ACTA OECONOMICA UNIVERSITATIS SELYE

International scientific journal
Volume 11.
No. 2

The publication of this issue was funded by the Pallas Athéné Domus Meriti Foundation.

PADME | PALLAS ATHÉNÉ DOMUS MÉRITI ALAPÍTVÁNY

J. SELYE UNIVERSITY - FACULTY OF ECONOMICS
AND INFORMATICS

ACTA OECONOMICA UNIVERSITATIS SELYE

International scientific journal

Volume 11.
No. 2

2022
KOMÁRNO

EDITORIAL BOARD
ACTA OECONOMICA UNIVERSITATIS SELYE

Acta Oeconomica Universitatis Selye is published twice a year by the J. Selye University, Faculty of Economics and Informatics, Bratislavská cesta 3322, 945 01 Komárno, Slovakia

CONTENTS

ASSESSMENT OF THE IMPLEMENTATION OF THE QUALITY MANAGEMENT (CAF MODEL) AS AN EFFECTIVE TOOL OF PUBLIC ADMINISTRATION MANAGEMENT – THE CASE OF NITRA MUNICIPALITY, SLOVAKIA

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Received:27. October 2022 Reviewed: 19. December 2022 Accepted: 30. December 2022

Abstract

The standard quality assessment system is a comprehensive quality management tool created for the public sector. From now on, the Common Assessment Framework model (such as CAF) assumes that effective management in public administration organizations can achieve exceptional results in organizational performance. The CAF model scheme consists of nine criteria that fall under the categories of organizational enablers and results. Within the "leadership" criterion, the paper explores the aspect of motivation and support of human resources in the organization by focusing on assessing the current state of implementation of the CAF model using a case study of the municipality of Nitra, Slovakia. As a part of the research, we focused on several aspects: the way the municipality deals with human resources of the self-evaluation process, the way the CAF team's training is implemented, the self-evaluation process and the interpretation of the results of the self-evaluation concerning the municipality office, as well as about the level of public involvement in the process of increasing quality. The paper also evaluates the questionnaire survey carried out by the municipal office of Nitra, thanks to which we were able to find out the view of the residents on the functioning of the researched municipality. In order to process the paper – to interpret results and outcomes and formulate conclusions, we applied a base of primary sources (qualitative research method of unstructured interview) and a base of secondary information sources (available results of the questionnaire survey published by Nitra municipality).

Keywords: CAF model, public administration, human resources

JEL Classification: H83, D73, M12

Introduction and theoretical background

In the private sector, quality is a concept that has become a fundamental element for the continuous running of an organization since at least the 1990s, and its influence is growing considerably. This has led to the development of supportive and educational models of quality that can provide a guide to excellent organizational management. Different quality management models adapted to the sector can be a helping hand for public administration managers in this area. We can mention benchmarking or the CAF model among the most used ones in the Slovak Republic. The CAF model is one of the most commonly used models due to its accessibility and ease of use. For employees of the municipal authority, this tool is an opportunity to advance the quality of the entrusted organization free of charge and with minimal effort. The CAF model's main benefits are understanding and describing internal processes defined by specific criteria and identifying strengths and weaknesses. In addition to improving internal processes, implementing the CAF model can also increase the institution's prestige.

The topic of local government performance is highly current, and its research is crucial to strategic planning (Matei & Enescu, 2012). Its absence is highly unreal; hence, we need to focus on processes that benefit public interests (Mitaľ,2018). Globalization has introduced many processes aimed at increasing efficiency, and this is why it is necessary to discuss the implementation of the CAF model in public administration economies. CAF is an essential tool for quality management and improvement in the public sector. CAF combines the excellence model of the European Foundation for Quality Management (EFQM) and the model of the German Speyer Academy (Staes et al., 2010). It applies to all parts of government and can be implemented at national, regional, and local levels and is based on the premise that leadership strategy and planning, which translates into the management of staff, partnerships, resources, and projects, is the key to achieving excellence in organizational performance as well as outcomes for citizens/customers, employees and society (EUPAN, 2019).

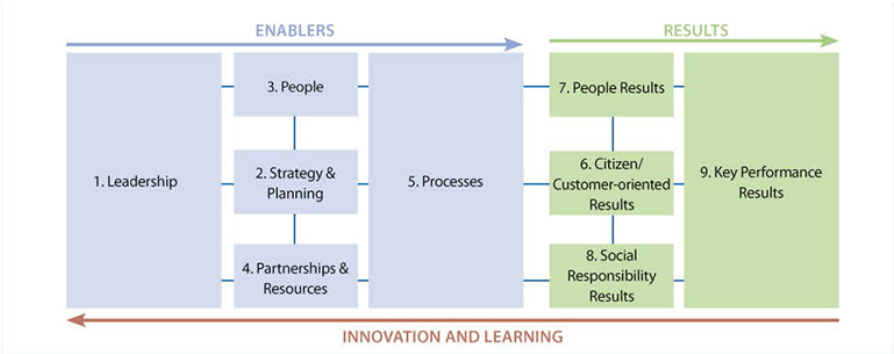
The EFQM model inspired the CAF, but it is more straightforward and beneficial for obtaining an accurate image of a public administration organization's efficiency (Paulová, 2014). Nevertheless, it can also be used for various other objectives (e.g. as part of a comprehensive reform program or as a foundation for directing public-sector improvement initiatives) (Paulová, 2014). Kollárová and Tománková (2012) examined the use of the CAF model in public administration using a case study. These authors identify that the use of the CAF model provides an effective system for an organization to initiate a continuous improvement process also because the CAF model provides the following:

- evidence-based evaluation using a set of criteria that are accepted in the public sector across Europe,
- opportunities to measure development and achievement of an exceptional level of achievement of the targets,
- a means of achieving a consensus of direction and agreement on what needs to be done to improve the quality of the organization,
- the link between the different outcomes to be achieved and the supporting practices or assumptions,
- creating enthusiasm among employees by involving them in the improvement process,
- opportunities to promote and share the best practices of different parts of their organization or another organization,

- integrating different quality initiatives into the organization's routine activities, measuring progress over time through periodic self-assessment.

The CAF model is based on nine criteria: leadership, strategy and planning, people, partnerships and resources, processes, citizen/customer-oriented centered results, people results, social responsibility results, and key performance results. The first five criteria deal with the management practices of the organization, called assumptions, and the following criteria are results (what the organization achieves) (EUPAN, 2019). The CAF also consists of 20 sub-criteria, and compliance with these core elements is required and recommended to be specific to the organization. As a result, 29 sub-criteria define the key concerns to examine while evaluating an organization. (Kalfa & Yetim, 2013 in Kalfa & Yetim, 2018).

Figure.1 Model CAF



Source: Kalfa & Yetim, 2018

The CAF score system, which quantitatively represents the organization's level of performance for each criterion and sub-criteria, must also be considered. It aims to achieve the following four objectives (Schwarczová et al., 2021):

- provide a path to follow while implementing improvements,
- track the own progress,
- determine the optimal practices based on high ratings for assumptions and outcomes,
- assist in identifying relevant benchmarking partners from which to learn.

Each of the nine criteria (e.g. leadership, people, strategy & planning) can be scored on a scale of 0 to 5, allowing the overall performance of each organization to be compared, which can then be benchmarked (Caddy et al., 2002).

In many European countries, CAF has been promoted and used since its introduction in 2000 to improve public administration through several activities. ("Study of the use", 2005) As a result of political constraints and the absence of competition, public organizations are perceived as less efficient at providing goods and services (Pesch, 2008). Moreover, in order for the public administration system to work and meet the needs of society, reform is needed. (Nunvářová, 2013) Over the previous 22 years,

the model has gone through multiple improvements, illustrating its flexibility and responsiveness to new difficulties, with each update spearheaded by representatives from European countries who make up the CAF National Correspondents Group (UNMS, 2022). It may seem that public administration reform is a fact worldwide, but certain countries require more of these reforms than others. (Prijon, 2012) Furthermore, the organizations are from a variety of sectors (e.g., judicial, municipal, social-service organizations), and their sizes range from small (10 people) to extremely large (over 5000), although we must assume that the middle category is the largest (Staes & Thijs, 2005).

Nenadal et al. (2008) defined advantages in the area of quality management in public administration organizations:

- introduce the principles of Total Quality Management into public administration,
- promote self-assessment of public sector organizations in order to obtain a structured picture of the organization and, consequently, ideas for improvements,
- to act as a link between the different models used in quality management,
- promote bench learning among public sector organizations.

Other significant advantages, according to Papalazarou & Tsoulfas (2018), include the following:

- the elimination of bureaucracy, which simplifies administrative procedures,
- promoting transparency,
- an attitude towards residents to develop trustworthiness in the institutions and procedures of the public sector institutions,
- a comprehensive strategy including all public organizations, with the degree of autonomy of individual public agencies being reduced,
- the most effective use of contemporary technology, particularly in the sphere of communications, both for the betterment of public services and the development of citizen-state interactions,
- MBO (management by objectives) may be introduced more efficiently, and relative indicators can be used to measure the efficacy of public services,
- the alignment of local authorities with mild socioeconomic changes.

However, as a quality tool, the model is only as good as how it is implemented; in other words, how the individuals in charge of its implementation "run" it determines its correct usage and potential use (Ramatta, 2011 in Papalazarou & Tsoulfas, 2018). This is also why we must consider the importance of self-assessment, which should lead to creating an efficient action plan for the areas of the organization that need improvement (Vakalopoulou et al., 2011). Organizations may use the self-assessment approach to examine themselves by analyzing leadership, human resources, planning, social effect, and citizen satisfaction, and the findings allow them to improve themselves based on the outcomes. (Balci, 2007 in Kalfa & Yetim, 2018) However, the long period of implementation makes it difficult to maintain the right pace and motivation, and this is why external feedback must be considered to be very important, as it keeps the focus on improvement and allows the organization to check that it is still working on its improvements according to plan (Thijs & Staes, 2010). Due to the need for third-party validation, the CAF network of National Correspondents inside the Public Administration Innovation Task Force has established an external feedback loop that evaluates the success of the following six fundamental objectives:

- to ensure the quality of the CAF model's implementation and its impact on the organization,
- to determine whether the CAF model has resulted in the organization applying TQM values,
- encourage and revive excitement for the organization's constant progress,
- promote peer review and bench learning,
- support organizations which have launched on a continuous improvement path without assessing their degree of excellence,
- to promote the involvement of CAF users in the European Foundation for Quality Management (EFQM) (Paulová, 2014).

Between 6 and 12 months following the preparation and finalization of the self-assessment report, organizations attempt to obtain external feedback in which assessors examine the documents provided by the organization, interview CAF team members and relevant stakeholders about the CAF model's implementation, and conduct an on-site assessment (EIPA,2020). The goal of this external feedback is to help the organizations better understand what they have done and provide more possibilities for future high-quality work. At the same time, the CAF label is only available to public administration organizations that make a concerted effort to use CAF successfully (Thijs & Staes, 2010). The CAF model's external feedback is built on these three pillars:

- self-evaluation process including a questionnaire covering six steps,
- improvement process,
- maturity of TQM in the organization (broader understanding of excellence).

Moreover, there are four assessment levels: "0 = Initiation level not reached, I = Initiation level, R = Implementation level and Z = Maturity level" (Valach et al., 2019). The aim of the external feedback is not to assess the actual results but to determine whether the improvement process is designed and managed correctly, in line with the requirements of the model, and therefore even those organizations that have not yet achieved significant results can be successful in the process (Paulová, 2012).

The European Contributors actively participate in model updates and work on various shared duties, with the Slovak Republic represented by the NMS SR (Slovak Office for Standardization, Metrology, and Testing) (UNMS, 2022). Each public organization can use the CAF model at its discretion, as it is available and accessible (Caddy, 2002). In the future, the CAF could, among other things, serve as a tool to promote international cooperation in European public administration, including international benchmarking, and may also provide a reliable basis for measuring or comparing performance between public sector organizations (Caddy, 2002).

CAF's experience over the previous two decades has shown that this simple instrument may be tremendously valuable for any public organization and can be successfully implemented by considering operational and personnel aspects (Asensio M. et al., 2021). However, compared to other European countries, the Slovak Republic does not yet have sufficient information regarding the application of CAF in organizations that are part of the public administration. This is one of the main reasons we have focused on specific features of the implementation process in the Nitra municipality.

Material and methods

In order to process the assessment of the implementation process of the CAF model on the example of the Nitra municipality, the study of related available references and related scientific research works were used in the first phase. Basic scientific methods such as analysis, synthesis, comparison, deduction, and unstructured interviews were applied in the next phase.

In the paper, we applied information and facts based on public materials available on the website of the municipality, internal materials, which were made available for inspection by the Municipal Office of Nitra, and last but not least, the information provided by the representatives of the municipal office in the unstructured interview. On behalf of the Nitra Municipal Office, the interview was conducted by Ing. Monika Reiskupová, an employee of the Project and Strategic Management Department and the Head of the Department, Mgr. Martin Horák. Based on the findings, we formulated conclusions that will improve the use of the CAF model.

The paper's main aim was to assess the current state of implementing the CAF model in the Nitra municipality. Based on the main aim, we have defined the following partial aims:

CAF's experience over the previous two decades has shown that this simple instrument may be tremendously valuable for any public organization and can be successfully implemented by considering operational and personnel aspects (Asensio M. et al., 2021). However, compared to other European countries, the Slovak Republic does not yet have sufficient information regarding the application of CAF in organizations that are part of the public administration. This is one of the main reasons we have focused on specific features of the implementation process in the Nitra municipality. Based on the main aim, we have defined the following partial aims:

- to assess how the Nitra municipality dealt with the personnel aspect of the self-assessment process - i.e., how the project manager was identified, how the CAF team was assembled, how the team leader was selected, whether anything was changed in the course of the other self-assessments, and if so, for what reason; the staffing of the quality unit - i.e., whether a separate position of "quality manager" has been allocated for this area,
- to find out how the CAF team has been trained or whether other staff have been trained,
- to analyze how the self-assessment itself was carried out, at what time intervals (how often) the individual self-assessments were carried out, how the municipality adapted the model to its needs, what method of assessment was chosen,
- to assess what the results of the self-assessment were and, in particular, how the municipality has followed up on them, what methods the municipality used to build on the knowledge gained from the self-assessment, and to what extent the public is involved in the self-assessment process and the quality improvement process in general.
- to assess the results of the questionnaire and the citizen's perception of the municipality in terms of image, services provided, and staff behavior.

Concerning the above partial aims, the following research hypotheses were defined, where four latent variables were used: perception of the municipal authority, staff behavior, preference for reporting complaints, and provision of quality services:

H1: Citizens' perception of the municipal authority significantly influences the provision of quality services by the municipal office.

H2: Employee behavior significantly impacts the delivery of quality services to the municipal office.

H3: Reporting preferences significantly by citizens and employees influence the provision of quality services by the city government.

The Nitra municipality collected data for the analysis from February to April 2021. 1,063 respondents completed the questionnaire, of which 744 were female, and 319 were male. Most respondents (340) were in the 31-40 age group with a university degree (636). Descriptive statistics and demographic characteristics of the respondents, such as gender, education, and age, were used for the analysis. The chi-square test of goodness of fit was applied to confirm or reject the stated hypotheses whose values we found based on calculations using AcaStat software.

Results and discussion

The self-government of the fifth largest city in Slovakia is facing the successful implementation of the CAF model and thus joining more than 4000 modern European organizations, which strengthened their position in the public administration sector thanks to the CAF model.

The idea of introducing quality management through the CAF model originated long before the Nitra Municipal Authority joined the self-assessment model. It was the effort and work performance of Mr. Mgr. Horák and Vice-Mayor (Mgr. Špoták) at IUVENTE (Slovak Youth Institute) during the implementation of the model was the trigger for the initiative of modernization of the home city administration, and the positive impacts of the implementation in the given state institution were perceived in particular. The process and staff audit itself is costly, and some of the steps in today's action plan would be indispensable for the Office. This was one of the reasons for contacting the Slovak Office for Metrology, Standardisation, and Testing, which provided more information on the process of the call aimed at municipalities, in which the Nitra Municipality was subsequently involved together with seven other cities. Assignment of consultant Assoc. Ing. Iveta Paulova, PhD., MBA, who also had the role of a trainer at the beginning of the process, was considered by the municipality as one of the most useful contributions of the Office. She guided the entire CAF team through the training for each phase, presenting an intensive consultancy activity where she drew on her own experience. The schedule for the training sessions was sufficient in terms of time (partly due to the consultancy work), yet flexible enough to allow for more days if needed. However, longer training could have a better impact on the staff regarding collaborative problem-solving and acquiring more knowledge. However, this would place a burden on the staff themselves, in addition to providing services to citizens, and for this reason, we can conclude that the duration of the training is fit for purpose. The Office for Metrology, Standardisation, and Testing has also supported funding to cover the costs of consultation and training, which the municipality would have had to allocate without their support. Other costs associated with implementation are based on the specific organization, which defines its errors and shortcomings, based on which it will take individual measures associated with such costs. The Office's readiness prior to the decision to implement the project was also at a high standard due to the high staffing capacity numbers. Based on an awareness campaign with the slogan "The best officials sit on the CAF." up to 32 staff signed up for the model. The formation of the CAF team itself was voluntary and was based on recommendations, including the involvement of the municipality's top management. The voluntary involvement of the members was reflected in the performance, and the greatest satisfaction came after

the external feedback of the self-assessment report, which was scored higher than that assessed itself. Unfortunately, the municipal authority in Nitra had to unexpectedly take unavoidable measures to cope with the pandemic, which, together with implementing the CAF model, required widespread changes in the necessary scope associated with process modifications and technical preparations. Gratitude, in this regard, belongs especially to the methodologist Ing. Monika Reiskupova, who is the driving force and, even in the most challenging conditions, managed the implementation and preparation of the self-assessment report in an admirable way together with the whole team. Although the implementation process had to be postponed by one whole month and the situation was not ideal, the Municipality of Nitra successfully submitted the self-assessment report as the first of all participating municipalities. However, looking at the whole implementation process as a long-term approach is necessary. With the help of the PDCA cycle, the introduction of regular questionnaires, and the monitoring of the satisfaction of employees and customers of the Office, the mistakes are gradually eliminated, and the steps are implemented to set up the right process and to prepare the second self-evaluation report. The management of the Nitra municipality recommends that other public administration organizations implement quality management tools, which provide a broad view of what should be urgently addressed and feedback, which is an important part of a proactive company. It is also important that public administration organizations look at the partners affected by the institution's work in a much broader context. The current management of the city of Nitra considers it to be a city with enormous potential, open to the challenges of the present day, and that is why the implementation of a common quality assessment system will contribute to the streamlining and improvement of the operation of the Municipal Office with an ultimate impact on the citizens. According to the city management, it can be highlighted as an advantage that the CAF model was created by the public administration for the public administration and tailored to the specific needs of public sector organizations. Another positive aspect of the model is that it is free of charge, which organizations welcome.

In addition, it turns out that implementing the CAF model in practice does not represent a financial burden for the organization. Even if the model were demonstrably beneficial but with the financial burden associated with it, it could be the case that for many organizations, it would simply not be worthwhile to implement the model.

The CAF self-assessment method primarily opens up an internal process of reflecting on the municipality's work and identifying the institution's weaknesses and strengths. The employees of the municipality perceive the following weaknesses and strengths:

Weaknesses:

- there is weak customer feedback,
- does not emphasize the importance of respecting fundamental human rights, such as the right to equal treatment,
- there is a bias in the results if permanent members are appointed to carry out the self-assessment.

Strengths:

- for its use, it is necessary to establish a vision or strategy for the institution, which significantly increases the possibility of managing the quality of work in the implementation of sub-tasks for its fulfillment,
- enables the strengths of the institution to be identified and thus the right processes and good practices to be found and shared,

- the CAF self-assessment identifies weaknesses in the institution's operations, identifies inefficient processes and faulty behavioral patterns that can be avoided,
- the fact that it is an evaluation of their work, the institution's staff is more motivated to implement changes, find better ways of working and more efficient processes,
- detailed methodological instructions for conducting the self-assessment, i.e., manageable and comprehensible use of the model,
- focusing on the customer - the citizen - and getting feedback on the work of the municipality,
- an opportunity to showcase the institution's efforts to improve the quality of its work and services,
- An external evaluation can complement a comprehensive evaluation of the organization's performance as an added value.

According to the CAF team, the CAF self-assessment does not require actively asking the customer about satisfaction with the institution's services at each step. The customer's opinion can be replaced by evaluating the employee involved in the self-assessment. The number of complaints received about the work of the institution is then placed in direct proportion to the evaluation of the improvement of the quality of the work of the institution - i.e. by the logic of the fewer complaints, the better the quality of the work. However, from the customer's point of view, they may be reluctant to share their negative experiences with authority because of fear that the matters they have come to the office may not be resolved.

This may result in the customer feeling that the authority is seeking their evaluation for the sake of the evaluation, not for the sake of service improvement that would be visible and valued by the customer. Public under-awareness of self-assessment and its outputs may also play an essential role.

The CAF self-assessment method is a very suitable tool for continuously improving the efficiency and performance of the Nitra municipality. The continuous use of this tool offers the city authority the opportunity not only to find shortcomings that need to be improved but also to identify good practice and share it further. This enables improvements in work and access to customers. However, it can be considered insufficient to inform the public, i.e., the authorities' customers, that processes to improve the authority's work are also underway and with what results? A further improvement in the use of the CAF is the inclusion of more frequent surveys of customers' views on the quality of the authority's services and the provision of information on how to make complaints and suggestions. These helpful steps are offered to promote a positive perception of the authority by placing information on the authority's involvement in the quality improvement process in a separate section on the office's website. This also provides an opportunity to comment online or in other ways on the authority's work. This 'Help us improve' can be essential in promoting good customer/citizen relations with the municipality.

Based on the questionnaire survey (carried out by the Nitra municipality in 2021.), we can demonstrate that up to 48.39% of respondents have a positive perception of the municipality's image. Respondents consider the municipal office as open and client-oriented, but up to 53.61% of respondents do not consider the municipal office as modern. Respondents rated the overall behavior of the staff they came into contact with positively (67.47%). When assessing the behavior of the staff, respondents reported that they most liked the polite behavior and pleasant manner (72.19%), and the least

liked the consistency or coordination of the approach of several departments or staff (41.59%). The municipal office provides quality services, which was marked by 52.54%. Office hours were mentioned by 65.87% of respondents as the best quality service, and the slightest quality service (level of innovation and digitalization) was marked by 44.17% of respondents. 39.53% of respondents answered that they do not have the opportunity to get involved in improving the quality of services of the municipality, and 87.40% would welcome the introduction of the possibility to make suggestions to improve the quality of services.

Regarding reporting complaints, the respondents prefer the electronic form (59.28%) and the least through the Municipal Council (10.74%). Respondents often use the social services of the municipal office and the Client center. The results presented in Table 1 show that all regression coefficients are statistically significant. Given that the regression coefficient (0.641) demonstrates that the relationship between citizens' perception of the city government and the provision of quality services is favorable and relatively high, it can be concluded that Hypothesis 1 (0. 001 < 0.05) is confirmed and statistically significant. Hence, the perception of the municipal authority significantly influences the provision of quality services by the municipal authority. A positive regression coefficient was also obtained for the relationship between employee behavior and quality service delivery, so this statement is also statistically significant. Since the p-value (0.017) is at < 0.05 level in this case, Hypothesis 2 can also be confirmed. Another relationship tested is between citizen and employee reporting preferences and the provision of quality services, for which a positive regression coefficient (0.035) was obtained. With the above relationship, it can be concluded that Hypothesis H3 is rejected as the p-value (0.514) is at 0.05 level.

Table 1: Statistical verification of the stated hypotheses

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Citizens' perception of the M /provision of quality services	0.641	0.643	0.051	11.095	0
Staff behavior/quality service delivery	0.596	0.601	0.047	9.654	0
Reporting preferences from citizens and employees/ provision of quality service	0.035	0.031	0.056	0.612	0.514

Source: Author´s editing

Conclusion

Thanks to the CAF model, interpersonal relations within the Nitra municipal office have improved, teamwork has improved, employees have become more interested in what is happening in the office, and the office's running has improved. The office has become more interested in what the residents think about their work, their perception of their suggestions, where the office should improve, and what they are satisfied with. In principle, we believe that the CAF model is a good tool for the self-assessment of authority; it is an essentially universal, simple, but effective tool.

It allows an authority to know its strengths and weaknesses and gives the authority a clear signal of what needs to be worked on and what direction to take in quality management. The CAF model is not a miracle that instantly transforms a dysfunctional office into a flawless, customer-oriented institution. However, as a cornerstone for setting the quality of an organization, it can be a suitable model that can be of great benefit to the organization if its implementation is appropriately "grasped" and the outputs are then used to improve processes and procedures. The CAF model opens up enormous room for improvement for a city authority precisely by identifying its strengths and weaknesses. Each employee has the opportunity to stop and reflect on how they work, the performance of the authority's duties as a whole, or effective processes that could be implemented. Evaluating these criteria and continuously striving for improvement in individual points and processes is a driving force and a solid motivational element for employees. By involving the staff member in self-evaluation, addressing and managing the efficiency and way of working of the authority, it transforms from a work matter to a personal one. At the same time, the employee gains insight into the scope for improving his work and his further personal development.

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BREAK-EVEN POINT ANALYSIS IN A SELECTED WINERY

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Received: 30. September 2022 Reviewed: 19. November 2022 Accepted: 22. December 2022

Abstract

Viticulture in Slovakia has a long tradition. The territory of the country is divided into six wine-growing regions. As of 31st of July 2021, 692 active winemakers were registered. The main goal of this paper is to analyze the break-even point of the best-selling products in a selected winery operating in the Central Slovak wine region in the period 2016-2020. This paper will compare the production of the selected company with the break-even point production. The average net profit and average selling price of a bottle of selected wines will be evaluated. Next, we will focus on the quantification of operating leverage and degree of operating leverage, which compares changes in EBIT to the increase in sales. The results show that the company was profitable by selling all four top-selling wines in the period under review because actual production exceeded production at the break-even point. Even the highest profit per bottle of wine may not automatically mean the highest total profit because it is mainly affected by the number of bottles produced and sold. The last result shows that the tremendous difference between the unit price and average variable cost means more substantial operating leverage and degree of operating leverage.

Keywords: break-even point, costs, operating leverage, wine, winery

JEL Classification: M11, M21, M41

Introduction and theoretical background

The tradition of growing wine grape in Slovakia dates to the third century AD, but the first written mention of its cultivation date back to the beginning of the 9th century. The beginnings of wine grape growing in Slovakia are associated with Mark Eurélio Próba, who is considered the founder of European North Pannonian viticulture (Hronský & Pintér, 2009). Grapevine planting, grape production, and

(vine preparation-production) have determined the lifestyle of people living in the agricultural landscape. Agrobiodiversity consists not only of the grapevine but also many other fruit woody plants (species and local and regional cultivars/races) resulting from long-term cultivation and planting/breeding in the vineyard region (Eliáš, 2012). Lieskovský et al. (2013) found that over the past 20 years, almost half the vineyard area in Slovakia has been abandoned or converted to arable land. The import of cheap grape must and wines, increased production costs and insufficient agricultural subsidies have made viticulture unprofitable. Local farmers perceive financial instruments and an inadequate market as limiting factors for farming. Currently, the Slovak viticulture region is divided into six viticultural regions: "Little Carpathians Wine Region", "South Slovak Wine Region", "Nitra Wine Region", "Central Slovak Wine Region", "East Slovak Wine Region", "Tokaj Wine Region". As of 31st July 2021, 692 active winemakers were registered, with the most significant number of producers operating in the "Little Carpathian Wine Region". The total area of vineyards has shown a fluctuating trend over the past five years. In 2020, the total area of vineyards was 11,248 ha, of which 86.7 % were fruiting vineyards. The average harvest in 2020 was 6.07 t/ha (VÚEPP, 2021).

