependence of correlation. Therefore, we can assume that the complementarity index will fall to 70% over the next two years. Several factors might contribute to this, for example increasing shift from the trade with the EU, simplified administrative in declaring the origin of the goods, that was already in use in 2021, continuing global recession and energy crisis, etc. Therefore, we are convinced that the level of the complementarity index will continue to represent a slightly negative growth trend in the future projection.

3.2 Discussion and conclusion

The results of the analysis of mutual foreign trade relations of the UK and the EU confirm the forecasts of economic theorists about the decline of both the total UK foreign trade and trade with the EU. Srovnalikova and Razinskaite (2017) predicted UK trade decline, Latorre (2019) expected decline of UK trade by maximum 3,9%, in real terms UK trade has declined by 5% – 6% in 2021 compared to 2019. In UK-EU trade exchange Dhingra and Sampson (2022) estimated small or no diversion away from trade with EU. Our analysis confirmed decline of UK exports to EU by 9% and import by 15% in 2021 compared to 2019, however after a sharp decline in the first months of 2021, mutual trade gradually grew, even though it was primarily UK export to the EU, which recovered faster.

Brexit means higher trade costs. Despite the fact, that the TCA allows no-tariff access to markets, exporters did not always apply them. Especially in case of low MNF tariffs, they preferred MNF regime to avoid time and money consuming originality proof to fulfil the RoO requirements. Therefore, PUR reached only 74%.

Other circumstances affecting mutual trade include:

- Increase of transport costs and reducing of efficiency of transport from the UK to the
  EU, not only due to changes within TCA, but also due to the increase in fuel prices.
- Overall trade slowdown due to anti-pandemics measures and Ukraine conflict.

The article points out the benefits of deeper integration for international trade, the short-
term experience after Brexit so far shows that the FTA agreement is not an equivalent variant
of EU membership from the point of view of foreign trade exchange. We may conclude that
Brexit, or the introduction of the TCA has reduced UK-EU foreign trade, reduced the
complementarity index and is expected to continue to decline, at least in the short term.

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Why is digital transformation significant for SMEs?

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Abstract

Research background: Due to their adaptability, small and medium-sized enterprises (SMEs) play an important role in economic systems and contribute significantly to economic growth. But just like larger enterprises, SMEs are subject to a variety of risks that have an impact on their performance. Moreover, they are more frequently confronted with these risks compared to large companies.

Purpose of the article: Digital transformation as a pervasive phenomenon has political, social, and economic implications. Companies cannot ignore the social and economic phenomenon of digital transformation, as digitalization could significantly influence the enterprise's success. SMEs can now strengthen their competitiveness by developing new products and services or streamlining their manufacturing procedures thanks to digitization.

Methods: The methodology used in the papers is based on the literature review of the studies aimed at digital transformation as one of the competitive advantages of SMEs. The information obtained from the literature is critically analyzed and compared. Based on the deduction, the main issues of digital transformation for SMEs are stated.

Findings & Value added: Digital transformation influences all aspects of a company's operations and goes beyond simple digitalization. It ultimately changes the business logic of the organization. It also helps to establish new business models. Based on the previous knowledge about risk in the SME environment, we can identify a lack of knowledge and managerial skills, digital leadership, and costs as one of the main threats from the digitalization point of view.

