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CHANGES OF PRODUCTIVITY IN THE TOURISM SECTOR OF THE EU BEFORE THE PANDEMIC- IMPLICATIONS FOR POLICIES AFTER COVID-19

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Abstract: *The constraints caused by the fight against COVID-19 have hit the tourism sector the hardest of all. The tourism industry's backbone services, such as accommodation and catering, but also the services partially related to transport, arts and entertainment have declined by tens of percent year-on-year. The business environment plays an important role in achieving economic growth. Tourism is also a key sector contributing to economic growth. We can conclude that tourism is one of the worst affected areas. Under various restrictive measures introduced by governments and national authorities, the number of foreign and domestic tourists has fallen. Using descriptive and sampling statistical methods, we will assess the significance of pandemic-related changes at EU country level. Based on these findings and an evaluation of measures against the spread of the coronavirus, we apply regression modelling to identify the impact of these decisions on the performance of tourism indicators. We decided to quantify the efficiency of investments and subsidies to rescue and revitalize tourism entities. Based on the results, we reached conclusions that contribute to the prosperity of tourism in the European countries. EU countries should invest primarily in infrastructure. Country leaders should promote the idea of sustainable 'green' tourism on the basis of improving the conditions for doing business in this area.*

Keywords: productivity, tourism, Malmquist index, the European Union.

1. Introduction

The tourism sector is one of the most affected by the COVID-19 pandemic. Many authors examine the negative effects of the pandemic on tourism and try to find possible connections that would help to restore and minimize extreme losses (Kinnuen et al., 2021; Żak & Garncarz, 2020). As such a pandemic has not occurred in recent history, it is very difficult to predict future developments. Therefore, we should learn from other crises and adopt specific acts that have helped to resolve crises in the past. One of the possibilities to evaluate the development in the post-crisis years is also the measurement of productivity, which can also be applied to the field of tourism. Such an approach has proved to be an effective tool for policy implementation in the past. The authors (Sun et al., 2015) have been researching the causes of changes in productivity for many years. These can be caused, for example, by technological changes (Oláh et al., 2019 Koraus et al., 2017a), economic changes, innovation (Piątkowski, 2020; Korshenkov, Ignatyev, 2020; Chenghu et al., 2021;), but also by managerial resp. political decisions. EU subsidy programmes play an essential role in the process (Halasi et al., 2019; Androniceanu, 2020; Marišová et al., 2021). According to (Barros and Alves, 2004; Corne and Peypoch, 2020; Peypoch and Solonandrasana, 2008; Mariš, 2019), measuring productivity using efficiency measurement methods is an effective tool for evaluating various impacts. Such measurements can be performed on many types of entities, such as hotels, countries, etc. (Cho and Wang, 2018; Mavi and Mavi, 2019; Marčeková et al., 2021). These entities cooperate in many in different areas, for exampole in clusters (Havierniková et al., 2017; Mura and Kajzar, 2018; Prokopenko and Omelyanenko, 2020). Many studies suggest that the increase in efficiency and productivity was evident after the crisis in 2009 (Bampatsou et al., 2020; Rudminas & Baležentis, 2020). However, there are still significant differences between the countries (Soysal-Kurt, 2017; Dobrovic et al., 2018; Androniceanu and Marton, 2021). Especially nowadays, however, the importance of research in the field of efficiency and productivity of tourism is growing worldwide. Countries are looking for competitive advantages that they can use to apply after the pandemic (Prokopenko et al. 2020; Radjenovic et al., 2020; Skare, Kukurin, 2020). About the development of ecological and social entrepreneurship write Prokopenko et al., 2020; Bilan et al., 2017; Csikósová et al., 2020. Options to increase tourism productivity might be state intervention or private innovation, as well as combination of both (Zhang et al., 2021; Mura 2020; Koraus et al., 2017b). The EU Green deal

initiated the approval of the Envirostrategy 2030, which aims at decreasing recycling and landfilling rate by 2030 (Valenčiková and Marišová, 2021). Based on this, we decided in this study, which was the main reason for the enormous productivity growth in EU countries in the years before the COVID-19 pandemic (Duro et al., 2021; Zopiatis et al., 2021). This paper focuses to assess the causes of growth in the tourism sector in the period after the financial crisis in 2009 and before the pandemic crisis that began in 2019. Based on this, it will be possible to propose the direction sources to renovate the tourism sector.

2. Materials and methods

In this section, we provide a brief description of the methods and materials used in this study.