Lombardi et al. (2015) analyze the intra-EU trade of the world's chief wine exporters – Italy, France, and Spain. Estimation results highlight the differences between bulk and bottled wine. Estimates for bottled wine all show a growth tendency. Analyzing pricing policies shows that France does not appear to target an increase in export volumes so much as an increase in average unit price. At the same time, Italy and especially Spain tend to increase export volumes, to the detriment of prices. Small and medium enterprises (SMEs) can play an essential role in the diffusion of wine innovation (Menna & Walsh, 2019).

Wine is a specific product with a high degree of customization of differentiation according to the attributes on which consumers decide to choose it. This attribute includes taste, price, brand, country of origin, and grape variety (Vokounova, 2021). The quality of Slovak wine is at a high level, but the competitiveness of the sector in the EU market has a negative trend. Please choose the appropriate measures to improve this situation we consider for the critical management decision of the Slovak wine industry enterprises (Rogovska, 2018). Managerial decision-making is closely associated with providing basic financial transaction information and its impact on the enterprise's financial situation and economic results. Nowadays, essential tools and methods of every manager include, besides budgets and calculations, effective and efficient usage of information obtained from managerial accounting. The ideal information database is variable cost calculation. Determining the critical capacity utilization and minimum acceptable profit is a fundamental task in managerial decision-making (Potkany & Krajčírová, 2015). Every production manager or procurement engineer faces the dilemma of determining the minimum lot size for producing a particular component so that the revenue received equals the costs associated with producing it at a given price. This is called break-even analysis, which determines the lot size to match the total costs of producing that lot (Kiran, 2022). Most managers will be familiar with the term break-even point. The break-even point is the level of activity that produces neither profit nor loss. In theory, a company can carry on trading at the break-even point forever, with income equal to the expenditure; however, profit needs to be generated to finance new machinery or research into new markets and production (Birchall, 1991).

Leverage is a crucial decision area in financial management (Bhatt Satyaki & Sanghvi, 2018). Many authors have dealt with the measurement of operating leverage (Chen et al., 2022; Jiao et al., 2019; Chen et al., 2022; O'Brien & Vanderheiden, 1987).

Operating leverage is one of the more popular parameters used in management practice and scientific research (Dudycz, 2020). Operating leverage increases profitability and reduces optimal financial leverage. Thus, operating leverage generates a negative relation between profitability and financial leverage that is thought to be inconsistent with the trade theory but is commonly observed in the data (Chen, Harford & Kamara, 2018). Marques et al. (2021) indicate that greater operational leverage is an advantage for companies that present growth opportunities and have yet to reach the point of overinvestment since ROA decreases as less is invested in this scenario.

The results confirm that operating leverage or cost structure, in addition to affecting profitability, also affects the relationship between that profitability and other sources of risk that depend on the country in which the company operates. More specifically, indebtedness, size, innovation specificity, and reputation affect profitability to a greater or lesser extent, depending on the company's operating leverage level (Grau & Reig, 2021). Sarkar (2018) derives a company's optimal degree of operating leverage with flexibility in investment and production. He identifies the essential determinants of DOL, such as costs (fixed, variable, and costs of capacity), demand characteristics, the productivity of capital, and interest rate. The choice of DOL is critical because it impacts the company's risk level, operating, financial performance, and valuation.

Material and methods

The object of this paper is to select a winery operating in the Central Slovak wine region and its four best-selling wines:

- Collection EXCLUSIVE
- Collection CASTLE
- Special MOVINO collection
- Traditional MOVINO collection

The primarily used data is from the internal company accounting of the selected company for the period 2016 - 2020.

This paper is focused on comparing the production of the selected company with the break-even point production, the average net profit and average selling price of a bottle of selected wines, and on the quantification of operating leverage and degree of operating leverage, which compares changes in EBIT to the increase in sales.

$$\textit{contribution for payment per bottle} = \textit{selling price} - \textit{average variable costs} \tag{1}$$

The contribution for the payment is the amount that remains for the company to cover average fixed costs and for the creation of profit after the payment of average variable costs.

$$\textit{profit/loss per one bottle of wine} = \textit{contribution for payment} - \textit{average fixed cost} \tag{2}$$

$$\textit{break-even point} = \frac{\textit{fixed costs}}{\textit{seling-price} - \textit{average variable costs}} \tag{3}$$

The break-even point is the point at which the company shows zero financial results: sales equal costs. The company does not make a profit or a loss.

$$operating\ leverage = \frac{EBIT_1 - EBIT_0}{TR_1 - TR_0} \quad (4)$$

Operating leverage shows how EBIT will change if sales increase by one euro.

$$degree\ of\ operating\ leverage = \frac{\frac{EBIT_1 - EBIT_0}{EBIT_0}}{\frac{sales_1 - sales_0}{sales_0}} \quad (5)$$

Operating leverage shows how EBIT will change if sales increase by one percent.

Results and discussion

Table 1 contains the calculation procedure of the break-even point for Collection EXCLUSIVE.

Table 1 The calculation procedure of the break-even point of Collection EXCLUSIVE

Indicator / Year	2016	2017	2018	2019	2020
Fixed costs (EUR)	36,155.13	28,682.94	45,444.62	55,380.52	59,924.02
Variable costs (EUR)	205,604.01	164,314.69	285,860.48	361,732.33	391,409.39
Production (bottles)	143,277	110,319	174,787	213,002	230,477
Average variable costs (EUR)	1.44	1.49	1.64	1.70	1.70
Selling price (EUR)	2.82	3.12	3.10	3.04	2.69
Contribution (EUR)	198,437.13	179,880.59	255,979.22	285,793.75	228,573.74
Contribution per bottle (EUR)	1.38	1.63	1.46	1.34	0.99
Break-even point production (bottles)	26,105	17,591	31,030	41,275	60,423
Exceeding the break-even point production (%)	448.85	527.13	463.28	416.05	281.44

Source: Author´s editing

Table 1 shows how many bottles of Collection EXCLUSIVE the company must produce to reach the break-even point of this production. The company exceeded the production volume, at which sales revenue covers the total costs of production of this wine in each year of the monitored period. In 2017, the company had to produce and sell 17,591 bottles of this wine to reach the break-even point (with the production and sale of each additional bottle, the company made a profit). In 2019 and 2020, the average variable costs were the highest - EUR 1.70 per bottle of Collection

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EXCLUSIVE. In the last year, the selling price of this product was reduced (from EUR 3.04 in 2019 to EUR 2.69), and overcame of break-even point in comparison with actual production was the lowest among the monitored period - by 281 %. The amount of unit contribution was the highest in 2017. After covering the average variable and fixed costs, the company started to make a net profit of EUR 1.37 per sold bottle - the average net profit of this wine for the monitored five years was EUR 1.10 per bottle.

Table 2 contains the calculation procedure of the break-even point for Collection CASTLE.

Table 2 The calculation procedure of the break-even point of Collection CASTLE

Indicator / Year	2016	2017	2018	2019	2020
Fixed costs (EUR)	32,420.69	30,142.58	42,662.88	25,549.16	17,205.24
Variable costs (EUR)	175,238.43	163,981.49	256,055.89	153,054.99	103,069.84
Production (bottles)	128,478	115,933	164,088	98,266	66,174
Average variable costs (EUR)	1.36	1.41	1.56	1.56	1.56
Selling price (EUR)	2.44	2.56	2.66	2.64	2.66
Contribution (EUR)	138,247.89	132,806.99	180,418.19	106,367.25	72,953.00
Contribution per bottle (EUR)	1.08	1.15	1.10	1.08	1.10
Break-even point production (bottles)	30,130	26,313	38,801	23,603	15,606
Exceeding the break-even point production (%)	326.42	340.60	322.89	316.32	324.02%

Source: Author´s editing

In 2016, the volume of production at which the company covered the costs of wine Collection CASTLE production with its sales was 30,130 bottles. In comparison with 2020, production volume decreased to 15,606 bottles sold - this is mainly because the fixed costs to produce this wine have decreased by EUR 15, 215.45. In every year of the monitored period, the company's production of this wine exceeded the volume of the break-even point production.

Table 3 contains the calculation procedure of the break-even point for the Special MOVINO Collection.

Table 3 The calculation procedure of the break-even point of the Special MOVINO Collection

Indicator / Year	2016	2017	2018	2019	2020
Fixed costs (EUR)	144,391.64	138,574.28	183,588.08	286,430.56	246,194.26
Variable costs (EUR)	618,016.31	617,188.81	875,770.96	1,363,322.34	1,171,809.79
Production (bottles)	572,201	532,978	706,108	1,101,656	946,901
Average variable costs (EUR)	1.08	1.16	1.24	1.24	1.24
Selling price (EUR)	1.85	1.92	1.91	1.84	1.72

Contribution (EUR)	440,555.54	406,128.95	472,895.32	663,724.70	456,859.93
Contribution per bottle (EUR)	0.77	0.76	0.67	0.60	0.48
Break-even point production (bottles)	187,538	181,856	274,126	475,420	510,269
Exceeding the break-even point production (%)	205.11	193.08	157.58	131.72	85.57

Source: Author´s editing

The company reported the highest contribution/contribution per bottle of Special MOVINO Collection in 2016 (approximately EUR 440,000 / EUR 0.77). After paying the fixed costs / average fixed costs from these amounts, the company started to make a net profit. The volume of break-even point production was highest in 2020 (510,269 bottles).

Table 4 contains the calculation procedure of the break-even point for the Traditional MOVINO Collection.

Table 4 The calculation procedure of the break-even point of the Traditional MOVINO Collection

Indicator / Year	2016	2017	2018	2019	2020
Fixed costs (EUR)	17,355.73	33,908.16	65,691.60	61,051.90	44,316.48
Variable costs (EUR)	74,284.95	132,749.21	261,250.20	245,819.16	178,435.72
Production (bottles)	68,778	130,416	252,660	234,815	170,448
Average variable costs (EUR)	1.08	1.02	1.03	1.05	1.05
Selling price (EUR)	1.60	1.62	1.55	1.53	1.58
Contribution (EUR)	35,759.85	78,524.71	130,372.80	113,447.79	90,872.12
Contribution per bottle (EUR)	0.52	0.60	0.52	0.48	0.53
Break-even point production (bottles)	33,381	56,316	127,309	126,366	83,124
Exceeding the break-even point production (%)	106.04	131.58	98.46	85.82	105.05

Source: Author´s editing

The average variable costs of this wine were the lowest among all monitored wines. The company monitored the highest volume of contribution for all bottles of the Traditional MOVINO Collection in 2018 and 2019. After reducing the contribution of this wine production by fixed costs, the company started to make a net profit from selling these products in all monitored years. The volume of break-even point production was highest in 2018 (127,309 bottles). If the company did not want to be unprofitable this year, it could not produce and sell less than 127,309 bottles.

The company was profitable by selling all four top-selling wines in the period under review because actual production exceeded production at the break-even point. We will compare these values for 2020 in the following figure.

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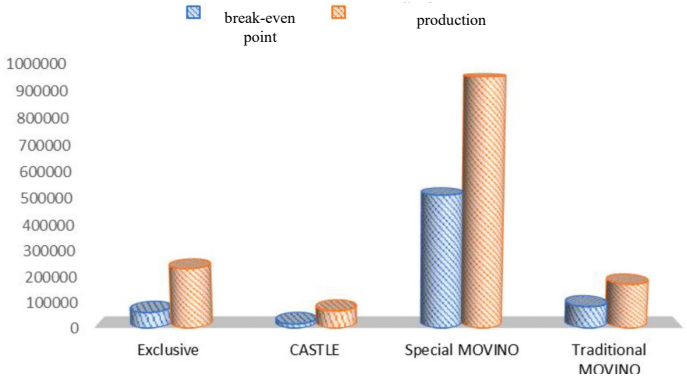
Figure 1 Comparison of production and break-even point in 2020



Source: Author´s editing

The company will profit after reducing the contribution per bottle by average fixed costs. Even the highest profit per bottle of wine may not automatically mean the highest total profit because it is affected mainly by the bottles produced and sold. Even though the Special MOVINO wine is third in the ranking in the comparison of the profit per bottle in the monitored period, this wine is produced and sold in an immense amount every year.

Table 5 Net profit per bottle

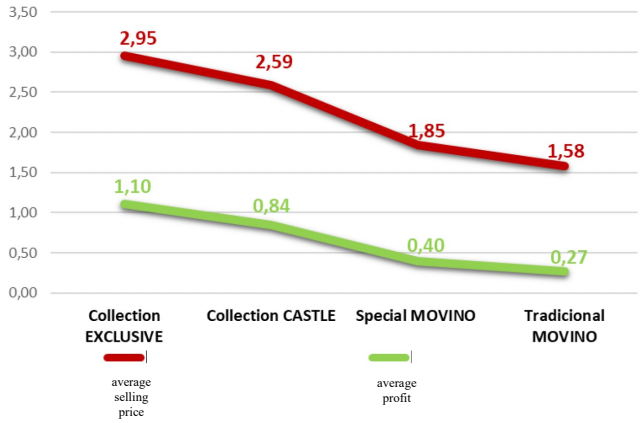
Indicator/year	2016	2017	2018	2019	2020
Collection EXCLUSIVE	1.13	1.37	1.20	1.08	0.73
Collection CASTLE	0.82	0.89	0.84	0.82	0.84
Special MOVINO	0.52	0.50	0.41	0.34	0.22
Traditional MOVINO	0.27	0.34	0.26	0.22	0.27

Source: Author´s editing

The most profitable wine was the Special MOVINO Collection. Although the company achieved the highest net profit per bottle from Collection EXCLUSIVE wine in 2017 (EUR 1.37), this year, the company also produced the smallest number of bottles of this product in the monitored period, which means that the total profit from the sale of this wine was the lowest. After paying the average fixed costs to produce Collection CASTLE wine from the contribution per bottle, the company also started to make the highest profit per bottle in 2017. However, the company made the highest profit from the sale of all bottles of this wine in 2018 (the company produced and sold about 164,088 bottles). The highest profit per bottle of Special MOVINO wine was achieved in 2016. The volume of bottles sold - 1,101,656 units in 2019 meant the highest total profit from the sale of this wine, even though the company started to make a profit after reducing the contribution by fixed costs.

Figure 2 shows the average profit per bottle and its average selling price for the five years under review and four monitored wines.

Figure 2 Average profit per bottle and average selling price for the five years under review and for four monitored wines



Source: Author´s editing

The highest value of operating leverage for Collection EXCLUSIVE wine was recorded in 2020. Based on the calculated value, we conclude that every increase in sales by 1 euro will mean an increase in earnings before interest and taxes by 2.24 euros (Collection CASTLE in 2016 - 0.52 euros, Special MOVINO in 2017 - 0.81 euros, Traditional MOVINO in 2019 - 0.38 euros).

Table 6 Operating leverage

Indicator/year	2016	2017	2018	2019	2020
Collection EXCLUSIVE	0.38	0.19	0.30	0.19	2.24
Collection CASTLE	0.52	0.19	0.25	0.32	0.30
Special MOVINO	0.79	0.81	0.07	0.13	0.42
Traditional MOVINO	0.26	0.26	0.11	0.38	0.06

Source: Author´s editing

The more significant difference between the unit price and average variable cost (contribution per unit) means more substantial operating leverage. The highest degree of operating leverage from the sale of Collection EXCLUSIVE wine was recorded in 2020. When the company's sales from the sale of this wine increase by 1 %, the earnings before interest and taxes from the sale of this wine can increase by 6.30 % (Collection CASTLE in 2016 - 1.44 %, Special MOVINO in 2017 - 2,90 %, Traditional MOVINO in 2019 - 2,30 %).

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Table 7 Degree of operating leverage

Wine/year	2016	2017	2018	2019	2020
Collection EXCLUSIVE	0.96	0.46	0.68	0.48	6.30
Collection CASTLE	1.44	0.56	0.73	1.02	0.96
Special MOVINO	2.59	2.90	0.26	0.60	2.25
Traditional MOVINO	1.33	1.55	0.53	2.30	0.45

Source: Author´s editing

Conclusion

The main aim of the break-even point analysis was to find out how many bottles of a selected wine the company must produce and sell to cover the company's fixed and variable costs for this product by sales. For example: for the Collection EXCLUSIVE in 2017, the company had to produce and sell 17,591 bottles. The company was profitable by selling all four top-selling wines in the period under review because actual production exceeded production at the break-even point. With each additional bottle sold, the company was already on the way to started making a profit from this wine.

Operating leverage/degree of operating leverage shows how EBIT will change if sales increase by one euro / per cent. For example, for Collection EXCLUSIVE in 2020, every euro increase in sales represents an EBIT of 2.24 euros. Collection EXCLUSIVE increases by 1% in 2020; the company could also record an increase in EBIT of this wine up to a rate of 6.30%.

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THE FINANCIAL SITUATION OF AGRIBUSINESSES IN RELATION TO CLIMATIC CONDITIONS: EVIDENCE FROM THE V4 COUNTRIES

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Received: 04. September 2022 Reviewed: 31. October 2022 Accepted: 20. November 2022

Abstract

The aim of the article is to provide a detailed statistical description and evaluation of the mutual relationship between the development of two types of agribusinesses' cash flows which represent the capacities of farms to save and self-finance in relation to changes in basic climatic parameters (i.e. temperature, precipitation). The calculations have been based on data obtained from the FADN (Farm Accountancy Data Network) and the CCKP (Climate Change Knowledge Portal). The figures on the V4 countries come from the period between 2004 and 2020. In terms of the net worth of agribusinesses and the values of their capital, V4 countries could be split into two groups. In Hungary and Poland, the development of temperature changes and the net worth or enterprise capital levels are moving in the same directions, while agribusinesses in Slovakia or Czechia, negative, but low correlation coefficients were measured. Regarding the relationship between cash flow and climatic conditions, we conclude that temperature changes are not happening to be a distinctive factor on the level of countries, but rather something that the whole Central European region has in common: the trend is suggesting the existence of a slight growing tendency and consequently pointing us to a direct relationship, but the nature of this relationship is rather weak and not indicative. The interaction of cash flow and of the development of precipitation levels is showing relatively more dynamics and fluctuations for all agro-businesses in the researched V4 countries. This results in a rising trend line where the yearly precipitation level is ranging from approximately 500 mm to 750 mm. Agro-businesses, mostly in Czechia and Slovakia, in the years when precipitation levels exceed 750 mm per year report relatively lower levels of cash flows.

Keywords: cash flow, FADN, agribusiness, climate change, V4 countries

JEL Classification: M21, Q14, Q13

Introduction and theoretical background

Cash flow statements and budgets are in general one of the main parts of agribusinesses' business economic management. In his study, originally focused on the Green Paradox, Österle (2016) states, among other conclusions, that the taxation of cash flow and the increase of this taxation are one of the effective tools for dealing with climate change. Chukwuezie et al. (2016) bring the macro view where they conclude that on the global level (i.e. regarding the stock of global financial assets) the discounted global cash flow is higher when modulated to the pre-industrial level of climatic parameters. The cash flow of entities is in general an important part of the global cash flow; that is why we assume it interesting to look at the mutual development of cash flows of agribusinesses and basic climatology parameters to assess whether there are any signs of co-dependency between such variables.

Hong et al. (2020) is among the many authors who claim that given the already proved macroeconomic impact of climate change, asset prices should be prone particularly also to the exposure of their cash flows to various climate risks, and research on this particular relationship (climate change parameters – cash flow fluctuations) regards as one of the very important ones in the whole climate finance research area. Nevertheless, the topic is not entirely new, but for climate economists this has been a topic since the 1980s, e.g. in (Montross et al., 1997; Lee et al., 1987; Ziauddin and Liang, 1986; Poling and Safley, 1986).

More than 40 years later, Brahmana and Kontesa (2023) studied the impact of temperature anomalies on cash holdings. The study worked with a sample of fishery companies based in 27 countries in the timespan from 2013 to 2019. The results indicate a positive relationship between cash holdings and temperature anomalies. Authors also pointed out that companies tend to possess higher amounts of cash in response to higher temperature anomalies.

However, it is essential to add that although cash flow and cash holdings have a couple of important common features, there are significant disparities between them. Cash flow is an annual range, and derived from adjusted annual profits, while cash holdings are characterized as a cumulative cash balance on the balance sheet. Financially deprived enterprises are less likely to enter capital markets, so it is apparent that holding cash could be in favor of their investment needs (either current or the future ones) (Chan et al., 2013).

Addoum et al. (2021) documented the impacts of temperature exposures on the actual earnings of enterprises in 59 different industries, while putting emphasis on the cash flow channel (in the form of operating cash flow). They argued that this could allow for the better understanding of the real economic impacts and effects of climate change on enterprises. Sensitivity to extreme temperature (either extreme heat or extreme cold) was measured in 24 out of 59 industries.

However, their hypothesis that temperature extremes will have significant effects on profitability in agricultural and related industries was not supported by sufficient evidence. On the other hand, they also stated that the reason for this result may lie in their focus solely on publicly traded firms, so the researched sample included only a few companies directly involved in farming and agricultural production. Their inclusion could bring different results.

Addoum et al. (2021) also concluded that there are no significant relations in industries such as agricultural product producers, producers of packaged meet and food, or staples and food retailing. Also, they were able to find significant extreme temperature effects among firms in the beverages and hotels and catering industries.

They also state that the earning effects they describe were prevalently revenue driven rather than a cost channel, suggesting that they may be more consumer demand driven than agricultural crop yields.

Huang et al. (2018) directly studied the impacts of climate-related risk on financial situations and choices made by publicly listed firms around the world through the Global Climate Risk index. They were able to prove that the likelihood of loss from major catastrophic climate events, such as storms, floods, heat waves, etc. need to be associated with lower and more volatile earnings and cash flow. Their findings are in agreement with policies that try to moderate these negative effects. They also concluded that enterprises located in countries characterized by more severe weather conditions are more prone to posses more cash to build financial slack and thereby some kind of organizational resilience to threats resulting from climate change. Those enterprises also tend to have less short-term debt and more long-term debt, and to have lower probability to be able to distribute cash dividends.

Since there is a lack (or absence) of studies of this kind of enterprises in the European area, we decided to inspect the relationship between the basic climatic condition parameters and cash flow for agricultural enterprises in the Visegrad 4 countries – Slovakia, Czechia, Poland and Hungary (hereinafter referred to as the V4).

Material and methods

In the analysis we worked with 5 variables describing the financial situation (economic size, net worth, average farm capital, cash flows), 2 variables representing basic climatic conditions in the researched countries where agribusinesses carry out their business activities (mean annual temperature change, total sum of precipitation of identified period), and through the 3 additional variables we provide information on the number of agribusinesses represented in our data sample (minimum and maximum number of enterprises and the represented enterprises in the particular country).

Regarding the representativeness of the data sample, we refer to the methodology of the Farm Accountancy Data Network, whose data set we use as the only resource of the economic parameters used in this study. Ramsey and Hewitt (2005) state that data samples must meet 2 conditions: a) containing only farms which belong to the field of observation, and b) the included farms must represent an identical distribution presented by the farms in the field of observation. According to the FADN (2018) methodology guide, the fulfilment of the second condition is provided by the procedure used for the extraction of the farms from the field of observation, which classifies the farms according to 3 criteria – geographical district, type of farming and economic size (classification variables defined in the Regulation on the Typology of agricultural holdings (European Commission, 2008). For the details on the process of the stratification, i.e., extraction of the representative sample as well as further details about meeting the conditions of representativeness see Mari (2020).

Below we provide further information on each variable used in our analysis:

- *Economic size* of agri-enterprise (measured in thousands of euros of standard output (based on Community typology, abbreviation used: econ_size, method of calculation: total economic size in euros divided by 1,00 euros, which is equal to 1 ESU–European size unit defined as a fixed number of ECU of Farm Gross Margin based on the Commission Decision 90/36, data source: *Farm Accountancy Data Network*)

- *Net worth* (measured in euros, abbreviation used: net_worth, calculation: total assets of the agribusinesses minus total liabilities of the agribusinesses, data source: *Farm Accountancy Data Network*)
- *Average capital* of the agro-enterprise except land and quotas (measured in euros, abbreviation used: farm_cap, calculation: average value = arithmetic mean of the opening and closing values, the formula sums up the following: livestock, permanent crops, land improvements, buildings, machinery and equipment, circulating capital; the value of quotas and other prescribed rights are not included as they cannot always be separated from the value of land, it is calculated only if land capital is recorded independently from the value of buildings, data source: *Farm Accountancy Data Network*)
- *Cash flow 1* (measured in euros, abbreviation used: CF1, represents the enterprise's capacity for saving and self-financing, calculated as the following stream: receipts minus expenditure for the accounting year, with no operations on capital and on debts and loans, net receipts of agricultural activity and other receipts (plus the balance agro-enterprise subsidies and taxes, plus balance subsidies and taxes on investments), sales of products, other receipts and sales of livestock (minus all costs paid, minus purchases of livestock), receipts minus expenditure for the accounting year, net receipts of agricultural activity and other receipts (plus balance agro-enterprise subsidies and taxes, plus balance subsidies and taxes on investments), sales of products, other receipts and sales of livestock (minus all costs paid, minus purchases of livestock, plus agro-enterprise subsidies, minus agro-enterprise taxes, plus VAT balance, plus subsidies on investments, minus taxes on investments), data source: *Farm Accountancy Data Network*)
- *Cash flow 2* (measured in euros, abbreviation used: CF2, represents the enterprise's capacity for saving and self-financing, calculated as the following stream: receipts deprived of values of expenditure for the accounting year, net receipts of agricultural activity and other receipts (added balance farm subsidies and taxes, balance subsidies and taxes on investments, add balance of operations on capital, balance of operations on debts and loans), sales of products, other receipts and sales of livestock (deprived of all costs paid and purchases of livestock, added enterprise subsidies, minus enterprise taxes, added VAT balance, subsidies on investments, minus taxes on investments, plus sales of capital deprived of investments, plus closing valuation of debts deprived of opening valuation of debts), data source: *Farm Accountancy Data Network*)
- *Precipitation* (measured as a sum over an identified period in millimetres, abbreviation used: precipitation data source: Climate Change Knowledge Portal)
- *Mean annual temperature change* (measured in Celsius degrees, abbreviation used: temp_change, annual mean temperature anomalies, i.e., temperature change with respect to a baseline climatology, corresponding to the period 1951–1980, data are based on the publicly available GISTEMP data, the Global Surface Temperature Change data distributed by the National Aeronautics and Space Administration Goddard Institute for Space Studies (NASA-GISS), source of the data: *Climate Change Knowledge Portal*)
- *Minimum of the sample agribusinesses* (measured as the number of enterprises in the sample, minimum value, abbreviation used: sample_min, data source: Farm Accountancy Data Network)
- *Maximum of the sample agribusinesses* (measured as the number of enterprises in the sample, maximum value, abbreviation used: sample_max, data source: *Farm Accountancy Data Network*)

- Agribusinesses represented (measured as a sum of weighting coefficients of individual enterprises in the sample, abbreviation used: farm_rep, data source: Farm Accountancy Data Network)

Table 1: Descriptive statistics, data sample of V4 countries, timespan: 2004–2020, frequency: annual

Variable	Mean	SD	Min.	Perc.25	Perc.75	Max.
country: Czechia						
Economic size (thousand €)	254.52	33.68	215.6	234.5	274.1	356.5
Net worth (€)	548508.47	80852	436051	493598	599058	686271
Average capital (€)	632300.06	84214.54	516182	563192	699217	782118
CF1 - Cash Flow 1 (€)	64881.53	15373.93	37104	55228	77711	88325
CF2 - Cash Flow 2 (€)	96757.29	101997.65	10688	22796	216888	277231
Precipitation (sum over identified period in mm)	690.69	75.95	567.52	644.41	735.54	868.6
Mean annual temperature change (Celsius degrees)	1.63	0.72	0.44	0.97	2.19	2.67
Sample agribusinesses (min)	1000	0	1000	1000	1000	1000
Sample agribusinesses (max)	2000	0	2000	2000	2000	2000
Agribusinesses represented (nb)	16508.41	1430.31	13899	15713	18007	18161
country: Hungary						
Economic size (thousand €)	51.33	6.51	39.4	46.9	56.1	61.8
Net worth (€)	135515.82	33629.89	81366	104059	163040	185872
Average capital (€)	124998.41	20327.79	86520	112675	137738	155762
CF1 - Cash Flow 1 (€)	21747.59	6309.19	8952	18533	25239	31936
CF2 - Cash Flow 2 (€)	5974.41	9643.43	-9026	-2604	14321	17587
Precipitation (sum over identified period in mm)	628.71	95.26	426.56	591.21	668.29	864.96
Mean annual temperature change (Celsius degrees)	1.55	0.7	0.27	0.92	2.1	2.58
Sample agribusinesses (min)	1294.12	469.67	1000	1000	2000	2000
Sample agribusinesses (max)	2294.12	469.67	2000	2000	3000	3000