Keywords: *SMEs; digitalization; digital transformation; risk*

JEL Classification: *L26; O31; O33*

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1 Introduction

Due to their adaptability, small and medium-sized enterprises (SMEs) play an important role in economic systems and contribute significantly to economic growth (in the European Union, SMEs account for 99.8% of all businesses, with microenterprises accounting for 93% of all businesses). Despite having little economic influence, they are considered the main forces behind each economy for this reason (Isensee et al., 2020). SMEs are regarded by the European Union as being the backbone of the European economy and being crucial to Europe's competitiveness, prosperity, economic or technical sovereignty, and resilience to external shocks (European Commission, 2020). It might result from how adaptable, effective, and progressive they are. But just like larger enterprises, SMEs are subject to a variety of risks that have an impact on their performance (Lee et al., 202). Moreover, they are more frequently confronted with these risks compared to large companies (Lima et al., 2020). SMEs are susceptible to life-threatening bankruptcy, which can be brought on by various causes, as demonstrated by Rico et al. (2021). The two main factors contributing to their failure are little diversification and increased risk exposure (Reim et al., 2022). What's more, risk management guidelines are designed with large corporations in mind, making it inappropriate to adopt them without adjusting to the circumstances of SMEs. Various authors as for example Abu Hasan et al. (2022), Zoghi (2017), Rico et al. (2021) or Belas et al. (2021), identify a lack of managerial expertise, demographic factors, personnel issues, and organizational structures, lack of technology adoption, as well as low levels of diversification, insufficient funding, restricted access to capital, and a lack of managerial training as the main obstacles to risk management implementation in SMEs.

One of the biggest importance of SMEs lies in creating workplaces because SMEs are considered the most important source of job offers, significantly increasing the employment rate. According to European Commission (2020), SMEs are responsible for creating almost every second workplace in the European Union. The ability of SMEs to maintain a balance at both the micro and macroeconomic levels is another crucial function. These middle-class businesses provide a counterbalance to oligopolies and monopolies and lessen the power of giant corporations to dominate the economy (Saary et al, 2020). Their significance is further demonstrated by the fact that it is currently popular for large corporations to collaborate with SMEs to provide specific goods or services that they need.

In the context of the above-mentioned characteristics of SMEs, the aim of the presented paper is to point out the importance of digital transformation for SMEs based on the analysis of the present literature focused on the issue of digitalization and digital transformation. The structure of the article is as follows. The first part is focused on the introduction to the importance of SMEs in the economy, the second part describes the used methods, the third part analyses digital transformation, and it smoothly eventuates into conclusions where the main perspectives of digital transformation for SMEs environment are proposed.

2 Methodology

The methodology used in the papers is based on the literature review of the studies aimed at digital transformation as one of the competitive advantages of SMEs. The information obtained from the literature is critically analysed and compared. Based on the deduction, the main issues of digital transformation for SMEs are stated. As it was mentioned above, SMEs are very flexible. Still, on the other hand, most of them have to face a shortage of sources, which are very important in implementing digitalization with simultaneously profit and business running on their mind (Saary et al., 2022; Lee et al., 2020).

At first, we consider it important to distinguish between the terms digitalization, digital transformation, or industry 4.0, which are often used as synonymous. Still, they need to be distinguished in their understanding and in the context of their creation.

The term digitalization could be defined as the process of transforming analogue data into easily processed digital data, which is utilised more frequently. All internal, organizational, and support procedures as well as the company's goods and services, can be digitalized. By utilizing data and digital technologies more, the business will be able to perform better, save money, or generate more revenue (Reim et al., 2022). Progressive digititalization is upending entire industries worth billions of dollars. Because the business strategies and procedures of established market leaders are out of date and unable to adapt to changing market conditions, digitalization frequently has a disruptive nature. Digital technology and associated services are one of the two key drivers of digitization, according to Saary et al. (2022). The other is how the market's invisible hand reacts to changing customer needs. Many authors link business digitalization with environmental sustainability, but Isensee et al. (2020) or Lee et al. (2020) claim that heavy use of digital technologies has also negative repercussions that necessitate a sustainable digitization process. But it needs to be said that the business sector is not the only one affected by digitization; it is also quickly permeating the public sector and altering how public organizations, authorities, and governments operate (Saary et al., 2022).

The theory of Industry 4.0 (also called the 4th industrial revolution or digital revolution) aims to make the market more intelligent, dynamic, and adaptable (Franco et al., 2021). Although Industry 4.0 and digitalization are often replaced their meaning is different. Digitalization is rather a condition for successful implementation of Industry 4.0, which represents a future focus mainly on the digital environment and maximum digitalization processes in companies that will lead to changes in the market and the behaviour of their users (Saary et al., 2022).

