Section ECONOMICS

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Examining the Territorial Differences in the Visegrad Countries, with Special Reference to the Region Type Model

Abstract
The aim of the study is to examine the NUTS3 level areas of the Visegrad countries using the region type model. By applying the region model, the regions of the Visegrad countries that are performing exceptionally well and have a positive impact on neighbouring regions can be highlighted. The region-type model is often found in the literature but is not widely used. Using the region type model, regions are grouped according to two dimensions (GDP per capita and population density). An important factor in defining the research period was to reduce the negative impact of the 2008 crisis. Thus, the research period is 2014 to 2019, where can be described as the "last year of peace". The region type study with the values of the capitals was analysed. The results show Prague as a knowledge hub region and Budapest and Warsaw as cosmopolitan regions for all the periods studied. The region type classification of the Czech Republic can be considered homogeneous in 2014, but the regions return to their original equilibrium status in 2019 for the Visegrad region. The results show that the region type analysis and the convergence studies can be put in parallel.

Keywords: *territorial inequalities, regio model, competitiveness, economic growth*

Introduction

Economic and social processes (migration, population concentration, globalization) have contributed to increasing territorial disparities. Territorial disparities can result from social, economic, and environmental components. Nowadays, economic competition has come to the fore for municipalities, regions, and countries (Káposzta, 2014; Lengyel, 2006).

The conceptualization of territorial inequalities has evolved in different stages since the 1900s. Initially, the economic factors appeared that was most important in the science of geography, but the spatial approach also came into focus from the 1950s onwards (Rey, 2004; Jackson, 2004). The definition of spatial inequalities underwent a paradigm shift in the first half of the 20th century, as the spatial distribution of natural and social phenomena became the focus (Győri, 2005). Following the paradigm change, economic studies focused on spatial processes and their interactions (Nagy, 2006), but since the 1990s, the combined use of space and time emerged (Szendi, 2017).

The aim of the study is to bring to the fore the classification of the NUTS3 level areas of the Visegrad countries based on the European Region Model. The European Region Model is a regional competitiveness model, which can be applied to focus on the more competitive areas within the greater region.

Literature review

Territorial inequality can arise from various economic, social and natural factors. Throughout history, territorial inequality has increased due to the impact of various economic crises and world wars.

Three types of regional inequality can be distinguished, measured by different indicators: economic (GDP per capita), social (living standards, employment, unemployment) (Wishlade & Yuill, 1997, Molle, 2007; Kutscherauer et al, 2010), territorial (infrastructure, innovation). Studies have shown that these inequalities are generated between centres and peripheries (Poledniková, 2014).

The recognition of spatiality can be traced back to ancient times and since the 1900s we can observe four stages of development in the definitions. Territorial inequality initially appeared in geographical sciences and spatiality has come into focus since the 1950s. Christaller focused on economic aspects (Rey, 2004; Jackson, 2004), which developed into spatial science (Probáld, 2007). In the first half of the 20th century, the discussion of territorial inequalities underwent a paradigm shift, as social and natural factors and, as a result, spatial distributions and modeling also came to the fore (Győri, 2005). In economic studies, the characteristics of inequalities were present without considering space and time, however, spatial social and economic inequalities also appeared in the focus of studies (Kocziszky, 2011). Nemes-Nagy's (1990) definition included the difference in opportunities and economic dependence and independence, which together affect the development of regions. However, according to Enyedi's (1996) definition, a certain degree of difference between regions always exists because the local characteristics of the regions do not necessarily have a positive effect on economic development, while Faluvégi (2000) stated that more than one indicator is needed to examine territorial inequalities to obtain more reliable results.

Based on the literature, territorial inequality can be formulated as follows: 'Social, environmental, and economic territorial disparities are the result of the combination of space and time, and of different processes and interactions. The extent of disparities is caused by different conditions and resources, which contribute to the economic growth of national economies. By focusing on the 'quantitative revolution', the extent, temporal variation and spatial distribution of disparities have become measurable, which allows the actuality of territorial disparities to be maintained." (Zapreskó-Farkas, 2023c p. 6)