Agribusinesses represented (nb)	105877.65	5462.92	94240	102448	110696	111878
country: Poland						
Economic size (thousand €)	26.22	5.28	18.7	20.6	31.6	32.7
Net worth (€)	132974.12	43516.08	61445	92371	163183	182654
Average capital (€)	79580.47	11987.93	55305	72053	87614	95129
CF1 - Cash Flow 1 (€)	12598.18	2231.6	7791	11869	14248	15687
CF2 - Cash Flow 2 (€)	8683.53	2495.96	1236	7850	10171	11314
Precipitation (sum over identified period in mm)	615.02	77.06	504.13	554.53	665.93	794.6
Mean annual temperature change (Celsius degrees)	1.56	0.75	0.4	0.84	2.15	2.65
Sample agribusinesses (min)	10000	0	10000	10000	10000	10000
Sample agribusinesses (max)	20000	0	20000	20000	20000	20000
Agribusinesses represented (nb)	736780.06	7179.99	725572	733856	739289	749204
country: Slovakia						
Economic size (thousand €)	395.01	56.94	308.9	343.4	448	463.9
Net worth (€)	864419.65	318203.99	609340	665842	878264	1608270
Average capital (€)	1060289.82	261977.7	752601	921144	1246762	1665371
CF1 - Cash Flow 1 (€)	63984.65	23942.78	23605	49970	73776	120703
CF2 - Cash Flow 2 (€)	-12817.65	34674.06	-85407	-25936	1169	54276
Precipitation (sum over identified period in mm)	801.89	114.91	614.09	718.75	854.34	1126.71
Mean annual temperature change (Celsius degrees)	1.52	0.72	0.43	0.86	2.14	2.58
Sample agribusinesses (min)	500	0	500	500	500	500
Sample agribusinesses (max)	1000	0	1000	1000	1000	1000
Agribusinesses represented (nb)	3942.76	312.73	3531	3697	4152	4579

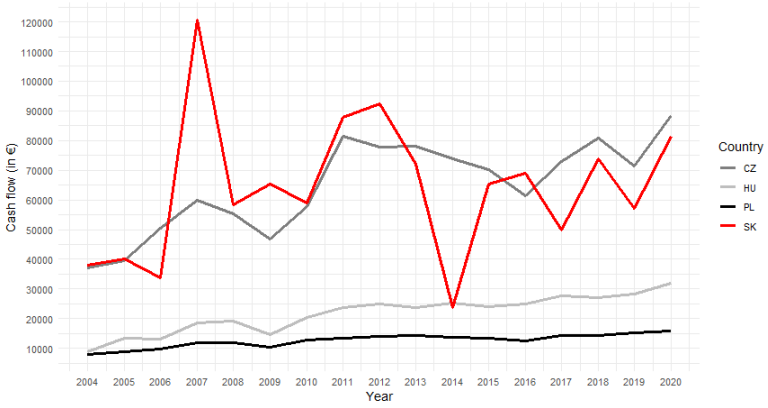
Source: own calculations based on FADN and CCKP data.
Legend: SD–standard deviation, Min.–minimum value, Max.–maximum value, Perc.–percentile, nb–number

Table 1 shows the basic statistical description (included mean, standard deviation, minimum, percentiles, and maximum values) of all the variables used for each researched country separately, while considering the timespan length of 17 years (2004-2020). The sample of agribusinesses we used in the analysis varies from 500 to 1000 businesses in Slovakia, 1000 to 2000 in Czechia, 1000 to 3000 in Hungary to 10 000 to 20 000 agribusinesses in Poland. All this is in proportion with the size of the agricultural sector in the selected countries, as it is visible from the numbers of agribusinesses represented. The country with the highest overall number of agribusinesses is Poland (mean value: 736 781), followed by Hungary with 105 878 agribusinesses, 165 509 in Czechia and 3 943 in Slovakia.

From the point of view of economics, the highest mean value when it comes to the economic sizes of agribusinesses is reached in Slovakia (395.01), followed by Czechia (254,52), the lowest mean value of economic sizes is reached in Hungary and Poland. The mean economic size of enterprises is five times smaller in Hungary than in Czechia and eight times smaller in Hungary than in Slovakia. In the case of Poland the gap is even more visible, where the mean economic size of Polish agribusinesses was approximately ten times smaller than that of Czech agribusinesses and fifteen times smaller than that of Slovak ones.

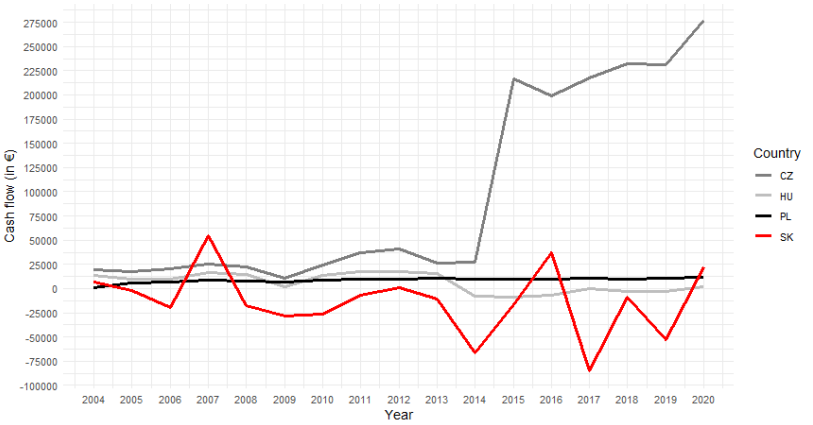
The total standard gross margin is the highest in the case of Slovak agribusinesses. It is also visible through the observed net worth of V4 agribusinesses. The biggest mean positive gap between total assets and total liabilities in the researched period was measured in Slovak agribusinesses (864 420 €), followed by Czech enterprises (548 508 €). Hungarian and Polish agribusinesses are more distinctive with smaller differences between their assets and liabilities values (mean values from 92 371 € in Poland to maximum 185 872 € in Hungary). When looking specifically only at how much capital agribusinesses operate with (gap between opening and closing values of various types of capital such as machines, buildings, equipment, land improvement, livestock or permanent crops), it is again Slovakia with the highest mean values over the researched period (1 060 290 €), whilst the Hungarian or Polish agribusinesses' average values of capital do not exceed 155 762 € (in Hungary), or 95 129 € (in Poland).

Figure 1 Development of Cash Flow (CF1) in V4 countries, timespan: 2004–2020



Source: own processing based on FADN data

Figure 2 Development of Cash Flow (CF2) in V4 countries, timespan: 2004–2020



Source: own processing based on FADN data

As Blyth et al. (2007) stated, climate policy uncertainty alone can significantly also affect the cash flow of companies and of various project investments. Uncertainty in cash flow very often leads to more uncertainty and risk, spreading and affecting the business sphere. In this paper we are working with the cash flows reported by the Farm Accountancy Data Network. The mean values of cash flow in the V4 are the highest in the agribusinesses in Slovakia (mean value: 63 985 €) and Czechia (mean value: 64 882 €). The lowest cash flow in agribusinesses is in Poland, where the mean cash flow value is 12 598 €.

Between the Cash Flow (CF1) and Cash Flow (CF2) there is only a methodical difference. Cash Flow 2 also includes operations on capital, debts, and loans. Those parts are not included in the Cash Flow 1 indicator. This is visible also in the values of Cash Flow 2 where there are apparent differences. This kind of cash flow is the highest in the case of Czech enterprises (mean value: 96 757 €), and much lower values are present in Hungary (mean value: 5 974 €) and Poland (mean value: 8 684 €). Slovakian agribusinesses are the only ones which report negative cash flow (mean value: -12 818 €) (when operations on capital, debts and loans are present in the analysis).

As it is also visible from Figure 1 and 2, the development and the dynamics of the cash flow 1 and 2 over the years from 2004 to 2020 differ. Fluctuations in the development of the cash flow 1 are mostly visible for Slovak and Czech agribusinesses with peaks in 2007 and 2012 and with a rapid downfall in 2014. On the contrary, Polish and Hungarian agribusinesses reported more stable financial flows over the researched years. Hungarian agribusinesses typically show stable growth over the years and their cash flow value evolved from approximately 6 000 € in 2004 to more than 31 000 € in 2020. Polish enterprises show stabilized cash flow values as well.

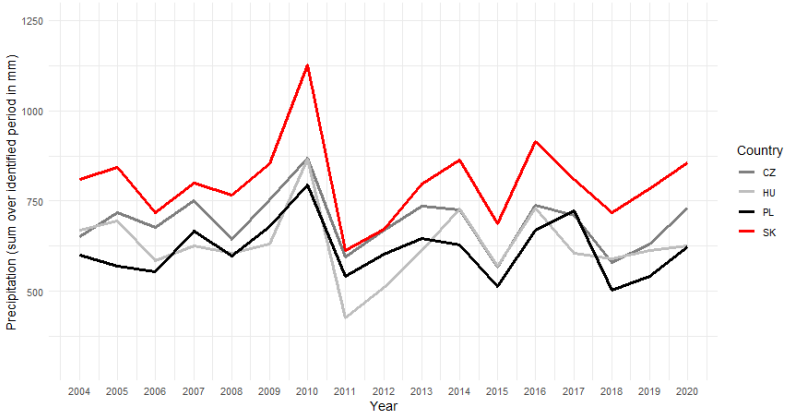
Cash flow 2, which takes into account the debts and loans and overall operations on capital, reported relatively strong fluctuations and dynamic development since the year 2014, especially for Czech and Slovak agribusinesses. However, Hungarian and Polish enterprise cash flows remain relatively stable, but with very low values, which could, when reported for that long period of time as it is in this case,

signalize relatively serious financial problems. The overall financial situation signalizes more stable development, bigger enterprises, when it comes to economics size, with higher net worth values and high but not that much stable values of cash flow for Czech and Slovakian agribusinesses.

The development of the climatic conditions we are describing with the two basic parameters–sum of precipitation over the identified period and the mean annual temperature change, are the most frequently and commonly used ones in the research area. Figure 3 and 4 show the development of both parameters between 2004 and 2020. The V4 countries are not only culturally but also geographically relatively similar, which should be also a good basis for the statement about similarities between the countries from the climatic point of view.

The country with the highest levels of precipitation measured per calendar year (see Figure 3 and Table 1 for more) for the whole researched period is Slovakia (mean value for the whole period is 801.89 mm, while in Poland precipitation is only 615.02 mm per year. Fluctuations for each country seem similar for the whole Central European region (Figure 3) with a peak in 2010, as the wettest year from the researched period. Year 2011 was the draughtiest for Hungary and Slovakia, and also as one of the draughtiest ones for Poland or Czechia.

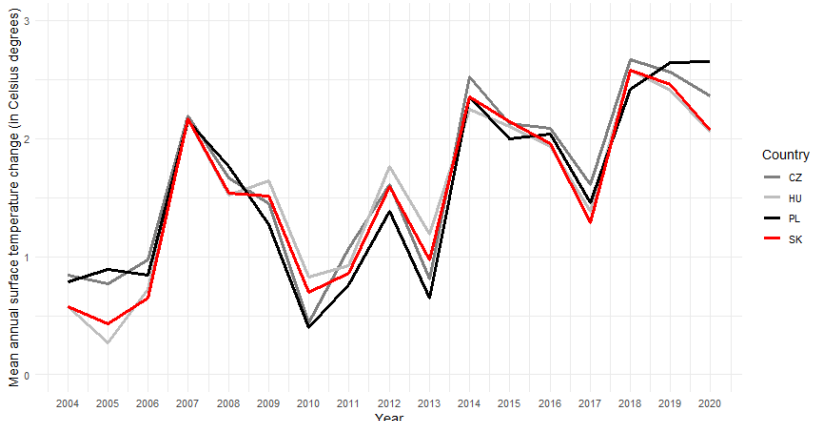
Figure 3 Development of precipitation level in V4 countries, timespan: 2004–2020



Source: own processing based on CCKP data

The developments in temperature changes in the V4 countries report extraordinarily strong and evident similarities across the whole researched period, with the most visible disparities in 2005 and 2020, where in both cases Poland is the country with the highest mean annal temperature changes, followed by Czechia, Slovakia, and Hungary. Development is full of fluctuations and there is also a visible stable growth trend in the observed temperature changes, e.g. in Poland the maximum mean annual temperature change in 2005 was 0.4 Celsius degrees, while in 2020 it was the mean annual value of 2.64 Celsius degrees.

Figure 4 Development of temperature changes in V4 countries, timespan: 2004–2020



Source: own processing based on CCKP data

Therefore, we can conclude that temperature changes are not happening to be a distinctive factor regarding the researched countries, but something that the whole Central European region has in common.

The aim of this study, which is prevalently a detailed statistical description and the evaluation of mutual relationships between the development of the two types of agribusinesses cash flows, is reached through descriptive statistics, the visualization of dynamic trend lines for the mutual relationship of the selected climatic variables and the selected economic variables and correlation analysis (Pearson, Spearman and Kendall correlation coefficients, analysis were conducted on the scaled data) for the 5 economic variables and 2 climatic condition parameters (all described in detail in the section above), for each of the researched countries separately.

Results and discussion

Trend lines

Visualizations of the mutual relationship between the cash flow of type 1 and the development of basic climatic parameters in the form of the sum of precipitation over an identified period and mean annual temperature changes are conducted trough the basic line plots with trend lines (shown in Figures 5 and 6). As we stated above, we do not register any major disparities in mean annual temperature changes. The joint trend line for all agribusinesses in the V4 countries is consequently suggesting the existence of a direct relationship between the variables, where higher mean annual surface temperature change results in higher values of cash flow type 1. However, the nature of this relationship is weak and not indicative (low coefficient of determination). We considered it more appropriate and accurate to visualize the trend line for each V4 country separately. As we mentioned in the data description section, in Figure 5 we can see a consistent prevalence of higher cash flow values for Slovak and Czech agribusinesses, analogously relatively lower cash flow values for Polish

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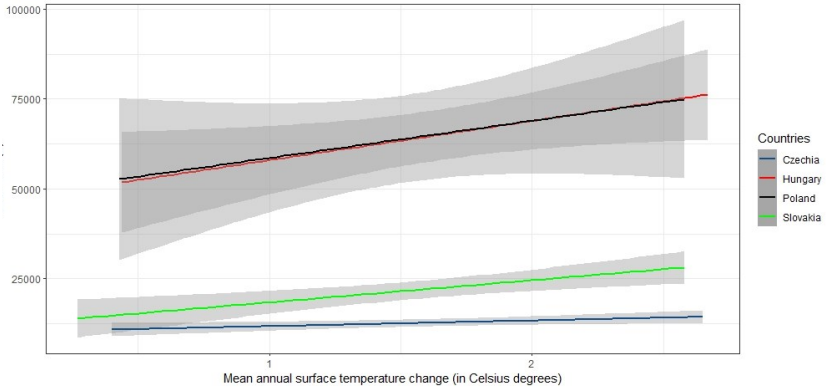
and Hungarian agribusinesses. Apart from the Czech agri-businesses, the agri-businesses in the remaining three V4 countries (Slovakia, Poland, and Hungary) show a positive trend in the relationship between the mean annual temperature change and cash flow values. The most visible, pronounced and almost identical is the common development of variables in Hungary and Poland. An existing, but a weaker positive trend is also observable in Slovak enterprises.

Figure 5 Relationship between the mean annual surface temperature change and cash flow (CF1) in V4 countries, timespan: 2004–2020, frequency: annual

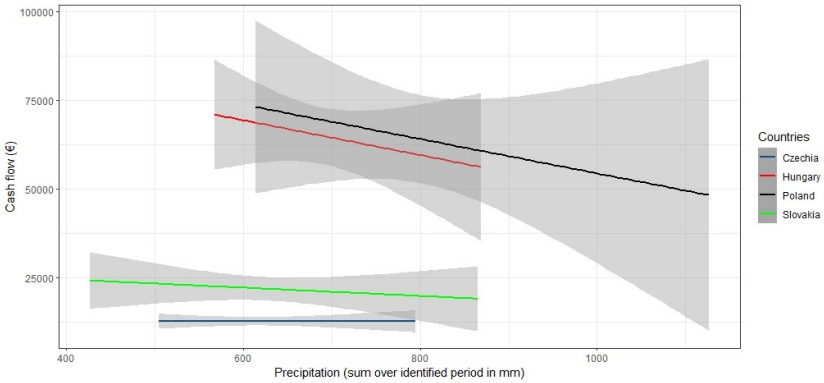


Source: own processing based on FADN and CCKP data

Figure 6 gave us glimpse into the nature of the relationship between the annual sums of precipitation and the development of cash flow type 1 throughout the period 2004-2020. This relationship is showing relatively more dynamics and fluctuations in all agro-business in the researched V4 countries, which results in a rising trend line for the situation where the yearly precipitation level is within the range of values from approximately 500 mm to 750 mm. Agribusinesses in Czechia or Slovakia operate in an environment with total precipitation not exceeding 900 mm per year and show relatively lower levels of cash flow compared to Polish and Hungarian agribusinesses. The development of their cash flow in relation to the precipitation levels compared again to the Polish and Hungarian counterparts is stable throughout the monitored period. Polish and Hungarian agribusinesses operate in an environment with higher annual precipitation totals and higher levels of cash flows, while the interrelationship of these variables shows a negative tendency.

Also, in case of the relationship cash flow–precipitation, the levels of cash flow are higher for Czech and Slovakian agribusinesses, as it is obvious also from the descriptive statistics (Table 1), which shows us that the first quartile (25% percentile) for Czech agribusinesses is 55 228 € (while the maximum level of precipitation over the researched timespan 2004–2020 is 88 325 €).

Figure 6: Relationship between the precipitation level and cash flow (CF1) in V4 countries, timespan: 2004–2020, frequency: annual



Source: own processing based on FADN and CCKP data

Modelling simple linear trendlines may not be sufficient for a proper and detailed description of the development of all researched variables. Therefore, the next section is devoted to the correlation analysis of mutual relationships of economic and climatic variables in each of the researched country separately.

Correlation analysis

In the correlation analysis (Figure 7) we quantify the co-development of the mean temperature changes, as one of the most characteristic type of climatic parameter with the selected economic variables. Regarding the relationship between the temperature changes and cash flow type 1, for 3 out of 4 V4 countries there are spotted 2 moderate correlation coefficients within the range from 0.51 for Czechia and 0.68 for Hungary (the exception from moderation in correlation with temperature changes are the Slovakian agribusinesses with a low correlation coefficient 0.31, which is, according to the Pearson correlation test, not statistically significant).

Including the balance of operations of the loans and debts in cash flow type 2 caused severe fluctuations in the flows, where according to correlation coefficients, there is moderate correlation with the temperature changes for Czechia (coefficient: 0.66), not statistically significant correlation for Poland and no correlation for the development of the observed variables in Slovakia. Hungarian agribusinesses report developments in cash flow 2 which evolves in contradiction with the developments in mean annual temperature changes (moderate negative correlation coefficient -0.58).

Regarding the economic size of agribusinesses in V4 countries high correlation is spotted for Hungarian enterprises (coefficient: 0.75), moderate correlation for the Polish (coefficient: 0.61) and Czech enterprises (coefficient: 0.5), and statistically insignificant correlation for Slovak enterprises. In terms of the net worth of agribusinesses and values of their capital, V4 countries could be split into two groups, where in Hungary and Poland the development of temperature changes and net worth or enterprise capital levels are moving in the same direction, while for

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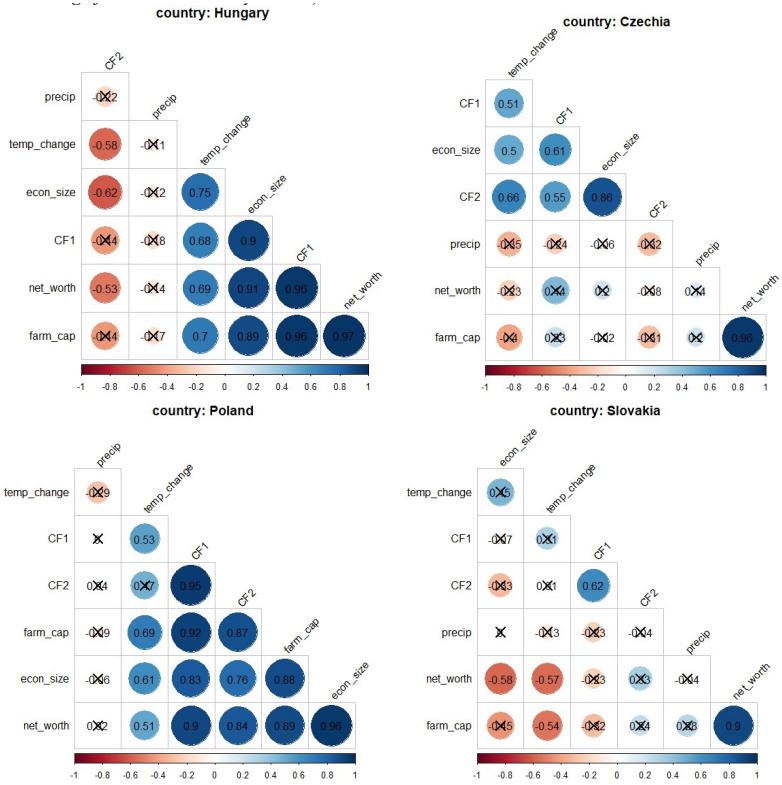
agribusinesses in Slovakia or Czechia, there were low negative correlations measured (Slovakia), or low correlation coefficients for Czech enterprises.

Figure 7: Correlation plots for observed variables in timespan 2004-2020 (level of significance for Pearson correlation test a = 0.05, correlations which are not statistically significant are marked by crosses)



Source: own processing based on FADN and CCKP data

Quantifying the joint co-development of annual precipitation level and of the financial variables, such as economic size, net worth, agribusiness capital, or agribusiness' cash flow streams through a correlation analysis shows no statistically significant correlation coefficients in none of the countries for any of the above listed economic parameters.

Differences between the V4 countries are also present in the mutual co-development of economic parameters. An inversely proportional development in the economic size of agribusinesses and their relationship with the net worth and amount of enterprise capital is present exclusively in Slovakia (in the form of low and moderate negative correlation). For Hungarian and Polish agribusinesses there is

evidence of a very tight and proportional co-development of economics sizes of holdings and their net worth (in both cases high correlation coefficients, for Poland 0.96 and for Hungary 0.91); however, no statistically significant relationship between the variables was found in the case of Czech enterprises. The tightness of the co-development of the economic size of agribusinesses and of the amount of possessed capital is also typically in strong correlation (for Poland the value is 0.88 and for Hungary 0.89). In the case of Czech and Slovakian agribusinesses there was no statistically significant relationship observed. Therefore, in this case there also are visible discrepancies between the two groups, one including Polish and Hungarian agribusinesses, and the second one consisting of Slovak and Czech ones.

It is also essential to mention that in Poland, Czechia and Slovakia, we can see a proportional development in both types of cash flow reported by FADN. High correlation is present in Polish enterprises, and moderate correlation in the Slovakian and Czech ones. A statistically insignificant relationship was found solely in Hungarian agribusinesses, signalizing that operations on debts and loans is the key factor, which makes a difference resulting in strong or no relationship for both type of cash flows in these two groups of countries. The existence of no relationship for Hungarian agribusinesses could have an impact on the positive co-development of cash flow type 1 with economic size, net worth or the amount of capital and a negative type of co-evolvement of cash flow type 2 with the above-mentioned economic variables (i.e. economic size, net worth, and amount of capital).

Conclusions

Considering the trend lines for four Central European countries in the timespan of 17 years (2004–2020), the results are suggesting the existence of a slightly growing shape of the trend line and consequently pointing us to a direct relationship between temperature and cash flow, where higher mean annual surface temperature changes result in higher values of cash flow type 1. However, the nature of this relationship could be considered rather weak and not indicative. The drawing up of a separate trendline for each country brings us to the conclusions that except for Czech agribusinesses, the agribusinesses in the remaining three V4 countries (Slovakia, Poland and Hungary) show a positive trend in the relationship between the mean annual temperature change and their reported cash flow values. The most visible, pronounced and almost identical is the common development of variables in Hungary and Poland. An existing, but a weaker positive trend is also present in Slovak enterprises. There are also visible and prevalent higher values of cash flow in Slovak and Czech agribusinesses and analogically relatively lower cash flow values are present in Polish and Hungarian agribusinesses.

The relationship between precipitation and cash flow is showing more dynamics and fluctuations in all agribusinesses in the researched countries. Agribusinesses in Czechia or Slovakia operate in an environment with total precipitation not exceeding 900 mm per year and report lower levels of cash flow compared to Polish and Hungarian agribusinesses. The development of their cash flow in relation to the precipitation levels compared to the Polish and Hungarian counterparts was stable throughout the monitored period. Polish and Hungarian agribusinesses operate in an environment with higher annual precipitation totals and higher levels of cash flow, while the interrelationship of these variables shows a negative tendency.

Regarding the correlation matrices, the following results were observed for the two main objects of research: for all V4 countries, for the relationship between

mean annual temperature change and cash flow values (type 1), moderate correlation coefficient within the range from 0.51 for Czechia to the strongest 0.68 in Hungary were spotted (in the rest of the V4 countries we were unable to prove the existence of such relationships). An interesting observation emerged from the correlation analysis when the balance of operations of the loans and debts were included into cash flow type 2. The inclusion of the two variables caused severe fluctuations in the flows, where according to the correlation coefficients, there was a moderate correlation with the temperature changes for Czechia (coefficient: 0.66) and no correlation for the development of both variables in Slovakia and Poland. Hungarian agribusinesses report a development in cash flow 2 which evolves in contradiction with the development in mean annual temperature changes.

The existence of evidence of a statistically significant co-development of the researched variables is in agreement with the results of the studies in the area but conducted on the data samples from the diverse types (geographically, by the focus of their agricultural activities, etc.) of countries around the world. An object of further research could be the reasons for the observed difference in interactions with climatic parameters for cash flows with and without operations on debts and loans.

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WORKPLACE RELATIONSHIPS OF OLDER PEOPLE AS AN IMPORTANT FACTOR IN WORK QUALITY

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Received: 02. August 2022 *Reviewed: 20. August 2022* *Accepted: 14. October 2022*

Abstract

Population forecasts assume a decrease in the size of the labor force in the labor market. What factors will be necessary for keeping older people in the labor market? It is assumed that for employed older people, good relations with their colleagues will play an important role. Our contribution aims to determine the specifics of the perception of positive relationships of employed persons aged 55-64 with colleagues in EU countries. The data source for the indicator "Employed persons having a good relationship with their colleagues" is the Eurostat database. The methods used to achieve the goal are comparison, descriptive statistics, growth coefficients, average growth coefficients, and beta convergence of the analyzed indicator. In teams composed of employees aged 55-64, it seems much more important to build good relationships than in teams composed primarily of employees aged 15-24. Collectives composed of women can perceive relationships with colleagues worse than men in Slovakia. The critical finding is that the perception of good relations in the Slovak Republic has significantly worsened since 2005. It is, therefore, important that employers make more outstanding efforts to improve relationships.