3 Results and Discussion

The digital transformation of organizations, which is defined as rethinking and rebuilding business processes using technology to increase resource efficiency and performance, is one of the current focal points of the European Union. It creates new possibilities for companies and consumers, supports the EU's transition to a greener economy, funds workers' training in this field, and digitizes public services without compromising citizens' fundamental rights and values (European Commission, 2022). The necessity of digital transformation is also depicted by the requirement that member states allocate funds for recovery and resilience at least 20 % for digital transformation. (European Commission, 2021).

Digital transformation as a pervasive phenomenon has political, social, and economic components. It is a complicated development that has an impact on both the economy and society. Afonasova et al. (2019) take a similar stance toward digital transformation, evaluating it from the perspectives of two levels: first, as a phenomenon in which new digital business models and processes restructure the economy, and second, as a social phenomenon in which the entire society and its inhabitants integrate digital technologies into their lives and habits. Therefore, a transformation occurs on both a social and economic level.

Companies cannot ignore the social and economic phenomenon of digital transformation as digitalization could significantly influence the enterprise's success (Franco et al., 2021; Afonasova et al., 2019). Small and medium-sized businesses can now strengthen their competitiveness by developing new products and services or streamlining their manufacturing procedures thanks to digitization. Eller et al. (2020) state, for example, that the usage of social media enhances the financial performance of SMEs by lowering marketing expenses and fostering better relationships with clients. We can also mention the

study of Ahmad et al. (2020), which is focused on the theoretical underpinnings of how SMEs may use digitalization to advance their business. Digital transformation provides a challenge that many SMEs, in particular, find difficult to meet. Although this knowledge OECD (2017) claims that level of digital transformation of SMEs is still low also in the areas which are connected with digitalization (for example, cloud computing). The challenge for SMEs is that while they are small enough to create the necessary resources, they are also large enough to make the digitalization process very expensive for them (Saary et al., 2022). This concept is supported by the OECD study (2021), which states that although small and medium-sized businesses greatly benefit from new digital processes, tools, and services, they lag behind in adopting digital technologies. For SMEs, digitalization opens up previously unimaginable chances to get past size-related obstacles to innovation, growth, or international expansion. The gap between SMEs and large enterprises is the smallest in the area of business-to-government interaction, when using electronic invoicing, in the area of social media or online sales. SMEs, however, tend to digitize some functions, especially general administration and marketing operations. Contrarily, the technological divide between major corporations and the SME group widens as technology advances. This is particularly true for enterprise resource planning software, where business scale is essential to manage both the cost and complexity of software deployment.

As a result of recent environmental, social, economic, and technological developments, businesses face new fundamental challenges (Isensee et al., 2020, Reim et al., 2022; Lee et al., 2020). These include, among others, the issue of too high competition, lack of qualified employees and increasing pressure on quality. OECD (2017) listed other significant obstacles to digital transformation as the price of the technology and insufficient capital. Lee et al. (2020) stated other significant obstacles to adopting digital technologies, which include the price of those technology as well as a lack of sufficient capital. These costs include not only the actual digital technology but also the associated expenses and investments necessary to enable successful adoption, such as the price of linked services and the investment in process innovation and training (Eller et al., 2020).

These circumstances put companies under stress, and therefore they are forced to take steps to optimize processes (Saary et al., 2022). With globalization, not only new opportunities appear but also risks and threats. That is why it is important for companies to respond quickly and effectively to digital transformation (Abu Hasan et al., 2020). Topics such as process improvement, efficiency, profitability, and long-term development of the company are the goals of a modern global company (Saary et al., 2022). Therefore, according to Eller et al. (2020), digitization is the right direction to achieve these goals. It is also proved by Reim et al. (2022), who claim that digital transformation influences all aspects of a company's operations and goes beyond simple digitalization. It ultimately changes the business logic of the organization. It also helps to establish new business models. In other words, a shift in the business model brought on by adopting digital technology is inextricably tied to digital transformation. It is in line with the European Commission (2021), which states that modern technologies integrate physical and digital systems and combined with creative business models and processes, lead to the production of smart products and services with a significant productivity improvement.

