

QUALITATIVE AND QUANTITATIVE ASPECTS OF THE CLUSTERS IN THE SLOVAK REPUBLIC

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Abstract

Clusters are not a new phenomenon in world economy. Many research study mainly Anglo - Americans emphasize the role of clusters in modern economy and regional development. Clusters refer to the tight connections that bind certain firms, industries, universities and local government together in various aspects – geographic location, sources of innovation, shared suppliers and factors of production, and so forth.

The main purpose of the paper is to find out the importance of qualitative and quantitative aspect of clusters in the Slovak Republic.

By means of Pearson correlation quotient we will emphasize the independent relations between business and employment and creation of GDP and between university graduates and employment. A partial aim of this paper is an application of selected quantitative method – shift-share analyses to investigate the cluster potential in Slovak regions. Next ambition is to evaluate the applicability method – shift –share analyses used for analyzing the industries adequate for cluster formation and its development. Based on the analysis we will try to recommended, in which other areas in Slovak regions could be new clusters created.

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JEL Classification: *P25, R11, C40.*

1. Introduction

The topic of clusters and clustering has recently come to the interest of experts from various scientific disciplines and executive branch states and regions. The regions dispose of different sources and conditions for the development of specific sector, which is also their comparative advantage. The regions diversifications generate a unique environment for companies with similar focusing; those are trying the use of comparative advantages of the region and create a network of companies interconnected by specific relationships – clusters.

A cluster is a geographically proximate group of interconnected companies in one area (region), operating in a particular sector. These groups of companies intervene in multiple sectors and multiple entities (e.g. suppliers, as well as government and other institutions – universities, research institutions, development institutions, trade associations, etc.) For the development of clusters it is especially important the base for innovative companies growth, that provide mainly the institutions with research and development character.

The main features of clusters are: management (from companies and public leaders), importance of meaning (cooperation and competition by entities interconnected in cluster), systematic approach (all participants have an equally important role), strong connection (between companies and institutions), informal ties (the most successful clusters operate with the help of informal social mechanisms that encourage competition with the help of favoring innovation).

If cluster is working correctly, it adds great value for both interconnected entities, as well as for the region.

The clusters play an important role in the regions that they contribute to increasing the competitiveness of the regions. On the other hand, excessive focus on one sector could lead to the

significant economic problems. Therefore, it is necessary to know the strengths and weaknesses points of existing clusters, and sectors identifications in regions, so that obtained results contribute to the most effective development of state and regional policy, by supporting of regional growth of economy.

The results of several researcher studies and development project particularly in foreign countries show that clusters are an important component of the regional economy for each state. They represent a potential tool how to increase regional values, due to the fact, that they use a combination of knowledge, skills and abilities of different subjects. While reducing the transaction costs and increasing the economic benefits of individual subjects occur in clusters to the creation of value for the customers. The benefits for enterprises in the cluster are in the form of an innovative approach to business, by which companies achieve improvement of their competitive position and improve the status of the region.

The issue of clusters becomes delayed part of interest of politicians and experts in Slovakia. While the European Union has linked research of clusters and clustering with a long tradition, in Slovakia this topic becomes the subject of discussion and interest particularly in the area of solving problems with the removal of regional disparities and the potential use of the regions. This is partly associated with the fact, that in Slovakia, there is no clear cluster policy whereas the cluster development is based on voluntary basis and cooperation of its individual members.

The theoretical bases of cluster

The clustering is not a new concept in the world economy. The cluster is an economic phenomenon that is placed in many research studies. Many definitions of cluster exist. In many research studies we can find definitions by default, context related and driven by purpose.

Questions about the formation of clusters as a strategic corporate purpose or to some extent give economists since the 19th century, for example Marshall in his work *Principles of Economics* (1890) who pointed on the importance of cooperation between industries that are concentrated in one place and can increase the benefit of the environment, for example through economies of scale. Marshall in his work so far defined the nature of clusters, but pointed out that the concentration and interconnectedness of businesses in industries concentrated in one place, in this way provides significant savings in localization. The Marshall's work follows several research studies and works, particularly those whose were of interest to agglomeration benefits.

A comprehensive theory of localization and industrial districts occurs late in the seventies of the 20th centuries, when Becattiny (1978, 1986 and 2002) defines the concept of industrial districts.

60th and 70th years of the last century were characterized by a decrease of the production in traditional disciplines. From this reason the necessity arose to look for new sectors, in which companies regain a competitive advantage. A change occurred in the 80th and 90th years of the 20th century, when American economists have pointed out that in addition to traditional sectors are geographically concentrated and to some extent, emerging sectors. These areas then exhibit more competitive both in domestic as well as global market. In 90th years of the 20th century mentioned theories engaged in their work M. E. Porter (1990, 1997, 2000) and Enright (1995).

Other important economists who deal with issue of cluster as the companies' agglomeration are Krugman (1991), Malmberg, Sölvell and Zander (1996). Authors like Sforzi (2002), Becattini (2001), Sölvell, Lindqvist, Ketels (2003) added to the definition of clusters model the area of social relations between the participants in the cluster. According to these economists, social capital cluster has a major impact on the development of the entire cluster.

According to many authors the clusters play an important role in several areas of state economy. Clusters represent one of the possibilities how to solve the problems with unbalanced economic development and growth, unemployment, financial stability not only in the region but also at the national and international level.