2.1 Productivity measurement

There are various measures of productivity in the modern economy and contemmporary business (Makieła, Wojciechowski & Wach, 2021). The Malmquist Productivity Index (MPI) measures changes in productivity along with changes in time and can be broken down into changes in efficiency and changes in technology using a non-parametric DEA approach. The MPI can be expressed by the distance function (E) as equation

(1) and equation (2) by observations at time t and t + 1.

$$MPI_I^t = \frac{E_I^t(x^{t+1}, y^{t+1})}{E_I^t(x^t, y^t)} \quad (1)$$

$$MPI_I^{t+1} = \frac{E_I^{t+1}(x^{t+1}, y^{t+1})}{E_I^{t+1}(x^t, y^t)} \quad (2)$$

where x is the input vector, y is the output vector and „I “denote the model orientation (Input). The geometric mean of MPI from equations (1) and (2) can be calculated as shown in equation (3).

$$MPI_I^G = (MPI_I^t . MPI_I^{t+1})^{1/2} = \left[\left(\frac{E_I^t(x^{t+1}, y^{t+1})}{E_I^t(x^t, y^t)}\right) . \left(\frac{E_I^{t+1}(x^{t+1}, y^{t+1})}{E_I^{t+1}(x^t, y^t)}\right)\right]^{1/2} \quad (3)$$

The geometric mean can be divided into so-called technological change (TECHCH) - change in technological efficiency (TE) and change in efficiency (EFFCH) - change in managerial efficiency (ME); see equation (4).

$$MPI_I^G = (EFFCH_I.TECHCH_I^G)^{1/2} = \\ = \left(\frac{E_I^{t+1}(x^{t+1}, y^{t+1})}{E_I^t(x^t, y^t)}\right).\left[\left(\frac{E_I^t(x^t, y^t)}{E_I^{t+1}(x^t, y^t)}\right).\left(\frac{E_I^t(x^{t+1}, y^{t+1})}{E_I^{t+1}(x^{t+1}, y^{t+1})}\right)\right]^{1/2} \quad (4)$$

Technological change is caused by changes in technology (investments in new machines, buildings). The change of efficiency is caused by managerial decisions. If the value of the indicator is greater than 1, it means that there has been an increase in efficiency (productivity). If the value is less than 1, it means that there has been a decrease in efficiency (productivity) (Färe et al., 1994).

2.2. Research object

The study is addressing the countries of the European Union (EU 27). The research was conducted during the inter-crisis period, between 2010 and 2018, the countries were analyzed using the Malmquist productivity index. The reason for choosing the research subject is the integrity of EU policies and directions, as well as the interconnectedness of the EU countries.

2.3. Data

Based on a literature review, we have identified several variables that are often used to measure efficiency and productivity in the tourism industry. The indicators we used in this study are listed in Table 1.

Table 1 Variables used in calculation of MPI in tourism

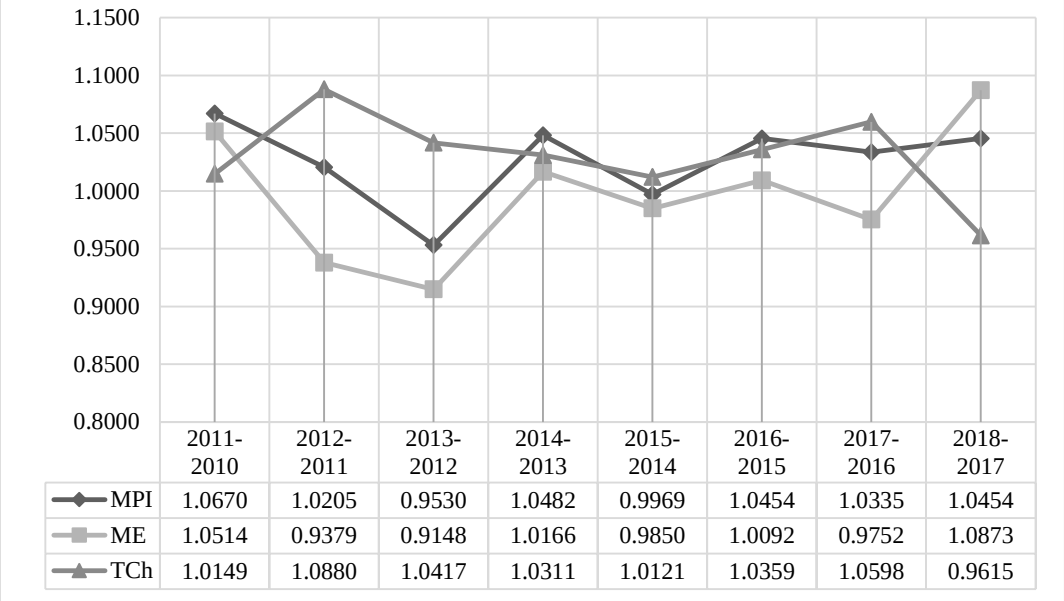
	Variable	Units
Inputs	Number of employees in HORECA sector	Thousand persons
	Number of employees in travel agencies, reservation systems, and other	Thousand persons
	Number of beds in accommodation facilities	Number
	Protected natural areas – Natura 2000	km^2
Outputs	The net occupancy rate of beds	%
	Gross domestic product from tourism in current prices	mil. €