Digital transformation involves transforming the entire business model in addition to internal process optimization and technology adoption. Therefore, when managers of small and medium-sized businesses make strategic decisions in the area of digitalization, they cannot assume that these actions will immediately result in an improvement in the company's performance. Instead, they must simultaneously adapt or change the business model (Eller et al., 2020). Technology is not the driving force behind digital transformation, according to Lee et al. (2020), but the ability to integrate it. Clear digital strategy, along with a culture and

leadership prepared to guide the company's transition, are what set digital leaders apart from the competition. In other words, companies in the early stages of digital maturity make the mistake of placing too much emphasis on particular technologies rather than prioritizing the transformation of business practices. Reim et al. (2022) highlight the fact that managers seeking to improve organizational performance with digital technologies want to implement a specific tool rather than consider digital transformation as a broader business strategy.

Based on the previous knowledge about risk in the SME environment, we can identify a lack of knowledge and managerial skills as one of the main threats from the digitalization point of view. And according to European Commission (2022), especially digital leadership is concerned with successful digital transformation. European Commission also stresses that digital leaders need to understand how technology may help enterprises to achieve their goals, empower employees and realign tasks and organisational structure to adapt to a changing entrepreneurship environment. But most SME entrepreneurs are focused not on defining the strategy (as a long-term view in connection with digitization is necessary) but on the operational goals (Lima et al., 2022). The inability to plan, manage, and optimize digital transformation is one of the issues in this situation (Franco et al, 2021). Information technology, competent staff, and a digital strategy are the three primary drivers of digital transformation in SMEs, according to Eller et al. (2020). SMEs are becoming more digital thanks to information technology like cloud computing, social media, and numerous analytics. IT has also been demonstrated to improve a company's financial performance by enabling them to reach a larger consumer base (Saary et al., 2022). An educated staff is essential to SMEs' digital transformation, but most of the employees are under-educated in this area (Ahmad et al., 2022). Small and medium-sized businesses typically spend less on employee skill-upgrading training (Zohghi, 2017). In addition to technology, digitization also depends on human capital because adopting new technologies depends on skilled workers. SME managers should encourage their staff to gain the appropriate knowledge and abilities. This includes fostering a flexible workplace culture that adapts to change, strong teamwork, and knowledge sharing within the organization. The previously mentioned digital strategy is the last but not least. The important place of digitalization is, according to Isensee et al. (2020), also in implementing sustainability to improve environmental performance. With this statement also agree Saary et al. (2022).

4 Conclusions

Digitalization has a significant impact on how enterprises operate. Unfortunately, most of SMEs are not currently prepared for digitalization due to high costs, a lack of understanding, and a lack of digital talent in the workforce. Additionally, SMEs still lag behind in terms of technology, which affects how effective the company is.

European Commission (2021) listed three major internal challenges of digitalization in SMEs as the lack of knowledge, lack of financial resources and lack of skills needed for successful digital transformation. International standards, regulatory obstacles, lack of accessible digital infrastructure, cyberattacks, lack of access to public data and digital platforms are identified as an external obstacles for SMEs.

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Sustainability prerequisites for FinTech business models in the context of globalization

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Abstract

Research background: The rapid rise of technologies makes it impossible to continue business as usual. A variety of technologies is used by companies because of their relevance for future success and directly address the sustainability in the real economy and as many of them have not yet been systematically harnessed to target this challenge. Usual approaches to sustainable development are insufficient to create necessary transformation of companies, industries, societies towards sustainable development. However, there is not a wide range of prepared tools available in order to support FinTech companies by creating their business models as sustainable ones.

Purpose of the article: the present paper aims to identify the theoretical foundation and to synthesize the main theoretical approaches of sustainability applicable to BMs in FinTech sector as well as to diagnose actions that lead to generation of sustainable policies and mechanisms in order to support FinTech business models.

Methods: t The methodology involved several iterations combining inductive generalising with deductive reasoning, as well as abductive inferencing to seek new order based on the interpretation of queried knowledge.

Findings & Value added: as a result, authors develop a set of prerequisites for successful business modelling in FinTech and define an approach to them.