The widely accepted descriptions of clusters are definition by Krugman (1991), Malmeber (1996), Porter (1998), OECD (1999) or European Union (2008).

“Clusters are not seen as fixed flows of goods and services, but rather as dynamic arrangements based on knowledge creation, increasing returns and innovation in a broad sense” (Krugman, 1991).

“Regional clusters are limited geographical areas with a relatively large number of firms and employees within a small number of related industrial sectors. Thus, the clusters are specialised in a small number of industries. This reflects the more general point that economic, entrepreneurial and technological activities in specific industrial sectors tend to agglomerate at certain places” (Malmberg, 1996).

A cluster is a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities” (Porter, 2000).

Clusters” – local concentrations of horizontally or vertically linked firms that specialise in related lines of business together with supporting organisations” (OECD 2005).

„Clusters are seen as an important factor for the explanation of the empirical phenomenon of geographical concentration of economic and innovation activities“ (European Union, 2008).

Clusters can be defined as a group of firms, related economic actors, and institutions that are located near each other and have reached a sufficient scale to develop specialised expertise, services, resources, suppliers and skills.

According Habánik and Koišová (2012) the reason for the existence of clusters are localization saving but also the atmosphere of the sector derived from the formal and informal contacts, working procedures and traditions of the region and the ability of university to support its competitive potential.

In general clusters can be defined as a group of firms, related economic actors, and institutions that are located near each other. Clusters are defined by relationships and geography with the aspect of a concentration of one or more sectors, within a given region as well as the emphasis on networking and cooperation between companies and institutions. Clusters have reached a sufficient scale to develop specialized expertise, services, resources, suppliers and skills.

2. Method

Prior to a closer examination of the main elements of this paper we have to note, that clusters refer to a group of firms that cooperate on a joint development project - complementing each other and they are specializing in order to overcome common problems, achieve collective efficiency and conquer markets beyond their individual benefit are formed mainly by businesses, local governments and universities.

This paper used two statistical methods for findings in area of qualitative and quantitative aspects of Slovak clusters: the Pearson correlation coefficient and the shift and share analyses.

To detect the tightness dependencies between selected indicators we used Pearson's correlation coefficient, which is giving a value between -1 and +1. (Chajdiak, Komorník, Komorníková, 1999)

We suppose that between the statistical variables Y and X is a linear dependence and its progress expresses the function (Grmanová, 2006):

$$y'_i = b_0 + b_1 x_i, \quad i=1,2, \dots, n \quad (1)$$

where coefficients b_0, b_1 :

$$b_0 = \frac{\sum_{i=1}^n x_i^2 \sum_{i=1}^n y_i - \sum_{i=1}^n x_i \sum_{i=1}^n x_i y_i}{n \sum_{i=1}^n x_i^2 - \left(\sum_{i=1}^n x_i \right)^2} \quad (2)$$

$$b_1 = \frac{n \sum_{i=1}^n x_i y_i - \sum_{i=1}^n x_i \sum_{i=1}^n y_i}{n \sum_{i=1}^n x_i^2 - \left(\sum_{i=1}^n x_i \right)^2} \quad (3)$$

Coefficient b_1 is named a regression coefficient, if its value is positive we are talking about positive correlation, if it is negative, we are talking about negative correlation. This coefficient refers how many units of measure the average change the dependent random variable, where the independent random variable changes by one unit of measurement. According to Grmanová (2006) the Pearson formula is:

$$r_{x,y} = \frac{n \sum_{i=1}^n x_i y_i - \sum_{i=1}^n x_i \sum_{i=1}^n y_i}{\sqrt{\left[n \sum_{i=1}^n x_i^2 - \left(\sum_{i=1}^n x_i \right)^2 \right] \left[n \sum_{i=1}^n y_i^2 - \left(\sum_{i=1}^n y_i \right)^2 \right]}} \quad (4)$$

The range of the correlation coefficient is giving value from -1 to +1.

The second used method is the Shift and share analysis. The shift and share analysis provides a retrospective view of the causes of growth. (Blair, 1995). It provides a picture of how well a region's mix of industries is performing and shows how well individual industries are doing. It is a technique for breaking down the regional employment growth into three components:

National share component (NS) – an area's growth can be attributed to national economic growth. For instance, the share of regional job growth attributable to growth of the national economy. If a locality grew at the national average, it would have maintained its share of national employment, hence the "share" term of shift and share analysis:

$$NS_{ir}^t = E_{ir}^{t-1} \times \left(\frac{E_{NL}^t}{E_{NL}^{t-1}} - 1 \right) \quad (5)$$

where:

t = current time period

t-1 = one year ago

NL = national level

i = specific industry

r = specific region

Industry mix (IM) component - an area may grow faster (slower) than the national average if it has a disproportionate level of employment in industries that grew fast (slow) nationwide. For instance it estimates how many jobs were created/not created in each industry due to differences in industry and total national growth rates:

$$IM_{ir}^t = E_{ir}^{t-1} \times \left[\left(\frac{E_{iNL}^t}{E_{iNL}^{t-1}} \right) - \left(\frac{E_{NL}^t}{E_{NL}^{t-1}} \right) \right] \quad (6)$$

where:

t = current time period

t-1 = one year ago

NL = national level

i = specific industry

r = specific region

Regional shift (RS) - an area may have a competitive advantage (disadvantage) compared to other areas because its environment is conducive (an impediment) to growth of particular industries. The mix and competitive components account for regional growth that differs from the national level. It identifies the region's leading and lagging industries.