Keywords: job satisfaction, older people, relationship with colleagues, work motivation

JEL Classification: D900, J140, J280

Introduction and theoretical background

Demographic developments in the European Union so far and population projections for the next period make it possible to predict future trends in the labor market. Based on them, it can be concluded that the size of the workforce will decrease in the future, and the economic burden on the productive part of the population will

increase (Eurostat, 2021). It follows that the use of the employment potential of persons in the pre-retirement and retirement years will become increasingly important. One of the ways to increase the employment of older persons is to find approaches that will lead to the fact that people of retirement age will continue to work even after retirement age and that people of pre-retirement age will not retire early. Several factors can influence such a decision. Among the most important factors can be considered their state of health (Ćwirlej-Sozańska et al., 2018; Neary et al., 2019; Cristea et al., 2020), motivational factors (Łaszkiewicz & Bojanowska, 2017; Bohorquez et al., 2020; You & Lee, 2021) and satisfaction with the work performed and the work environment (Raziq & Maulabakhsh, 2015; Lakic, 2019; Homocianu et al., 2020).

It is started from the assumption that employment is influenced by relationships at the workplace in the scientific state. Workplace relationships can lead to improved cooperation and atmosphere and ultimately impact work productivity. Therefore, analysing and monitoring the factors that influence them is vital.

Reuter et al. (2020, p. 997) say, "Having a good relationship with colleagues is the most important factor for being happy at work". Persson et al. (2018a) claim that strengthening positive work relationships among colleagues is essential for employee health promotion. Persson et al. (2018b) highlight employee relationships as vital resources that create sustainable workplaces. Comi et al. (2022) researched the effect of retirement on social relationships. They found that older people during retirement have a more significant share of relationships with family and less with colleagues and better overall satisfaction and deeper emotional relationships. Good workplace relations are reflected in the quality of work. Barroso (2022) found that higher-quality personal workplace relationships in Europe are experienced primarily by managers, professionals, technicians, and associate professionals, while worse interpersonal relationships are experienced mainly by skilled agricultural workers and elementary occupations, and that the best relationships with colleagues are among those with contracts of unlimited duration.

Good relations at the workplace can lead to significant employee satisfaction and, therefore, can contribute to the decision of employees to remain in employment even after retirement age. Good relations with colleagues can be assessed in several ways. We assess them based on the indicator "Employed persons having a good relationship with their colleagues" in percentage in the scientific study, and the researched age category is persons aged 55 to 64 years.

Our contribution aims to determine the specifics of the perception of positive relationships of employed persons aged 55-64 with colleagues in EU countries. It is focused on the indicator's values at the level of the EU27 states. To quantify the phenomenon, it indicates the percentage of employees who have good relations with colleagues. When evaluating the results, it is aimed to evaluate the status and development of the indicator in the Slovak Republic in the context of the results of the EU states.

It sought the answers to several research questions in the research study:

- Are the differences between EU countries decreasing in the proportion of people aged 55-64 perceiving a positive relationship with their colleagues?
- What is the specificity in the share of persons aged 55-64 and 15-24 perceiving a positive relationship with colleagues?- What are the specifics of each sex in the proportion of people who perceive that they have a positive relationship with colleagues?
- Is the position of the Slovak Republic improving in the values of the indicator?

The answers to the mentioned questions will allow us to fulfill the set goal of the scientific study.

Several important tasks will need to be completed to complete the goal:

- To express descriptive statistics and use them to characterize the level and variability of the indicator values in the three years of the analyzed period.
- To express growth coefficients and average growth coefficients using the geometric mean. Use them to characterize the dynamics of the indicator's development.
- To carry out beta convergence and find out the convergence tendencies of the EU27 countries within the monitored indicator.
- To determine the specifics between the sexes.
- To characterize the status and development of the indicator in the Slovak Republic in the context of the EU.

Our findings can contribute to the systematization of knowledge on the mentioned issue and help employers determine approaches to improve the situation in the labor market. We expect essential conclusions primarily from the state's characteristics and the indicator's development in the Slovak Republic. They will enable us to formulate recommendations for employers in Slovakia.

Material and methods

The data source for the indicator "Employed persons having a good relationship with their colleagues" is Eurostat (2022). Eurostat indicates the source: European Foundation for the Improvement of Living and Working Conditions (Eurofound). Indicator data in percentages have been published in five-year intervals since 2005. The last period of published data is 2015. We monitored data for all 27 EU countries.

One of the fundamental specifics that we will focus on is identifying regional differences at the national level and their tendencies. We used several methods to determine regional differences. We analyzed the average level of indicator values and their variability using descriptive statistics. We monitor the state of the indicator values and focus on assessing the development dynamics. Based on the values of the variability indicators in all three years, we assessed how its variability changed.

To characterize the dynamics of development, growth coefficients, and average growth coefficients are used for the analyzed indicator, which is expressed as a geometric mean according to relation (1).

$$\bar{k} = \sqrt[n-1]{\frac{y_n}{y_1}}, \tag{1}$$

where n is the number of periods,
y_1 is the indicator's value in the first period,
y_n is the indicator's value in the nth period. Own modification of the source Minařík et al. (2013). Note that in the study, it is expressed the average annual growth coefficient of the indicator.

The beta convergence method is used to analyze the convergence tendencies in the analyzed period. It is based on initial values and average growth coefficients for all units. The initial values are the values of the indicator in the first period. Beta convergence is a method that uses the method of least squares to quantify

the parameters of a linear regression, where the dependent variable is the logarithm of the average growth coefficient, and the independent variable is the logarithm of the initial values. If the linear regression function is decreasing, the tendency towards convergence prevails. If the linear regression function increases, the tendency toward divergence prevails (Minařík et al., 2013). The linear regression model has an expression according to (2).

$$y_i = b_0 + b_1 x_i + e_i, \quad i = 1, 2, ..., n, \tag{2}$$

where n is the number of units,
x_i is the logarithm of the initial values,
y_i is the logarithm of the average growth coefficient,
e_i is a random component.

If the regression coefficient is positive, the compensating regression function increases. If the regression coefficient is negative, the equalizing linear regression function decreases. Part of beta convergence is also the expression of the coefficient of determination, which expresses how many percent of the total variability is explained by the model. If its values are low, it is concluded that convergence or divergence tendencies are not proven.

It is used tables and graphic displays for a more explicit description of the status and development of the analyzed indicator. Data analysis is performed in Microsoft Excel and StatSoft's Statistica program.

Results and discussion

Specifics of the perception of positive relationships of employed persons aged 55-64 with colleagues in EU countries

It is analyzed the status and development of the indicator in EU countries and describes its level and variability using descriptive statistics in the introductory part of the scientific study.

Based on the displayed values of the indicator in 27 EU countries in Figure 1 and Table 1, it can be concluded that the values of the indicator varied in the first year of the analyzed period in the interval from 42.1% to 86.8%. In the last year of the analyzed period, from 47.4% to 85.6%. Surprisingly, the minimum value of the indicator was in Italy in all three years. Thus, the extreme values (the lowest) in Italy are not only an exception but have a stable character. Employers in Italy must focus more on building good relationships in the workplace.

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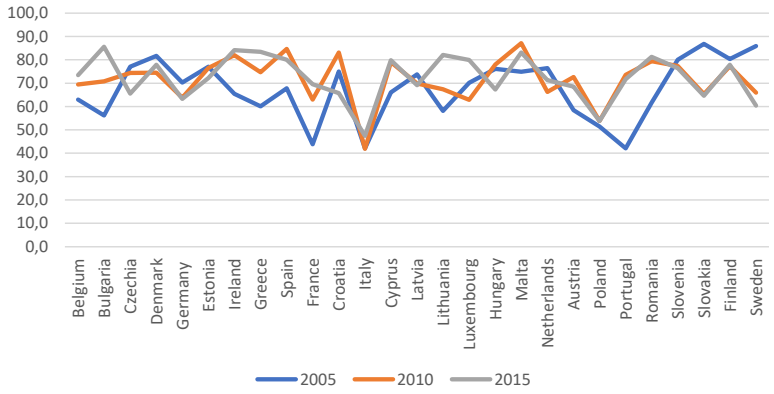
Figure 1 Employed persons having a good relationship with their colleagues, aged 55-64



Source: Author's editing according to Eurostat (2022)

Table 1 Descriptive statistics of the indicator "Employed persons with a good relationship with their colleagues, aged 55-64."

Descriptive statistics	2005	2010	2015
Arithmetic mean in %	67.5	71.6	72.4
Standard deviation	12.6	9.6	9.4
Coefficient of variation in %	18.6	13.3	13.0
Minimum in %	42.1 /Italy, Portugal	41.9 / Italy	47.4 / Italy
Maximum in %	86.8 / Slovakia	87.1 / Malta	85.6 / Bulgaria

Source: Author's editing according to Eurostat (2022)

Another interesting finding is that in 2005 the maximum value of the indicator was in Slovakia. In the next period, however, values were significantly decreased. The average level of the indicator increased compared to the first year. However, the variability of the indicator expressed by both the standard deviation and the coefficient of variation decreased. This fact thus reduced the variability of the indicator values in individual EU countries.

To capture changes in the indicator in the analyzed period and to determine its dynamics, it is expressed the growth coefficient, or the coefficient of decline (Table 2), and the average annual growth coefficient, or the average annual coefficient of decline.

Table 2 Descriptive statistics of the indicator "Employed persons with a good relationship with their colleagues, aged 55-64."

Countries with increasing indicator values		Countries with a decrease in indicator values	
Country	**Growth coefficient**	**Country**	**Decline coefficient**
Belgium	1.165	Czechia	0.851
Bulgaria	1.523	Denmark	0.953
Ireland	1.286	Germany	0.900
Greece	1.388	Estonia	0.938
Spain	1.180	Croatia	0.876
France	1.587	Latvia	0.936
Italy	1.126	Hungary	0.884
Cyprus	1.209	Netherlands	0.933
Lithuania	1.413	Slovenia	0.955
Luxembourg	1.138	Slovakia	0.744
Malta	1.109	Finland	0.970
Austria	1.173	Sweden	0.703
Poland	1.045		
Portugal	1.703		
Romania	1.320		

Source: Author's editing according to Eurostat (2022)

The highest increase in the values of the indicator was in Portugal, where the value increased by 70.3% from 2005 to 2015. We do not have evidence of which factors caused the increase in the indicator values, but it would be interesting to focus on finding these facts in further research. The most significant drop in values was recorded in Sweden. The second in line was Slovakia. In Slovakia, the indicator's value dropped from 2005 to 2015 to 74.4%. The indicator's decreasing values signal that it is necessary to direct employers to devote themselves more to building positive relationships in the workplace.

Comparison of the perception of positive relationships of employed persons with colleagues aged 55-64 with persons aged 15-24 and differences between sexes

In the next step, we focused on the differences in the values of the indicator for persons aged 55-64 and for persons aged 15-24. The descriptive statistics of the indicator for employees of different age groups (Table 3) show that the average values of the indicator within the EU are significantly higher in the 15-24 age group in all three years. Thus, on average, older age groups have much less good relations with their colleagues. In 2015, three countries were exceptions: the Czech Republic, Romania, and Lithuania. In other states, the rating is higher in younger age groups. The most significant differences between age groups are in Sweden, where the difference is up to 20.9 percentage points (20.9 percentage points more in the 15-24 age group).

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Table 3 Descriptive statistics of the indicator "Employed persons with a good relationship with their colleagues, aged 55-64 and 15-24."

Descriptive statistics	2005		2010		2015	
Age	15-24	55-64	15-24	55-64	15-24	55-64
Arithmetic mean in %	80.4	67.5	77.9	71.6	81.3	72.4
Standard deviation	9.7	12.6	9.7	9.6	10.0	9.4
Coefficient of variation in %	12.1	18.6	12.5	13.3	12.3	13.0

Source: Author's editing according to Eurostat (2022)

Building good relationships in a team of older workers from the mentioned comparison is much more critical. Employees' perception of good relations is rated worse on average within them than in the group of young employees.

Descriptive statistics by sex (Table 4) show that in 2010 and 2015, the average values of the analyzed indicator were higher for women. The variability of the values, expressed by both the standard deviation and the coefficient of variation, was higher for women in the entire analyzed period than for men. An interesting finding is that in some EU countries, there was a significant difference between the sexes.

Table 4 Descriptive statistics of the indicator "Employed persons with a good relationship with their colleagues, aged 55-64."- males and females

Descriptive statistics	2005		2010		2015	
Sex	Males	Females	Males	Females	Males	Females
Arithmetic mean in %	69.9	63.5	71.0	72.4	72.3	72.4
Standard deviation	12.0	17.1	10.0	11.2	9.5	11.2
Coefficient of variation in %	17.1	27.0	14.0	15.4	13.1	15.5

Source: Author's editing according to Eurostat (2022)

The values of the indicator for women were 17.8% lower than for men in Poland in 2015. There were similarly significant differences between the evaluation of men and women in the Czech Republic (difference 11.8%) and Slovakia (difference 10.6%). The situation is the opposite in countries such as Denmark (difference of 13.5%) and the Netherlands (difference of 11.7%). The values of the indicator are higher for women.

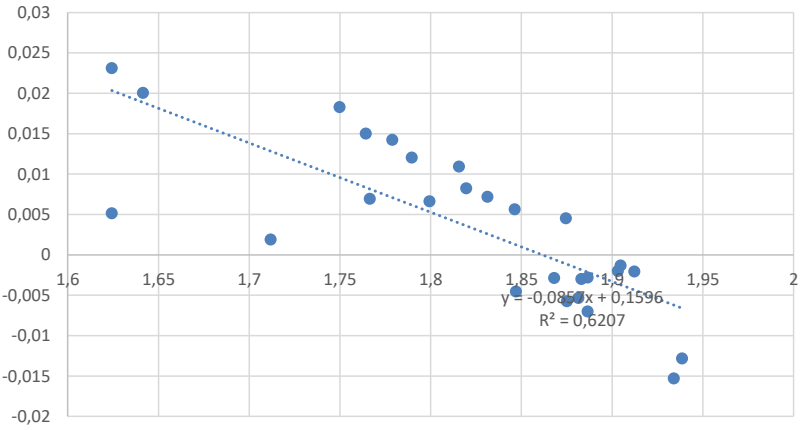
It can be concluded from the comparison of values and the findings of sex differences in the Slovak Republic and the Czech Republic that from the aspect of building good relations between colleagues for the group of employees aged 55-64, employers must pay more attention to female teams.

Convergence of EU countries

To know the answer to the research question, whether the differences in the share of persons aged 55-64 who perceive that they have a positive relationship with colleagues between EU countries are decreasing, it is used the beta convergence method (Figure 2). The function is decreasing from the graph and values of the regression coefficient of the linear regression function. The coefficient of determination

is 62.07%. The tendency towards convergence prevails among the EU 27 countries from the above. Differences between countries have narrowed. We can consider this fact and the growth of level values as positive. In general, the perception of good relations with colleagues within the EU is improving.

Figure 2 Beta convergence of the indicator "Employed persons with a good relationship with their colleagues, aged 55-64."



Source: Author's editing according to Eurostat (2022)

Several conclusions for employers follow from the mentioned characteristics. In collectives composed of employees aged 55-64, it seems much more important to build good relationships than in collectives composed primarily of employees aged 15-24. In collectives composed of women, it is worse on the average perception of good relationships than those composed of men in the Slovak Republic. Another important finding is that the perception of good relations in the Slovak Republic has significantly worsened since 2005. It is, therefore, important that employers make more efforts to improve relations.

Conclusion

Good relationships among colleagues at the workplace are a significant motivating factor for job satisfaction, a critical factor in the quality of work, reflected in older people's decisions to extend their working life. It is found that when comparing the indicator "Employed persons having a good relationship with their colleagues" for the younger generation aged 15-24 with older people aged 55-64, younger workers have better relationships with their colleagues. In a sex comparison, it is found that women in the Slovak Republic suffer from deteriorated relationships with colleagues more than men. We consider the findings to be a challenge for employers to prevent unwanted interpersonal situations and improve relationships at workplaces, mainly where female work groups in the age range of 55-64 are concentrated. We recommend the reasons for the deterioration of the perception of relations with colleagues for further research.

Interesting findings were data on Italy, when the minimum value of the indicator was in all three years, 2005, 2010, and 2015 for persons aged 55-64. On the contrary, in Slovakia, the values in this indicator for 2005 reached the maximum among all EU countries - 86.8%. The highest increase in the values of the indicator was in Portugal, where the value increased by 70.3% from 2005 to 2015. The most considerable decrease in values was recorded in Sweden, while the second in order was in Slovakia. In Slovakia, the indicator's value dropped from 86.8% in 2005 to 74.4% in 2015.

As for the development of the monitored indicator within the EU countries in the analyzed period, the countries' convergence is found. In general, the perception of relationships with colleagues is improving, and the differences between countries are decreasing.

Improving workplace relations may be one of the critical factors that will play a significant role in older people's decisions not to take early retirement or to work during retirement. Considering the demographic development in the EU countries in the growth of the share of older adults in the population and the forecasts of the increase in the share of economic dependence of older people, it is vital to identify the motivational factors that influence the quality of work of older people and their job satisfaction, so that ultimately policymakers and employers can adequately set up tools supporting the use of the working potential of older people on the labor market.

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WAGE INEQUALITIES WITHIN GENDERS: EVIDENCE FROM THE SLOVAK REPUBLIC

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Received:20. November 2022 Reviewed: 15. December 2022 Accepted: 30. December 2022

Abstract

The paper examines wage inequalities in the context of gender in the Slovak Republic in the years 2005-2020 at the level of eight regions of Slovakia. The data source is the DataCube statistical database of the Slovak Statistical Office. Wage inequalities in the labor market have been a long-term problem in the current society. The purpose of this paper is to clarify and identify the labor market and socio-demographic factors influencing wage inequalities on the labor market in the Slovak Republic. We assume that a higher labor supply will lead to an increase in wage inequality, since employers have more potential workers available for one job, which pushes wages down. New workers in the labor market usually have less experience compared to those who have gained experience throughout a longer period. As a result, their wage rate is lower and wage inequalities are increasing. The number of hours worked is also an indicator on the labor supply side. The limitations of this research lie in the very poor availability of data on gender inequalities in the Slovak Republic. However, this is the first study that analyzes the phenomenon within the framework of gender inequalities in conditions prevailing in the Slovak Republic. We propose a new model for controlling demand and supply in the labor market and socio-demographic factors affecting inequalities. Our contribution opens up space for further research in the area.

Keywords: wage inequalities, gender, labour market

JEL Classification: J30, J31, J01

Introduction and theoretical background

Gender inequalities between the genders are a very often discussed topic in economics, and is being addressed by more and more experts. In all developed economies, women make up a minority of employees and women generally earn less than men. Women are also more likely to be discriminated against, to work fewer hours on average or to bear the costs of running a household and maternity, which also affect their lifetime earnings. However, in the literature, we are less likely to encounter theories and analyses that look at gender inequalities. This paper deals with gender inequalities in the labor market in the Slovak Republic. The paper identifies spatial differences in the eight regions of the Slovak Republic and uses regression analysis to estimate the effects of determinants of wage differences within genders from the labor market and social sphere. A key question in the debate on gender inequality is whether the gender pay gap reflects free choice, natural differences, or discrimination. If some women earn less because they choose lower work intensity, lower education, or lower paid occupations then there may be nothing to deal with. If individuals make these decisions freely, they must take their consequences into account. Remuneration differences have been present in society since ancient times. In the economic literature, these differences are partly attributed to the fact that some labor market participants have low labor skills. One of the factors is the presence of discrimination in the labor market. Many countries have seen declining trends in the gender pay gap in the past (Blau and Kahn, 1992). According to Meza González (2001), these trends are particularly evident in developing countries and are mainly because women are increasing their skills and becoming more involved in the labor market. Most research on pay inequality has focused on growing disparities between genders and at different levels of education, age and income, but much of the growing inequality occurred within these groups (McCall, 2000). Inequality within a group can be defined as the dispersion of individual income controlling socio-demographic, human and work characteristics. VanHeuvelen (2018) argues that if the average pay gap between those with secondary and tertiary education, workers with different levels of experience and in different sectors and occupational categories could be compensated, the averages in these social categories would be indistinguishable from zero and inequality would be reduced. However, research has shown that even under such conditions, inequalities fall by only 1/3 on average (Author, Katz, and Kearney, 2008).

According to some authors, inequalities occur due to the different returns of investments in education for different individuals that employers can observe (Mouw and Kalleberg, 2010). It is true that large differences persist between men and women in the orientation of study programs. We have more female graduates than male graduates in education or social work and, conversely, a lot more men graduate from engineering and industrial production than women. If these differences are decisive for the wage gap, they could be expected to be reflected primarily in the choice of occupation. Technological innovations, complemented mainly by workers in higher hierarchical positions, enable an increase in productivity. Higher productivity consequently leads to higher salaries compared to workers with lower education. Thus, inequality is reflected in increased returns on investments in education for highly skilled workers compared to low-skilled workers. This statement is supported by the fact that highly-skilled workers are constantly in high demand, pushing wages upwards. A similar statement applies to work experience (Lemieux, 2006), where workers with many years of experience are expected to work more efficiently and profitably.

Another factor that contributes to the inequalities is deinstitutionalisation, which represents a declining protection of employees in the labor market. It is particularly characterized by low employee participation in trade unions (Western and Rosenfeld, 2011). It is also manifested in institutional changes in labor market policies or in the setting of the minimum wage. One of the negative effects of deinstitutionalisation is the emergence of job insecurity at all levels of employment. Following that, inequality can be perceived as a certain indicator of uncertainty or risk of job loss (VanHeuvelen, 2018). Institutional labor market arrangements and policy systems that increase occupational safety and reduce flexibility should reduce gender inequalities.

Another factor, the family aspect, considers families to be small organizations that spread risk among family members by spouses or other family members entering the labor market to cope with the loss of income associated with unemployment, illness or caring for family members (Western, Bloome and Percheski, 2008). Marriage thus divides parental and economic responsibilities between spouses. However, the problem arises if the parent is alone to raise the child. Such families have lower economic security and often have to rely on help from parents or more distant family members. Families of this type are often supported by social benefits, which provide a degree of economic security. The opposite effect of social benefits is that they reduce the willingness to work because the individual receives a financial reward. Families form inequality within a group by creating income insecurity. More generally, the configuration of families and labor market institutions affects individuals' income insecurity. Where incomes are more variable and show greater differences from year to year, inequality will be higher. Thus, a significant increase in inequality within a group may reflect an increase in income uncertainty.

Juhn, Murphy, and Pierce (1993) observe an increase in male pay inequality in the United States between 1963 and 1989. Their finding supports the theory of inequalities caused by the return on investment in education. The authors argue that the explanation for the general increase in returns from education is that the demand for skills has increased in the United States during this period.

McCall's (2000) study focuses on wage inequality across cohorts in more than 500 U.S. labor markets in 1990. The analysis shows that two frequently cited explanations for growing wage inequality over time have little impact on wage inequality within a certain group - technological change and trade openness. On the contrary, flexible and precarious employment conditions (unemployment or fixed-term employment) are associated with a high level of wage inequality, especially among women.

Gray, Mills, and Zandvakili (2003) observed the decomposition of wage inequalities into components representing inequalities between groups and components representing inequalities within groups in Canada between 1991 and 1997. The data showed a clear trend of increasing inequality in household income. Although most of the increase in measured inequality is attributed to the "within-group" component, the change in inequality "between groups" is still significant, especially for education, age, and marital status.

Cunningham and Jacobsen (2008) have observed wage inequality in four Latin American countries. Their results show that inequality in earnings within a group contributes to overall income inequality rather than intergroup inequality. The authors also created a simulation where a disadvantaged group becomes favored and found that the overall income inequality rate had only slightly decreased or even increased.

Williams (2012) argues that one of the reasons for inequality is the different types of professions. Based on data for Great Britain in the period 1970-2000 examines the wage inequalities within occupations. By dividing the factors into two groups,

the author found that although most wage inequalities are within occupations, a greater share of changes is between occupations.

The authors Xie, Killewald and Near (2016) examine historical trends in income inequality between and within occupations for a group of high-ranked scientists. They found that the return on investment in education has increased significantly over time, which supports the theory of inequality caused by different returns in education. Results also suggest that inequalities between and within occupations increased at the same rate among university graduates, so the share of inequality attributable to differences in occupations remained constant. An important finding is that trends in inequality vary by occupation and education, which makes it difficult to summarize the impact of education and occupation on the overall increase in income inequality.

Jaumotte, Buitron (2015) observe the impact of labor market institutions on wage inequality. The authors found evidence that the weakening of labor market institutions is associated with an increase in income inequality. The key findings are that the decline in the influence of trade unions is linked to an increase in the proportions of people with the highest incomes and less redistribution, while the weakening of the minimum wage is linked to a significant increase in overall inequality. There is also evidence that the extension of collective agreements to non-union members is associated with higher inequality, probably due to higher unemployment. The results also suggest that financial deregulation and lower taxes are associated with higher inequality.

The study by Kristal and Cohen (2017) analyzing 43 US industries from 1968 to 2012, is in a similar vein. The authors found that the decline in unions and real value of the minimum wage explained about half of the growing inequality, while informatization about one quarter. This suggests that much of the growing inequality in the US is due to the weakening of workers rather than market forces.

VanHeuvelen (2018) uses the large Luxembourg Income Study dataset, which contains 28 countries over a period of 40 years. The results of the study suggest that in almost all countries, gender inequality is the primary driving force behind inequality levels and trends. As inequality grows, so does the relative importance of inequality within the group. The large amount of data has shown considerable heterogeneity based on different labor market institutions and employment protection legislation across countries.

In extensive study of inequalities in South Africa, economist Thunde (2019) finds that the increase in wage inequality was due to an increase in inequality within the group, as inequalities between groups decreased over the period. In the research, the author identified that union membership, educational attainment, and the industry in which an individual works are factors influencing inequality within the group, while unions and educational attainment contribute to growing overall inequality.

Campos-Vazquez et al. (2016) examine wage inequalities in men's age cohorts in Mexico, specifically, between younger and older men. Research suggests that wage inequalities have decreased. However, the decline occurred in an undesirable way, as the wages of older workers fell and their decline was more pronounced than that of young men. The results of this study suggest that the skills of older workers may be outdated in the labor market, and therefore retraining courses are important to keep older workers attractive for the labor market.

Material and methods

The paper examines the within gender wage inequalities in the Slovak Republic in the period 2005-2020 at the level of eight regions of Slovakia. The source of data is the DataCube statistical databases of the Statistical Office of the Slovak Republic.

The main variables examined are ratio indicators pointing to wage inequalities in the labor market, namely decile indicators and one quartile indicator, which compare groups of people with different wage levels. The most frequently examined ratio is the share of the top 10% of earners and the bottom 10% of wage distribution - D9/D1. Statutory conclusions can also be drawn from the share of the 9th decile and median earners, as there are groups of people who earn the minimum wage around the level of the median wage – D9/D5. The last decile indicator is the ratio of median to first decile - D5/D1. Regarding the quartile indicator, we use a comparison of the 3rd quartile with the 1st quartile - Q75/Q25. This indicator compares 25% of the highest-earning people with the 25% of the lowest-earning workers.

We assume that wage inequality is influenced by both demand and supply factors in the labor market. To control labor market demand factors, the average wage is used as a proxy for labor costs and the unemployment rate, which can partially control employee demand but is primarily used as a proxy for the economic cycle (Harman, 2021). To control the supply on the labor market the number of job seekers is used as a proxy. We assume that a higher labor supply will lead to an increase in wage inequality, since employers have more potential workers available for one job, what pushes wages down. The second variable considering the labor supply is the rate of economic activity in the labor market. Higher levels of economic activity are expected to exacerbate inequalities, especially for women. New workers in the labor market tend to have less experience compared to workers with experience. As a result, their wage valuation is lower and wage inequalities are increasing. The number of hours worked is also an indicator on the labor supply side. We assume that this indicator reduces inequalities.