Keywords: *Business models; business model sustainability; FinTech; sustainability framework*

JEL Classification: *M16; G23; F23; E37*

1 Introduction

The rapid rise of technologies makes it impossible to continue business as usual. Technology transforms individuals from mere consumers of products to empowered participants in value co-creation. Companies feel immense pressure to adopt new ways of doing business, in other words to create new business models. Technological and economic progress is vital for

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development but it needs to be balanced with the needs of society, environment and the long-term effects of these actions to stay sustainable. A variety of technologies is used by companies because of their relevance for future success. Many of them directly address the sustainability in the real economy, for instance, around data streams, protocols and security. Technology-driven solutions offer a great potential for success and development of the company, but they have not yet been systematically harnessed to target this challenge: many innovation and acceleration efforts of companies are not always typically focused on achieving sustainable development, although the sustainability as a possible determinant for doing business in the future has been challenging traditional business models as well.

In just a few short years, Fintech companies have defined the direction, shape, and pace of change across almost every financial services subsector. Customers now expect seamless digital onboarding, rapid loan approvals, and free person-to-person payments—all innovations that FinTech's made popular. And while they may not dominate the industry today, FinTech's have succeeded as both standalone businesses and vital links in the financial services value chain.

Until now there is no consistent theoretical approach to the concept of a Business Model (BM) for FinTech in the literature while Business modelling is becoming a widespread topic. Even more, Business modelling has become particularly critical in areas where technological development is the core of the industries, as the technological development level turns even more advanced during business modelling and implementation. This means that modelling business in a rapidly evolving field like FinTech requires a pragmatic and strategic approach that allows anticipating tendencies and using trends as impact factors. However, there is not a wide range of prepared or predefined tools available in order to support FinTech companies by checking their business models for sustainability reasons.

Authors of this paper have set a goal to develop a basic approach for FinTech business modellers which helps to create business models for FinTech industry more sustainable. The reference is made to the existing statistics of FinTech start-ups, which demonstrate, that failed FinTech business models didn't fulfil the sustainability criteria or were not able to meet them due to the current pandemic situation, although the FinTech industry is from actual technological point of view the best placed to overcome the obstacles caused by the pandemic. The other reason is also to contribute to business modelling in FinTech sector since the sustainability concept here undoubtedly plays a prominent role as well. Therefore, the present paper aims to identify the theoretical foundation of sustainability applicable to BMs in FinTech sector, to synthesize the main theoretical approaches of sustainability and sustainable businesses and to identify those actions that lead to generation of sustainable policies and mechanisms in order to support FinTech business models.

2 Methods

Authors used an extensive literature review: compiled literature from EBSCO database systematically in order to identify sustainability-oriented approaches for business modelling in FinTech industry. Out of 123 articles dedicated to FinTech business models and 2604 articles dedicated to sustainable business models a sub-sample of 126 was identified as potentially relevant. The articles were screened and classified (e.g. according to research methods and theories) in an Excel sheet. This selection, which was based on relevant criteria, helped to identify relevant approaches: first, sustainability is an explicit normative orientation for business model development, and second, underlying assumptions and theoretical foundations are explicated.

3 Research

Theoretical focus on business models in FinTech industry is still too small: the number of studies about FinTech business models identified in the EBSCO database for the period from 2015 to 2020 is 123 (EBSCO, 2020). This indicates that the industry is still young and there will be many considerations made before a well-founded theoretical basis has been developed: the financial crisis of 2008 was the occurrence that triggered a new wave of business and investment (Menat, 2016), but its rapid growth is not taken into account sufficiently enough. According to a McKinsey report, over the last five years (2015-2020), $23 billion of venture and growth equity has been deployed to FinTech start-ups. And now (2020) it's anticipated that more than $150 billion could be invested in this vertical over the next 3-5 years. Now Fintech's already feel the squeeze; venture capital funding has slowed, business model vulnerabilities are being exposed, and competitive dynamics are shifting. This has brought the sector's underlying profitability and long-term business model sustainability into sharp focus—to a point where the path to profitable scale for many FinTech's has been structurally altered challenge for FinTech's. Many of them are still not profitable and have a continuous need for capital as they complete their innovation cycle: attract new customers, refine propositions and ultimately monetize their scale to turn a profit (McKinsey, 2020). The emergence and spread of the pandemic are also causing unprecedented economic damage across the globe. It also means, as a corollary, it has brought digital payments, digital onboarding and virtual customer service to the forefront. Players now need to take a hard look at their value propositions and roadmaps and ensure that they reflect evolving customer behaviours and segments, testing and validating new propositions at pace.