$$RS_{ir}^t = E_{ir}^{t-1} \times \left[\left(\frac{E_{ir}^t}{E_{ir}^{t-1}} \right) - \left(\frac{E_{iNL}^t}{E_{iNL}^{t-1}} \right) \right] \quad (7)$$

where:

t = current time period

t-1 = one year ago

NL = national level

i = specific industry

r = specific region

The formula for calculating the shift and share components for a single industry can be expressed as can be expressed as:

$$\Delta ei = NS_{ir}^t + IM_{ir}^t + RS_{ir}^t \quad (8)$$

where:

Δei = the change in local employment in industry I NS_{ir}^t = National share component
 IM_{ir}^t = Industry mix RS_{ir}^t = Regional shift

3. Results

Slovak Republic consists of 8 regions: Bratislava, Trnava, Trenčín, Nitra, Žilina, Banská Bystrica, Prešov and Košice. According to Statistical office of Slovak Republic (SOSR) in 2012, the Slovakia has a population over five million people and an area of about 49 000 square kilometres. In 2012 the inflation rate was recorded at 3,6%, the Slovakia's GDP was around 71 mld €, which represented growth of 3,4% over 2011, unemployment in this year reached rate of 14,4%. Slovakia's GDP comes mainly from the tertiary (services) sector, but an important role within the economy plays the industrial sector (car manufacturing and electrical engineering). In 2012 reported by the Statistical Office of the Slovak Republic, were registered 164 771 businesses (firms) in total.

With regards to different historical, geographical, natural, social and economic and other conditions, individual Slovak regions are limited by various level of social and economic development. (Habánik, Koišová, 2012).

The development of regions is affected by their available resources. (Masárová, 2012). In the Slovak Republic in 2012 according to the data from the Statistical office of the Slovak Republic, the largest share of the national average had sectors: manufacturing 24,78%, Wholesale and retail trade; repair of motor vehicles and motorcycles 13,47%, Education 10,26%, Public administration and defence; compulsory social security 9,52%.

Business activity in the Slovak Republic under the legislation can be performed by legal entities or private entities, which meet the requirements of the legislation. The registry of Statistical office of the Slovak Republic present data for the number of enterprises in these categories and categories of micro (0-19 employees), small (20-49 employees), medium (50 – 249 employees) and large businesses (250 and more employees).

In 2012 there were 387452 private entities, the self employed represents 92,81% of the private entities. There were 222 929 legal entities, the largest group of entities in this category are business companies (69,83%).

In the category of enterprises the most group presented category of micro enterprises (80,93%). The small and medium sized enterprises represents 99,63% of Slovak enterprises. From regional level, the highest share of SMEs on Slovak average has the Bratislava region (35,46%), the lowest share has the Trenčín region (7,94%).

With the development of enterprises in the region of Slovakia can by identify the convergence tendency. Historically from 2000 until 2010, Slovakia GDP in current prices increased by 199,54% from 22,00 mild € (2000) to 65,91 mild. € (2010). The aim of analysis of correlation between GDP and businesses is to evaluate the business as a part of regional development, especially in area of business effects connecting with creation of GDP in year 2010. The results are presented by figure 1. Based on the regression function $y = 0,6901x + 3,8736$ it can be concluded that the increase in the number of businesses per unit of regional GDP will grow by 0,6901%. By the regression models for the year 2010, we can based on coefficient of determination (0,9729) explained 97,3% of the common variability of GDP and the number of businesses therefore it is not possible that the relationship between enterprises and GDP is random.

The biggest influence on the economic development of the region has currently companies. Localization in less social and economic developed regions brings synergy effect for whole economy (Ivanová, 2012). It shows the correlation analysis prepared under Person coefficient, which shows a close relationship between business and employment indicators and regional GDP.

Based on the Pearson correlation coefficient (0,9863) and coefficient of determination (0,9729) dependency between regional share of businesses (%) and share of regional GDP (%) can be the dependent of the variable identified as significant. The result of correlation between businesses and GDP in regional dimension is significant.

The second important correlation is between regional share of businesses and level of regional employment rate. The results of correlation we can see on figure 2. Based on the regression function $y = 1,4166x - 60,294$ we can conclude that the growth of the regional share of businesses about one unit, rate of employment will increase about 1,42%. By the determination coefficient (0,6137) we can explain 61,37% of the common variability of regional employment rate (%) and regional share of businesses (%). Pearson coefficient of correlation (0,7834) pointed on significant power of dependence between the studied phenomenon.

