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MANAGEMENT OF COMPETITIVENESS IN EU MEMBER STATES: THE MAIN STRENGTHS AND WEAKNESSES

Abstract. *The paper's main objective is to investigate the differences in competitiveness among the EU member states. Each nation's competitiveness is determined by its government's management capabilities on the national, regional and local levels and thus poses substantial implications to economic growth. For this purpose, hierarchical clustering as the primary method of investigation was selected. The data mining process was based on extracting GCI score data about individual member states. Based on the GCI score evaluation, the cluster analysis showed two groups of EU member states, according to the 'traditional' division of old member states (OMS) and new member states (NMS). Results showed a statistically significant gap in GCI scores between the OMS and NMS. Furthermore, the within-class variability in the OMS cluster appears to be higher than in the NMS cluster, which underlines growing disparities among old member states. Most significant differences among both groups prevail in the field of institutions, ICT adoption, business dynamism and innovation. Finally, the link between achieved GCI score and average economic growth has been investigated. Contrary to expectations, more developed member states (OMS) showed, on average, relatively lower economic growth rates over the investigated period than the less developed member states (NMS). The results showed a moderately negative link between the GCI score and economic growth, which suggests that a higher GCI score does not mean achieving higher economic growth, whereas member states with lower total GCI scores could outpace the higher ones in terms of economic growth. In many aspects, the EU still resembles two rails in Europe, and a significant gap between OMS and NMS prevails. Relatively higher economic growth of NMS might help reduce the gap over time. However, it may prove a short-sighted, and significant lags in many crucial factors will stiff the competitiveness in the long term.*

Keywords: competitiveness, innovation, cluster analysis, data mining, economic growth.

Introduction. The scope of the paper is based on the competition evaluation of the EU member states. Particularly, the paper focuses on evaluating differences between the factors of competitiveness with implications for the economic growth of the EU member states. The goal is clear, achieving sustainable national competitiveness is a long-term objective, which could be reached through the purposeful management of resources and driven by economic growth. Competitiveness might be defined in several ways. A number of authors relate the 'competitiveness' to the ongoing process of globalisation (Lall, 2001; Chikan, 2008). Globalisation refers to a complex set of worldwide processes that make the world economy and the various societies that comprise it more integrated and interdependent. In an economic sense, it means that national and state borders and differences between financial markets have become much less important because of a number of trends:

1. International finance;
2. The increasing importance of transnational corporations (tncs);
3. Foreign direct investment from the core of the world – north America, western Europe and East Asia;
4. Global specialisation in the location of production;
5. The globalisation of the tertial sector of the economy (Stutz and Warf, 2012).

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Globalisation has had a profound impact on national economies since the late 1970s. For instance, between 1960 and 2006, the average per capita income in the wealthiest 20 countries grew from 18 to 36 times that in the poorest 20 countries. Some parts of the periphery have almost slid off the economic map. In Sub-Saharan Africa, economic output fell by one-third during the 1980s. Meanwhile, globalisation has resulted in the consolidation of the core of the world system. The core is now a close-knit triad of the geographic centres of the United States, the European Union and Japan. Most of the world's goods, capital and information flows are within and between these three centres (Knox et al., 2008). Over the two last decades, we are witnessing mixed industrial reactions in the developing world. The entry of new industrial economies (NIEs) in Asia and some areas of Latin America has been observed, which seized opportunities offered by the globalisation with profound adjustment of their manufacturing base, human skills and technologies toward the FDI inflows and export orientation. (Wignaraja, 2003). As a result of ever more global inter-relatedness, many regions face severe ecological, social and economic vulnerabilities. Thereby competitiveness has effectively become a natural law for economic development and policy, and the resulting imperative is the pursuit of globally competitive firms (Horlings and Mardsen, 2014).