The potent combination of changing customer buying and consumption patterns, a weaker economy, lower interest rates, and reduced creditworthiness represents a fundamental challenge to many fintech's business models (McKinsey, 2020).

4 FinTech characteristics

FinTech covers a broad range of technologies and financial functions and activities, ranging from good old e-commerce, payments and consumer banking to lending, crowdfunding, block-chain, financial security and much more. FinTech transforms the whole financial sector, makes it consumer-oriented and engages it in the chain of value (Tiberius and Rasche, 2011). FinTech services allows performing business transactions from anywhere at any time, which gives flexibility for all actors (Anshari e al, 2019). FinTech's are new entrants, start-ups and attackers which are looking to enter financial services using new approaches and technologies. These firms seek to build economic models similar to those of banks, often targeting a niche or particular product (McKinsey, 2018).

5 Theoretical aspects of business model and sustainability

Business models are the "*business blueprints used by an organization to create, provide and capture value*" (Papadopoulos, 2016). A clear statement of the business model enables a company to acquire a robust understanding of what it is seeking to achieve and the associated threats and opportunities (Wirtz, 2010). Thanks to modelling, a clear picture of processes, relationships, dependencies and possible risks in the modelled area can be obtained, and the information can be used to timely develop alternative scenarios in order to maintain a stable

position on the market and to increase the competitiveness of a company, or to reduce the identified risks (Škapa, 2018).

Sustainability as a business approach is the ability to create a long-term value which is possible when environmental, social and financial demands and concerns are managed and coordinated and ensure responsible, ethical and ongoing success. Sustainability is about building foundations for future success (Hedstrom, 2018): understanding the trends that will impact business and the buying habits of the customers; understanding of the interrelationships and dependencies of the company's activities and the work of employees.

Business model with "*integrated*" sustainability is called creating "*shared value"* for the company and the society (Lüdeke-Freund, 2010). The concept of '*shared value*' describes that businesses can only achieve long-term competitiveness when the interconnectedness of the business and society environment is taken into account (Schmitt and Renken, 2012). A business model, which has been intentional created with a focus on the sustainability, helps to describe, analyse, manage and communicate a company's sustainable value proposition to its customers and stakeholders (Morioka et al, 2017). Moreover, sustainability as a concept, idea and activity would be integrated into core business decisions. In the centre of consideration there are negotiations and definitions of normative values required as well as interests and goals of social, ecological, and economic outcomes have to be taken into account (Boons and Lüdeke-Freund, 2013, Stubbs and Cocklin, 2008, Jones and Upward, 2014). The scope of value includes not only economic transactions but also relationships, exchanges and interactions conceptualised as value flows that take place among stakeholders in a network (Den Ouden, 2012). Sustainability processes are seen as something 'extra' to add (Glinik and Vorbach, 2019). In the present business environment sustainability is sometimes seen as a trend, but sustainability goes beyond being a trend and leads to fundamental changes in the business environment (Esty and Winston, 2009).

Business model is defined as sustainable when it represents all of business elements, their interrelations and the systemic context that "*enable sustainable value exchange with stakeholders ...., translating and providing feedback between corporate strategy and operations*" [10]. Sustainability of the company's operations are based on resources that are closely related to knowledge and its transformation into competencies that can be only realized using the structure of physical and social resources. In order to increase the competitiveness of a company and make it possible to manage it, it is necessary to acquire new knowledge and experience, new practices and theories, which, like the business environment, have become more complex and diverse.

More than 90% of start-ups fail, due primarily to self-destruction rather than competition. For the less than 10% of start-ups that do succeed, most encounter several near death experiences along the way (Marmer et al, 2011). According to the Wall Street Journal, about 75 % of venture-backed start-ups fail (WSJ, 2020). This rate is high enough to draw attention to why this happens and what is the underlying cause. For this reason, the authors research them and find the causes using Google search and the keywords "*Fintech failure rate*" or "*FinTech failure statistics"*. 2.8 Million results could be found. The authors researched the first 10 Sheets and could determine which of FinTech failure reasons, mentioned in several publicly accessible articles, are the most common and could be combined and generalized as follows.