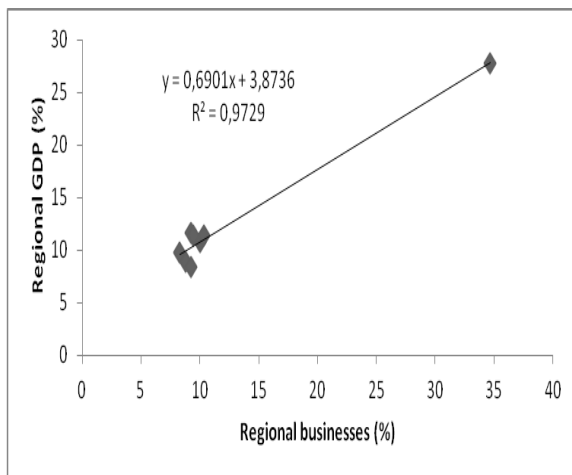


Figure 1. Regression relationship between GDP and businesses in the regions of Slovakia (2010)

Source: adapted by the author based on the data of the SOSR

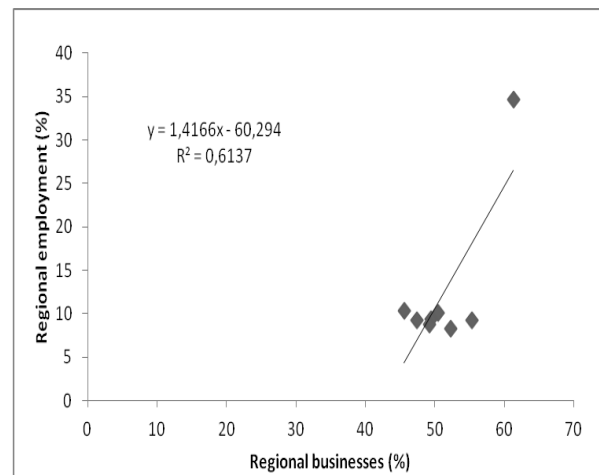


Figure 2. Regression relationship between employment and businesses in the regions of Slovakia (2010)

Source: adapted by the author based on the data of the SOSR

The next correlation explains the relation between regional share of university graduates students (%) and rate of regional employment (%). Based on formula $y = 0,4265x + 46,057$ in chart 3, we can conclude that regression coefficient indicates a positive dependence. It interprets that the increasing of the regional share of university graduates students by one unit increase the regional employment rate of 42,65%. Although the Pearson coefficient of correlation is 0,6965, that significant high level of correlation, this does not indicate an uniquely dependence due to the fact that there are many other factors that affect on the level of employment rates in the regions.

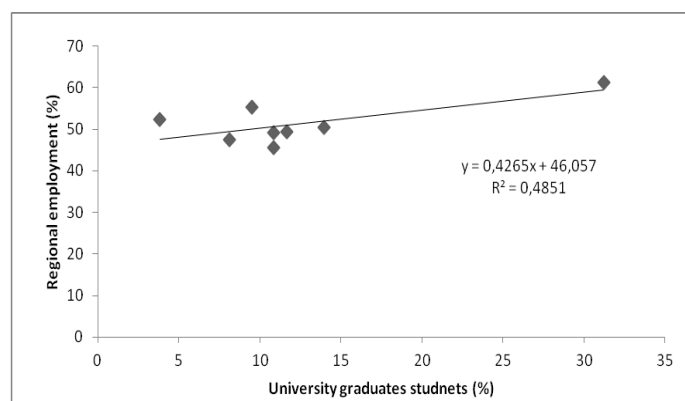


Figure 3. Regression relationship between university graduates and employment in the regions of Slovakia (2010)

Source: adapted by the author based on the data of the SOSR

Qualitative and quantitative aspects of the clusters in the Slovak Republic

Under the project: The problems of clusters efficiency measuring we found out that there are 18 officially established clusters in 8 regions of the Slovak Republic. We realized the questionnaire survey between these clusters, but the return of questionnaires was only 44.4% (completed questionnaire sent only 8 clusters). The clusters of tourism in at present are focusing on new legislation of tourism agencies and from this reason is possible, that they will work as this agencies, no as a cluster. That's why they didn't interest in participation in the survey.

According to the results of our analysis we can divide the Slovak clusters into 3 types: technology clusters, clusters of tourism, knowledge cluster. Table 1 presents clusters in the regions of Slovak Republic.

Table 1. The quantitative aspect of clusters in the Slovak Republic regions

Region	Cluster title	Number of clusters		
		Analysis	Questionnaire	
			returned	number of active clusters
Bratislava	Danube knowledge cluster	1		
Trnava	Automotive cluster Western Slovakia, Electro-technical cluster- Western Slovakia, Energetic cluster, Cluster for tourist industry – Western Slovakia, Cluster of tourism Eastern Slovakia, Cluster Smolenice, Construction cluster of Slovakia	6	4	3
Trenčín	-	0	0	0
Nitra	Slovak plastic production – oriented cluster, Association for the use of renewable and alternative energy sources	2	1	1
Žilina	Z@ict, Liptov cluster, Orava cluster, Turiec cluster	4	1	1
Banská Bystrica	1 st Slovak cluster in machine engineering, Balnea Cluster – tourism associations	2	1	1
Prešov	-	0	0	0
Košice	BITERAP cluster, Cluster AT + R, Kosice IT Valley, association of legal entities	3	1	1
SR in total	-	18	8	7

Source: adapted by the author based on the questionnaire survey

Forming successful clusters needs tight cooperation of three sectors: the public sector, academic sector and the private one. The representatives of three sectors are included in the analyzed clusters. When a real and genuine cooperation exists within the cluster, the cluster has more opportunities to survive and to operate well. The establishment of Slovak clusters including cooperation of self-government, municipalities with universities and businesses. Percentage of the three sectors when the clusters were established is shown in Figure 4.