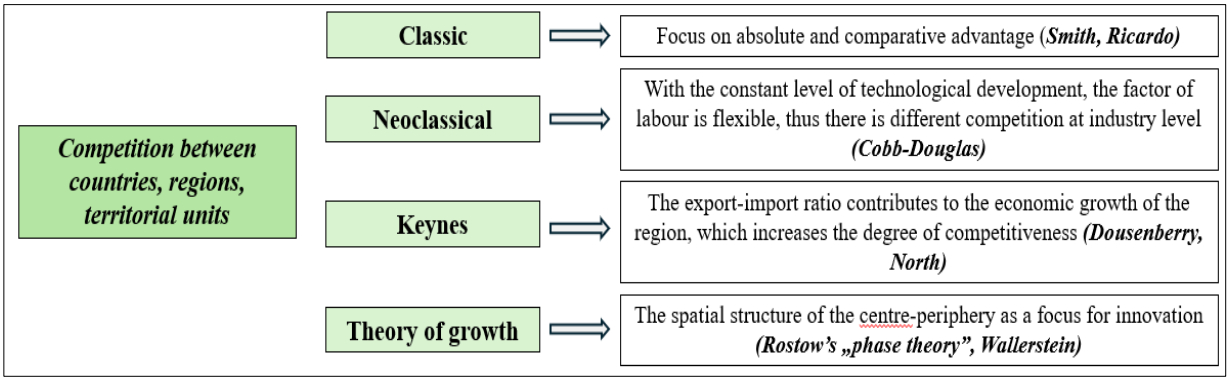
Territorial disparities, centre-periphery interactions and the ongoing process of globalization have brought economic competition to the fore. The competition between companies, regions and countries is aimed at gaining a position to be comparable with each other (Lengyel, 2006).

Porter (1990) argues that competitiveness is more simply understood at the company's level because it includes resources, investment, innovation and welfare at the level of national economies (Wren, 2001; Kitson et al, 2004). However, Aiginger (2006) defined competitiveness as "the ability of a country or region to generate wealth" (Lengyel 2016, p. 146). In further research, the author focuses on social and ecological factors to improve competitiveness (Aiginger & Firgo, 2015). A new approach to the measurement of competitiveness emerged after the 2008 crisis, as the notion of well-being came into focus alongside economic growth and social progress (Stiglitz et al., 2010).

Figure 1. illustrates the economic approaches to competitiveness. Macro-level competitiveness, which can be determined by the combined effect of the concentration of companies, the level of productivity, the standard of living and income factors in the relationship between countries, regions and settlements. Among the classical growth theories, the models of Smith (1776) and Ricardo (1817) stand out. Smith prioritized absolute (lower import ratio and products produced from own resources),

while Ricardo prioritized comparative (specializing in products produced with absolute advantage, which reduces the relative price of the product) advantages (Camagni, 2002). Among the neoclassical theories, the Cobb-Douglas (1934) model stands out, according to which the capital and labor factors are flexible, while technological development remains unchanged. Among the Keynesian growth theories, the export-based model of Duensenberry (1950) and North (1955) can be highlighted. The goal of export-based models is economic growth, which can be achieved through the combined effect of consumption, investment, government spending and the export-import ratio. Among the center-periphery theories, Rostow (1960) (phase theory) and Wallerstein (1974) models (Metcalfe & Ramlogan, 2007) can be highlighted.

Figure 1. An economics approach to competitiveness



Source: own editing based on Camagni, 2002; Metcalfe & Ramlogan, 2007; Poreisz, 2018

In conclusion, a parallel can be drawn between competitiveness and economic theories. Economic models help to illustrate competitiveness at the regional level.

Materials and methods

The European Region model is used in this study. There is a large literature on the role of region types in territorial competition. The European Union examined the factors affecting regional competitiveness between 2007 and 2013 (Martin et al, 2003).

The European Union's region types of model groups regions according to two dimensions (population density, GDP per capita). Theoretical types include productive sector regions, economics of scale regions, knowledge centre regions; while basic types include rest regions, rural regions, balanced regions, dynamic regions, special city regions, cosmopolitan regions.