Literature review. This concept became more highlighted after Porter's (1990) seminal work, *The Competitive Advantage of Nations*. However, the groundwork of the competitiveness study lies in the historical works of classical and neoclassical economists (Bhawsar and Chattopadhyay, 2015; Zeibote et al., 2019). More recently, Porter proposed a national diamond model, with four classes of country attributes in the definition of competitive advantage on a national level: input factors and demand; forward and backward linkage industries; and company management and its contenders. Also, two other factors – government policy and exogenous shocks- affect competitiveness in general but do not create it (Porter, 1990). After, Porter's model was challenged, mostly by the representatives of management schools (Dunning, 1992) and economics (Davies and Ellis, 2000) and a number of amendments were proposed (Dunning, 1993). Foreign direct investment, government policies and pro-competitive policies are often cited as other factors that profoundly impact competitiveness (Kordalska and Olczyk, 2015; Androniceanu et al., 2022). Zeibote et al. (2019) highlight the role of the government in several aspects, such as:

- 1) providing guarantee for sufficient supply of resources, which are necessary for the development, especially factors for creating advantages;
- 2) creating the basis for the economic development and innovation – measures for protecting the environment, safety standards, etc.;
- 3) ensuring the functioning of market systems, and 4) stimulating human capital development.

Many policymakers express serious concerns about national competitiveness. Lall (2001) notes that this is nothing new. The governments of wealthy countries are concerned about their cutting-edge technology retention and introduction of new activities where high wages generally do not suppress competitiveness. This is often the foremost concern for the export-oriented new industrialised economies (NIEs) which vary ahead of lower-wage entrants and challenge mature industrial countries in sophisticated activities. On the contrary, import-substituting economies that open themselves and face foreign competition worry about the protracted phase of industrial restructuring while developing new competencies. Finally, there are the least developed countries, with survival problems in existing industrial activities and angst about shifting into new export activities. Aiginger and Firgo (2017) claim that this term is often used like an 'instrument' in economic policy, resulting in the call for low wages, taxes and social and ecological standards. Aiginger and Vogel (2015) give competitiveness to the relation between price competitiveness and quality competitiveness. The price competitiveness has still merit when some lower-cost competitors challenge the economy (or a firm or industry). However, cost levels have to follow the productivity. Finally, the quality of the competitiveness can be analysed according to the value-added or exports. Mura and Hajduova (2021) relate competitiveness to the efficiency of firms. The unit is efficient when it consumes a small number of inputs while generating many outputs.

This concept has micro and macro dimensions (Waheeduzzaman, 2011). The macro dimension deals with competition among nations, while the micro dimension primarily involves competition among the firms within the nation (Dvoulety and Blazkova, 2020; Ozcelik and Taymaz, 2004) extend the micro dimension concept of international competitiveness by comparing firms from different countries and regions. Peracek et al. (2020) add that entrepreneurship is a priority for the market economy in terms of its functioning. The core of entrepreneurship in the business sector consists of business units. The vast majority of businesses are small and middle-sized enterprises, and in this group, a special form of business – a family business can be found. Mura et al. (2021) provided valuable insights on the effects of knowledge sharing by the employees toward entrepreneurial competitiveness built-up.

In assessing nations' competitiveness, Fagerberg et al. (2007) refer to technological advancement, capital build-up, and demand for economic growth. This is also the possible reason for the above-average growth of Asia (e.g. Asian tigers) compared to other country groups. On the other hand, poor technological development and capital equipment are, together with unfit export composition, the leading causes impeding a number of developing countries in using the potential to catch up with technology and income. When a number of such factors pool together (unfavourable location, nature, and climate issues), competitiveness stagnation may emerge, as in Sub-Saharan Africa. Gallup et al. (1999) compare natural endowments of countries, particularly location and climate, as a precondition of income level and growth. They likely affect transport costs, disease burdens, and agricultural productivity. Africa is especially disfavoured by its tropical position, high prevalence of tropical diseases, and relatively low share of the population living near the coast.

On the other hand, Europe, North America, and East Asia, this core region, are favoured on all three counts. Especially, differences between inland and coastal economies in terms of trade are highlighted. Recent work found that Italy, Korea, Germany, France, Netherlands and Switzerland are drivers of the research. More importantly, the ability to materialise such research into practice is supposed to be high or improving fast in the countries, including some CEE countries. On the other hand, substantially slow improvements in countries such as India (with vast gaps) underline a huge underuse opportunity for research and development (Momaya, 2019).

