REDUCING REGIONAL DISPARITIES IN THE IMPACT OF DEVELOPING CLUSTERS

Dana Jašková[7]

Abstract: *The issue of regional development aimed to reducing regional disparities is a current topic in the whole of the European Union. Socio-economic analysis of the region is starting activity in determining the development strategy of the region. In the analysis of regional development will use a variety of concepts and methods. Regional development concepts are always confronted with convergence or divergence. The main aim of this paper is to access the level of regional disparities in the Slovak Republic with a focus on the role of cluster in regional development. The analysis is carried out using the beta and sigma convergence of statistical data classified in the cross-sectional structure*

Keywords: *Region, Regional disparities, Beta convergence*

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✉ Dana Jašková
dana.jaskova@tnuni.sk

[7]   Faculty of Social and Economic Relations, Alexander Dubček University of Trenčín, Študentská 3, 911 50 Trenčín, Slovakia

1. INTRODUCTION

Regional policy is concerned with improving the welfare and performance of the regions. The aim of regional policy is to ensure the development of the regions and reduce the differences in their development. Different socio-economic level of the regions has an impact on the overall economic development of the country. Regional development is a set of economic, cultural and environmental processes and relationships that take place in the region. These relationships have a lasting impact on the economic, social and territorial development and for reducing these differences.

With the theory and practice of regional development combines the concept of cluster. The concept of the first cluster has defined its work by Michael Porter (1980). It is a geographic concentration of interconnected companies, specialized suppliers, service providers in related industries and institutions in a certain area. These businesses have both compete but also cooperate with each other. It is now considered as an important element of the concept of cluster development (Porter, 2000).

The dynamics of regional development is currently a frequent theme. Knowledge of the economic level of the regions and disparities is necessary due to the proposal for the next steps for the realization of development of the various regions. The main task of regional development is to reduce regional disparities and the promotion of economic growth with a view to raising the standard of living of the inhabitants of the region.

The basic aim of the paper is to evaluate the use of selected indicators of regional disparities in the Slovak Republic with a focus on the importance of clusters in regional development.

2. CLUSTERS AND REGIONAL DEVELOPMENT

The aim of regional policy is to ensure the development of the regions and reducing development disparities. Apply in the current global economy is only possible through the integration of the various partnerships and alliances. Such networking business can be, for example, the shape of the cluster. The cluster is an incentive for economic development. Regionality is the linchpin for the stable development of the cluster, which has an important role in the selection of the priority directions of investment in the region. The effectiveness of the investment is subject to the reciprocal links between the participants by strengthening the cluster (Krajňáková, 2016).

In the context of cluster definitions overlap with areas of cooperation and relations between firms, agglomerating effects, social capital, economies of scale, the transfer and dissemination of technology, innovation and knowledge management. Innovation, innovation policies and implementation strategies are one of the most important aspects of the current international economy and business development issues (Kordoš, Karbach, 2014; Sipa, Lemanska-Majdzik, Okreglicka, 2016).

The clusters are becoming particularly important in industries where the Gibratov law and where small enterprises are not growing faster than big companies are. Small businesses do not, therefore, one of its primary advantages over big firms (Leitão, Serrasqueiro, Nunes, 2010; Del Monte, Papagni, 2003).

Clusters play a major role in the development of the various regions by contributing to an increase in their competitiveness (Navickas, Vojtovic, Svazas, 2016). The importance of the cluster in regional development is based, in particular, in improving the Division of labour, increasing

migration of workers between enterprises, the cooperation of the undertakings within the framework of the Department, the growth in the number of jobs, higher wages, higher rate of patenting, creation of new types of businesses, their growth and survival rates and other benefits (Schwab, Porter, Sachs, 2001).

The promotion of regional development, the influence of the existence of the cluster in the region is influenced by several factors: the level of scientific-research base and access to research institutions and facilities in the region, the second entrepreneurial culture of the participating companies, the proximity of markets, and the level of transport infrastructure, the level of use of materials technology, the availability of skilled labour, availability of financing, availability and the ability to raw material and availability of inputs, availability and the level of potential participants in the cluster and the availability of foreign markets. The economic development of the country and its regions are affected by other factors, conditions and relations of the spectrum. New forms of specialization, institutionalization, the creation of regional, trans-regional and trans-national flows and processes in real time, including new perspectives on the structure of and changes to the comparative advantages of the countries and territories shall contribute to the the total change in economic development (Kordos, Vojtovic, 2016).