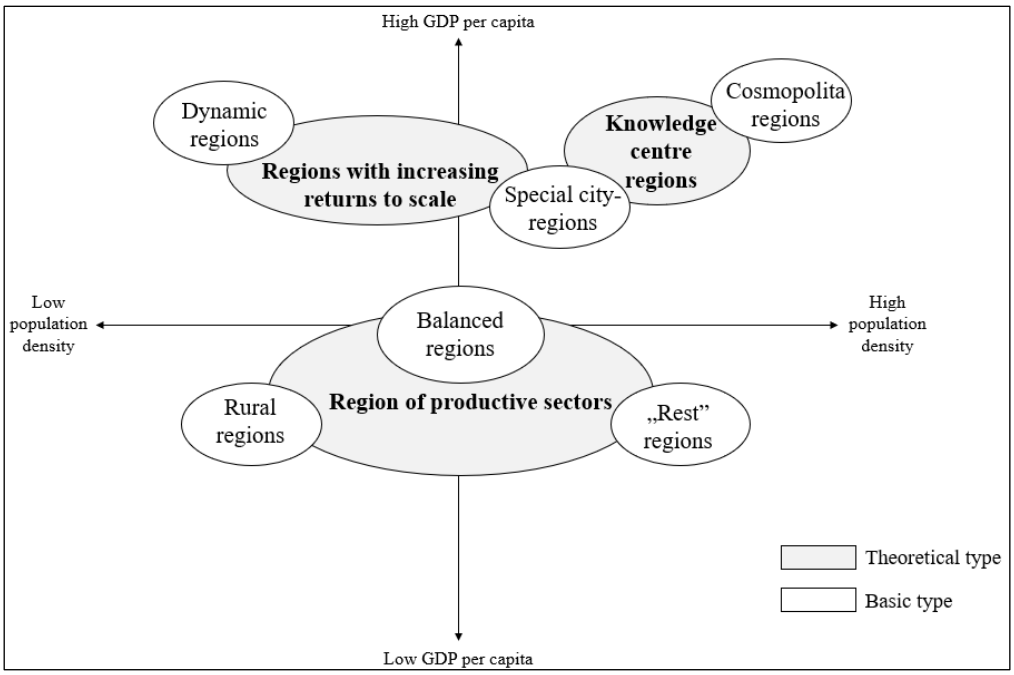
The group of productive sectors includes regions with a medium income level. The main competitive advantage of the regions is the use of cheap input and available cheap labor market at the company level. In addition, the human resources are suitable for the creation of the assembly sites of multinational companies. The regions belonging to this group have a medium population density and an average GDP per capita.

Areas with a high per capita GDP and medium population density can be called regions with increasing returns to scale. Their competitive advantage is ensured by the relatively higher qualification of human resources and the easier availability of suppliers. The well-being of the areas belonging to this group is ensured by the few main industries present in the region.

The regions belonging to the knowledge center have a high per capita GDP and population density.

The region absorbs the highly and well-educated workforce, which means that a high level of research, development and innovation can be found. The high quality of human resources and openness to international relations can be considered as a competitive advantage.

Figure 2. European Region Type Model



Source: own editing based on Martin et al, 2003 and Fenyővári & Lukovics, 2008

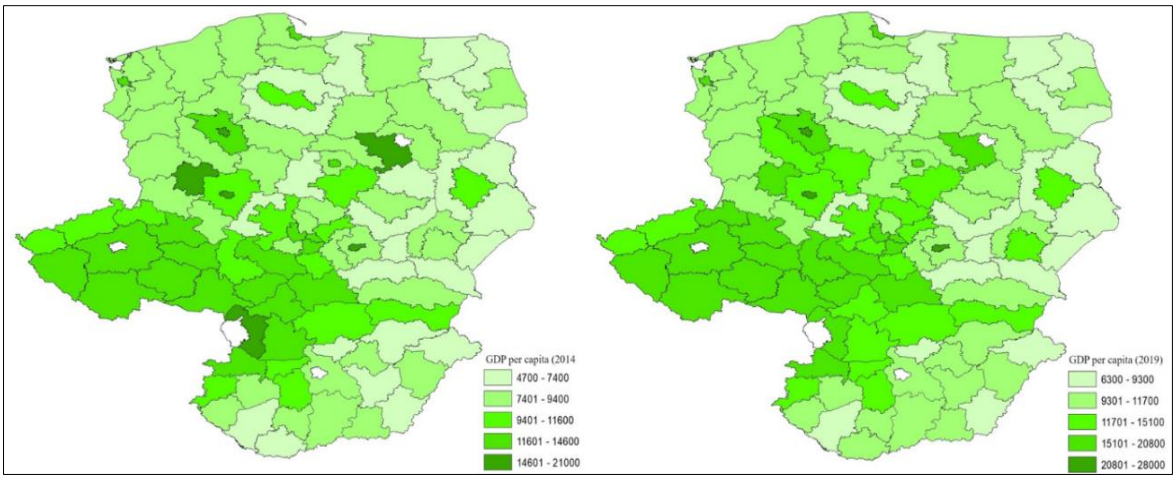
Regions in the balanced category are characterised by a medium level of population density and GDP per capita. Rural regions have lower population densities and GDP per capita, but "resting" regions have higher GDP per capita with low population densities. Compared to balanced regions, special city-regions have relatively higher GDP per capita and population density. Dynamic regions have high GDP per capita and low population density; however, cosmopolitan regions have high levels of both. The main difference between a special city region and a cosmopolitan region is presumably the research and development and innovation rate. It is likely that the cosmopolitan region will outperform on these factors. On this basis, it can be argued that the region has a high quality and educationally advanced human resource base.