Table 1: Descriptive statistics

	Men				Women			
Variable	**Mean**	**St. Dev.**	**Min**	**Max**	**Mean**	**St. Dev.**	**Min**	**Max**
Dependent variables								
D9D1	3.618	0.689	2.662	5.747	3.041	0.464	2.473	4.892
D9D5	1.923	0.187	1.668	2.468	1.764	0.120	1.567	2.276
D5D1	1.868	0.165	1.594	2.362	1.716	0.142	1.498	2.177
P75P25	1.888	0.159	1.606	2.357	1.802	0.105	1.595	2.144
Independent variables								
Labour market factors								
Unemployment rate	8.898	5.089	1.740	20.46	10.771	5.307	2.200	21.2
Average wage	975.908	283.249	439.084	1896	762.711	226.612	342.032	1498.000
Jobseekers (ln)	9.629	0.684	8.105	10.786	9.693	0.587	8.287	10.595
Economic activity rate	68.048	2.106	62.800	73.3	51.502	3.358	45.700	60.5
Hours worked	181.198	5.656	156.803	186.520	177.110	5.165	155.667	180.800

Socio-demographic factors								
Children (ln)	9.796	0.369	6.084	10.154	9.796	0.369	6.084	10.154
Aging Index	68.796	16.208	38.030	108.27	115.916	24.043	65.760	169.98
Age	37.029	2.437	31.200	42.000	40.188	2.463	33.900	45.3

Source: own calculations, SOSR.

In addition to demand and supply factors in the labor market, wage inequalities are also affected by socio-demographic factors. Three variables are used to control these factors. The first is the number of children who were enrolled in kindergartens and nurseries. The impact of this indicator should be positive, since a higher number of children means that their parents had to leave the labour market for a certain period of time in the form of - maternity or parental leave. As a result, projected incomes are falling, creating inequality in the labor market compared to childless workers (Owens, 2016). Workers' experience is an important factor influencing wage inequality. Due to the unavailability of data, we decided to use the median age as a proxy variable. We anticipate that experience will be of some benefit to elderly workers and exacerbate inequalities between them and their younger counterparts. However, we assume that the productivity of elderly employees decreases in relation to younger ones from a certain age, as the lower ability of older employees to keep up with technological trends is reflected (Heywood et al., 1999; Lallemand and Rycx, 2009). For this reason, age squared is also used. The last variable considering the demographic structure of the population is the Aging Index (Sauvy Index). This expresses the number of people in the post-productive age per 100 people in the pre-productive age. All variables are broken down by gender. Using the subscripts i and t to denote the region and year:

$$Y_{it} = \beta_0 + \beta_1 Unemployment_{it} + \beta_2 (ln) Average\_wage_{it} + \beta_3 (ln) Jobseekers_{it} + \beta_4 EA\_rate_{it} + \beta_5 (ln) Hours\_worked_{it} + \beta_6 (ln) Children_{it} + \beta_7 Aging\_index_{it} + \beta_8 Age_{it} + \beta_9 Age^2{}_{it} + FE_{it} + TE_{it} + \varepsilon_{it} \quad (1)$$

where Y_{it} are dependent variables representing wage inequalities within a gender. $Average_{wageit}$ is a log of the average wage. Jobseekersit is a log of the number of jobseekers. EA_{rateit} is a variable considering economic activity rate. Childrenit represents the number of children enrolled in kindergartens and nurseries. $Aging_{indexit}$ is the Aging Index. Ageit accounts for median age of population. FE_{it} are fixed effects and TE_{it} are time-fixed effects. ε_{it} is error term.

Table 1 provides an overview of the descriptive statistics of the observed variables. There is lower inequality within women compared to men, especially when comparing the top 10% earnings with the bottom 10%. The difference at the lower end of the wage distribution is more favourable for both genders, but the differences are still significant. Income for men in the lower percentile is up to 86% lower than the median, almost 72% for women. The unemployment rate is lower among men and the economic activity rate is higher among men. However, the difference is significant - almost 17 percentage points. Socio-demographic indicators suggest that we can expect a faster aging of population for women. This finding is provided by the Aging Index, which shows that on average, 1 woman in the pre-productive age population has 1.15 people in the post-productive age. For men, this ratio is more favourable - 0.76. The median age of women is 3 years higher than that of men.

Results and discussion

The aim of the paper is to identify and compare the effects of labor market factors and socio-demographic factors on within-gender wage inequalities. Figures 1 and 2 show a wage growth of income groups in the Slovak Republic from 2005 to 2020. The figures show that women's wages grew faster than men's. The wages of the lowest earners (D1) increased by almost 70% during the observed period, growing by about 15 percentage points per year since 2018. As for men, the growth of this income group was significantly higher compared to other income groups. This shows that wage inequality in Slovakia is decreasing. The upper side of the income distribution also grew significantly but did not outpace the growth of the median income (D5) or the third quartile (P75). For women, we observe almost the same wage growth rates until 2017, when low-income groups break away from the rest and start to grow faster. To a large extent, this effect can be attributed to a significant jump in the minimum wage.

Figure 1: Wage growth by income groups, 2005=100, Men

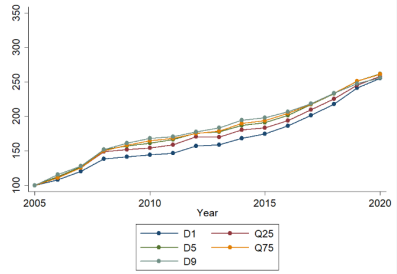
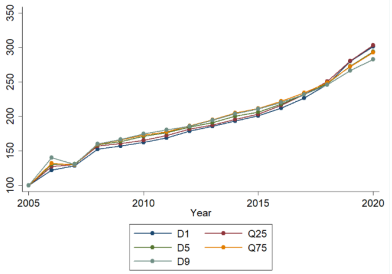


Figure 2: Wage growth by income groups, 2005=100, Women



Source: own calculations, SOSR.

Figures 3 and 4 show the wage inequalities for men and women. In case of both genders, wage inequality shows declining trends. Inequalities observed among men are more pronounced, but their decline is also steeper. In 2010, workers on the right side of the distribution earned about four times more than those on the left, while by 2020 this ratio had fallen to about 3.5 times lower values. This fact can be partly attributed to the sharp rise in the minimum wage and social transfers. A comparison with the median says that this ratio does not change significantly over time. The same goes for the ratios of the median and the low-income group or for the comparison of the 75th percentile to the 25th percentile. For women, the trend is also declining compared to the top 10% of earners with the bottom 10% , but not to the same extent as for men. In 2005, this ratio was 3.3. By 2020, this inequality had narrowed and the best-earning incomes were about 3 times higher. The ratio of median wages to the bottom 10% does not change significantly over time. Inequality between other income groups is declining at a slow pace. From the figures we can observe that there is more inequality between higher-income groups than between low-income groups, which means that most of the wealth is concentrated in the hands of high-income groups.

Figure 3: Development of wage inequality - Men

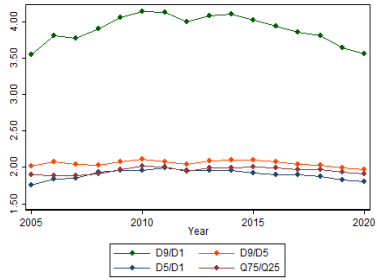
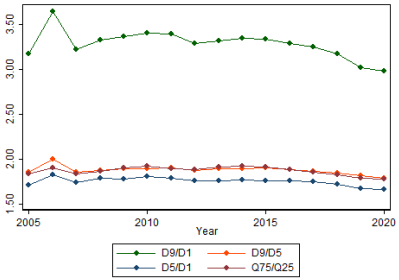


Figure 4: Development of wage inequality - Women



Source: own calculations, SOSR.

Tables 2 and 3 show that inequalities are not the same across Slovakia. In the Bratislava region, inequalities were expected to decrease to the greatest extent, which is mainly due to the inflow of foreign capital into the capital as the most attractive region in Slovakia. It is foreign capital and multinational corporations that bring job opportunities to the Bratislava region, which favours the labor market in this region over the rest of the Slovak Republic. The arrival of the large car manufacturer Jaguar Land Rover around the city of Nitra has brought jobs with higher wages for low-skilled workers. Despite this investment in the area, inequalities between the 9th and 1st deciles have deepened. Looking at the comparison of the group with the median wage and low income, we observe smaller differences. It is worth mentioning the Košice region, where the differences decreased most significantly. The Banská Bystrica region, which has long suffered from the highest unemployment, has seen a significant increase in the concentration of wealth in the hands of the top 10%, as has the Prešov region.

Table 2: Changes in wage inequalities by region - Men

	D9/D1			D9/D5			D5/D1			P75/P25		
	2005	2020	Diff.	2005	2020	Diff.	2005	2020	Diff.	2005	2020	Diff.
BB	2,66	2,98	**0,32**	1,67	1,81	**0,15**	1,6	1,64	**0,05**	1,61	1,72	**0,11**
BA	4,83	4,54	**-0,29**	2,18	2,17	**-0,01**	2,21	2,09	**-0,12**	2,18	2,17	**-0,01**
KE	3,77	3,41	**-0,36**	2,08	1,85	**-0,23**	1,81	1,85	**0,04**	2,04	1,93	**-0,11**
NR	2,77	3,04	**0,27**	1,7	1,82	**0,12**	1,63	1,67	**0,04**	1,68	1,83	**0,15**
PO	2,69	3,02	**0,33**	1,68	1,8	**0,12**	1,59	1,68	**0,08**	1,64	1,81	**0,17**
TN	3,03	2,86	**-0,17**	1,82	1,72	**-0,09**	1,66	1,66	**-0,01**	1,8	1,71	**-0,09**
TT	3,28	3,11	**-0,17**	1,98	1,77	**-0,21**	1,65	1,76	**0,11**	1,82	1,78	**-0,04**
ZA	2,97	3,06	**0,09**	1,73	1,77	**0,04**	1,72	1,73	**0,01**	1,67	1,74	**0,07**

Region abbreviations are as follow: BB – Banská Bystrica, BA – Bratislava, KE – Košice, NR – Nitra, PO – Prešov, TN – Trenčín, TT – Trnava, ZA - Žilina; Source: own calculations, ŠÚSR

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In the case of women in the labor market, we observe similar trends. However, the differences between the individual income groups are not as significant as for men. The biggest step towards equality for women took place in the Bratislava Region, which provides the most job opportunities with the highest wages in the Slovak Republic. We also observe a significant decrease in inequality in Bratislava in the case of comparing the median wage and low-income groups (-0.17. We do not observe such a jump in other regions (except BB), which we attribute to the fact that in the rest of Slovakia many women work for a wage very close to the minimum. For this reason, inequalities have not changed much. In the Trenčín and Trnava regions, we even observe a slight increase in the concentration of wealth in the group of high-income women. An important finding resulting from the comparison over time is that inequalities in almost the whole of Slovakia are decreasing.

Table 3: Changes in wage inequalities by region - Women

	D9/D1			D9/D5			D5/D1			P75/P25		
	2005	2020	Diff.	2005	2020	Diff.	2005	2020	Diff.	2005	2020	Diff.
BB	2,81	2,74	**-0,07**	1,57	1,71	**0,15**	1,79	1,60	**-0,19**	1,83	1,72	**-0,11**
BA	3,99	3,49	**-0,50**	1,99	1,90	**-0,09**	2,00	1,84	**-0,17**	2,05	1,86	**-0,19**
KE	3,32	2,86	**-0,46**	1,91	1,72	**-0,18**	1,74	1,66	**-0,08**	1,86	1,74	**-0,11**
NR	2,65	2,62	**-0,02**	1,65	1,67	**0,02**	1,61	1,57	**-0,04**	1,64	1,68	**0,04**
PO	2,56	2,70	**0,13**	1,65	1,74	**0,09**	1,55	1,55	**0,00**	1,72	1,71	**-0,01**
TN	2,47	2,56	**0,08**	1,65	1,67	**0,02**	1,50	1,53	**0,03**	1,59	1,60	**0,01**
TT	2,79	2,85	**0,06**	1,69	1,70	**0,01**	1,65	1,67	**0,02**	1,69	1,73	**0,04**
ZA	2,86	2,70	**-0,16**	1,72	1,70	**-0,03**	1,66	1,60	**-0,07**	1,76	1,65	**-0,11**

Region abbreviations are as follow: BB – Banská Bystrica, BA – Bratislava, KE – Košice, NR – Nitra, PO – Prešov, TN – Trenčín, TT – Trnava, ZA – Žilina; Source: own calculations, SOSR

Table 4 shows the pairwise correlations between the observed variables. The correlation analysis showed a statistically significant negative relationship between unemployment and wage inequality factors, in the case of decile ratios. On the contrary, the rate of economic activity is strongly positively correlated with all wage inequality variables ($P<0.000$). In the case of the average wage in the economy, the relationship is also positive ($P<0.000$), so with wage growth, inequalities increase because they are allocated on the right side of the wage distribution. In the case of labor supply expressed by the number of jobseekers, we would expect a positive correlation, as higher labor supply reduces wages, especially on the left side of the wage distribution and thus deepens inequalities. However, the correlation coefficients are negative and significant, which negates our assumption. The relationship with the median age proved to be negative but statistically insignificant, as was the Aging Index. The correlation coefficients in the relationship between inequalities and children enrolment are positive, but they did not prove to be statistically significant in three cases.

Table 4: Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) D9D1	1.000											
(2) D9D5	0.963	1.000										
	(0.000)											
(3) D5D1	0.963	0.858	1.000									
	(0.000)	(0.000)										
(4) Q75Q25	0.960	0.931	0.928	1.000								
	(0.000)	(0.000)	(0.000)									
(5) Unemployment	-0.258	-0.228	-0.247	-0.137	1.000							
	(0.003)	(0.010)	(0.005)	(0.124)								
(6) Average wage	0.342	0.352	0.296	0.369	-0.442	1.000						
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)							
(7) Jobseekers	-0.324	-0.282	-0.320	-0.202	0.952	-0.422	1.000					
	(0.000)	(0.001)	(0.000)	(0.022)	(0.000)	(0.000)						
(8) EA rate	0.603	0.500	0.644	0.534	-0.507	0.382	-0.589	1.000				
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)					
(9) Hours worked	0.028	-0.006	0.065	0.060	-0.100	0.491	-0.083	0.057	1.000			
	(0.751)	(0.950)	(0.464)	(0.502)	(0.260)	(0.000)	(0.349)	(0.524)				
(10) Children	0.121	0.116	0.120	0.182	0.164	0.036	0.194	0.005	0.018	1.000		
	(0.175)	(0.194)	(0.176)	(0.039)	(0.065)	(0.687)	(0.028)	(0.952)	(0.840)			
(11) Aging index	-0.055	-0.051	-0.082	-0.124	-0.574	0.570	-0.579	0.246	0.288	-0.207	1.000	
	(0.536)	(0.571)	(0.357)	(0.163)	(0.000)	(0.000)	(0.000)	(0.005)	(0.001)	(0.019)		
(12) Age	-0.027	-0.009	-0.063	-0.058	-0.538	0.726	-0.534	0.262	0.330	-0.164	0.961	1.000
	(0.766)	(0.921)	(0.481)	(0.514)	(0.000)	(0.000)	(0.000)	(0.003)	(0.000)	(0.065)	(0.000)	

P-value in parentheses. Source: own calculations.

Table 5 shows the results of the regression analysis. In terms of labor market factors, unemployment is estimated to have a slightly negative impact on inequalities, which means that it increases them. The coefficients of the average wage are positive and statistically significant at a high level indicating a large deepening of inequalities among men. This means that more income is allocated on the right side of wage distribution. This is also confirmed by the highest coefficient at the ratio of the top 10% of earning people with 10% of the lowest wage workers. The increase in the number of jobseekers has a statistically significant effect on wage inequality in the case of the three indicators, namely reducing them. Higher economic activity also increases inequality, albeit only to a small extent, as most of the newly economically active people are employed in lower paid positions. The number of hours worked has a highly significant effect on inequalities, always reducing them.

Socio-demographic factors are causing a rise in wage inequality. As expected, children increase wage inequalities. Men being on a parental leave is becoming a rising trend in society, which is consequently reflected in lower incomes. This effect is partly reflected in higher wage inequalities between men. Population aging is currently an important issue in the economy. The aging index is positive and statistically

significant, which means that a greater future burden on productive people increases wage inequality. Similarly, the median age has shown that the relationship between inequality and population aging is growing and has an inverted U-shape.

Table 5: OLS – Men

	(1)	(2)	(3)	(4)
	D9D5	D9D1	D5D1	P75P25
Labor market factors				
Unemployment rate	0.016***	0.048***	0.008**	0.014***
	(0.005)	(0.016)	(0.004)	(0.005)
Average wage (ln)	0.755***	2.886***	0.655***	0.678***
	(0.072)	(0.241)	(0.054)	(0.060)
Jobseekers (ln)	-0.093*	-0.270*	-0.049	-0.097**
	(0.051)	(0.152)	(0.037)	(0.042)
Economic activity rate	0.021***	0.100***	0.026***	0.010*
	(0.007)	(0.021)	(0.004)	(0.005)
Hours worked (ln)	-1.282***	-3.614***	-0.357	-1.058***
	(0.314)	(0.940)	(0.295)	(0.306)
Socio-demographic factors				
Children (ln)	0.035*	0.149***	0.038***	0.041***
	(0.019)	(0.055)	(0.012)	(0.014)
Aging index	0.016***	0.067***	0.014***	0.009***
	(0.003)	(0.010)	(0.002)	(0.002)
Age	0.468***	1.767***	0.431***	0.394***
	(0.104)	(0.305)	(0.071)	(0.082)
Age²	-0.009***	-0.033***	-0.008***	-0.007***
	(0.001)	(0.004)	(0.001)	(0.001)
Constant	-4.287*	-28.335***	-8.688***	-3.322
	(2.477)	(7.275)	(1.797)	(2.182)
Observations	128	128	128	128
R^2	0.631	0.746	0.774	0.674

*Robust standard errors in parentheses. Source: own calculations. *** p<0.01, ** p<0.05, * p<0.1*

The use of balanced panel data allows us to control the effects of cross-sectional units over time, which are characteristic only for them and can be correlated with explanatory variables. In the case of correlation, omitting them would bias the estimate. Since the panel data consists of several observations of the same subject over a longer period, it is possible to eliminate the so-called time effects. It is therefore possible to control any unobserved shocks that affect the whole country. It is also possible to control the effects of individual monitored entities. Table 6 shows the estimated models using the fixed effects method. The validity of the fixed effects is tested by the Hausman test, which confirmed their validity. The results have changed

significantly compared to OLS estimates. Unemployment has proven to be an impact that reduces labor market inequalities between men. On the contrary, the supply of jobseekers has a negative impact on inequalities and thus increases them. The effect of average wage changed slightly. The same applies to the number of hours worked, which significantly reduces inequalities. In the case of socio-demographic factors, statistical significance has disappeared to some extent. The number of children in families has a significant impact in only two cases, one of which is marginal. The Aging Index shows similar trends. On the contrary, age plays an important role in the labor market for all indicators of inequality.

Table 6: Fixed effects - Men

	(1)	(2)	(3)	(4)
	D9D5	D9D1	D5D1	P75P25
Labour market factors				
Unemployment rate	-0.010**	-0.032**	-0.005	-0.004
	(0.005)	(0.014)	(0.004)	(0.004)
Average wage (ln)	0.857***	3.370***	0.817***	0.740***
	(0.061)	(0.194)	(0.054)	(0.058)
Jobseekers (ln)	0.071*	0.267**	0.060*	0.014
	(0.038)	(0.120)	(0.034)	(0.036)
Economic activity rate	0.013***	0.071***	0.019***	0.005
	(0.004)	(0.013)	(0.004)	(0.004)
Hours worked (ln)	-0.775***	-2.209***	-0.187	-0.703***
	(0.238)	(0.755)	(0.211)	(0.225)
Socio-demographic factors				
Children (ln)	0.017	0.106*	0.036**	0.028
	(0.019)	(0.061)	(0.017)	(0.018)
Aging index	0.003	0.022**	0.005*	0.000
	(0.003)	(0.008)	(0.002)	(0.002)
Age	0.147*	0.686***	0.199***	0.178**
	(0.082)	(0.260)	(0.073)	(0.077)
Age^2	-0.003**	-0.013***	-0.003***	-0.003**
	(0.001)	(0.004)	(0.001)	(0.001)
Constant	65.634***	226.695***	54.045***	42.748***
	(10.983)	(34.913)	(9.773)	(10.382)
Hausman χ^2	46.02	114.26	53.61	128.33
F-Statistic (FE)	87.38	76.74	29.43	46.80
Observations	128	128	128	128
R^2	0.853	0.891	0.850	0.819

Robust standard errors in parentheses. Source: own calculations.
**** p<0.01, ** p<0.05, * p<0.1*

Table 7 shows the same regression models estimated for women. Unemployment rate coefficients are significant, but close to zero. Higher unemployment leads to higher inequalities. One of the reasons is that women on the left side of the wage distribution are laid off more often. Wage growth in the economy leads to higher inequalities, in case of all indicators. However, the effect is lower compared to the group of men, which means that wages are more evenly distributed among women than men. From the supply side of the labor market, coefficients of the economic activity rate are statistically significant, all of which are positive, but close to zero. The number of jobseekers also has a statistically significant effect on inequalities, but in the opposite direction. The number of hours worked has a major impact on inequalities. More hours worked lead to a reduction in inequalities. Socio-demographic indicators have also proved to be highly important for women. However, children enrolment only affects women with higher than median incomes. The burden of future generations on increased payments for old-age pensions, caused by an aging population, is exacerbated by inequalities for all indicators. As the ratio of pensioners to children increases, so do inequalities. The aging of women as measured by the median age suggests that inequalities increase only to some extent, meaning this relationship has an inverted U-shape.

Table 7: OLS - Women

	(1)	(2)	(3)	(4)
	D9D5	D9D1	D5D1	P75P25
Labour market factors				
Unemployment rate	0.010*	0.049***	0.017***	0.017***
	(0.005)	(0.018)	(0.005)	(0.004)
Average wage (ln)	0.496***	1.781***	0.460***	0.327***
	(0.074)	(0.288)	(0.095)	(0.061)
Jobseekers (ln)	-0.098*	-0.438**	-0.136***	-0.103**
	(0.057)	(0.192)	(0.050)	(0.043)
Economic activity rate	0.008***	0.053***	0.021***	0.016***
	(0.003)	(0.010)	(0.003)	(0.002)
Hours worked (ln)	-1.457***	-5.282***	-1.343***	-0.726**
	(0.406)	(1.383)	(0.423)	(0.330)
Socio-demographic factors				
Children (ln)	0.026***	0.061**	0.007	0.023***
	(0.006)	(0.026)	(0.013)	(0.008)
Aging index	0.009***	0.038***	0.011***	0.006***
	(0.002)	(0.008)	(0.003)	(0.002)
Age	0.245***	1.225***	0.429***	0.237***
	(0.061)	(0.236)	(0.081)	(0.058)
Age^2	-0.005***	-0.022***	-0.007***	-0.004***
	(0.001)	(0.003)	(0.001)	(0.001)

Constant	2.910	0.836	-1.147	-0.404
	(2.461)	(7.957)	(2.323)	(1.798)
Observations	128	128	128	128
R^2	0.531	0.639	0.662	0.616

Robust standard errors in parentheses. Source: own calculations.
**** p<0.01, ** p<0.05, * p<0.1*

Since we collected panel data for both genders, we can control the fixed and time-fixed effects for women as well. Hausman's test and F-statistics confirmed the importance of these effects. Unemployment has not proven to be a statistically significant factor in reducing inequalities. On the contrary, the average wage has a major negative impact, as positive coefficients indicate an increase in inequalities. The supply side of the labor market in the form of the number of jobseekers has a statistically significant impact on only two indicators, with one being only marginal. Positive signs also indicate a deepening of inequalities through the entry of new workers into the labor market, meaning that new people in the labor market are employed in lower paid positions. A similar scenario is confirmed by the coefficients in the rate of economic activity. On the contrary, a higher number of hours worked reduces inequalities within the gender. Socio-demographic factors have not been shown to have a significant impact on women's inequalities. We attribute this phenomenon to the fact that most women go through motherhood, and so the influence of newborns is basically present in almost every woman's life. The burden of aging society does not have a significant effect on pay gaps between women. Nor does age.

Table 8: Fixed effects - Women

	(1)	(2)	(3)	(4)
	D9D5	**D9D1**	**D5D1**	**P75P25**
Labour market factors				
Unemployment rate	-0.005	-0.016	-0.004	0.005
	(0.005)	(0.012)	(0.004)	(0.004)
Average wage (ln)	0.699***	2.748***	0.790***	0.520***
	(0.075)	(0.205)	(0.059)	(0.060)
Jobseekers (ln)	0.040	0.241*	0.101**	0.033
	(0.050)	(0.136)	(0.039)	(0.039)
Economic activity rate	-0.001	0.024***	0.014***	0.011***
	(0.003)	(0.008)	(0.002)	(0.002)
Hours worked (ln)	-0.904***	-2.858***	-0.575**	-0.256
	(0.316)	(0.861)	(0.247)	(0.250)
Socio-demographic factors				
Children (ln)	0.026	0.064	0.009	0.024*
	(0.017)	(0.046)	(0.013)	(0.013)
Aging index	-0.002	-0.014*	-0.007***	-0.004*

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	(0.003)	(0.008)	(0.002)	(0.002)
Age	-0.052	-0.187	-0.052	-0.044
	(0.087)	(0.238)	(0.068)	(0.069)
Age²	0.001	0.004	0.002	0.001
	(0.001)	(0.004)	(0.001)	(0.001)
Constant	79.015***	361.128***	120.824***	71.280***
	(14.379)	(39.218)	(11.249)	(11.396)
Hausman χ^2	514.01	101.59	101.35	102.64
F-Statistic (FE)	42.03	96.80	107.84	41.53
Observations	128	128	128	128
R^2	0.728	0.865	0.882	0.776

Robust standard errors in parentheses. Source: own calculations.
**** p<0.01, ** p<0.05, * p<0.1*

Conclusion

The aim of this paper was to identify the factors influencing wage inequalities in the labor market in the Slovak Republic during the years 2005-2020. Most of the literature on inequalities in the labor market deals with wage inequalities between the genders. This paper is different in a way that it looks at gender inequalities within genders and the labor market and socio-demographic factors that affect them. In the conditions of the Slovak Republic, we did not find any relevant research focusing on this issue, which creates space for research in this area and raising the awareness of within gender inequalities.

Changes in indicators of wage inequality by region, and also at the aggregate level, indicate that the distribution of wages is equalizing and inequalities are decreasing for both genders. This result also shows the figure where inequalities have been decreasing over the last ten years. The largest decrease occurred in the wage ratio of the 10% of the highest-earning workers and the 10% of the lowest-earning workers of both genders. As for the reduction of inequalities by region, wages have levelled off the most in Bratislava, Košice and Trnava. We can state that the curve of wage equality has increased throughout Slovakia.

The results of the regression analysis showed that labor market factors on both the demand and supply sides have a significant impact on inequality for both genders. The level of the average wage and the level of economic activity have a negative effect on wage inequality for both genders. The unemployment coefficients are significant but very close to zero. The number of job applicants also has a significant impact on both genders. Socio-demographic factors have shown to be important in determining wage inequality, especially for men. This is because men do not tend to stay on maternity leave. The structure of the family in terms of the number of children mainly affects inequalities between men, and the aging of the population significantly affects inequalities within both genders. The burden of the young generation providing higher financial care for unproductive individuals in society appears to be significant also in relation to wage inequality, especially among men.

The results of this contribution can be used as a basis for future research in the field of wage inequalities on the labor market in the Slovak Republic, but also

as a basis for labor market policies, the aim of which is to reduce wage inequalities and thus give room for the unification of wage evaluation for both genders.

Acknowledgment

The article is the result of the solution of the research project VEGA no. 1/0037/20 „New challenges and solutions for employment growth in changing socio-economic conditions“ and VEGA no. 1/0851/21 „The social economy as a modern tool for building an inclusive society in the context of global change and the challenges of the UN 2030 Agenda for Sustainable Development”.