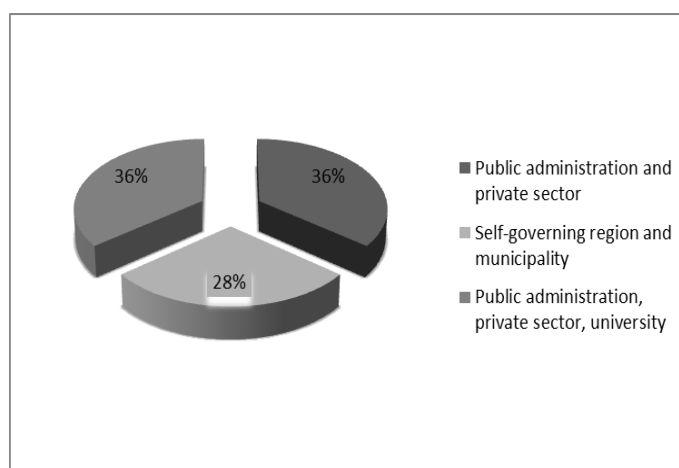


Figure 4. Establishing cluster

Source: adapted by the author

The first established cluster is cluster BITERAP in Košice region (2004), the last one Danube knowledge cluster in Bratislava region (2010). The first cluster with the university participation IT Valley Cluster (2007) in Kosice region (the University of Kosice), followed by the first Slovak engineering cluster in Banská Bystrica (2008), Z@ict in Zilina (2008), in Kosice region - Cluster AT + R(2010) and in the region of Bratislava - Danube knowledge cluster (2010). Table 2 presents relations between clusters and universities in the Slovak regions.

Table 2. Relations between clusters and universities in the Slovak regions

Region	Number of clusters involving universities		Number of universities in region	The number of universities involved to cluster
	Analysis	Questionnaire	Analysis	
Bratislava	1	0	11	3
Trnava	2	2	4	3
Trenčín	0	0	3	0
Nitra	1	1	3	1
Žilina	1	1	3	1
Banská Bystrica	1	1	3	1
Prešov	0		2	0
Košice	2	1	4	2

Source: adapted by the author based on the questionnaire survey

The table shows that in spite of the large number of universities in the region, only a small percentage is connected with the business sector and the local government.

According to the results of questionnaire involvement of universities in the cluster provides the following benefits: transfer of innovation, participation in large projects, preparation and implementation of research and development projects, support for research and development, organization and realization of scientific and technological research and development in the cluster.

The most important group of cluster participants are small and medium sized enterprises (SMEs). SMEs represent a segment of the business which tends in the current competitive environment to succeed and maintain a strong competitive in long term period. (Ivanová, 2012) As shown the table 3, in the Slovak regions operates a large number of SMEs that potential could be used for development of the cluster as well as the region itself.

Table 3. Clusters and small and medium sized enterprises

Region	Number of clusters	Number of SME	Number of clusters involving SME
Bratislava	0	42167	0
Trnava	4	11800	3
Trenčín	0	11383	0
Nitra	1	13870	0
Žilina	1	13747	1
Banská Bystrica	1	12386	1
Prešov	0	14120	0
Košice	1	14661	1

Source: adapted by the author based on the questionnaire survey

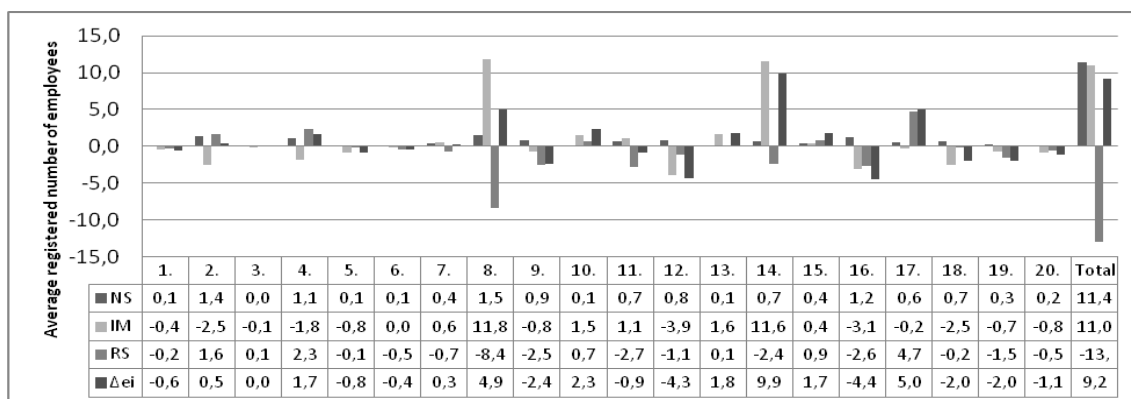
The application of shift share analysis in regions of the Slovak Republik

The method of shift-share analysis is based on information about employment in different sectors at the regional level as well as at the national level. For the purpose of this analysis was selected period of years 2009 – 2011, by the reason of changes in reporting categories of economic activity after year 2008 to methodology NACE rev. 2. Input data are information about employment in twenty sectors: 1. Agriculture, forestry and fishing, 2. Manufacturing total, 3. Mining and quarrying, 4. Manufacturing, 5. Electricity, gas, steam and air conditioning supply, 6. Water supply; sewerage, waste management and remediation activities, 7. Construction, 8. Wholesale and retail trade; repair of motor vehicles and motorcycles, 9. Transportation and storage, 10. Accommodation and food service activities, 11. Information and communication, 12. Financial and insurance activities, 13. Real estate activities, 14. Professional, scientific and technical activities, 15. Administrative and support service activities, 16. Public administration and defense; compulsory social security, 17. Education, 18. Human health and social work activities, 19. Arts, entertainment and recreation, 20. Other service activities.