Smit (2010) summarises that countries are likely to join in international activities because of the advantages of such activities. The gains from trade come through specialisation, which could be due to comparative advantage or agglomeration economies. Comparative advantage means to country differences and explains inter-industry trade, whereas in similar industries worldwide is explained by agglomeration economies (intra-industry trade). However, as Smit (2010) points out, the country-specific advantages should be interchanged by the comparative advantage. Country-specific advantage often cites location as a source of international competitive advantage for firms, whereas comparative advantage underlines the sectoral trade structure between countries.

Foreign direct investment inflow (or outflow) is often demonstrated as a sign of national competitiveness build-up. Rodrik (2000) argues that '*opening up*' should comprise complex institutional reform and does not just tariff code revision or riding off the foreign investment barriers. Dunning and Zhang (2008) investigated the relationship between inward and outward FDI and the locational competitive advantage of world countries. The level of competitiveness generally encourages both inward and outward direct investment, though there are some exceptions to this general statement – especially concerning asset augmenting FDI. Popovici and Calin (2015) found a relation between FDI/capita increases if only making institutions more competitive in the sample of CEE countries (Androniceanu, 2020; Prokopenko et al., 2017). Anastassopoulos (2007) refers to differences in the case of inward FDI flow towards EU regions, with possible explanation factors like macroeconomic performance, administrative and business efficiency and infrastructure (Grondys et al., 2021). Andrijauskiene et al. (2021) link EU investment from

the Framework Program of Research and Innovation to positive long-term effects on business and higher education institutions' patent applications and product and process innovations.

Finally, there are a number of factors which could enhance the competition built-up of countries. Neverauskienė et al. (2020) consider factors like the surrounding social, ecological and economic environment that create sustainable competitiveness. Such factors are external; the company has to accept them. On the other hand, productivity is the key to competitiveness, which defines the efficiency of utilising the factors of production and translates into the benefits of improving the quality of technological and human resources. This factor is then internal for the company, resulting in a combination of production inputs. One broad category includes '*domestic competition policies*', which refer to the stance of the governments toward adopting competition between firms in economic development. Pitelis (2003) considers these policies part of a more general category, that of supply-side and industrial policies. Implementing CPs requires setting up competition or anti-trust authorities. It consists of competition law and competition advocacy. Competition law and advocacy are designed to correct market failures resulting from private and regulatory impediments to competition. The competition laws of certain industrial economies, notably Germany, Japan, the United States, and the European Union, have often served as a model for reforming economies (World Bank, 1995). They should not be «captive» to business or other interests and should coordinate with regulatory bodies and other authorities, domestically and internationally. At the same time, they should recognise that «competition policy is no panacea for competitiveness; competitiveness depends significantly on other factors such as investment in human capital and infrastructure» (World Bank, 1995).

Among other factors which should significantly contribute to productive entrepreneurship, Bosma et al. (2018) list proxies for institutional quality, financial stability, small government, and start-up skills as the crucial predictors. On the other hand, Baron and Tang (2011) highlight creativity with the positive impact of firm innovation. Both of these factors are thrust in highly dynamic rather than stable environments. (Ghoniem and Khouly, 2012; Prokopenko and Kasyanenko, 2013; Hajduova et al., 2021) investigate the effect of the innovation index on competitiveness rank and GDP growth. Mainly, diffusion and spill-over effects arising from university-industry cooperation in R&D, government engagement in advanced technology procurement and company investment in R&D were found to be significant. R&D expenditure is a significant driver of innovation in enterprises, as innovation is expected to improve the quality of products and services, increase profits and expansion in domestic and foreign markets (Priede-Bergamini et al., 2020; Li et al., 2020). Novak (2021) extends this field also about cooperation between the government, and public and private research institutions, which play the role of the «mediating variables» within the innovation processes.