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COMPARISON OF THE STRUCTURE OF THE SLOVAK ECONOMY AND THE MOST DEVELOPED EU COUNTRIES

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Received: 30. September 2022 Reviewed: 26. November 2022 Accepted: 15. December 2022

Abstract

The constant economic growth associated with the growth of energy and raw material demand has reached the point where we begin to observe significant environmental changes, especially global warming. These processes changed the view of the development of technology and the economy. Attention to the environment and the minimization of emitted emissions are coming to the fore. This transition is closely linked to the industrial revolution represented by Industry 4.0. This article aims to analyze the current structural maturity of the Slovak economy in comparison with the developed countries of the European Union. We offer a specific insight and identify the development trend in highly developed EU countries, which Slovakia should follow regarding increasing competitiveness, macroeconomic indicators, and, last but not least, the standard of living. Using the analysis of employment in individual sectors, we identified prospective and reductive areas of the economy. The recovery plan brings a unique opportunity to invest in these promising areas from the package of money intended for the economy's recovery after the Covid-19 pandemic.

Keywords: environment, economy, green deal, emissions, employment

JEL Classification: A10, J11, F60

Introduction and theoretical background

Slovakia faces significant challenges brought by the transformation of the economy, generally called Industry 4.0, and the global climate crisis, which creates pressure to reduce emissions and pollution of the air and the environment. In the context of these two crucial factors, the economy's structure also develops. The industries that most significantly burden the environment are gradually going into decline. Gradual changes in the economy to meet modern standards require significant investments.

The recovery plan after the COVID-19 pandemic offers a unique opportunity to finance these investments.

On the contrary, green industries are increasingly supported and favored, which makes them more attractive to entrepreneurs and investors. In this article, we focused on comparing the structural development of the most developed economies of the European Union and Slovakia. This comparison will reveal to us at what stage the economy of Slovakia is. Identification and knowledge of prospective industries are essential, as it is also necessary to adjust the education system, legislation, labor market, and people's thinking and perception. In today's dynamically changing world, it is necessary to change the approach to education, as the knowledge gained through education quickly becomes obsolete. It is necessary to emphasise lifelong education, which is still minimally developed in Slovakia, as most of the population perceives education as a one-time stage of their lives.

The Slovak economy is dominated by the so-called "dirty" industries, representing the largest share of employment and GDP. Since the trend within the European Union is in the opposite direction when industries that do not burden the environment are supported, gradually, more and more pressure will be exerted on the structural transformation of the Slovak economy. As part of the European Green Deal, the Slovak Republic has also committed to achieving carbon neutrality by 2050. This will require a change in the approach to setting goals, measures, and legislative changes. Since these "dirty" industries employ the most significant part of the population, these structural changes will also majorly impact the labor market, which must adapt to the changes.

According to the Environmental Performance Index (EPI), Slovakia has a negative downward trend; in 2010, it was ranked 10th, which meant the best position among the V4 countries, but in 2020 it was in 26th place. This decrease can be justified mainly by the focus of the Slovak economy on the manufacturing sector, where the automotive industry is dominant (Andrejovský et al., 2022). Slovakia lags in shifting the tax mix from the labor tax burden to green taxes. Most environmental taxes are from energy carriers, which do not reflect the level of pollution (Gyurián & Nagy, 2022).

One hundred ninety-five countries have signed the Paris Agreement, where they have committed to the goal of limiting global warming to 1.5C to 2C. The total carbon budget for climate stabilization at the level of 1.5 to 2C is assumed to be 2900 to 3600 Gt of CO2 emissions, while 2300 Gt of CO2 has already been emitted from this budget. The USA and the EU28 are responsible for a third of cumulative historical emissions. The massive economic development of the past 50 years has been fueled primarily by fossil fuels. Limiting global warming to 2C requires world carbon neutrality by 2070. Limiting global warming to 1.5C requires world carbon neutrality by 2050. Within the European Union, this is more of a political than an economic or technological challenge, as it is an interstate community where it will be necessary to introduce legislative frameworks into the legislative system of each country separately for the sake of carbon neutrality (Schreyer et al., 2020).

The essence of the European Green Deal (EGD) is to avert climate change. The reason for the gradual depletion of natural resources is mainly the constant increase in global competitiveness and the rate of growth of the world population. Supporting the sustainable growth of dynamic bio-economy sectors contributes to the transition from a society based on the use of fossil resources to an innovative, resource-efficient, and competitive society (Morone & Clark, 2020).

In the middle of the 19th century, the chemical composition of the stratosphere began to change more significantly. Since then, burning coal, petroleum, and wood

has produced more carbon dioxide than the planet can absorb through oceans and photosynthesis. This difference began to increase radically, especially in the 1950s. In this context, the term "moral economy" gradually began to be mentioned. It is a concept that emphasizes the balance between the material needs of society and the integrity of nature and the entire ecosystems on which it rests (Palaeologu, 2020). An important sector in the implementation of Industry 4.0 is science and research. Investments in developing new technologies are necessary for the subsequent increase in productivity, energy efficiency, and reduced intensity of produced emissions (Ulusoy et al., 2021). In every socio-economic system, growth must be recalibrated in terms of alignment with the production and carrying capacity of natural systems and energy resources on which the health of the human population depends. Based on this reasoning, we can conclude that the development of human society supported by economic growth is healthy only if this growth is gradually transformed with the gradual reaching of the limits of carrying capacity and production capacity of natural capital (Mieila, 2017).

Economic and technological changes leading to green economy goals in the EU are currently proceeding too slowly. A much more noticeable, profound, and permanent change in the EU economy and society is required to create new opportunities and substitution processes throughout the economic structure. To achieve this, studying and understanding the enabling factors and mechanisms at the intersection of policies and fundamental economic dynamics that could accelerate and guide the transformation is vital. Indeed, environmental policies within EU states directly affect environmental standards and regulations in countries outside the EU, e.g. emission standards of road vehicle engines. Fiscal reforms are also one critical factor. Economic instruments such as environmental taxes and emissions trading systems are political instruments that can change the prevailing price systems, which is essential to start the transformation process to a resource-efficient ecological economy. The reform of environmental taxation and the gradual cancellation of subsidies harmful to the environment are also closely related to this issue. Implementing resource-efficient technologies is often not economically viable under current economic conditions. For example, higher energy prices – driven by economic instruments – could trigger a more extraordinary creation and diffusion of green technologies. Achieving the expected benefits from economic instruments and environmental fiscal reforms, however, fundamentally depends on environmental taxation, which could otherwise have adverse effects such as the loss of competitiveness of businesses on the world market (European Environment Agency, 2014).

Definitions of the green economy according to the EEA are generally characterized by these three objectives (European Environment Agency, 2014):

a) improving the efficiency of resource use: a green economy is an economy that efficiently uses energy, water, and other material inputs;
b) ensuring the resilience of the ecosystem: it also protects the natural environment, the structures of its ecosystems, and the flows of ecosystem services;
c) enhancing social justice: promotes people's well-being and fair sharing of burdens between societies.

Existing economic models have primarily looked at the use of resources in terms of rationalizing their consumption and reducing human needs. However, this view has proven inappropriate as consumption continues to grow. Because of this, it was necessary to build an economic model to support the design of activities related

to renewable resources, which are determined from economic, social, and natural foundations. Such a model is the circular economy, which is based on three principles: waste design and pollution reduction, maintenance of used products and materials, and regeneration of the natural system. The importance of the circular economy model and care for its implementation is also reflected in the fact that the European Commission adopted an action plan for the circular economy in 2015, which was fully completed in 2019. However, its activities and development are still ongoing. The assumption is that the transition of society to a circular economy strengthens and accelerates the building of sustainable economic development, strengthens global competitiveness, and opens new jobs (Nestorovic & Radicevic, 2019). As a result of globalization, which has dramatically increased the interconnection and interdependence between all actors of the global economy, whether they are multinational corporations, small companies, or countries, finding a long-term solution is complex and requires global cooperation. The reason is that when tightening environmental protection regulations in one country or community (for example, the EU), the multinational companies concerned moved production to another country where these regulations were not so strict. Global governance and global regulations may be a solution to this type of situation. However, such a solution on a global scale is not realistic in the near or even foreseeable future (Bonviu, 2014).

The EGD document stipulates that all unreduced emissions will be eliminated by 2050, e.g. through natural carbon sinks such as forests and carbon capture and storage technologies. However, due to possible negative ecological impacts, there is still uncertainty regarding carbon storage in geological structures related to long-term release and safety, as well as ocean storage. Furthermore, these carbon storage technologies are expensive. Considering the growing demand for biological resources, the options for increasing natural carbon sequestration could be more precise. This confirms that the primary emphasis must be reducing emissions to the maximum already in the production phase. Given the progress made so far in reducing emissions, the introduction of EGD will require an entirely new approach to the economy and relatively drastic measures in all sectors of the economy. It will represent a severe challenge to all EU countries. However, it is also clear that the starting point varies widely between countries, bringing about differences in the level of challenge (Zlaugotne et al., 2020).

Achieving carbon neutrality requires a structural change in the economy, which means a significant change in the labor market. From the point of view of the labor market, the name green workplace has become established. The International Labor Organization (from now on referred to as the ILO) defines this term as follows: "Green jobs are decent jobs that contribute to the protection or restoration of the environment, whether in traditional sectors such as manufacturing and construction, or in new, emerging ecological sectors, such as renewable energy and energy efficiency. At the corporate level, green jobs can produce goods or provide services that benefit the environment, such as green buildings or clean transportation. However, these green outputs (products and services) are not always based on ecological production processes and technologies. Therefore, ecological workplaces can also be distinguished by contributing to more environmentally friendly processes. For example, green workplaces can reduce water consumption or improve recycling systems. However, green jobs defined through production processes do not necessarily produce environmental goods or services" (International Labor Organization, 2016).

According to Stilwell, the appropriate measure is "green stimulus" programs, which combine fiscal policy to direct investment to create more green jobs.

These programs would be particularly appropriate during the economic recovery from the current COVID crisis, when businesses could use them to change the transformation process towards reducing emissions, given the environmental change related to the commitment to climate change mitigation. (Stilwell, 2021) However, not all areas of the economy were affected by the pandemic in the same way, so it is necessary to set these incentives concerning the pandemic's impact on individual sectors. According to a study conducted on a sample of Slovak companies, the most affected sectors were construction, services, gastronomy, retail, consulting, and accounting, which showed a problem with liquidity (Papíková et al., 2022).

According to the study by Dolge and Blumberga, an essential factor in reducing emissions is energy efficiency. The results showed that over the ten years from 2010 to 2019 in the EU, reducing energy intensity had more than twice the impact on greenhouse gas emissions compared to reducing emissions intensity. In order to achieve more significant reductions in greenhouse gas emissions, more outstanding efforts should be made to develop effective energy efficiency policies and accelerate the adaptation of energy efficiency measures in all sectors of the economy (Dolge & Blumberga, 2021).

Material and methods

The main goal of this article is the comparison the structure of the economic sectors according to employment in selected countries of the European Union and the identification of promising sectors that will grow in the coming decades in the context of the economic transformation of Industry 4.0 and the climate requirements established by the European Union as part of the European Green Deal.

This work used the basic scientific methods of analysis, synthesis, deduction, and comparison. We drew data on employment in the age group 15 to 64 in individual sectors from Eurostat. For comparison, we converted the data in units of thousands of employed persons into the percentage share of the given industry in the total number of employed persons in the economy.

As it follows from previous research that more developed countries (in terms of GDP) are further along in the process of introducing Industry 4.0 and reducing emissions, we divided the countries of the European Union according to GDP per capita into three categories:

a) Less developed countries (HDP/pc <20 000 EUR),
b) Medium developed countries (HDP/pc >= 20 000 EUR a HDP/pc =< 35 000 EUR),
c) Highly developed countries (HDP/pc > 35 000 EUR).

After an initial analysis and comparison of the structure of employment in the Slovak Republic with a group of highly developed EU countries, we identified individual sectors of the economy, which we divided into three categories according to the difference between the individual sectors:

a) Prospective industries (difference <-0.3%),
b) Industries with little potential (difference from =<-0.3% to >= 0.3%),
c) Reductive industries (difference > 0.3%).

We used bar graphs and tables to interpret the data graphically. In the summary graph showing the share of employment in individual sectors in total employment, we compared the Slovak economy only with the category of highly

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developed EU countries. In the graphs presenting data for individual industries, we also compared the Slovak economy with other categories:

a) EU-27,
b) countries V4,
c) Eurozone,
d) Medium developed countries EU,
e) Highly developed countries EU,
f) Less developed countries EU.

Results and discussion

Based on data on employment in individual sectors of the economy, we calculated the average for highly developed EU countries (HDP/pc>35.000 EUR).

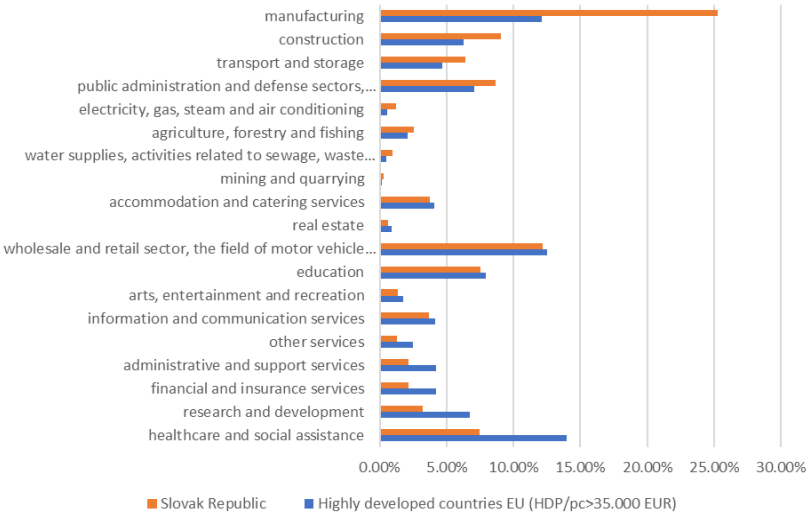
Table 1 Comparison of the share of employment in individual areas in total employment (%)

Industry	Highly developed countries EU	Slovak Republic	Difference
healthcare and social assistance	13.96	7.46	-6.50
research and development	6.70	3.24	-3.46
financial and insurance services	4.23	2.16	-2.07
administrative and support services	4.22	2.18	-2.04
other services	2.47	1.29	-1.18
information and communication services	4.15	3.70	-0.45
arts, entertainment, and recreation	1.78	1.33	-0.45
education	7.95	7.56	-0.39
wholesale and retail sector, the field of motor vehicle and motorcycle repair	12.53	12.18	-0.35
real estate	0.90	0.60	-0.30
accommodation and catering services	4.06	3.77	-0.29
mining and quarrying	0.15	0.29	0.13
water supplies, activities related to sewage, waste and sanitation	0.52	0.93	0.41
agriculture, forestry, and fishing	2.08	2.56	0.48
electricity, gas, steam, and air conditioning	0.58	1.21	0.63
public administration and defense sectors, mandatory social security	7.10	8.66	1.57
transport and storage	4.69	6.38	1.69
construction	6.25	9.06	2.81
manufacturing	12.15	25.29	13.15

Source: Author´s editing according to Eurostat.

Based on the above comparison, we see that the most significant difference is achieved by the manufacturing sector, 13.15%, which means that this sector is represented much more in the structure of employment in the Slovak Republic than in highly developed EU countries. On the other hand, the healthcare and social assistance sector achieves the most considerable negative difference of 6.5%, which means that this sector is more prominently represented in the employment structure of highly developed EU countries than in the Slovak Republic. For a better overview, we also present a graphic representation of this comparison (chart 1).

Chart 1 Share of employment in individual areas in total employment



Source: Author´s editing according to Eurostat. (Eurostat, 2022)

Significant differences can be observed in 16 sectors out of 19. Based on this, we deduce that the structure of the Slovak economy achieves significant differences compared to highly developed EU countries.

Based on the above procedure, we divided the individual industries into categories according to the difference. We present this distribution in the following table (table 2).

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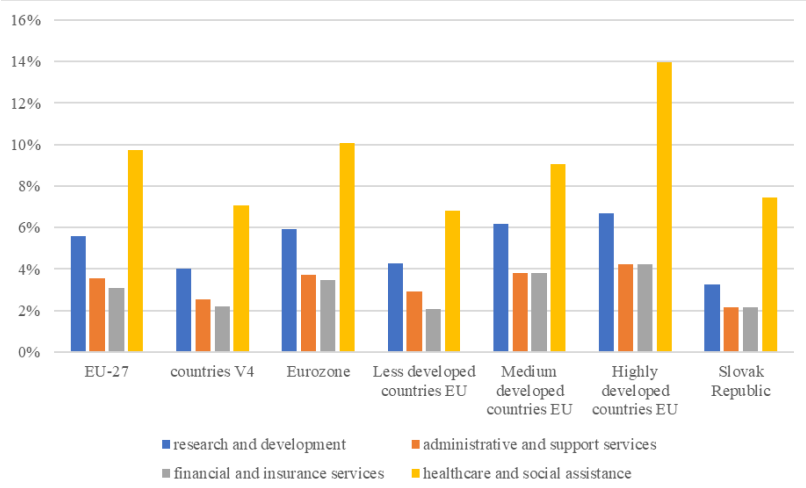
Table 2 Division of industries by difference

Prospective industries (difference <-0.3%)	healthcare and social assistance; research and development; financial and insurance services; administrative and support services; other services; information and communication services; arts, entertainment, and recreation; education; wholesale and retail sector, the field of motor vehicle and motorcycle repair
Industries with little potential (difference from =< -0.3% to >= 0.3%)	real estate; accommodation and catering services; mining and quarrying
Reductive industries (difference > 0.3%)	water supplies, activities related to sewage, waste and sanitation, agriculture, forestry, and fishing; electricity, gas, steam, and air conditioning; public administration and defense sectors, mandatory social security; transport and storage; construction; manufacturing

Source: Author´s editing

In order to find out in more detail the position of the Slovak economy compared to the EU-27, the V4 countries, the Eurozone, less developed countries, and medium-developed countries, we also analyzed individual sectors that were classified in the perspective or reductive category. In the following summary charts, we have focused on selected prospective industries.

Chart 2 Comparison of employment in the healthcare and social assistance sectors, financial and insurance services, administrative and support services, and research and development



Source: Author´s editing

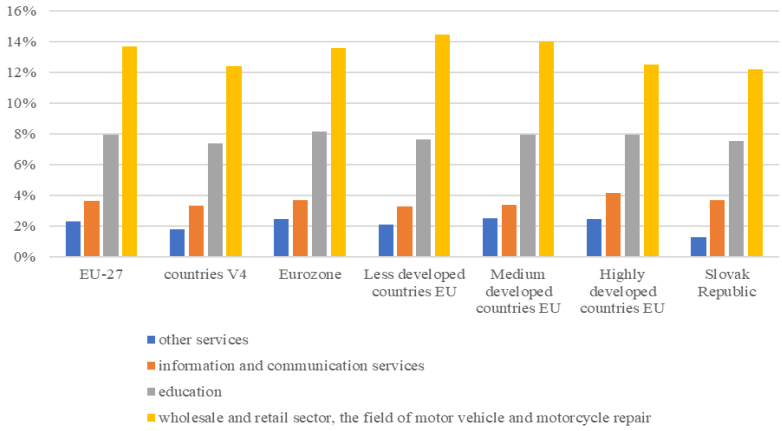
From this summary chart, we can see that in the healthcare and social assistance sector, the Slovak Republic achieves the highest employment agreement, with the surrounding countries included in the V4, 7.46%. On average, EU-27 countries, medium-developed EU countries, and Eurozone countries achieve higher employment in this sector.

This industry is the engine of economic growth and productivity, as new technologies and procedures are an essential determinant in the current Industry 4.0 change era. When we focus on the comparison in the field of research and development, we can observe from the graph that the Slovak Republic, with only 3.24% value, lags significantly behind highly developed countries, and these countries reach more than twice the share of this sector in employment. Slovakia also lags behind the average of the V4 countries and the average of less developed EU countries.

Within the administrative and support services sector, SR is again significantly behind the highly developed countries of the EU, which again achieve twice the employment in this sector. Just as in the research and development sector, the SR also lags behind V4 and less developed countries.

In the financial and insurance services sector, the SR again achieves poor results, only 2.16%, compared to the highly developed countries of the EU, 4.23%. Compared to less developed countries and V4 countries, SR achieves average results. So this is another sector with growth potential.

Chart 3 Comparison of employment in the other services, information and communication services, wholesale and retail sector, the field of motor vehicle and motorcycle repair, and education



Source: Author´s editing

In the wholesale and retail sector, the area of motor vehicle and motorcycle repair, SR achieves average results within the category of V4 countries. Compared to highly developed countries (12.53%), Slovakia (12.18%) achieves similar results. Less developed countries in this sector achieve significantly higher employment than Slovakia.

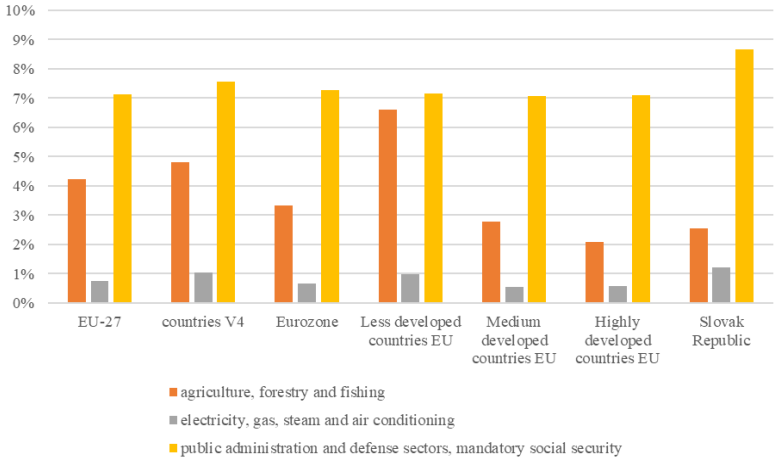
Slovakia is again at the level of V4 countries and less developed countries within the education sector. Employment in this sector reaches 7.56%, while in highly developed EU countries, employment reaches 7.95%. In the case of Eurozone countries, employment reaches the level of 8.14%. In the other services sector, Slovakia again achieves the weakest results of all monitored groups. While highly developed EU countries have an employment rate of 2.47%, in Slovakia, it is only 1.29%. Again, this is about a two-fold difference.

We have also identified the scope for increasing employment through green jobs in the information and communication services sector. Slovakia reaches an employment level of 3.70%, a higher value than the average of V4 countries and less developed EU countries. Highly developed EU countries reach an average of 4.15%.

Reductive industries

In the following section, we analyze in more detail the position of the Slovak economy in comparison with other groups of countries in the sectors we have identified as reductive.

Chart 4 Comparison of employment in the agriculture, forestry and fishing, electricity, gas, steam, and air conditioning, public administration and defense sectors, mandatory social security



Source: Author´s editing

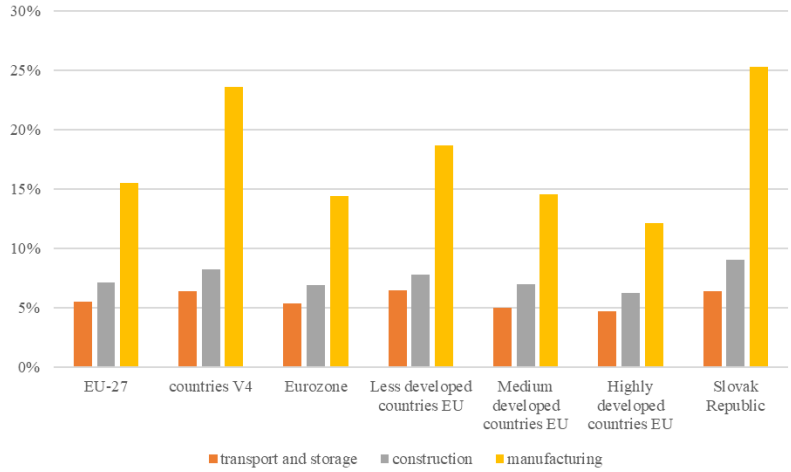
The electricity, gas, steam, and air conditioning supply sector employs 1.21% of the population in Slovakia, while in highly developed EU countries, it is only 0.58%. Slovakia also achieves higher values than the average of V4 countries, 1.03%, and the average of less developed EU countries, 0.98%.

In the field of public administration and defense, mandatory social security, we see a significantly higher value achieved by Slovakia compared to other investigated groups. Slovakia reaches 8.66%, highly developed EU countries 7.10%, V4 countries

7.57%, and less developed countries 7.16%. These results indicate the exuberance of state administration compared to other groups of countries. Other countries need significantly fewer state employees to operate than Slovakia, which means higher efficiency and productivity per employee.

Natural factors and the fragmentation of the country significantly influence the sector of agriculture, forestry, and fishing. Therefore, the results may differ from the context of the examined issue of the economy's structure. Slovakia achieves similar results (2.56%) to highly developed EU countries (2.08%). However, the surrounding countries of the V4 group achieve a significantly larger share of employment at 4.81%. The category of less developed EU countries reaches an even higher level of 6.61%.

Chart 5 Comparison of employment in the transport and storage, construction, and manufacturing



Source: Author´s editing

We have identified transport and storage as a reductive industry, where Slovakia has an employment rate of 6.38%. Highly developed countries employ only 4.69% in this industry. The average of the V4 countries and less developed EU countries is approximately at the same level as Slovakia, namely 6.40% and 6.43%, respectively.

In construction, employment in the Slovak Republic (9.06%) reaches significantly higher values compared to highly developed EU countries (6.25%). However, it also reaches higher values than the average of V4 countries (8.24%) and less developed EU countries (7.76%).

We found the most prominent difference within the manufacturing industry. While Slovakia reaches 25.29% employment in this sector, it is only 12.15% in highly developed countries. The only group of countries that comes close to the Slovak Republic is only the group of V4 countries, while the less developed countries of the EU reach a significantly lower value of 18.70%.

Suggestions and recommendations

Based on our findings, the Slovak economy structurally lags significantly behind the average of highly developed EU countries. Due to the necessity of a significant change in the economy's structure, it is also necessary to pay significant attention to the reform of the education system, which must reflect the new requirements of the labor market. From the research results, the education sector is represented in the Slovak Republic to a similar extent as in highly developed countries, which is an essential prerequisite for the successful transformation of the economy in the sense of Industry 4.0. However, the educational process must be innovated in order to be able to reflect the high dynamics of the labor market and to be flexible enough in the preparation of job seekers, as technologically, the time and environment change so quickly that the classic concept of education is dysfunctional, as knowledge and skills can already be 5 - 10 years out of date. In Slovakia, the concept of lifelong education still needs to be represented to a minimal extent, which causes problems with the employment of people of higher productive age.

Based on the research, we propose creating a motivating business environment in promising sectors where employment should increase. The tool can be various subsidy schemes, tax breaks, simplification of bureaucracy or grants so that potential investors decide to do business in prospective industries, from which the Slovak economy will benefit in the longer term, rather than in reductive industries, which will have to be a few years in the future decade dampened mainly because of EGD and the resulting commitment to carbon neutrality, but also because of the natural decrease in demand for these goods caused by a change in the lifestyle of the population. We suggest using positive motivational tools in promising industries at the expense of harmful tools in reductive industries, such as tax increases, which could have short-term adverse effects on employment. At the same time, a smoother and more natural transition of capital from reductive industries to promising ones would be ensured. For this purpose of changing the business environment, we propose to create a working team within the Ministry of Economy of the Slovak Republic, which would deal with the transformation of the economy in the long term.

Conclusion

In this article, we compared the employment structure of the Slovak economy and various groups of European Union countries, based on which we found differences and identified prospective industries, industries with little potential, and reductive areas. Our findings are essential mainly because they offer a particular insight and identify the development trend in highly developed EU countries, which Slovakia should follow regarding increasing competitiveness, macroeconomic indicators, and, last but not least, the standard of living. Technological changes, globalization, outsourcing, robotization, automation, and so on caused structural changes in the economy in the group of highly developed EU countries, which can show us the development trend that the Slovak economy will gradually have to follow to increase productivity and competitiveness across Europe. It is also necessary to introduce changes and guide the development of the economy of the Slovak Republic due to the obligations arising from the European Green Deal initiative, where the Slovak Republic is committed to achieving climate neutrality by 2050.