At present, Slovakia registered eleven major technology clusters. Innovation and Energy Agency keeps track of these clusters (Slovenská inovačná a energetická agentúra, https://www.siea.sk/databaza-technologickych-klastrov).

Table 1 Technological clusters in SR

	Name of cluster	*Region*
1	ABC - Academic Business Cluster	Bratislava
2	National Energetic Cluster NEK	Bratislava
3	Automotive cluster	Trnava
4	Electrotechnic cluster	Trnava
5	Slovak plastic cluster	Nitra
6	Z@ict	Žilina
7	1. Slovak engineering cluster	Banská Bystrica
8	Energetic cluster of Region Prešov	Prešov
9	Cluster AT+R	Prešov
10	Košice IT Valley z.p.o	Košice
11	BITERAP cluster	Košice

From the data, it is evident that in the region of Trenčín is not a technology cluster. The intention of the article is to compare the conditions of all counties with few economic indicators on the method of regional convergence. Based on the results of the analysis to define the potential of the Trenčín region for the creation of a technology cluster.

3. REGIONAL DISPARITIES

The reason for the implementation of regional policy are different levels of social and economic development between the various regions, what is referred to as regional disparities. Disparities are not only social and economic dimension, but can be understood by a broader, such as inequalities in spatial, geographical, political, social, environmental and resource (Habánik, Koišová, 2011).

In General, the concept of inequality, diversity or disparity reflects the diversity, disparity between different phenomena. To the understanding of the specific concept of regional disparities (RD) can be accessed from different points of view. By Kutscherauera (2010) represent diversity or disparity RD of the characters, events, or processes that have a clear spatial location, and there are at least two territorial entities in this structure. In European terms, are a measure of the level of economic, social and territorial cohesion of the RD of the European territory? In the article, we will explore the economic disparities.

One of the effective solutions of regional disparities is support the development of clusters in regions such as Havierniková and Strunz (2014) says: One possibility how to contribute to the regional development is interconnection between businesses, educational institutions and local government entities into the purpose-built configurations – clusters.

Regional disparities, which are exacerbated while existing spatial structure of the Slovak economy, which is inherently unbalanced does not create conditions for effective regional development and thereby are reduces the competitiveness of regions therefore the clusters represent a fundamental organizing framework for understanding local economy in regions and for developed economic performance and competitiveness (Kráľová, Sochuľáková, 2016).

Measurement and evaluation of regional disparities (RD)

The primary condition for balancing regional disparities is to quantify their level. The analysis is subject to obtaining the relevant data RD. This requires sufficient knowledge and guidance in a wide range of published methods and ways of their implementation. In general, one can speak of a threefold assessment of RD: selection of observational units, the selection of appropriate indicators and the selection of the appropriate method.

When choosing the observational units we only have statistical data that are available only in defined statistical territorial units at NUTS level. The correct selection of the indicators depends on many factors, from the definition of the RD, the objective pursued, which is to track the analysis. It further depends on the territorial scale, the power indicator lights and their evaluation. There are simple and composite (aggregated, integrated) indicators.

Composite indicators represent a higher degree of identification RD. Based on appropriate links a range of indicators. Their basic attribute is sufficient comparative ability, mathematical manageability and readability of the information. The method of aggregation is based on the use of multiple methods. Methods, tools and measures can be classified according to the different aspects of the RD. According to the mathematical complexity to simple and complex multivariate statistical methods. By the time the static and dynamic. According to a notice the power of the deterministic and stochastic. From a substantive point of view for easy and integrated. From the aspect of the development of the assessment on the convergent and divergent. Michalek (2014) defined by the basic concepts, approaches and methods for the measurement RD and divided them as follows:
- indirect methods (IE large-scale techniques, method, the semaphore, the point method),
- direct comparative methods (methods of statistic and dynamic interregional comparation),
- simple statistical method (method of spatial polarisation, the coefficient of variation)
- rates of spatial concentration (concentration coefficient, location quotient, Gini coefficient, Lorentz curve),indexes of entropys (Measure of entropy, Theil´s index, Hoover´s index),

- complex statistical models (regression models, correlation analysis, PCA analysis, Factor analysis, Cronbach coefficient alpha, Cluster analysis, method of distance from the fictional object, the analysis of time series)
- statistical summary of descriptive methods and variables (aggregate techniques, the method of the efficiency of the border, the distance from the target, the expert decision),
- new methods and tools (neural networks method, real convergence, GIS).