Additionally, the top five factors affecting doing business worldwide are access to financing, inefficient government bureaucracy, corruption, tax rates and restrictive labour regulations. Lorincova et al. (2018) speak about the employees' work motivation as a strategic instrument of human resource management. In turn, human capital development is essential to the business's success in the market. Dima et al. (2018) switch on the qualitative and human capital aspects as determinants of EU competitiveness and economic convergence. Moreover, there is evidence of the positive effects of inclusive education (like tertiary education and lifelong learning) on enhancing a country's competitiveness and development of human capital (Hu et al., 2021). The strategic management on the firm level, in the standard organisation, has to include a modern, flexible education environment which is reflecting the daily requirements of global business (Balco and Gregus, 2014). Also, (Stachova and Musilova, 2019; Kajanova, 2008) highlight the role of the human factor. The key role in achieving entrepreneurial subjects' quality and competitive ability is attributed to the human factor. There is a necessity to support entrepreneurial education to provide the necessary skills.

Contrary, there are also factors which, in general, hinder the country's competitiveness. High corporate taxes generally hurt the international competitiveness position of a country. The excessive tax burdens undermine the international performance of industries. On the other hand, corporate tax cuts could attract more investment capital and increase firms' productivity and motivation. (Knoll, 2010). High job creation expectation rate, tax rate and the costs of starting a new business are negatively related to the economic competitiveness of analysed countries (Rusu and Dornean, 2019).

Currently, the Global Competitiveness Index (GCI), provided by World Economic Forum (WEF), represent countries ranking based on their level of global competitiveness (Auzina-Emsina, 2014). However, some studies point to the criticism of GCI (Xia et al., 2012) by failing to link GCI and the output growth of countries (Kordalska and Olczyk, 2015). Djogo and Stanisc (2016) objected to the results of the GCR. According to the evidence, there are nations whose competitiveness levels have been either underestimated by the GCR or overvalued. Kharlamova and Vertelieva (2013) recognise the significance of such ratings and rankings, stressing that the high level of national competition should attract investment inflows, spark technology transfers, and expand any country's market presence. Conversely, a low rating indicates the need for the prompt improvement of the national environment in those countries.

The global competitiveness index (GCI) represents a highly advanced indicator for measuring the competitiveness level of nations, comprising the microeconomic and macroeconomic base of national competitiveness. Competitiveness can be observed as a pool of factors, adopted policies and working institutions that should define the overall level of productivity of a nation. In turn, economies at a higher competition level could produce higher incomes for their citizens. The productivity level is also a factor which should determine the investment return rate due to investing in a country. Resultingly, more competitive countries are likely to grow faster over the medium to long run (WEF, 2007). The index also means a strong message for policymakers to look beyond short-term and reactionary measures and instead focus on factors determining productivity. These factors are comprised of 12 pillars: Institutions; Infrastructure; ICT adoption; Macroeconomic stability; Health; Skills; Product market; Labour market; Financial system; Market size; Business dynamism; and Innovation capability. The GCI results are aggregated into a report provided by WEF, including a panel of 200 leaders from business, government and civil society.

Similar report – The doing business report provided by the World bank group was paused after revealing data irregularities identified in the Doing Business 2018 and Doing Business 2020 reports (World Bank Group, 2021).

Methodology and research methods. The paper set out several research objectives. At first, the paper aims to investigate compliances and differences between the EU member states and the United Kingdom. The object of the study is factors of competitiveness outlined in GCI reported by the WEF. Secondly, the investigation of the most problematic factors identified by the business community, thereby hindering the competitiveness of the countries, is being performed. Third, the link of the overall competitiveness score to average economic growth gained by each member state over the five years is evaluated.