The sectors with the tremendous potential for growth, resulting from our research, are health and social assistance, where the average of highly developed EU countries is higher by 87%, research, and development, where the average of highly developed EU countries is higher by 106%, administrative and support services, where the average of highly developed EU countries is higher by 93% and financial and insurance services, where the average of highly developed EU countries is higher by 94%.

On the contrary, we have identified the manufacturing industry as the most significant reductive sector, where the average employment value in highly developed EU countries reaches only 48% of the value in the Slovak Republic.

These results should be taken as a basis for further research, which will be more complex, and focused on individual sectors since many other geographical, socioeconomic, and legislative factors influence the results. It is, therefore, necessary to be aware of the limits of this research, overcoming which can be the subject of further scientific research.

Acknowledgments

Slovak Research and Development Agency Grant No supported this work. APVV-20-0012 "EU Green Recovery in the post-Covid-19 Period".

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THE QUALITY DETERMINING THE GENERAL VALUE OF BUSINESSES THROUGH DISCOUNTED CASH FLOW METHOD

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Received: 05. October 2022 *Reviewed: 22. November 2022 Accepted: 15. December 2022*

Abstract

The contribution aims to estimate the quality of determining the general value of the selected company and to determine the most suitable model through the method of discounted cash flows. The general value of the enterprise is an expert's estimate of the most probable price of the assessed property on the day of the assessment at the given place and time. The quality of determining the general value of the enterprise is essentially related to the assessment of the actual situation in the enterprise, which includes obtaining and using funds, fluidity of financial flows, investing in other activities, the ability to repay foreign resources, planning and the current state of the enterprise. In the contribution, we focused on the quality of determining the general value of the company with an emphasis on the revenue potential. We carried out the valuation of the assets of the selected company in a two-phase process, which consisted of the calculation of free cash flows, the average weighted cost of capital, and the calculation of the company's value based on the parametric and Gordon formulas. When determining the general value of a company, it is also essential to consider whether the financial results of the company depend on economic deviations, and it is necessary to monitor the capital market, the development of interest rates on loans provided by banks, and the development of interest rates on government bonds.

Keywords: cost of capital, discounted cash flow, enterprise, general business value, quality

JEL Classification: G32, L32, M41

Introduction and theoretical background

Determining the company's market value is required to prepare for a unique and complicated process because every business is unique, and we cannot, therefore, be compared with other businesses. The synergistic effect causes the company's value to

be higher than that of its parts. Business valuation is determining the company's value in monetary terms on a specific date. It is the process of determining the general value of the company using appropriate valuation methods. The resulting value valuation is thus equal to the price, but only the most likely estimate. The value of the company's assets is the expert valuation of an asset trader at a particular valuation date in ordinary business. Eiteman, Stonehill, and Moffett (1998) state that it is crucial and necessary to consider not only the actual value of assets but also subjective factors such as yield potential and prospects for further business development. In assessing the future success of the business entity is also required to use management tools that support the strategy and business performance in terms of increasing its value and competitiveness (Durkáčová, Gontkovičová, 2014).

The company's market value results from objectified asset value estimated by the organization or institution specializing in the expert activity. Enterprise value is determined by the future revenue of owners or all investors, which reflects the time value at a given location and a specified period. An enterprise is measured as a body capable of bringing income, considering its revenue potential. The resulting enterprise value is determined as the present value of its future revenue that is willing to offer more than the company's market value (Hečková, 2007).

The whole process of undertaking the valuation aims to determine the company's fair value, which may be a determination of the market value yield or expected value. Enterprise value is generally under Eiteman, Stonehill, and Moffett's (1998) Subjective assessment of a particular wearer's past, present, or future revenues.

The value of the company concerned, the maximum appreciation, respectively depreciation contributions from owners in monetary terms on a specific date, and determining the company's value is engaged in expert work, which has become an essential part of business development. Expert activities in the Slovak Republic shall be registered in the list of experts, which is led by the Ministry of Justice and must follow the relevant expert legislation (Kislingerová, 2001).

The market value of the company is an expert estimate of the most likely rates improved asset at the date of valuation in each place and time, which he should reach the market in conditions of the free competition at a direct sale when the buyer and seller act with due awareness, caution and assuming that price is not affected by undue consideration, usually including value-added tax. In determining the value of a company is not only the actual current value of the property, as well:

- yield potential,
- position on the market,
- future of the company.

Quality plays a significant role in determining the general value of the company because it is currently one of the critical phenomena in the business field. Quality is the foundation of business success. It depends on the quality and the prospects of further development of each company. Exact statistical methods and specific outputs in graphical form are the core of statistical quality control. By Tkáč (2001), these statistical outputs are produced through software support, creating a sufficient basis for applying and implementing selected statistical methods.

Valuation of the property business in the Slovak Republic, the decree on determining the general value of property no. 492/2007 Z.z. as amended. Decree uses the term universal value, that is, the property's inherent value to which the expert in the valuation and finalize mentioned decree regulates the manner or method of determining the value of assets. Determination of the general value of a company in

Slovakia implements expert institutes, organizations that are legal entities registered in the expert industry 51 01 01 Valuation of companies. The above expert industry is a part of Department 51 00 00 Economics and business management.

Mlčoch (1998) states that in the valuation of companies, encounter many types of assets may have economic, construction, engineering, or other nature, so it is possible that the general value of the company is to designate one expert as a natural person. The establishment can assess only an expert who is a legal person, is Forensic Institute or organization, and the individual departments are made up of experts who value individual assets. Reasons and causes determining the enterprise value may result from internal or external needs. Business valuation based on internal needs is the case:

- the purchase or sale of company
- of real creditworthiness of the company,
- enterprise merger, liquidation, bankruptcy,
- new companion,
- input on a stock exchange market (Mlčoch, 1998).

Business valuation based on external needs again by Copeland, Koller, and Murrin (1993) occurs in the realization of these facts:

- loan application,
- acquisition of the components of a gift, inheritance, or gratuitous transfer,
- insurance of property,
- litigation and tax purposes.

Before starting the expert, activities must have an expert available particular document, which is necessary to proceed with a business valuation. Hečková (2007) states that the primary input information can include the company's financial statements for a certain period, information about the subject, and pricing information on macroeconomic factors that influence the final general value.

In determining the general value of a company can also come up against some obstacles, which, according to Kislingerová (2001), include the fact that:

- every company is a specific unit; therefore, there is no public supply and demand, which would objectify price on the market
- enterprise value is typically more significant than the sum of an individual asset,
- not consider only the actual current value of the property, as well as revenue potential, position in the market, and its prospects,
- the subjective approach to the external assessor, and court expert.

Material and methods

Kotulič, Király, and Rajčániová (2007) reported that in determining the yield value of the business enterprise is valued as an asset capable of bringing the yield. Therefore the value of the company is determined as the present value of its future revenues considering:

- net revenue of the company,
- the interest capitalization rate of return,
- level of risk capital investments in business valuation.

The primary methods of determining the general value of the company include:

- equity method,
- business, respectively yield method,

- a combined approach, the liquidation method,
- comparison method and other methods.

The new company shall, in the case valuation yield method, based on the original company's accounting value of assets and liabilities and the difference between the market value; the carrying value of assets and liabilities is accounted for as valuation difference. In this case, a new enterprise recognizes assets and liabilities in the initial carrying amount, which their objective recognition cannot attain (Kislingerová, 2001).

Industry and corporate-specific factors are significant determinants of corporate performance (Oyebanji, 2015; Rajkumar, 2014; Akinyomi, 2013; Akintoye, 2008; Egbunike, Okerekeoti, 2018).

The model's yield method can be divided into several models, which include:

- a discounted dividend,
- discounted cash flow (DCF),
- model net present value of growth opportunities,
- models of capitalization of profits,
- Capital Asset Pricing Model,
- models' capitalization of net income,
- discounted FCFS,
- combined methods,
- discounted values of indicator EVA.

In this paper, we applied the calculation of the valuation company through the discounted cash flow method, where we calculated the company's value in the first and second phases, and we used formulas summarized in Table 1.

Table 1 Summarizing using the formula

		Formula
The first phase DCF	Enterprise value by model FCFF	$\Sigma\ FCFF_t/(1+WACC)^t$
	The weighted average cost of capital (WACC)	$r_d\ (1-t)\ D/V + r_e\ E/V$
	The cost of equity (r_e)	$r_f + \beta\ (r_m - r_f)$
The second phase DCF	The weighted average cost of capital (V)	$D + E$
	The continuing value (parametric formula)	$KPV_{T+1}\ (1-g/R_t)/(WACC_{T+1} - g)$
	Gordon formula	$FCFF_{2022} = FCFF_{2021}\ (1 + g)$
	The continuing value (Gordon formula)	$FCFF_{2022}/(WACC - g)$

Source: Author´s editing

Studies by El Ghoul et al. (2011) and Gregory, Tharyan, and Whittaker (2014) show that a discounted cash flow (DCF) model framework (which describes a company's value as the sum of future cash flows, discounted at the cost of capital) can be used to break down the influence of a corporation's ESG profile on equity valuations, including cash flows, risk, and cost of capital.

Consequently, within a DCF model, systematic risk is typically captured through the cost of capital (i.e., the denominator in the DCF model). In contrast, the firm-specific risk is linked to the numerator of the DCF model, that is, future cash flows. (Giese, Lee, Melas, Nagy, Nishikawa, 2019)

Results and discussion

Calculation of company general value discounted cash flow method

Prior to the selection of a method is necessary to determine the purpose of valuation and the valuation for whom it is intended. Currently, there is a problem of valuation lack of theoretical methods, but on the contrary, are too numerous, and thus, the selection of the most appropriate method is influenced by many factors, which include a description of the company, the level of estimated profit achieved, the expected rate of profit growth, stability, leverage, and others. In this paper, we have chosen for valuation of efforts by the subject to obtain a loan, respectively, finding current fair credit standing enterprise as information for management.

FCFF proceeded in two phases. The first phase covers the period for which the expert can develop a forecast of free cash flow for the year. The second phase is the period from the first phase to infinity, which is the period for which a valuator does not dare to estimate earnings or other financial forecasts. We must calculate the discounted cash flow based on free cash flow. The selected company's free cash flow for 2017-2021 is calculated in Table 2.

Table 2 Calculation of free cash flow (FCFF)

	2017	2018	2019	2020	2021
Taxation of income before deducting interest NOPAT	12 325	12 255	10 700	18 102	19 393
+ depreciation	9 335	8 460	7 076	6 604	6 179
= Preliminary operating cash flow	21 660	20 715	17 776	24 706	25 572
- An investment in the adjusted working capital	n/y	3 814	3 457	11 043	-3 856
= - Investment in the acquisition of fixed assets	n/y	3 170	5 898	3 900	6 385
FCFF	**n/y**	**13 731**	**8 421**	**9 763**	**23 043**

Source: Author´s editing

For calculating the cost of equity, it is necessary to know the risk-free interest rate rf, β coefficient for the studied company profitability and the market as a whole r_m for each year studied, which in our case is the period from 2017 to 2021. Table 3 displays the appropriate parameters selected for individual years, the calculation of the required rate of return on shareholder (r_e), and the weighted average cost of capital (WACC).

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Table 3 The calculation of the weighted average cost of capital (WACC)

	2017	2018	2019	2020	2021
Risk-free interest rate rf	6.3 %	5.1 %	4.1 %	4.8 %	3.3 %
β factor for the chosen company	0.85	0.75	0.75	0.75	0.75
The profitability of the overall market rm	7.5 %	7.5 %	7.5 %	7.5 %	7.5 %
The required rate of return of shareholder re	7.32%	6.9 %	6.65%	6.83%	6.45%
WACC	**0.0701**	**0.0672**	**0.0663**	**0.0671**	**0.0623**
WACC (%)	**7.01%**	**6.72%**	**6.63%**	**6.71%**	**6.23%**

Source: Author´s editing

Based on the above parameters, we calculated the company's value in the first phase, which is 42 254,35 thousand €.

To determine the value of the business in the second phase, we used a parametric formula that works with selected value-creation factors. The purpose of establishing the weighted average cost of capital (WACC) after 2022, we, based on previous developments, set the following estimates:

- $r_f = 3\%$,
- $\beta = 0{,}75$,
- $r_m = 7{,}5\%$,
- $r_d = 5{,}8\%$.

The management of the holdings is expected in 2022, with the need for an operating loan of € 22 million €, but the total amount of credit by the end of the year will change with the gradual repayment of various loans and other sources. We, therefore, proceed to:

- estimation of interest-bearing borrowed funds under the previous development in 1650,
- estimate equity 60 100 thousand €,
- determining the income tax rate for 2022 of 21 %.
- From this data, we calculated that:
- the estimated required rate of return of shareholders is re = 6,38 %
- the estimated weighted average cost of capital of the WACC = 0,0618, representing 6,18 %.

We then calculated the rate of investment as a share of net profit NOPAT and capital invested in the previous year, return on capital investment as a share of profit and NOPAT invested capital and return on investment as a share of the total net increase in NOPAT growth and capital invested in the previous year. The achieved parameters are recorded in Table 4.

Table 4 Results calculated parameters – a parametric formula

	2017	2018	2019	2020	2021	average	estimate
NOPAT	12 325,4	12 254,6	10 699,6	18 102,0	19 392,8	-	**18 454,1**
The growth rate of operating profit	N/Y	-0.6 %	-12.7 %	69.2 %	7.1 %	**16.3** %	**4.5** %
Total invested capital	34 584,9	38 398,4	41 855,5	52 898,8	49 042,6	-	**46 668,6**
Net investment rate	N/Y	31.1 %	32.3 %	61.0 %	-19.9 %	**23.9** %	**10.9** %
Return on Invested Capital	N/Y	35.4 %	27.9 %	43.2 %	36.7 %	-	-
Return on Investments Net	N/Y	N/Y	-40.8 %	214.1 %	11.7 %	**39.0** %	-

Source: Author´s editing

Of the above parameters, we calculated the company's continuing value according to the parametric formula estimated in the amount of 978 834,16 thousand €.

For comparison, we estimated the continuing value based on the Gordon formula and set the value of expected FCFF for the period from 2022 to infinity. Based on expected stable growth in the future, we calculated an estimate FCFF2022, and we found that the estimated continuing value by the Gordon formula is 1 433 324 thousand €.

Conclusion

In this paper's valuation of the company's general value discounted cash flow method, we applied the ongoing second phase estimate based on two procedures. Specifically, the parametric and Gordon formula, where the resulting value by Gordon formula achieves significantly higher value because it is based on estimated future free cash flows (FCFF) with the assumption of steady growth. The development of free cash flow in the past showed a significantly uneven development. Estimated parameters (FCFF) from last year's first phase according to a stable growth rate will be significantly overstated. Used parametric formula based on profit NOPAT, estimated based on factors expressing the value of the company and the continuing value of this formula appears on the precautionary principle preferable because the parameters are necessary for its calculation, which includes investment rate and the growth rate of profit based on averages determined by developments in the past, which is essential for achieving the elimination of some significant variations in the development of individual parameters.

The primary disadvantage is that the recalculation is based on an accounting model that has yet to be adjusted to an economic one. Therefore the result of evaluating the company's performance may need to be corrected. This shortcoming can be eliminated by appropriately adjusting the data entering the calculation.

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In calculating based on discounted cash flows and applying other methods, yield estimate is the most crucial moment for the future. When estimating the growth rate of both components and the cost of capital, it is necessary to analyse the impact on the undertaking operation in detail. It is crucial to deal with the fact that the firm's economic performance is dependent on economic fluctuations and must also follow the stock market, the trend of urban government bonds, and interest rates of loans to the banking institutions. Even a low estimate deviation from the expert properties can rapidly change the company's estimated value.

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CORRELATION OF THE RETURNS OF SELECTED STABLECOINS WITH BITCOIN AND ETHEREUM

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Received: 02. October 2022 Reviewed: 18. November 2022 Accepted: 15. December 2022

Abstract

The phenomenon of cryptocurrencies has become one of the most controversial topics in the last few years, both among the professional public in economics and finance and among ordinary people who trust and invest in them. The main goal of the work is to find out the correlation between stablecoins that failed and did not maintain the promised stability around their peg and prominent cryptocurrencies with a large market capitalization, namely Bitcoin and Ethereum. The task is to find out the connection of stablecoins to significant cryptocurrencies. With a high correlation, these stablecoins cannot be stable if they are connected to a highly volatile asset. Price movement data of selected cryptocurrencies are used with a daily resolution from freely available portals. The correlation is calculated based on the primary return indicator and the Pearson correlation coefficient. The calculations show that the returns of QCash and NuBits cryptocurrencies are correlated with Bitcoin and Ethereum, and this correlation was not confirmed for the other studied failed stablecoins.

Keywords: stablecoin, cryptocurrency, correlation

JEL Classification: G11, G12, 039

Introduction and theoretical background

Cryptocurrency is a subset of the class of digital currency Chuen (2015). Cryptocurrency is also virtual or digital currency (Mufty, 2017). The term cryptocurrency is used because all transactions and issuance of new units use a cryptographic system developed using blockchain technology DeVries (2016). In general, cryptocurrencies, or virtual currencies, can be defined as a medium that functions as a currency, i.e. it can be exchanged for services or goods, but unlike standard fiat currency, it is not bound and independent of geographical borders, central banks, or other sovereignties or authorities. Such currencies implement mechanisms for the exchange of digital information and are built on cryptographic methods that ensure the security of transactions and, at the same time, their verifiability Maese et al. (2016). They have overgrown in price and popularity Foley et al. (2019). The investment use of cryptocurrencies instead of their use as currency by ordinary people is mainly used

because they are highly volatile (Swan, 2015). The so-called stablecoins Kolodziejczyk (2020) should solve their high volatility. A stablecoin continues to be a digital currency (cryptocurrency) that attempts to offer price stability while offering an additional level of security against being backed by a reserve asset such as an already existing fiat currency (e.g., USD, EUR), gold, or even another cryptocurrency. Stablecoins were designed to dramatically reduce volatility concerning cryptocurrencies such as the Bitcoin mentioned above (BTC) or Ethereum (ETH). The advantage over the asset to which the stablecoin is linked is its implementation with the help of blockchain technology. Such cryptocurrencies are cryptographically secured, allowing users to transact almost instantly without double spending or an intermediary. Furthermore, it is possible to integrate them with smart contracts Liao (2022) programmatically due to blockchain technology. The first such cryptocurrency was BitUSD.

Stablecoins are simply cryptocurrencies with a stable value. Since it is a cryptocurrency, it is generally not controlled by any government; it can be quickly sent or received, even across national borders, without interference from the authorities. Unlike most other cryptocurrencies, it does not suffer from ailments such as high volatility, which would prevent its use in everyday life as a payment for goods and services Samani (2018). For quantification, it is necessary to add that the volatility of, e.g. cryptocurrency Bitcoin against the US dollar is ten times higher than the volatility among major international fiat currencies Yermack (2015). The stability of stablecoins is solved by tying the value of the given stablecoin (so-called peg) to another currency (e.g. USD), commodity (gold), or another financial instrument. Stablecoins pursue price stability by holding reserve assets as collateral or using algorithmic formulas to control supply Hayes (2022).

Due to different implementation options, stablecoins can be divided into several groups, depending on how their stability is achieved:

Collateralized stablecoins
Crypto-Collateralized stablecoins
Algorithmic stabilization

The main task of stablecoins was to solve the high volatility of traditional digital currencies in order to be able to use the advantages of cryptocurrencies in the standard payment system for services and goods. There are currently around 200 stablecoins (Portal 101 Blockchain) in circulation, primarily used to facilitate the trading, borrowing, or lending of other cryptocurrencies in online marketplaces. Countless people put their trust in them, saying they are the monetary system's future. Although the idea is to have a stable digital currency, stablecoins also carry a risk that is even higher because they claim to represent a specific stability. Thus, one of the most significant risks is the risk of a high loss of value of the cryptocurrency that implements the stability mechanism. This risk is written into stablecoins that gained popularity but ultimately failed. By the end of 2022, we registered up to 23 failed (Portal CryptoSec) stablecoins. One of the most significant impacts on investors was the fall of the Terra/ Luna stablecoin.

The reason for calculating the correlation of stablecoins with Bitcoin and Ether is to determine whether stablecoins are tied to these significant cryptocurrencies. In their work, the authors Hoang & Baur (2021) investigated the stability of stablecoins through correlation, but such stablecoins, which are working until now, did not fall or lose their peg during the examined period. Thus, they examined stablecoins that are large, their market capitalization is higher, and did not experience significant price

fluctuations, e.g. Tether (USDT), USD Coin (USDC), Paxos Standard (PAX), True USD (TUSD). According to their claims and the work results, stablecoins should show a correlation of returns with more substantial cryptocurrencies with a large market capitalization; mainly, it is a correlation with the bitcoin cryptocurrency, so we decided to investigate this correlation. If the correlation is significant, then stablecoins cannot be stable. It is very volatile if they are strongly linked to an asset, like Bitcoin Hoang & Baur (2021). We will focus on the correlation of the returns of those stablecoins that did not maintain stability around their peg. These cryptocurrencies were not addressed in the mentioned article.

Material and methods

We chose an approach where we first get data for stablecoins that are known to have failed, i.e. lost their peg to the FIAT currency they were tied to. For this selection, we will use commonly available data sources from providers including Coinmakertcap (https://coinmarketcap.com/), Nomics (https://nomics.com/), and Finance Yahoo (https:// finance.yahoo.com). The mentioned portals provide freely available historical data with a daily resolution. Using the available Python programming language, we obtained this data from the given portals and edited it into the required standardized form. We need an overview of a sufficiently large time horizon without the need for high granularity to choose cryptocurrencies for analysis. Therefore, we obtained the data at a daily resolution since, in this form, the time developments of crypto-currencies are available on most portals dedicated to cryptocurrencies or finance. The time horizon for the given data will not be the same since different stablecoins were created in different periods and mainly ran into problems or maintained specific stability at different points.

Thus, the choice of stablecoins for analysis is given by a simple key. We will select stablecoins whose linkage to the selected asset was maintained in a favorable ratio with this asset, and at a certain point in time, it was the case that the value of the given cryptocurrency diverged from the value of its peg. By a favorable value ratio, we will understand the state when the value of the stablecoin deviated negligibly from the value of its asset compared to the values after the collapse. In other words, we used stablecoins that can be considered close to their peg for a certain period of their lifetime and lost their peg in a specific part of their lifetime, or their peg ceased to exist.

Further in the analyses, we will operate with returns as the fundamental quantifier of the asset. As profitability, we will consider the commonly used logarithmic profitability, which is understood as the natural logarithm of simple profitability and is calculated as

$$x_i = \ln \frac{P_i}{P_{i-1}} \tag{1}$$

where P_i represents the value of the interest at the end of the time subinterval i a P_{i-1} and the value of this interest at the end of the time subinterval *i-1*. Such a calculation is fully consistent with the work of Hoang & Baur (2021).

For our work, we will use the Pearson correlation coefficient to calculate the correlation between two quantities as calculated in the article by Hoang & Baur (2021), even though logarithmic returns do not satisfy the normal distribution condition, but more alpha-stable distribution Parker (2022). In statistics, Pearson's

correlation coefficient (Pearson's product-moment correlation coefficient) expresses a measure of linear correlation between two data sets. For two data sets X and Y, where $\in X$ and $\in Y$, the correlation between these sets is calculated using the relation

$$r_{xy} = \frac{Cov(X, Y)}{\sigma_X \sigma_Y} \quad (2)$$

where Cov represents the operator of the covariance, and is the standard deviation of given sets X and Y respectively.

To double-check our results, we also compute the Spearman correlation coefficient. Spearman correlation assumes that two variables can be described using a monotonic function instead of a strict linear function as in the case of Pearson correlation. We will compute spearman correlation via

$$r_s = \frac{Cov\ (R(X), R(Y))}{\sigma_{R(X)} \sigma_{R(Y)}} \quad (3)$$

where *Cov* represents the operator of the covariance, R means the rank of a given variable, and σ is the standard deviation.

Results and discussion

Selection of stablecoins

The goals we have set in the work, and the related questions we want to answer, have a familiar character, namely that it is a group of cryptocurrencies called stablecoins, which in some way have not been successful, have lost stability, be it temporary or permanent. Figure 1 shows the time courses of any stablecoins in the selected time interval that became unsuccessful in time and could not maintain a peg to their asset for various reasons. It houses the infamous TerraUSD (ticker USTC), Coffin Dollar (COUSD), bitUSD, DefiDollar (DUSD), Open Dolar (USDO), DEI (DEI), BondAppetite USD (USDAP), NuBits (ticker USNBT) and Qcash (ticker QC). The dashed line shows the peg of individual stablecoins.

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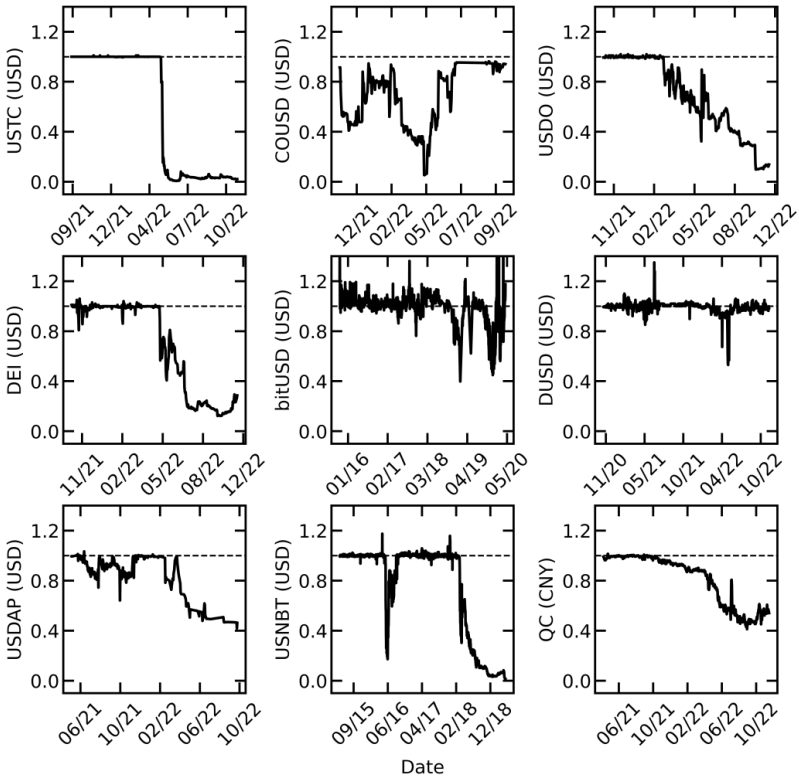
Figure 1 Failed stablecoins. Individual charts show the price of a given stablecoin in time, with its peg depicted as a dashed line.



Source: Authors' elaboration based on the data from the Finance Yahoo portal.

Figure 1 shows the time courses of any stablecoins in the selected time interval that became unsuccessful in time and could not maintain a peg to their asset for various reasons. It houses the infamous TerraUSD (ticker USTC), Coffin Dollar (COUSD), bitUSD, DefiDollar (DUSD), Open Dolar (USDO), DEI (DEI), BondAppetite USD (USDAP), NuBits (ticker USNBT) and Qcash (ticker QC). The dashed line shows the peg of individual stablecoins.

All of these stablecoins except QC were designed with a peg to the US Dollar (USD) except the last mentioned QC, which was designed with a peg to the Chinese Yuan (CNY). When calculating the correlation, we considered stablecoins that lost their peg and did not return to it in the observed time horizon. These are stablecoins Terra (USTC), USD Open dollar (USDO), DEI, Bond Appetite USD (USDAP), Qcash (QC), and NuBits (USNBT). In order to confirm the behavior of our calculations, we also included in the analysis the stablecoin Tether (USDT), whose correlation with Bitcoin was

calculated in the article by Hoang & Baur (2021). In the article mentioned above, Hoang & Baur (2021) focused on the correlation of stablecoins that were stable throughout their lifetime and calculated it based on data from October 2018 to December 2019. While we calculate the correlation of stablecoins that did not maintain stability, and the time window will be at the time of stability of stablecoins. The time windows of the calculated correlation of stablecoins with Bitcoin and Ethereum can be seen in Table 1.