The first step of shift share analysis is to complete data of employment in sectors in the Slovak regions. Data are obtained from the regional database of the Statistical Office of Slovakia in period 2009 and 2011.

Next step of this analysis is calculation of shift share components (coefficients). Using the variations of the traditional model of shift share analysis we calculated the shift share coefficients in accordance to the formulas set out in chapter Method, namely: National share component (NS), Industry mix (IM) component, and Regional shift (RS). Those coefficients had to be calculated for 20 sectors and 8 regions. Component NS refers to the impact of national economy on development jobs in analysed region.

Bratislava region

**Figure 5.** Components of shift share analysis in Bratislava region

Source: adapted by the author

In Bratislava region component NS refers, that the impact of the national economy would increase the number of jobs in Bratislava region about 11391 (NS equal to the rounded 11,4). The real access of employment in the observed period amounted the increasing of 9192 jobs. This difference was due to the internal structure of the Bratislava region economy, which represents the relative net change in employment, which is expressed as the sum of the sectoral mix (structural component IM) and regional changes (regional component RS). Net relative change in employment is contingent upon two factors at the same time structural and regional components.

The positive/negative value of IM indicates faster/slower growth for sector in the region compared with national level. In Bratislava region sectors: 7., 8., 10., 11., 13., 14. and 15., growth faster than the sectors on national level. The positive value of regional component (RS) for sector indicates that region has comparative advantage for this sector. In Bratislava region has comparative advantages in sectors 2., 3., 4., 10., 13., 17. Coefficient Δei reflects total increase or decrease in employment in various sectors of the national economy in the monitored region. In Bratislava region the highest increase we can see in sectors: 8., 14., and 17., the highest decrease is in sectors: 9., 12., 16. and 18.

In Bratislava Region was created, the Danube knowledge cluster. This fact as well as results of shift share analysis declares that in Bratislava region are created conditions for job growth and the potential development of clusters. Based on the results of the application of shift share analysis we can identify potential sectors for the formation of cluster in sectors. The highest value of real growth in the period under review achieves the sector 14., follows by sector 17.

Tрнава region

The Figure 6. presents the results of shift share analysis components in Trnava region. The analysis suggests that in period 2009 -2011 there was in this region an increase in the number of employees about 6213 jobs.

According to the positive result of RS we can conclude that employment in businesses in Trnava region grew faster than employment at the national level. The comparative advantage for this region is in the sector 6., 9., 16., Other values take values around 1 or 0, or the value is negative. We can conclude that region does not have significant comparative advantages. Despite this fact, in the region are active 3 clusters of 6 established clusters.

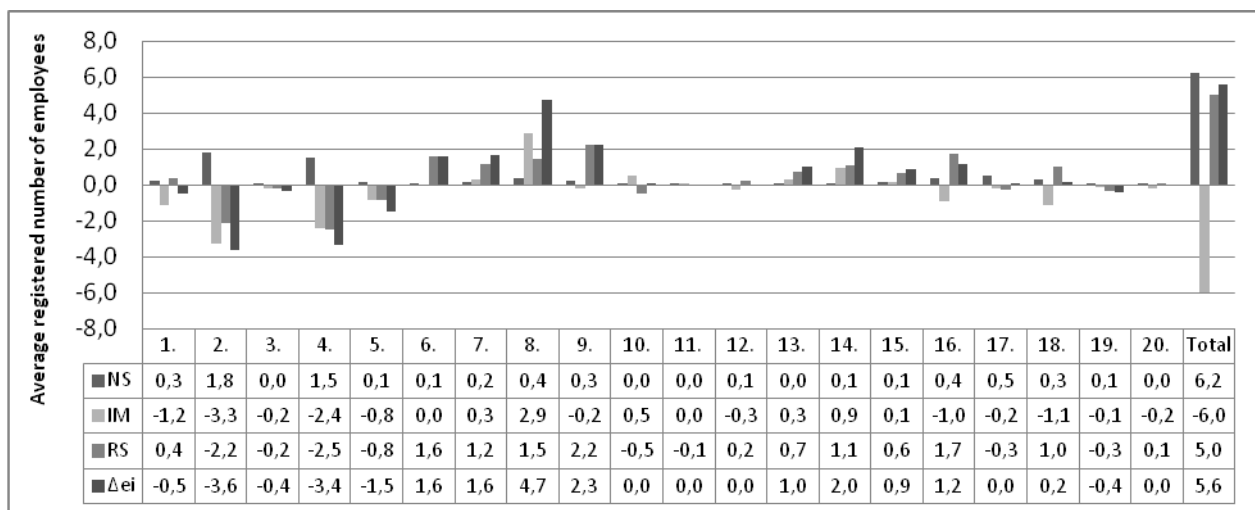


Figure 6. Components of shift share analysis in Trnava region

Source: adapted by the author

Trenčín region

In Trenčín region component NS refers, that the impact of the national economy would increase the number of jobs in this region about 7949 jobs. According to component IM we can

conclude, that the job growth is slower than national level in mainly in sectors: 2., and 4., and higher mainly in sector 8.. RS component presents influence of the local economy conditions. The comparative advantages are only in the sector 8. Total change in employment is 775 jobs. According to the results we can conclude, that potential for cluster creation is mainly in sector 8. In this sector, the employment has significantly increased and it can identify higher business potential than in other sectors.