For the competitiveness factors, the evaluation opted multivariable method – aggregated hierarchical clustering (AHC). The method is applied to investigated objects – EU countries, based on assessed indicators – factors of competitiveness, organised into twelve pillars. The cluster analysis and its result (dendrogram) mean a hierarchical arrangement of objects based on the distance or similarity between them. Cluster analysis would help find clusters of similar states and thus reveal the common trends and patterns. Hendl (2012) is formally considered N objects, represented by the EU member states plus UK. On each object, k characters are investigated, which means competitiveness factors. It is possible to find Nk – vectors x_1, x_2, \dots, x_N . Let denote them X as a set of all objects. The goal of cluster analysis is to aggregate x_i objects to n clusters S_1, S_2, \dots, S_n , respectively. Objects of the cluster analysis are

aggregated into clusters by the distance or the similarity criteria. As a basis for 'dissimilarity' determination among the clusters or states is *Euclidean distance* v , which can be formalised as a distance between two arbitrary vectors Y and Z

$$v_{YZ} = \sqrt{\sum_{i=1}^k (y_i - z_i)^2} \tag{1}$$

In each step, clusters are considered «new» objects and submitted to further clustering according to the same principle as the prior one. The primary basis for clustering procedures is each pair of objects' distance matrix (v_{rs}). We can use several methods of clustering. For our purposes, we use Ward's method as basic criteria for clustering. This method is based on minimising total dispersion within the cluster. Thus the method uses a modified Euclidean distance squared.

$$v_{rs} = v(\{X_r\}, \{X_s\}) = \|X_r - X_s\|^2 \tag{2}$$

Finally, the overall factor score was related to each member state's average economic growth (five-year period). For calculating the factors scores (12 pillars), the study used The Global competitiveness report (2019) issued by the World economic forum. Each country's factor score is identified within the report. More detailed description of competitiveness factors and methodology of GCI assembling is outlined within the report (Global competitiveness report, 2019)

Results. The study's first aim is the distribution of the EU member states plus the UK into clusters based on competitiveness factor score (included in 12 pillars). Based on GCR 2019 data aggregated hierarchical clustering method has been used.

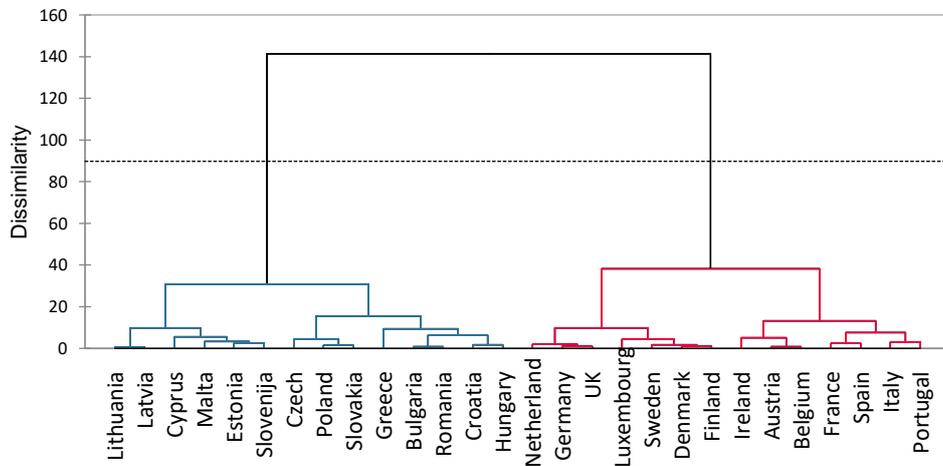


Figure 1. EU member states assembled into clusters, based on factor competitiveness score, XLStat

Sources: developed by the authors.

Figure 1 displays the results of cluster analysis. It might be observed that two heterogeneous clusters, including EU member states. The difference in the GCI score mean values became statistically significant (p -value <0.0001). Within each cluster, it might be observed that at least two subgroups of countries. However, the OMS cluster shows higher heterogeneity than NMS.

Interestingly this cluster represents an almost accurate division of EU member states into «old member states» (red cluster) and «new member states» (blue cluster) with accession after 2004 (except for Greece). The difference between them is noticeable. The General GCI score of OLM is 77.79, and in the case of NMS, it is 66.92, so the difference is 14%.