The first two input variables relate to the production factor of labour and capture the number of employees in accommodation establishments and travel agencies (Huang, 2018; Martín et al., 2017). The number of beds in accommodation facilities indicates the capital capacity in tourism,

the term is widely used in the available scientific literature (Niavis and Tsiotas, 2019, 2019). The area of protected areas according to Natura 2000 methodology is also an input that concerns production factors, specifically land area. It is assumed that a country with a higher proportion of protected areas should also attract more tourists (Benito et al., 2014). As outputs of our MPI model, we chose Bed Occupancy (Corne, 2015; Qiu et al., 2017), which tells about how the country uses its capacities. Finally, we chose GDP generated by tourism as an output related to the economic impacts of tourism (Chaabouni, 2019; Ilić and Petrevska, 2018; Maris et al., 2019). Data in this study were obtained from databases of Eurostat and the World Bank. (Eurostat, 2021; The World Bank, 2021)

3. Results

Graph 1 shows the geometric mean of MPI values, changes in managerial efficiency and technological change for the tourism sector.



	2011-2010	2012-2011	2013-2012	2014-2013	2015-2014	2016-2015	2017-2016	2018-2017
MPI	1.0670	1.0205	0.9530	1.0482	0.9969	1.0454	1.0335	1.0454
ME	1.0514	0.9379	0.9148	1.0166	0.9850	1.0092	0.9752	1.0873
TCh	1.0149	1.0880	1.0417	1.0311	1.0121	1.0359	1.0598	0.9615

Graph 1 Development of changes in productivity in the case of tourism efficiency - geometric average

Source: own calculation.

The productivity of countries in terms of tourism efficiency varied in the EU countries during the period under review. The value of MPI increased significantly when comparing the obtained data from 2011 and 2010, specifically by 6.7%. Productivity decreased slightly during the period

2013/2012 and the period 2015/2014. The trend in the change of managerial and technological efficiency was significantly fluctuating. In the periods 2011/2010 and 2018/2017, the positive impact of managerial changes prevailed over technological changes, but in all the remaining periods it was the opposite. Table 2 shows the results of measuring productivity changes for each EU country.

Table 2 Results of the Malmquist productivity index analysis for tourism efficiency

Country	2011-2010			2015-2014			2018-2017		
	MPI	ME	TE	MPI	ME	TE	MPI	ME	TE
Belgium	1.043	1.023	1.019	0.999	1.058	0.944	1.005	0.968	1.038
Bulgary	1.173	1.029	1.140	1.246	1.131	1.102	1.346	1.535	0.877
Cyprus	1.369	1.397	0.980	1.072	1.099	0.976	1.315	1.622	0.811
Czechia	1.100	1.112	0.989	1.081	1.215	0.890	1.026	1.117	0.919
Denmark	0.982	1.000	0.982	0.967	1.000	0.967	1.091	1.000	1.091
Estonia	0.977	0.989	0.988	1.036	1.072	0.966	0.952	1.023	0.930
Finland	1.125	1.079	1.043	0.892	0.789	1.129	1.016	1.071	0.949
France	1.043	1.000	1.043	1.110	1.000	1.110	1.009	1.011	0.999
Greece	1.034	0.961	1.076	1.030	1.029	1.002	1.446	1.534	0.943
Netherlands	1.023	1.000	1.023	1.026	0.969	1.058	1.029	0.986	1.044
Croatia	1.671	1.347	1.241	1.095	0.967	1.133	0.892	0.949	0.939
Ireland	1.012	1.016	0.996	1.496	1.475	1.014	1.248	1.199	1.041
Lithuania	0.907	0.927	0.979	1.055	1.232	0.857	0.965	0.966	0.999
Latvia	1.010	1.033	0.979	1.150	1.263	0.910	0.987	0.988	0.999
Luxembourg	0.874	1.000	0.874	0.888	1.000	0.888	0.892	1.000	0.892
Hungary	0.988	0.984	1.004	1.235	1.174	1.051	1.382	1.446	0.956
Malta	0.991	1.000	0.991	1.057	1.000	1.057	0.927	1.000	0.927
Germany	1.050	1.035	1.015	1.025	1.066	0.962	1.037	1.025	1.012
Poland	0.999	1.034	0.965	1.114	1.120	0.995	1.049	0.981	1.070
Portugal	1.294	1.241	1.042	1.015	0.972	1.045	0.816	0.851	0.958
Austria	1.122	1.140	0.984	1.059	1.197	0.885	1.059	1.154	0.917
Romania	1.100	1.077	1.021	1.037	1.066	0.972	1.244	1.335	0.932
Slovakia	1.003	0.989	1.014	1.062	1.068	0.995	0.915	0.914	1.001
Slovenia	1.016	1.149	0.885	1.777	2.180	0.815	1.115	1.394	0.800
Spain	1.031	0.954	1.081	0.908	0.813	1.117	0.885	0.912	0.970
Sweden	1.126	1.012	1.113	1.097	1.000	1.097	0.977	1.000	0.977
Italy	1.000	1.000	1.000	0.968	1.000	0.968	0.920	0.883	1.042

Source: own calculation.