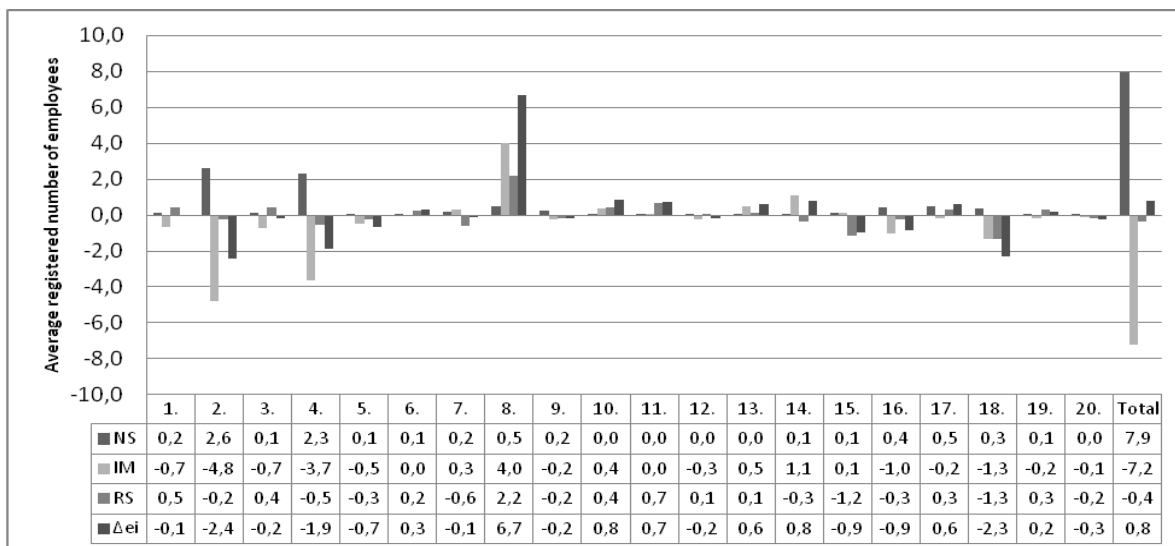


Figure 7. Components of shift share analysis in Trenčín region

Source: adapted by the author

Nitra region

Components of shift share analysis present the following results: the impact of the national economy would increase the number of jobs in this region about 7308 jobs, the sectors growth is slower, than national level, the comparative advantages in this region could be in sectors: 7., 9. and 11. Total employment increased mainly in sector 8., that presents possibility for cluster creation.

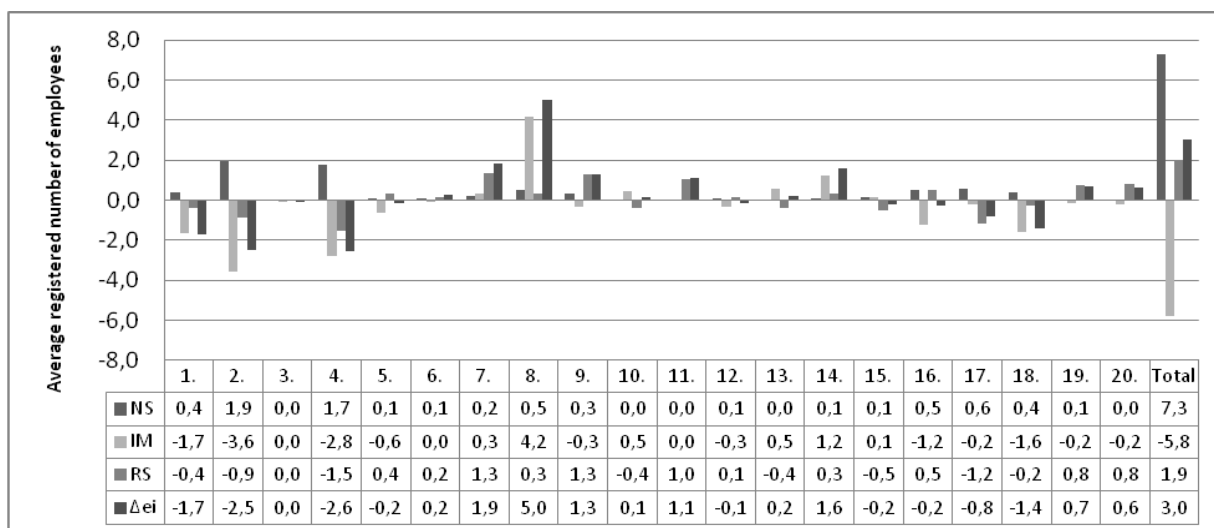


Figure 8. Components of shift share analysis in Nitra region

Source: adapted by the author

Žilina region

In Žilina region we can interpret the results of shift share analysis as follows: compared to the national average employment increased by 7224 jobs, sectors in the region are growing more slowly

than in the whole country. Region disposes of comparative advantages in sector 4. which can be attributed to the localization of foreign investors in the region.