Finally, relations between the overall GCI score gained by each member state and economic growth (five-year average, 2016 - 2020) have been investigated. The idea that the competitiveness level of each state should be reflected in their economic growth might be evaluated.

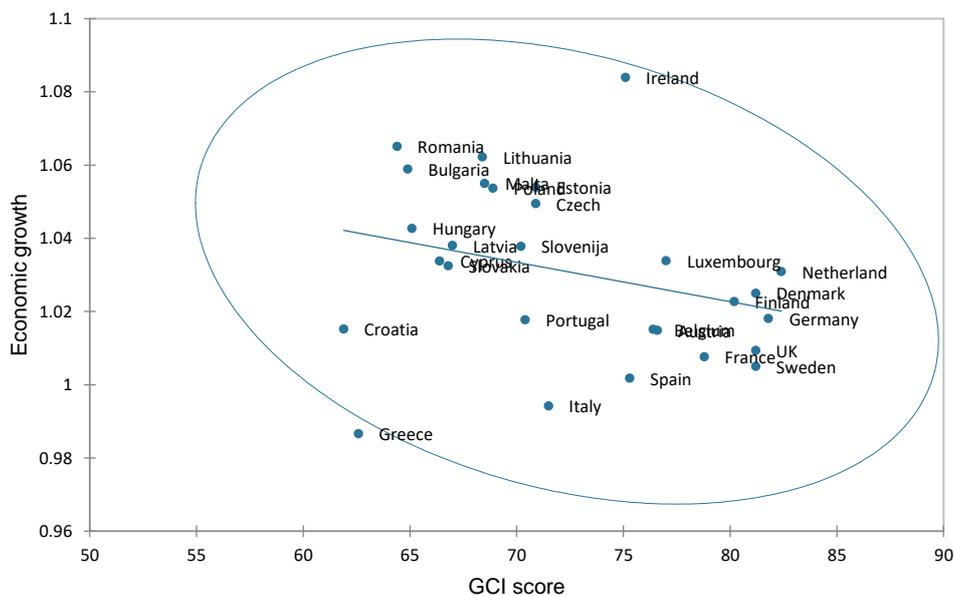


Figure 3. Relation between GCI score and average economic growth, XLStat

Sources: developed by the authors.

Figure 3 displays the relations between achieved overall GCI score and EU member states' economic growth (five-year average). The relation is somewhat 'loose' and negative. According to the scattergram, those member states that had achieved higher GCI scores (x-axis) generally achieved lower economic growth rates. This is the case for most old member states like Belgium, Italy, France, the UK, Sweden, Germany etc. The exception is Ireland, which became an outlier by achieving an extraordinary growth rate (more than 8% on average). Contrary, states (mostly new member states) with generally lower overall GCI scores achieved on average higher growth rates over the evaluated period. This is the case in Romania, Bulgaria, Lithuania, Malta, Poland, Estonia, Czech and others.

The correlation rate (measured as Pearson's correlation coefficient) is moderately intense, just -0.295 and not statistically significant. It seems that a higher competitiveness score does not guarantee higher economic growth.

Conclusions. The paper's main objective was to investigate the differences in competitiveness management among the EU member states and to infer economic growth. For this purpose GCI score provided by the WEF (2019) has been used. The results pointed to the apparent gap between the old member and new member EU states in terms of GCI score, which was demonstrated by the results of the

AHC. Generally, OMS achieved a higher GCI score in most factors of competitiveness (12 pillars of competitiveness). According to the results, NMS generally lags mostly in factors like institutions, ICT adoption, business dynamism and innovation capability. The differences are not widespread in infrastructure, macroeconomic stability, labour skills and health. Nowak (2021) found a relatively low level of cooperation in innovation activities in NMS, particularly in Poland. Also, the low level of cooperation in innovation activities corresponds to the number of marketed innovations. Regions characterised by a low level of cooperation in innovation activities also show a low level of innovativeness measured by the number of introduced innovations and general development potential. Similar findings were presented by Bucher (2018), according to his calculations of GCI indexes, which found that countries of Northwestern Europe have a high level of socioeconomic development, naming the top five countries as: Switzerland, Finland, Germany, Netherlands and Sweden.