Table 1 Selected stablecoins and time window of computed returns correlation

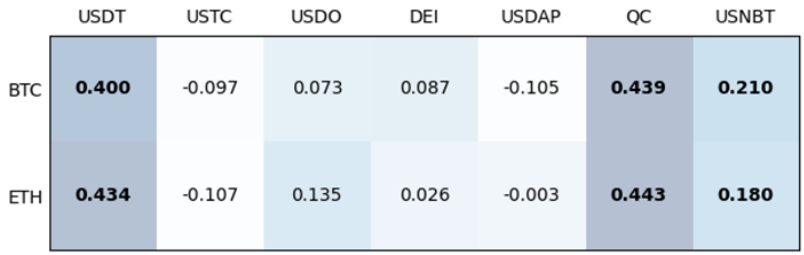
Cryptocurrency name	Ticker	Pegged to	From	To
Tether	USDT	USD	31.10.2018	26.12.2019
Terra	USTC	USD	1.6.2021	30.4.2022
USD Open dollar	USDO	USD	1.8.2021	28.2.2022
Dei	DEI	USD	1.11.2021	1.5.2022
Bond Appetite USD	USDAP	USD	10.12.2021	10.3.2022
Qcash	QC	CNY	15.2.2019	1.10.2021
NuBits	USNBT	USD	1.10.2016	1.3.2018

Source: Authors' elaboration based on the data from the Coinmarketcap portal

Correlation of the returns of selected stablecoins

Based on the formulas mentioned in the Data section, we calculated the return and, subsequently, the Pearson and Spearman correlation of selected stablecoins, including Tether, with Bitcoin and Ethereum. In Figures 2 and 3, we can see the correlation results.

Figure 2 The Pearson correlation of stablecoins with Bitcoin and Ethereum counts. With bold font are denoted values with a 5% significance level.



Source: Authors' elaboration based on the data from the Coinmarketcap portal

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Figure 3. The Spearman correlation of stablecoins with Bitcoin and Ethereum counts. With bold font are denoted values with a 5% significance level.

	USDT	USTC	USDO	DEI	USDAP	QC	USNBT
BTC	**0.425**	-0.102	0.060	0.083	0.024	**0.532**	**0.130**
ETH	**0.464**	**-0.136**	0.059	0.004	0.113	**0.577**	**0.136**

Source: Authors' elaboration based on the data from the Coinmarketcap portal

Based on the results shown in figure 2, for Pearson correlation, with methodological consistency with the paper Hoang & Baur (2021), we can conclude that Tether, Qcash, and NuBits with a significance level of 5 % have a bead with Bitcoin and Ethereum. For these cryptocurrencies, the null hypothesis was rejected. The null hypothesis, in this case, means that stablecoins are uncorrelated, so the correlation is 0. The alternative hypothesis means that cryptocurrencies are correlated. The correlation of Tether with Bitcoin was confirmed to us in the article by Hoang & Baur (2021), with a slight deviation of the result by 0.07. Terra and Bond Appetite USD negatively correlate with both examined cryptocurrencies. With stablecoins USD Open dollar and Dei, we found a slight positive correlation, which from the results and interpretation of the Pearson correlation coefficient, shows no correlation between them.

A slightly different approach obtained the results. Thus, we can conclude very similar results using a more generalised Spearman correlation. The only difference is that regarding this approach, we can also see the correlation of USTC with Ethereum.

Conclusion

Several cryptocurrencies suffered the fate of high volatility and thus lost the trust of their investors. For this reason, we decided to examine some cryptocurrencies that were said to be stable. For a while, they looked like they could hold their peg. Nevertheless, there came a time when their price fell out of sync, the value dropped, and they could never recover to their peg value because users and investors lost interest in them. Such a failure can take several forms. One of them is stablecoins, which at a certain point in their lifetime, intensely stopped following the asset concerning which they had a peg in such a way that they were unable to rise to the present, and thus there is a strong assumption of their complete failure. The second case was stablecoins when the very design of the cryptocurrency caused a significant fluctuation around its peg; its value fell, experienced instability, but eventually returned to the value of the peg. Such stablecoins include, for example, Coffin Dollar USD (COUSD-USD). The development and, thus, the fluctuation of selected cryptocurrencies can be seen in Figure 1.

Our goal was to examine the correlation of returns of failed stablecoins at the time of their price stability with cryptocurrencies with a large market capitalization

- Bitcoin and Ethereum. For the correctness of our calculations, we used the Tether token for the calculations, where we were confirmed to be tied to Bitcoin and Ethereum, as well as QCash and NuBits. In other failed cryptocurrencies such as Terra, USD Open dollar, DEI, and Bond Appetite USD, this dependence on returns was not confirmed for us. The reason for examining these cryptocurrencies was to verify the claims from the works of Hoang & Baur (2021) and Kristoufek (2020), according to which stablecoins should show a correlation of returns with more substantial cryptocurrencies with a large market capitalization, mainly a correlation with the bitcoin cryptocurrency.

As another subject for work, we propose to find out if any indicator would predestinate them to extinction from a specific moment.

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THE USE OF EMPLOYEE TRAINING AND DEVELOPMENT METHODS IN SLOVAKIA BEFORE AND DURING THE COVID-19 PANDEMIC

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Received: 29. August 2022 Reviewed: 03. October 2022 Accepted: 15. October 2022

Abstract

The COVID-19 pandemic has affected the entire world and in a relatively short time has grown global and has changed the behaviour of individuals and companies for more than three years now. We can observe its consequences in every sphere of life, including HRM and its components. The aim of the paper is to find out whether there were changes in the methods of training and development of employees in Slovak companies during the COVID-19 pandemic. The intention was to find out whether the number of employee training and development methods used changed during the COVID-19 pandemic, and if so, which ones were used less often during the pandemic than before the pandemic, and which ones, on the contrary, were used more often. The research was carried out using a questionnaire survey on a sample of 308 employees of Slovak companies. Statistical methods such as mean, median or mode, Wilcoxon Signed Ranks Test and McNemar Test were used to analyse the answers. One of the main findings is the fact that among the interviewed employees there was a decrease in the used methods of training and development, especially in the use of workshops, coaching, mentoring and instructing. The only method that began to be used more often during the COVID-19 pandemic was e-learning.

Keywords: human resource management; training and development; COVID-19; Slovak employees

JEL Classification: 3 codes M12, M53, O15

Introduction

The COVID-19 pandemic has been indelibly written in the history of mankind. Its greatest tragedy is that it claimed a large number of human lives. At the same time, however, it paralyzed cities, businesses and cut people off from their loved ones for many months. In order to protect the life and health of the most endangered population, the governments of many countries have taken various, often unpopular, measures. The most common concerns were caused by restrictions on the movement

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of people, the closure of public spaces and increased demands on personal hygiene. Each country dealt with the COVID-19 pandemic in a different way, and companies had to react accordingly. The measures affected the daily functioning of not only families and individuals, but also had an impact on business processes, including human resource management. Among the most common measures that did not require the complete cancellation or stopping of established processes was the transfer of activities to the online space. Although working in the online space is widespread and very popular today, there are activities that require personal interference from employees. In the field of training and employee development, theoretically, all the most frequently used methods could be implemented online. But the question is whether companies perceive their added value even in the conditions of the online world, or whether they approach online training and development cautiously. The immediate readiness and technical equipment of companies or employees in their home environment is also an important factor in the transfer of training and development activities to the online space. We can therefore assume that companies are rather inclined to dampen training and development activities during the COVID-19 pandemic.

RQ1: Were there any changes in the number of methods of training and development of employees during the COVID-19 pandemic?

H1: The overall number of used training and development methods in Slovakia decreased during the COVID-19 pandemic.

Theoretical background

Human resource management is not static. On the contrary, over time, due to the changing needs of the dominant generations on the labour market and as a result of more and more opportunities for companies, HRM is changing, expanding and becoming more complex. HRM includes work with employees in the company, which carries the elements of both operational and strategic activities. Therefore, we can consider the main goal of HRM to be the use of everything that employees know and can do to achieve the company's short-term and long-term goals. Individual-level HRM processes are focused on individuals and are often highly personalized. Most often, these are processes such as employee adaptation, evaluation of their performance and potential, training and development, or career planning (Rahn, 2012).

Employee training and development are human resource management activities used to fill gaps between current and expected performance. They represent organized activities aimed at disseminating information or instructions to improve the recipient's performance or to assist in achieving a desired level of knowledge or skill. They are part of knowledge management and knowledge transfer and play a crucial role in human resources management (Poór et al., 2018). The training and development of employees are strategic tools to increase the knowledge, abilities and skills of employees for current and future work requirements. This increases the competitiveness of the company in the global market because the knowledge, abilities and skills of employees acquired through training and development are unique and inimitable (Murtiningsih, 2020). Generally, companies are aware that the training and development of their employees is important for business success (Kucharčíková et al., 2018). Misiak-Kwit (2020) consider inaccessibility to the training and development of employees as one of the barriers preventing companies from growing. Moreover, compared to employees without further training, those who have engaged in professional development have considerably lower risks of premature termination of

their employment relationship (Becker, 2019). Employee engagement should not be a one-time implementation, but should be part of the corporate culture and visible in the daily work of all employees (Chanana, Sangeeta, 2021). Engaged employees are always optimistic, keep good interpersonal rapport with each other, and also show a high level of performance in the company (Jena et al., 2018). Providing appropriate training and development opportunities and clear performance evaluation criteria will also enable the workforce to work hard to achieve competitiveness in an ever-changing business environment (Al-Kassem, 2021). Training and development are significantly and positively associated with the construct of employee job satisfaction and that these relationships are highly significant in businesses (Ohene Afriyie et al., 2022). Employees could feel motivated to participate continuously in further training in order to guarantee their prospects of receiving benefits by improving their ability to react to the consequences of technological change (e.g. automation or rationalization) (Becker, Schömann 2015). It is a process of imparting basic skills, programmed behaviour, so that individuals become aware of rules and procedures to help them manage their own behaviour in the effective performance of their work. Although the two terms are often used interchangeably, there are certain differences between them, especially in the goals they pursue. Training is aimed at improving the skills needed to achieve company goals, as it increases the effectiveness of individuals, groups and the entire company. We understand corporate training as investing in employees with the aim of achieving better performance. Its results are applied to the job where the employee is currently working. So it mainly helps in performing current tasks. The specific goals of training mainly include aligning the knowledge, abilities and skills of employees with job requirements, developing employee skills and improving their performance, eliminating undesirable employee behaviour and adjusting the value orientation of employees to be in line with corporate values (Rodriguez, Walters, 2017).

Although the concept of employee development can also be considered as further training, it focuses on acquiring new abilities and skills for personal growth, increasing qualifications, acquiring knowledge, developing abilities and skills needed in a different, usually more demanding and important job. Improving qualifications includes learning and acquiring new knowledge, skills, and abilities that an employee needs to be able, or qualified to perform a different job (Šikýř, 2016). In the case of retraining, there is the acquisition and mastering of completely new skills, knowledge and abilities, which are not necessary for the performance of current work tasks, but for the employees to increase their qualifications in the given company, or also outside it, or to be able to apply them in another job as well (PeopleHum, 2021). We understand employee development as a preparation for performing higher qualified work or work with higher responsibilities. It can also be seen as a broader concept. It can be considered as the overall long-term growth of individuals for the purpose of fulfilling future tasks and responsibilities, for the needs of their promotion and management of their career in the company (Elnaga, Imran, 2013). It helps with professional orientation for the future, shapes work skills, personal qualities and potential. Development activities should signal to employees that the company is interested in employing them in the long run (Hitka et al., 2021). Development goals primarily include helping employees to grow and develop their potential in the company, promoting employees and planning their careers, meeting the future demand for human resources, mainly from internal sources, and reducing the time required for the training and adaptation of employees starting to work in a newly created workplace or transferred to another job or employees promoted in the company (Nassazi, 2013). Thus, training involves planning for preparing different

learning techniques for the staff in order to increase their ability to reach the targeted goal. While development is interested in understanding the mechanisms of things, and future issues not only current process as a general, it seeks future demands and it occurs over a longer period of time than training which is happening at the present time and deals with every single staff responsibility (Anwar, Ghafoor, 2017).

Both training and development consist of prepared plans and ways to assist the employee in terms of their current skills, behaviours and their way of acting in the working environment (Nechirwan et al., 2021). However, systematic training and the development of employees according to their individual needs began to appear in management from the 1950s to 1970s (Stachová et al., 2020). The implementation of training or development is the most important phase of the whole process. It is important to realize that the quality of the entire training process directly affects other personnel activities, and therefore it is very important that the company chooses the most appropriate training method. The success of training programs depends on the methods of training used by the company. When selecting from training methods, the following factors must be considered as they highly contribute to the effectiveness of training programs. Such factors include: objectives of training, cost of training, time of training, location of training, frequency of training, suitability of training methods, content of training, delivery style, capability of application, trainer's capabilities and employees willingness to learn and apply (Abdulraheem Sal, 2016). By applying appropriate methods, inputs are transformed into outputs, which take the form of increased performance, productivity and efficiency of work, new roles in the company, higher responsibility at work. Part of the implementation phase of employee training and development programs is the key choice of an adequate form and method. The first of them is the form of training at the workplace, the so-called On-the-job (formal, informal, informal, interpersonal education), and the other one outside the workplace – off-the-job (institutionalized, lifelong education). Nowadays, the corporate sector is increasingly using mobile technologies to train employees and develop their skills and competences. This learning methodology is known as mobile learning (mlearning) (Butler, A. et al., 2021). Currently, however, such methods are applied only in the most advanced companies with strong material security or with a strong connection to the IT sector. The most common methods used in Slovakia are usually the more traditional ones. They are shown in Table 1.

Table 1 Methods of training and development of employees

On-the-job methods	Off-the-job methods
Instructing	Lecture
Coaching	Seminar
Mentoring	Case studies
Counselling	Workshop
Assisting	Brainstorming
Task assignment	Simulations
Cross-training program	Role playing
Work meetings	Diagnostic-training program
Demonstrating	E-learning

Shadowing	Self-Study
Consulting	Development centre
Job rotation	

Source: Koubek (2015)

On-the-job training is the basic means of providing effective and concentrated training in most areas related to finance, administration practical management etc. This type of training allows employees to learn and apply the lessons and respond to situations in a good manner while performing their daily tasks (Anwar, Abdullah, 2021). On the other hand, off-the-job training is away from the working environment. Employees get appropriate training similar to that provided at work, but in a different environment. A special environment is arranged to facilitate maximum interaction between trainers and trainees (Anwar, 2017). Employees are usually expected to prefer general training, as opposed to on-the-job training, since the latter ones often focus on firm-specific human capital. This type of training cannot be fully utilised in other companies, and is rarely certified, and as such, is rarely acknowledged by other employers (Becker, 2019). However, the COVID-19 pandemic means a great challenge for business managers operating in various fields to consider the implementation of new management methods and tools in this unstable and changing world. Dvouletý (2021) claims that after the end of 2020 there may not have been a significant drop in business activities. On the contrary, his research indicates that activity has increased and even increased to a level higher than in 2019. However, procedures and practices in human resources management, including the management itself, are affected by COVID-19 just like other activities in businesses (Tomčíková et al., 2021). Remote working, creating virtual teams and knowledge management are some of the many practices that most companies are adopting as a concept to keep companies running smoothly (Carnevale, Hatak, 2020). The big change is the popularization of e-learning as a training and development method and the growing supply of ready-made lectures, courses and modules. Demand for e-learning is reported even by companies that have never used it before (Mikołajczyk, 2021). Similarly, Ribbers and Waringa (2015) claim that in a rapidly moving world, internet connection is an inevitable development for every coach, mentor or instructor. Moreover, Rahmadi et al. (2021) claim that the transfer of the mentioned methods to the online space is one of the solutions during the COVID-19 pandemic. All other missing training and development methods can be replaced by self-study, since employees do not receive enough support from companies. Intrinsic motivation plays a key role in this.

RQ2: Which methods were used less frequently during the COVID-19 pandemic than before the pandemic?

H2a: Workshops were used less frequently during the COVID-19 pandemic than before the pandemic.

H2b: Model situations were used less frequently during the COVID-19 pandemic than before the pandemic.

H2c: Role plays were used less frequently during the COVID-19 pandemic than before the pandemic.

RQ3: Which methods were used more often during the COVID-19 pandemic than before the pandemic?

H3a: E-learning was used more often during the COVID-19 pandemic than before the pandemic.

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H3b: Self-education was used more Slovakia during the COVID-19 pandemic than before the pandemic.

RQ4: Were there any methods whose frequency of use has not changed during the COVID-19 pandemic?

H4a: The frequency of use of coaching has not changed during the COVID-19 pandemic.

H4b: The frequency of use of mentoring has not changed during the COVID-19 pandemic

H4c: The frequency of use of instructing has not changed during the COVID-19 pandemic

Material and methods

The aim of the paper is to find out whether there were any changes in the methods of training and development of employees in Slovak companies during the COVID-19 pandemic. We collected data using a questionnaire.

In the questionnaire survey, we asked the respondents whether they were trained or developed before and during the pandemic and, if so, what methods were used. The respondents who took part in the survey were Slovak employees. In order to be able to assess and compare the situation before the outbreak of the COVID-19 pandemic with the situation during the pandemic, we worked with respondents who had worked for their company for at least two years. Employees with a shorter employment relationship could not evaluate the changes in professional training and development. The survey was attended by 308 compliant respondents who were approached through social networks or by direct selection. The questionnaire survey was carried out in the first half of 2022. We evaluated the summarized numerical results of the responses from the questionnaire survey using statistical methods such as mean, median or mode, Wilcoxon Signed Ranks Test and McNemar Test.

Results

In search of an answer to the first research question, we focused on the number of methods by which employees were trained or developed. Due to anti-pandemic measures and several lockdowns, we assumed that the number of used methods had decreased. To verify this assumption, we present the descriptive statistics of the number of methods in Table 2.

Table 2 Descriptive Statistics of the number of used methods

	Before COVID-19	During COVID-19
Valid N	308	308
Missing N	0	0
Mean	2.86	1.42
Median	3	1
Mode	0	0
Std. Deviation	2.08	1.49
Minimum	0	0
Maximum	7	5

Before COVID-19		Frequency	Percent	Cumulative Percent
No. of methods	0	86	27.92	27.92
	1	4	1.30	29.22
	2	26	8.44	37.66
	3	47	15.26	52.92
	4	66	21.43	74.35
	5	55	17.86	92.21
	6	22	7.14	99.35
	7	2	0.65	100.00
	Total	308	100.00	
During COVID-19		**Frequency**	**Percent**	**Cumulative Percent**
No. of methods	0	133	43.18	43.18
	1	35	11.36	54.55
	2	61	19.81	74.35
	3	46	14.94	89.29
	4	24	7.79	97.08
	5	9	2.92	100.00
	Total	**308**	**100.00**	

Source: own elaboration

As it can be seen at first glance, our assumption has been confirmed. While before the COVID-19 pandemic each employee encountered an average of 2.89 methods, during the pandemic the average value dropped to 1.42. It is also worth mentioning the fact that before the pandemic, 27.92% of the surveyed employees had no training or development at all, while during the pandemic it was up to 43.18% of the surveyed ones. Moreover, while before the pandemic employees could encounter a combination of 6 or 7 training methods (7.79% of respondents), during the pandemic it was maximum 4 – 5 methods (10.71% of respondents). Subsequently, we tested the number of used training and development methods with the Wilcoxon Signed Ranks Test, which tests the null hypothesis that the medians of the methods before and during the pandemics are equal against the alternative hypothesis that they are different. We performed the testing at the level of significance $\alpha = 0.05$. The results are shown in Table 3.

Table 3 Results of Wilcoxon Signed Ranks Test

Ranks		N	Mean Rank	Sum of Ranks
During / Before COVID-19	Negative Ranks	175a (56.82%)	115.40	20194.50
	Positive Ranks	35b (11.36%)	56.01	1960.50
	Ties	98c (31.82%)		
	Total	308		

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	Z	Asymp. Sig. (2-tailed)
	– 10.404	0.000

Source: own elaboration

a. N During COVID-19 < N Before COVID-19 b. N During COVID-19 > N Before COVID-19
c. N During COVID-19 = N Before COVID-19

As we can see from the results of the Wilcoxon Signed Ranks Test (Z = – 10.404; Asymp. Sig < 0.05), during the COVID-19 pandemic there were changes in the methods of training and development of employees. However, it is interesting to note that the decrease in the number of used methods was witnessed by 56.82% of respondents, while 31.82% of respondents did not change the number of implemented methods. In 11.36% of cases, the number of training and development methods used even increased. This points to the fact that some companies have taken advantage of their reduced production capacity during the pandemic to invest in the training and development of their employees. However, we confirm hypothesis H1 and claim that the overall number of used training and development methods in Slovakia decreased during the COVID-19 pandemic.

For an even deeper understanding of the changes, we were interested in what changes occurred during the implementation of individual training and development methods. For our analysis, we selected the 8 most frequently mentioned methods, shown in Table 4. We determined the difference in their use by using the McNemar Test, which tests the null hypothesis that the use of individual methods before and during the pandemic was the same against the alternative hypothesis, that the use of methods was different. We performed the testing at a significance level of $\alpha = 0.05$. The results are shown in Table 4.

Table 4 Results of McNemar Test

Before / During	N	Chi-Squarea	Asymp. Sig.
Coaching	308	60.016	0.000
Mentoring	308	68.014	0.000
Instructing	308	80.012	0.000
Workshop	308	149.007	0.000
E-learning	308	8.108	0.004
Model situations	308	37.026	0.000
Role playing	308	25.037	0.000
Self-Study	308	16.598	0.000
None	308	24.322	0.000

Source: own elaboration a. Continuity Corrected

Looking at the results (Asymp. Sig < 0.05 in all cases), we reject all null hypotheses and conclude that during the COVID-19 pandemic, there was a statistically significant change in the frequency of use of all training and development methods. There was also a statistically significant change in the number of respondents who were not provided with any education. We can therefore unequivocally answer RQ1 that during the COVID-19 pandemic there was a change in the use of all training and development methods in Slovakia.

Table 5 Difference in the use of most frequently used methods

	Before (%)	Std. Dev.	During (%)	Std. Dev.	Difference (% points)
Coaching	36.04	0.48089	15.91	0.36636	– 20.13
Mentoring	35.71	0.47994	12.99	0.33671	– 22.72
Instructing	37.01	0.48363	10.39	0.30562	– 26.62
Workshop	64.29	0.47994	15.26	0.36018	– 49.03
E-learning	27.60	0.44773	37.66	0.48533	+ 10.06
Model situations	16.56	0.37231	3.90	0.19382	– 12.66
Role playing	10.39	0.30562	1.62	0.12658	– 8.77
Self-Study	58.77	0.49306	43.83	0.49699	– 14.94
None	27.92	0.44935	43.18	0.49614	+ 15.26

Source: own elaboration

By comparing the use of individual methods before and during the COVID-19 pandemic (Table 5), we can answer the second and third research question. We recorded the largest decrease in the use of workshops (49.03% points), since before the pandemic 64.29% of the surveyed employees took part in the workshops, compared to only 15.26% during the pandemic. The fact that the workshops took place online did not help either. Therefore, we can accept the hypothesis H2a. We also recorded a significant decline in the use of model situations (12.66% points), since they were used by 16.56% of employees before the pandemic. During the pandemic, this proportion decreased to 3.90%. Thus, we can also accept hypothesis H2b. To complete the testing of hypotheses related to the second research question, we investigated whether there was a decrease in the use of role plays. Based on the results, we accept hypothesis H2c, as the use of role plays decreased by 8.77% points from 10.39% before the pandemic to 1.62% in its course of development. During the pandemic, role plays were used the least of all the methods taken. We do not consider these results surprising, because these 3 methods probably require the most personal contact between the educator and the educated employee.

On the contrary, the only method that began to be used more often during the pandemic was e-learning (increase by 10.06% points). This was also to be expected as the whole world has become forced to function online to a much larger extent. However, it came as a slight surprise that there had not been an increase in employees who had encountered self-study in the workplace, because, as we mentioned when analysing the number of methods used, some companies used their own reduced production capabilities during the pandemic to invest in the training and development of their employees. On the contrary, we observed a decrease (of 14.94% points). Therefore, we accept hypothesis H3a, but we have to reject hypothesis H3b.

With the last – fourth research question, we were interested in whether there are training and development methods that remained statistically unaffected by the COIVD-19 pandemic. Due to their current popularity and long-term character, we assumed that coaching, mentoring and instructing could be the ones. However, the results of the study show that the use of coaching decreased by 20.13% points, mentoring by 22.72% points and instruction by 26.62% points, respectively. Therefore, we reject hypotheses H4a, H4b and H4c and claim that there is no educational or development method that was unaffected by the COVID-19 pandemic.

ACTA OECONOMICA UNIVERSITATIS SELYE 2022, VOL. 11, NO. 2.

Conclusion and discussion

The COVID-19 pandemic has affected the entire world in all its spheres. The COVID-19 lockdowns have led a transformation in the way we run our schools, interact with loved ones, teach and learn, do our work, do our shopping, travel, get medical care, spend leisure time, engage in commerce, and conduct many of the routine transactions of life (Sneader and Sternfels 2020). The working environment has changed significantly in almost all companies, and employees were often forced to stay at home in order to protect their own health. Every area of management was facing new challenges. It was the same in the case of HRM and its individual components. In the recent years of the continuous development of individuals, the economy and society, corporate training and development have become a common and necessary part of the working life of employees. But the COVID-19 pandemic changed everything. The goal of the paper was to find out whether there were changes in the methods of training and development of employees of Slovak companies during the COVID-19 pandemic. We fulfilled this goal by searching for answers to the questions whether the number of employee training and development methods used changed during the COVID-19 pandemic, and if so, which of them were used less often during the COVID-19 pandemic than before the pandemic, and which, on the contrary, were used more often. We were also interested in whether there are any methods that have not been affected by the pandemic at all. Based on our findings on a sample of Slovak employees, we can claim that there has clearly been a change in the number of training and development methods used. Specifically, we observed a decrease in their number. All the most common methods were used less often, except for e-learning. This one was the only one that recorded a boom. This contradicts the findings of Mikołajczyk (2021), who claims that "all forms connected to development have been transferred to the Internet". Based on our findings, we claim that methods such as coaching, mentoring or instructing in the Internet environment either lose their quality or are not useful at all. So we will correct Mikołajczyk's statement to: "The MAJORITY of forms connected to development have been transferred to the Internet". We recognize that e-learning and internet connection have served many companies as a substitute for the mentioned training and development activities, because ICT training and development during COVID-19 has taken centre stage due to the demand (Seberini et al., 2022). As claimed by Bondar et al. (2020), contemporary training and development requires the development of new forms of learning based on the SMART approach, which allows the development of the relevant skills, abilities, and competencies. We agree with Hite and Mc Donald (2020), who think that a critical part of creating and sustaining a learning culture is recognizing how differently employees have experienced this crisis, and what they might need to return to work and be successful. Treating each employee on an individual basis will be important because for some, this pandemic has not been a career shock, but rather a minor distraction or an opportunity to spend more time with their families. We consider this to be one of the main reasons why we observe a decline in self-study among employees, although in many cases the space was created for it. Another reason was identified by Mura et al. (2021), who found that learning and professional development as a means of reward were mentioned only by 6.5% of the leaders. This suggests that in the event of a pandemic, they were primarily concerned with other aspects of HRM. We therefore agree with Yawson (2020), who claims that the uncertainty that is associated with post-COVID-19 future requires strategic flexibility, the ability to change strategies, and become more adaptable.

Acknowledgement

This work was supported by project KEGA 012UCM-4/2022.

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Year: 2022
Volume 11.
No. 2
The Journal is published twice a year.
This issue was published in December 2022.
Publisher: J. Selye University, Faculty of Economics and Informatics, Bratislavská cesta 3322, 945 01 Komárno, www.ujs.sk, IČO: 37961632

Prepared by: GF Knives, s.r.o.
ISSN 1338-6581, e-ISSN 2644-5212, EV 4538/12 MK SR
Price: 12,- EUR