This study examines the NUTS3 level (115 regions) of the Visegrad countries. Based on the region type model, I focus on GDP per capita and population density in 2014 and 2019. The aim of the study is to focus on the regions with a competitive advantage in the V4 based on the classification of the region type model.

Results

Previous studies have shown a similar trend in the development of the V4 countries, which can be explained by foreign direct investment and connection to the European Union (Csaba, 2014; Farkas, 2017; Fábián & Pogátsa, 2016; Lengyel & Kotosz, 2018). In terms of GDP per capita (PPS, USD), the Czech Republic increased from 58% to 78%, Slovakia from 44% to 72.5%, Poland from 42% to 64.5% and Hungary from 51% to 63.5% compared to the EU15 Member States between 2000 and 2015. It can be concluded that the V4 countries are undergoing a strong economic catching-up process (Lengyel & Kotosz, 2018).

Figure 3. Regional differences in the Visegrad countries; NUTS3 (GDP per capita; euro; 2014, 2019)

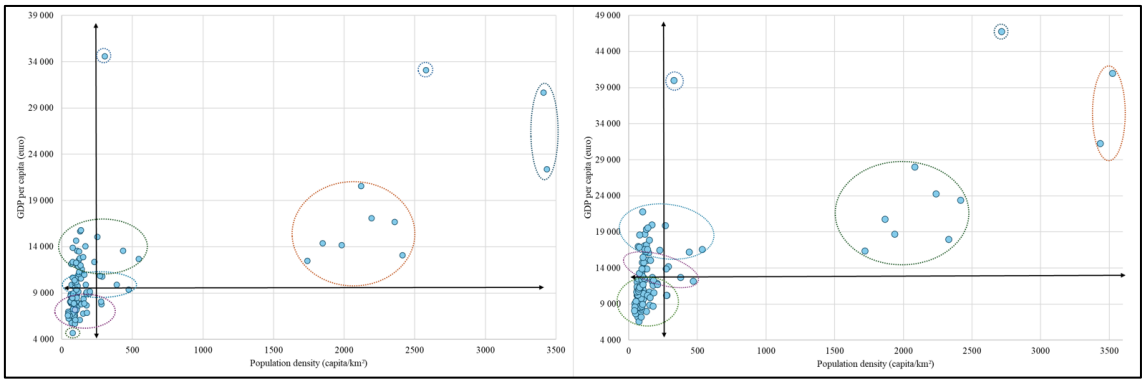


Source: own editing based on eurostat data

Figure 3 illustrates the spatial distribution of regional differences in the Visegrad countries (excluding capitals[1]) based on GDP per capita. The figure shows that the Czech Republic stands out at the level of the greater region, as all its regions have high GDP per capita. Nógrád has the lowest GDP per capita (4700 euro in 2014; 6300 euro in 2019), while Warsaw has the highest (31400 euro in 2014; 41000 euro in 2019) in the years under analysis.

The figure 4 shows the distribution of NUTS3 level areas in the Visegrad countries by region type model in 2014 and 2019. In the analysis, the annual average of the region type model indicators (GDP per capita and population density) is used as the model origin.[2] The difference between the two periods examined is that the trend line is steeper in 2019 than in 2014, suggesting that income inequality has increased in terms of GDP per capita.

Figure 4. Distribution of NUTS3 level areas in the Visegrad countries based on the European Region Type model (2014, 2019)



Source: own editing based on eurostat data

[1] GDP per capita in Bratislava is 34600 euro in 2014 and 39900 euro in 2019; in Prague 33100 euro in 2014 and 46800 euro in 2019; in Warsaw 31200 euro in 2014 and 41000 euro in 2019; in Budapest 22400 euro in 2014 and 31000 in 2019.

[2] The average GDP per capita is 10327 euro in 2014 and 13623 euro in 2019; while the average population density is 324 km² in 2014 and 326 km² in 2019.

I examined the correlation between the coefficients (GDP per capita and population density) that show table 1. The significance value is 0.000 at both time points examined and the strength of the relationship between them is R^2 (2014) = 0.668 and R^2(2019) = 0.720. There is a relatively strong positive relationship between the variables at both time points examined.