4. MATERIAL AND METHODS

In assessing the need for an integrated perspective on the issue arises RD. This is related to the construction of a Composite Indicator (*CI*). The Organization for economic cooperation and development (OECD) in 2008 has published the methodology and process of its construction. The composite indicator is a higher level of identification and interpretation of the RD (Handbook on Constructing Composite Indicators, 2017). For the calculation of the composite indicator itself for each region is used additional aggregate method. The formula for the calculation is the following:

$$CI_r = \frac{\sum_{i=1}^{n} I_{i,r} w_i}{\frac{\sum_{i}^{n} \sum_{r}^{m} I_{i,r}}{m}}, \tag{1}$$

where

$$I_{i,r} = \frac{x_{i,r} - min_r(x_i)}{max_r(x_i) - min_r(x_i)} \tag{2}$$

in the case of a positive orientation of indicator $x_{i,r}$ a

$$I_{i,r} = \frac{max_r(x_i) - x_{i,r}}{max_r(x_i) - min_r(x_i)} \tag{3}$$

in the case of a negative orientation of indicator $x_{i,r}$, i is number of indicator, r is region and w_i is the weight of indicator. If the value of the $CI_r \cong 1$, studied region r can be considered as the average. In the case of value greater than 1 for an above average and otherwise mediocre.

To comparing regions with a *CI*, we can use the methods of real convergence. It is used by several of the concepts: beta (β) convergence (absolute, conditional) and sigma (σ) convergence. Sigma convergence tests measure whether the variance in the regional distribution of the indicator. Beta convergence tests shall examine whether regions with low levels of indicator experienced stronger growth than regions with a high level of the indicator (Minařík, Borůvková, Vystrčil, 2013).

β-convergence

Under the process of convergence can be imagined, for example, reducing disparities between multiple variables at a time, up to a level where the difference converges to zero. The opposite of convergence id divergence represents the concept, according to which the less developed regions are growing faster than the more developed regions. The subject of research is the only condition for the beginning and end of the period under review. This can be a disadvantage, because the information on developments remain unused. . β - convergence is examined by using the aquation:

$$\frac{1}{T} . log\left(\frac{x_{i,t_0+T}}{x_{i,t_0}}\right) = a - \left(\frac{1 - e^{-\beta T}}{T}\right) . log\left(x_{i,t_0}\right) + u_{i,t_0,t_0+T}, \tag{4}$$

x_{i,t_0} (x_{i,t_0+T}) is value of analysed indicator in time t_0, $(t_0 + T)$, β is the speed of convergence, u_{i,t_0,t_0+T} is the random component of the t_0 and $t_0 + T$. According to the directive of the straight line.β, if $\beta < 0$ there is a tendency for convergence, if $\beta > 0$ there is a tendency for divergence, if $\beta \cong 0$ it shows none of the tendencies. Coefficient of determination $r^2 = \frac{var \log \bar{k}'}{varlog \, \bar{k}}$. where $\bar{k}$ is average growth of the reference indicator, indicates an estimated reliability of a linear trend. If the value of the coefficient of determination, close to 100%, it is considered a tendency (convergence) as a major. Otherwise, it is considered to be insignificant (Janssen, Hande, De Beer, Van Wissen, 2016).

5. EVALUATION OF THE REDUCTION OF THE DISPARITIES IN THE SLOVAK REPUBLIC

For the assessment of the appropriateness of the establishment of a technology cluster in the Trenčín region, we analysed the five economic indicators from the database of Statistical office of the Slovak republic. In brackets are given the units of indicators.

x_1- Gross value added at current prices (mill. €),x_2- The total regional employment in the industry, x_3- Regional gross domestic product per capita (€),x_4- Gross fixed capital formation in current prices (mill. €),x_5- The economically active population. All indicators are positive orientation.

Comparison of the regions from the point of view of selected indicators for the period 2000-2016, was because the data for the year 2017 are not yet officially published. For the mutual comparability of indicators were recalculated on the middle condition of the population in a given region in a given year.