On the contrary, Southeastern Europe countries were characterised by a significantly lower level. The gap is caused by significant differences in the condition of the institutional framework, the infrastructure, the market of goods and services and innovative activity and other factors. Moreover, in their findings, Roszko-Wójtowicz and Grzelak (2020) confirm the leading position of OMS in terms of the competitiveness rankings. However, they recorded also a noticeable increase in the competitiveness of NMS.

Finally, the relation between achieved overall GCI score and average economic growth of EU states over the years 2016-2020 was examined. The results showed a moderately negative link between growth and GCI score. Thereby, states with higher GCI scores achieved lower economic growth rates and vice-versa. It is worth thinking about this result. One reason should be the relatively high tax burden mostly adopted in OMS. For instance, North Europe countries are famous for maintaining relatively high taxes, which are able to undercut much of the country's economic growth.

On the contrary, Ireland, famous for low corporate taxes in the EU, showed unusually high economic growth. Likewise, results were found by Kordalska and Olczyk (2015) on the sample of world countries. The link between the GCI score of individual countries and their GDP growth rate was investigated. They found significant bidirectional causality among analysed countries, i.e. GDP growth precondition competitiveness. Additionally, the GCI score has not been a reliable instrument in economic growth prediction in the majority sample of analysed economies.

Despite the results, it should not be suggested that keeping the healthy, vibrant, and constantly improving business environment is not essential. Improving the business environment in the country to become more competitive is crucial for maintaining the population's long-term and sustainable living standards. However, on the other hand, it suggests that keeping high tax rates mainly in OMS means that the government do not know how to use public funds efficiently.

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Управління конкурентоспроможністю у країнах-членах ЄС: ключові сильні та слабкі сторони

Метою статті є аналіз рівня конкурентоспроможності країн-членів Європейського Союзу (ЄС). Автором наголошено, що конкурентоспроможність країни залежить від ефективності державного урядування на національному, регіональному та місцевому рівнях. Рівень конкурентоспроможності країни безпосередньо впливає на її економічне зростання. Автором застосовано ієрархічну кластеризацію як основний метод дослідження. Вихідну базу дослідження сформовано на основі аналітичних звітів Global Competitiveness Index (GCI). Результати кластерного аналізу дозволили визначити дві групи країн-членів ЄС, відповідно до «традиційного» поділу на старих (OMS) і нових країн-членів ЄС (NMS). Результати показали статистично значущий розрив у балах GCI між OMS та NMS. Крім того, мінливість всередині класу в кластері OMS виявляється вищою, ніж у кластері NMS, що підкреслює зростаючі диспропорції та розриви між старими країнами-членами ЄС. Найбільш суттєві відмінності між обома групами переважають у інституціональній сфері, впровадженні ІКТ та інновацій, бізнес-середовищі. Автором досліджено зв'язок між досягнутим показником GCI та середнім рівнем економічного зростанням в країнах ЄС. Всупереч очікуванням, більш розвинені країни-члени продемонстрували в середньому відносно нижчі темпи економічного зростання протягом досліджуваного періоду, ніж менш розвинені країни-члени. Результати підтвердили негативний зв'язок між GCI та рівнем економічного зростання. Це своєю чергою свідчить, що вищий рівень GCI не означає досягнення більшого економічного зростання, тоді як країни-члени з нижчими загальними показниками GCI випереджають за темпами економічного зростання. У багатьох аспектах у країнах ЄС все ще спостерігається значний розрив між OMS та NMS. Відносно вищі темпи економічного зростання NMS можуть допомогти зменшити розрив з часом. Автором наголошено, що наявні стратегії зменшення розривів зорієнтовані на короткострокову перспективу, що тим самим може знизити рівень конкурентоспроможності у довгостроковій перспективі.

Ключові слова: конкурентоспроможність, інновації, кластерний аналіз, аналіз даних, економічне зростання.