6 Results

The authors of this research have set the goal to develop a basic approach for FinTech business modellers which helps to create business models for FinTech industry more sustainable and to successfully exist in the market, innovate and create new value for the

economy as well as for society. In previously conducted researches the authors determined those business model dimensions that are particularly affected by the risk of unsustainability in FinTech and which of them have to be particularly checked for sustainability reasons by company's management in terms of time, costs, flexibility and quality (Zvirgzdina et al, 2019). In addition, in another research they offered a methodology that contributes to creation of success criteria and presented methods for development of success criteria and sustainability controlling related to time, costs, flexibility and quality (Zvirgzdina et al, 2019). Combining the results from previously made researches and those which are obtained in this research there is a possibility to build a scheme or a framework for FinTech companies which could be used on the level of Management as a "solid footing" for building stable long-term business.

There is a set of prerequisites for successful business modelling in FinTech presented that have been worked out by the authors of this paper as a foundation for creation and development of a FinTech business model. This set of prerequisites is based on collected and analysed information and build the knowledge basis on both - the level of the FinTech Industry as well as the level of the sustainable FinTech enterprise. Form authors point of view chance of business model success is rather low without this knowledge and risk to fail – to high (see Fig. 1).
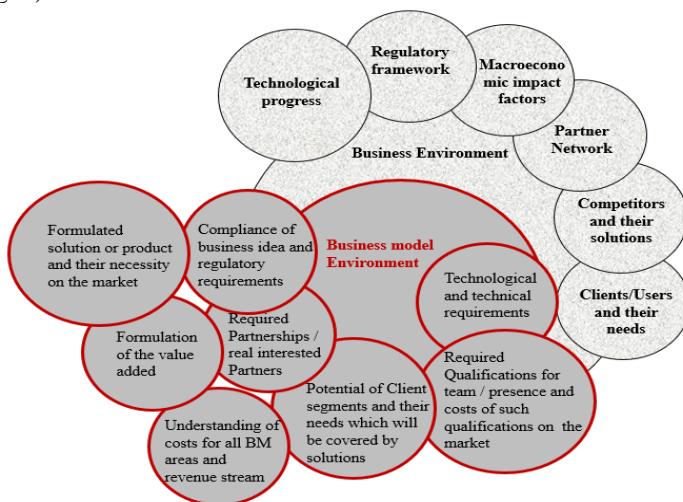

Figure 1. Prerequisites for successful business modelling in FinTech

Source: created form the authors (2022)

At the industry level, it is essential to understand the regulatory framework for the future project: this framework will limit the business in the realization of idea as well as open new untapped potential. The knowledge about the regulatory framework in FinTech industry form the basis for the existence of the business model. In terms of removing the regulatory barriers, decision-making should aim to involve relevant stakeholders in decision-making and the preparation of policy instruments.

As the research above has shown, partnerships play a significant role for the FinTech market participants. Rather, many authors (see above) have rated them as indispensable success and even survival factors. Taking into account the above mentioned, it is necessary to find out who on the market could be a potential partner and who is actually interested in the cooperation. It is about any kind of partnership - in the legal, technological, product-related etc. area. Thus, a picture of possible and real cooperation's is created, which not only

allow the business model to be realized, but also perfect the added value and contributes to sustainability integration into the model.

Next, macroeconomic factors are also of great importance. In their previous papers (Skadina and Zvirgzdina, 2018, Skadina and Zvirgzdina, 2020), the authors have also identified these and analysed their influence on FinTech business models and cause-effect chains. The business idea can be very good; however, the unexplored impact factors can completely destroy this idea if they have not been analysed and considered.