The determination of weights of indicators

Each indicator included in the analysis was assessed by using a exploratory analysis. Descriptive statistics were calculated (location, variability and symmetry). Graphical methods are identified the extreme values, data independence, homogeneity. The starting point to determine the weights of the individual indicators was the PCA analysis.
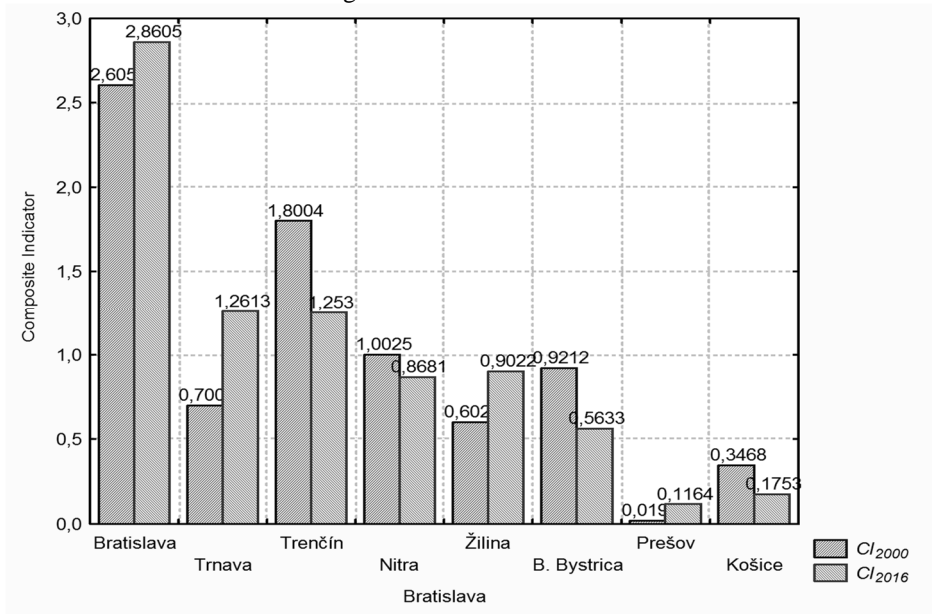
Table 2. The weights of the individual indicators

Indicator x_i	x_1	x_2	x_3	x_4	x_5
Weight w_i	0,2964	0,1347	0,3429	0,0992	0,1268

Source: own processing

In the following column chart shows calculated values of *CI* for the year 2000 and 2016 for each region.

Figure 1 Value of *CI*

Source: own processing

From the chart you can see the value of *CI* in the economic sphere in some regions has grown, but has fallen in some regions. Most of this increase can be observed in the region. The biggest decline recorded by region.

The following chart may be assessed to the convergence regions tended to in the economic field. Of the correlation chart, it can be concluded on the position of the individual regions.