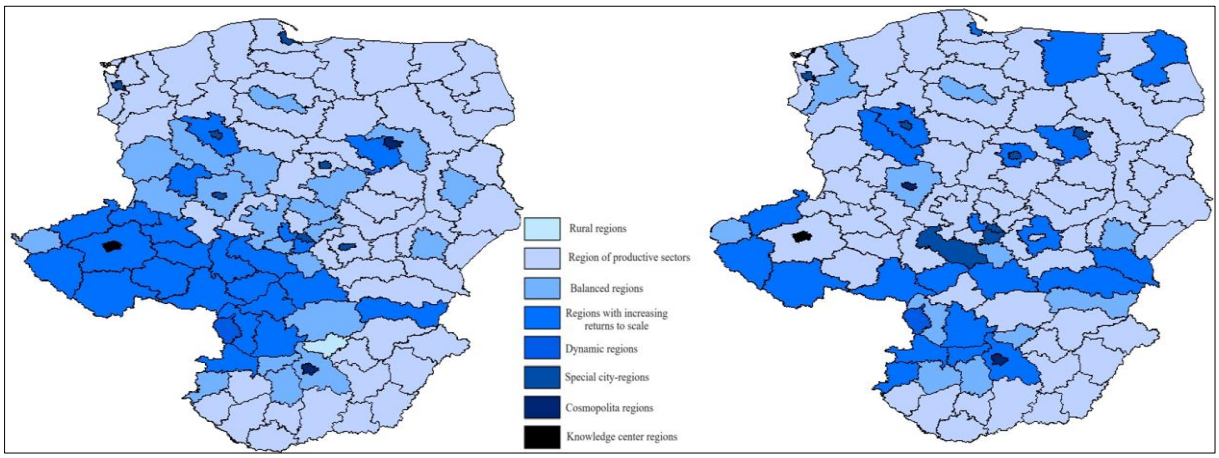
Table 1. Statistical summary table of the relationship between GDP per capita (euro) and population density (km²) indicators

	Regression line equation	Significance	R^2
2014	y = 4.8067x + 8767.5	0,000	0.668*
2019	y = 6.8665x + 11384	0,000	0.720*

Source: own editing

Figure 5 illustrates the territorial distribution of the Visegrad countries based on the region type model. In both periods, Prague was classified as a knowledge centre region, while Budapest and Warsaw were in 2014; in 2019, Miasto Wroclaw was classified as a cosmopolitan region besides Budapest. In the special city-region group, the regions of the major cities in Poland, such as Katowicki, Miasto Krakow, Miasto Lodz, Miasto Poznan, Miasto Szczecin and Miasto Warszawa, are the most important ones in both time periods considered. In both 2014 and 2019, the Bratislavsky kraj region can be classified as a dynamic region. The classification of Bratislavsky kraj as a dynamic region is presumably due to the automotive sector in the region.

Figure 5. Territorial distribution of the Visegrad countries based on the region type model; NUTS3; 2014, 2019



Source: own editing based on eurostat data

There are larger differences in the spatial distribution of regions of increasing scale at the two points in time. In 2014, this category includes almost all of the Czech Republic, while Poland includes areas next to larger urban regions. However, in 2019, a smaller part of the Czech Republic was included in this category. In Hungary, the Pest, Győr-Moson-Sopron and Vas regions are still included in this category. Areas close to central urban areas can be classified as balanced regions, while regions in semi-peripheral or peripheral areas can be classified as productive sectors. The position of the Nógrád

region is outstanding, as in 2014 it was a rural region, but in 2019 it is in a balanced category.

Conclusion

The development of spatial disparities has brought to the fore different social and economic factors, whose characteristics mean that no two points in space have the same characteristics. The spatial structure is constantly changing because of different economic processes, which means that studies of spatial inequality are constantly relevant. Today, competitiveness is a key issue not only for companies, but also for regions and countries. The competitiveness approach at regional level aims to raise living standards. The importance of regional competitiveness is supported by the literature and models presented.

The European Region model includes two dimensions - population density and GDP growth rate. They can be classified into theoretical types: regions of productive sectors, regions with increasing returns to scale and knowledge centre regions; and basic types: cosmopolitan regions, special urban regions, dynamic regions, balanced regions, resting regions and rural regions.

Each basic type can be connected to an economic theory. Regions of productive sectors are associated with classical, neoclassical and Keynesian theories; regions of increasing size are associated with evolutionary and Keynesian theories; while regions of knowledge centres are associated with evolutionary and Jacobsian urban growth theories.

In summary, the negative impact of the 2008 crisis was still felt in 2014, which can be explained by the homogeneous representation of the Czech Republic in the region type model.

In general, it can be stated that the European Region Model focuses on those areas that are more competitive. However, competitiveness cannot be explained only by factors such as GDP per capita and population density, but other factors (employment rate, education level, innovation presence, research and development expenditure, etc.) also need to be examined.

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