Such prerequisites as knowledge about the market and market players are also integrated into the set of prerequisites. Knowledge about economic environment where competitors are operating and customers or users that will pay for the product or solution is indispensable. The balance of power of the competitors is also an important aspect that could play both a positive and a negative role by development of the business model. Strategic contemplation about cooperation with competitors for the purpose of mutual benefits would be considerable at this point. This is the way, in which risks arising from competitive pressure can be minimized in advance. According to statistical data about failed business models, 42% of all developed solutions are not demanded on the market at all [13]. This means that prior knowledge about whether the product or solution will have its potential buyer was not present. The knowledge about customers, who will be potentially using the solution, must also be acquired, because the business model will only work if there are those who will pay for the product or solution.

Technological aspects, which were also suggested as prerequisites by the authors, must be also taken into account. Apart from the technological nature of the FinTech business models, it is important to consider the general conditions (infrastructural conditions, available know how, qualifications, trends etc.). It is not enough to have only the programmers. Rather, it requires those who can combine a product technically and in terms of content as well as those who implement the business idea into the technologized solution and those who lead the work to the goal.

The next big preliminary work that has to be done before modelling business is the knowledge that relates to meeting requirements at the level of FinTech company`s future. Here it is a matter of adapting and deriving the knowledge which is acquired about the industry to the company-specific conditions. This is about monetising all efforts that are necessary for the success of the future business model. The result forms a full picture of the result, its costs and possible profit opportunities. This information could be a begin for real business model development.

At this level, it is possible to find out what characteristics a product or solution must a company have in order to be competitive and demanded. This is the right time to formulate the solution and its contribution to the value added. So, it is possible to consider how this added value can be maintained, improved, supported, etc. from a technological point of view using the latest and most realistically possible technological capacities and what resources must be used for this. Here, legal framework for the realization of the project is captured, assessed and weighed up whether the solution is compatible with the legal requirements and whether compliance can be achieved or not. At this level, the acquired knowledge about the necessary and existing partner network is important, because this forms the basis for the future framework of the product, markets, customers and costs. Just as important is the acquired information about the necessary labour resources. When formulating team members, the available labour resources on the market and their acquisition is a part of the future business model and its quality. Together with formulated requirements for the team core, the abilities and skills of the work resources must also be worked out.

Based on their own experience in the FinTech sector, the authors believe that the preliminary work proposed in this article is a very important for the success of a business

model. Without knowledge and availability of the whole picture, the idea, even if it is unique, can be hardly realized. Without preparation and knowledge of the effort that is required on the way to the realization of the business model and that must be operated in a cost-covering manner, no successful and sustainable business model can be created. As mentioned before, sustainability is a business approach and ability to create a long-term value. "*Sustainability is about building foundations for future success*" (Hedstrom, 2018).

7 Conclusions

This rate of FinTech failures is high enough to draw attention to why this happens and what is the underlying cause: about 75 % of venture-backed start-ups fail; more than 90% of start-ups fail, due primarily to self-destruction rather than competition. Identified reasons for FinTech business model failure are poor market knowledge, high human factor risks, neglected regulatory aspects, wrong partnerships and incompletely used technological aspects.

There are success-criteria stated which mostly correlate with the reasons of business model failures and can be seen as a threshold for FinTech companies between business existence and basis for sustainable development: customer satisfaction that can be achieved through technologically involved tools and lead to understanding of psychological customers behaviours around money; regulatory and compliance know how that is the prerequisite for remaining compliant with the rules and regulations; partnerships that support building of new networks and innovative solutions as well as ensure constantly information exchanges and updates about latest trends and developments in the industry and on the market; business models that confirm the statement about gaining of a clear picture of processes, relationships, dependencies and possible risks in the modelled area.

To model a sustainable business, entrepreneurs must research and gain Know How, which helps them to get the BigPicture without having invested the maximum effort. The authors are of the opinion that without this BigPicture conditions for a stable functioning business model cannot be created and by evaluating them later the risk of failure becomes greater. It is a matter of collecting all relevant information about legal framework, macroeconomic factors that could endanger or support business, selection of suitable technologies as well as costs and efforts that should be taken into account by setting up the model.

Furthermore, the authors believe that this acquired industry-level-information should be transferred to another – company´s level to calculate concrete scenarios of what is and what is not financially viable. At this stage, considerations can be made as to whether the vision is compatible with real possibilities and circumstances. And only then business model can be built, and previously gained and analysed insights can be transformed into sustainability directed actions.

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