Figure 2 Convergence assessment and correlation diagram
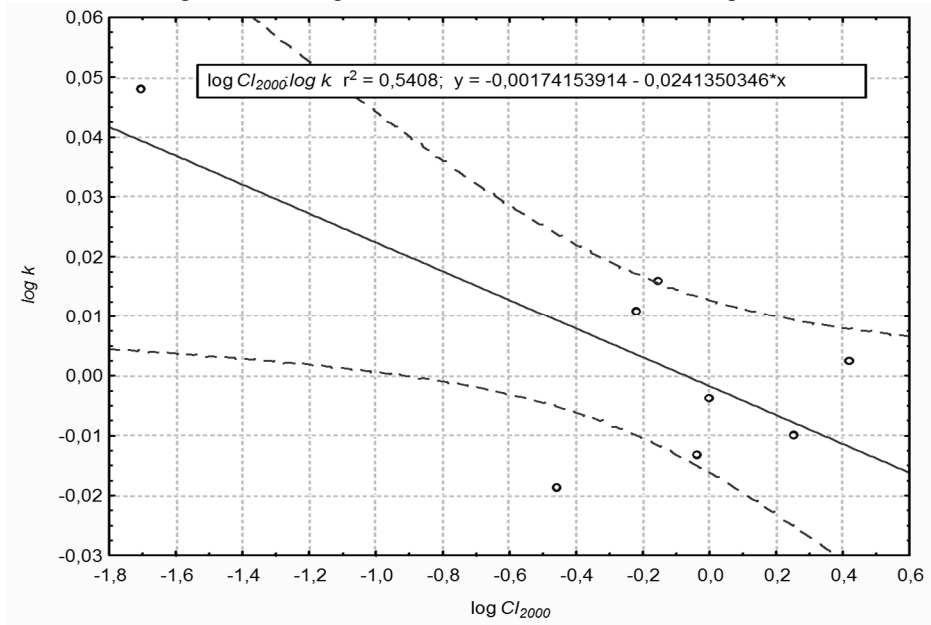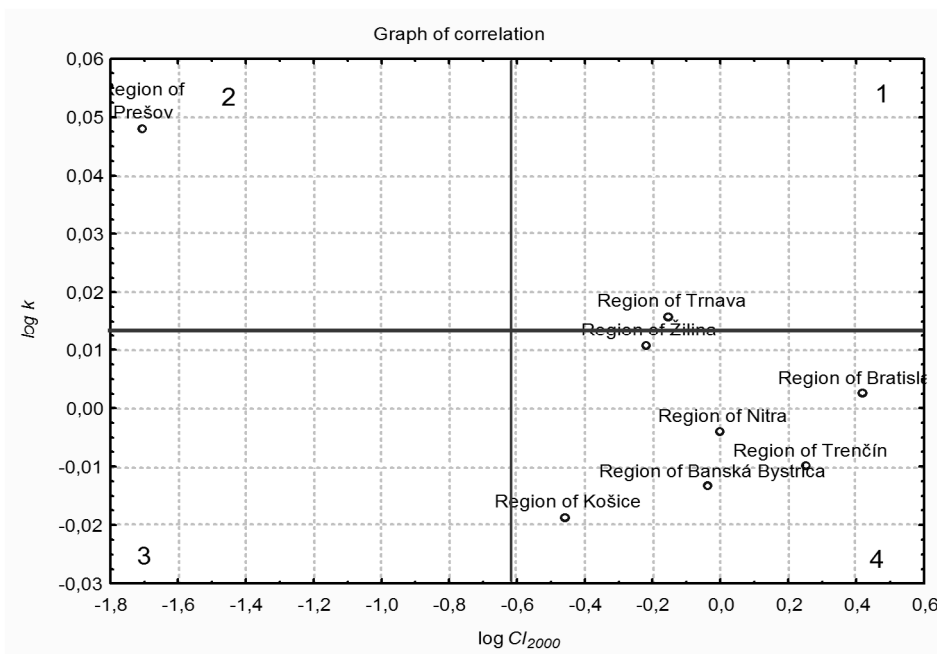
Source: own processing

The development of the regions is compared using the method β- convergence. The graph shows the decreasing trend in the regression line, with a coefficient of determination $r^2 = 54,08\%$, while the speed of convergence is $0,0241$. Conclusion of the measurement β- convergence is thus, that in the reporting period in the eight regions with the convergence and regional disparities will diminish.

Correlation diagram is divided into four quadrants. The region of the first quadrant (Trnava) above the initial value of the highest economic growth at *CI*. The region of the second quadrant (Prešov) displays a combination of below-average initial value and the rapid pace of growth in the economic field. In the third quadrant was not on any region. In the fourth quadrant is situated six remaining regions. As regards economic matters, when the superior value of *CI* in the year 2000 showing the slowest growth.

CONCLUSION

The basic purpose of regional development is to sustainably increase the quality of life in the region. The realization of this objective requires a comprehensive approach to the assessment of differences between regions, and by assessing their potential for the formation of the cluster cooperation. One of the approaches is the measurement and comparison of regional development at the time of the level or the status of the quality of life in the region. One of the approaches is the measurement and comparison of regional development at the time of the level or the status of the quality of life in the region. In your post is constructed a composite indicator for economic levels remain scattered regions of Slovakia. For the base year of 2000 has been selected. We analyzed five key indicators of the economic area. By analyzing the PCA was found to be the weight of the indicators. One of them was subsequently constructed a composite indicator of the *CI*. From the results it is clear that the best value of *CI* underperforming districts. The worst value of *CI* already underperforming. During the period, however, rose. The highest increase recorded by the region of Trnava and the $0,5623$. Long-term declines in the value of the composite indicator is in region

Trencin. The decrease is 0,5474. This drop is the largest of all regions. The idea of developing a technology cluster could help the region increase its economic potential. In the next part of the convergence of regional disparities have been evaluated using the method. It may be observed, that in this area, the disparities only very slowly diminish. In the framework of the more comprehensive meta-analysis of the problem as described, it would be better to use other alternative approaches.

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