Between 2011 and 2010, the highest increase in MPI values occurred in the case of Cyprus (36.9%) and Croatia (67.1%). Between 2015 and 2014, a high increase in MPI was recorded in Ireland (49.6%) and Slovenia (77.7%). Between 2018 and 2017, high growth was recorded for Bulgaria (34.6%) and Greece (44.6%). A slight increase has been detected in some of the EU countries. Slovakia recorded a slight increase in 2011/2010 (0.3%) and 2015/2014 (6.2%), followed by a decrease in MPI by 8.5% between 2018 and 2017. The most signficant increase in productivity was detected in Hungary in the V4 group. Table 3 shows the comparison of changes in productivity between 2010 and 2018. The disadvantage is therefore that such a recalculation does not capture the development in the middle of the period considered.

Table 3 Comparison of changes in productivity between years 2010 and 2018

Country	2018-2010		
	MPI	ME	TE
Belgium	1.298	0.901	1.440
Bulgary	1.600	1.408	1.137
Cyprus	1.586	1.397	1.135
Czechia	1.317	1.081	1.218
Denmark	1.221	1.000	1.221
Estonia	1.039	0.964	1.078
Finland	1.123	0.924	1.215
France	1.046	0.914	1.144
Greece	0.886	0.789	1.123
Netherlands	1.145	0.821	1.396
Croatia	0.792	0.665	1.191
Ireland	2.291	1.819	1.259
Lithuania	0.977	0.980	0.997
Latvia	1.374	1.319	1.042
Luxembourg	0.944	1.000	0.944
Hungary	1.513	1.260	1.201
Malta	1.349	1.000	1.349
Germany	1.293	1.075	1.202
Poland	1.205	1.018	1.184
Portugal	1.110	0.895	1.240
Austria	1.335	1.110	1.203
Romania	1.349	1.141	1.182
Slovakia	1.098	0.929	1.182
Slovenia	1.049	1.064	0.985
Spain	0.885	0.780	1.134
Sweden	1.291	1.012	1.275
Italy	1.022	0.761	1.343

Source: own calculation.

If we compare the years 2010 and 2018, the highest increase occurred in the case of Ireland, by 129.1%. There was also a significant increase in Bulgaria by 60% and Cyprus by 58.6%. A significant decrease was recorded in Croatia (20.8%). The highest increase among V4 countries was recorded in Hungary (51.3%), the Czech Republic (31.7%), Poland (20.5%) and Slovakia (9.8%). In Slovakia, as the only V4 country, there has been a decline in managerial efficiency.

4. Discussion and conclusions

Based on the results of our study, several findings can be concluded. After 2010, there was significant decline in productivity until 2013. The reason was probably the consequences of the financial crisis and reduced demand for farmers due to lack of funds. It can be argued that tourism is a luxury asset that one does not necessarily need to survive, and perceived as a marginal activity in critical years. However, the crisis has different meaning for a group of people who lack finances and those who are afraid to be infected. Subsequently, there was a gradual revival of tourism after 2013. In EU countries, Technological change has been the main catalyst of recovery in the EU countries. However, this changed in 2018. In 2018, the increase in productivity was due to the greater impact of managerial changes. It can be explained by the fact that policies promoting tourism have outpaced policies to invest in accommodation and services. The following figure shows the regional differences in the growth/decline of productivity in tourism sector of the EU countries.

Graph 2 Regional comparison of changes in productivity between years 2010 and 2018

As we can observe, productivity growth was recorded mainly in countries that were severely affected by the crisis - the Baltic countries, Ireland, Germany etc., as well as in the countries that joined the EU at that time - Bulgaria and Romania. This suggests in particular that growth was due to massive investment in the post-crisis period. On the contrary, the countries generating high GDP ratio from tourism - the Mediterranean countries – experienced either a decline or small increase in productivity.

The research findings show that investment into tourism infrastructure can result in overall improvement of the sector. One possible solution is green tourism. Investments aimed at improving the business environment and energy uses of buildings is the basis for recovery of the tourism industry. Future research could focus on measuring the impacts of the pandemic on the productivity of selected EU regions.

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