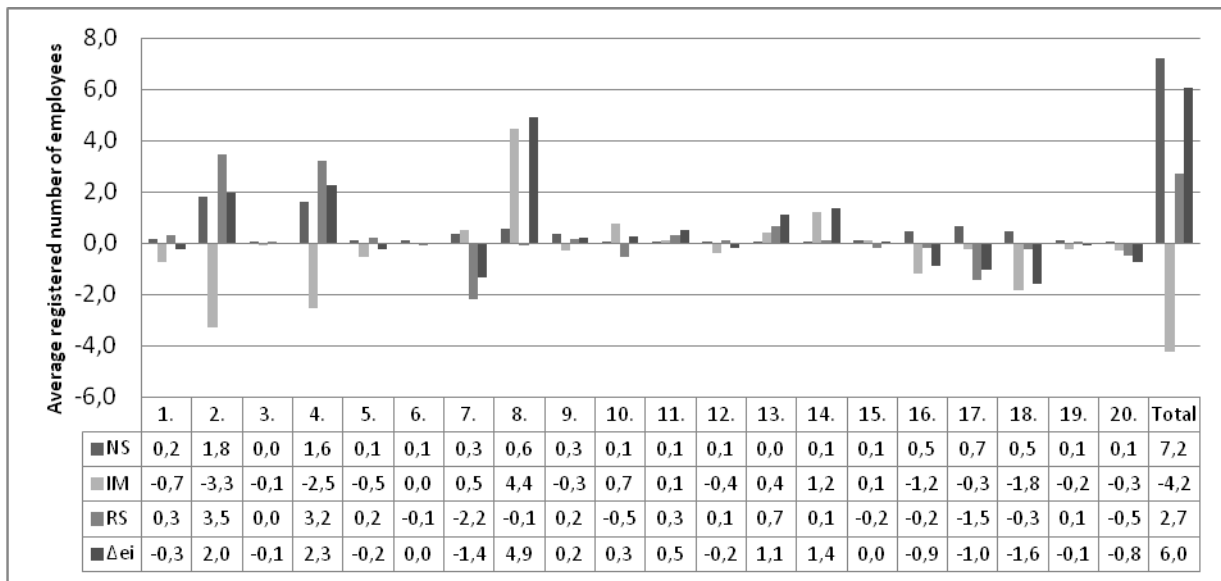


Figure 9. Components of shift share analysis in Žilina region

Source: adapted by the author

Banská Bystrica Region

In Region Banská Bystrica employment increased by 6437 jobs. Sectors in region growth slowly than sectors in national level and results of component RS had negative value, or value around zero, that expresses the problem with clustering. The results of total change in employment are low. According to the results of shift share component, we can conclude, that possibilities for the clustering are very low despite the natural conditions of the region.

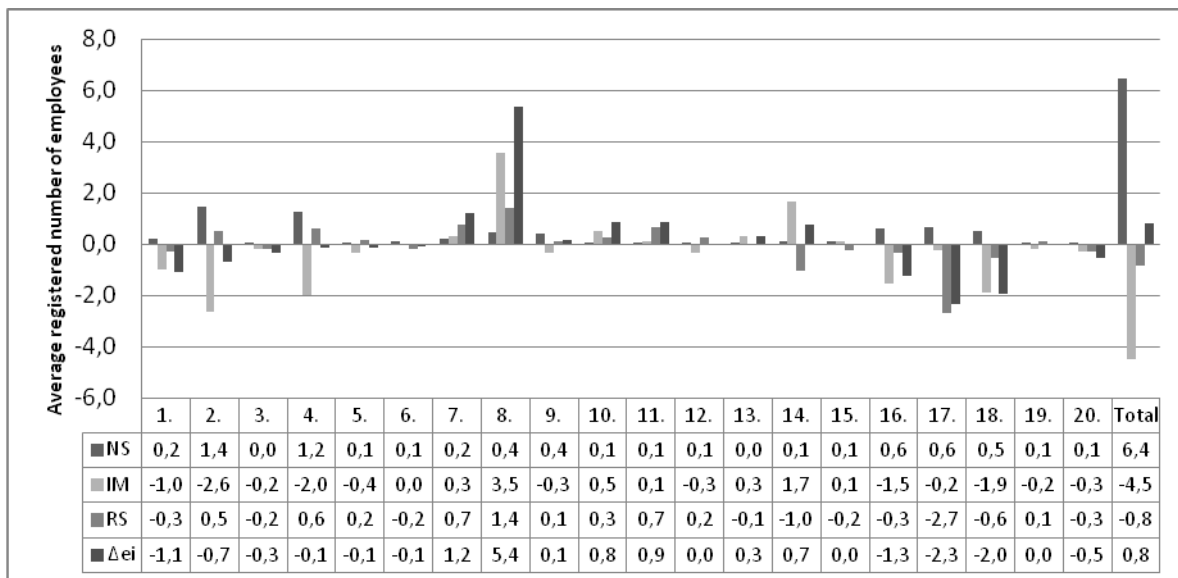


Figure 10. Components of shift share analysis in Banská Bystrica region

Source: adapted by the author

Prešov region

In Prešov region component NS refers, that the impact of the national economy would increase the number of jobs in region about 63915 jobs. The accumulated value of component IM has negative value that means that sectors in this region growth slowly, than sectors in

national level. The same situation is with the accumulated value of component RS. The positive value has only sectors: 13., 14., 15., 16. and 17., but their values are very low, that's way we can conclude that in this region are very low possibilities for clustering.

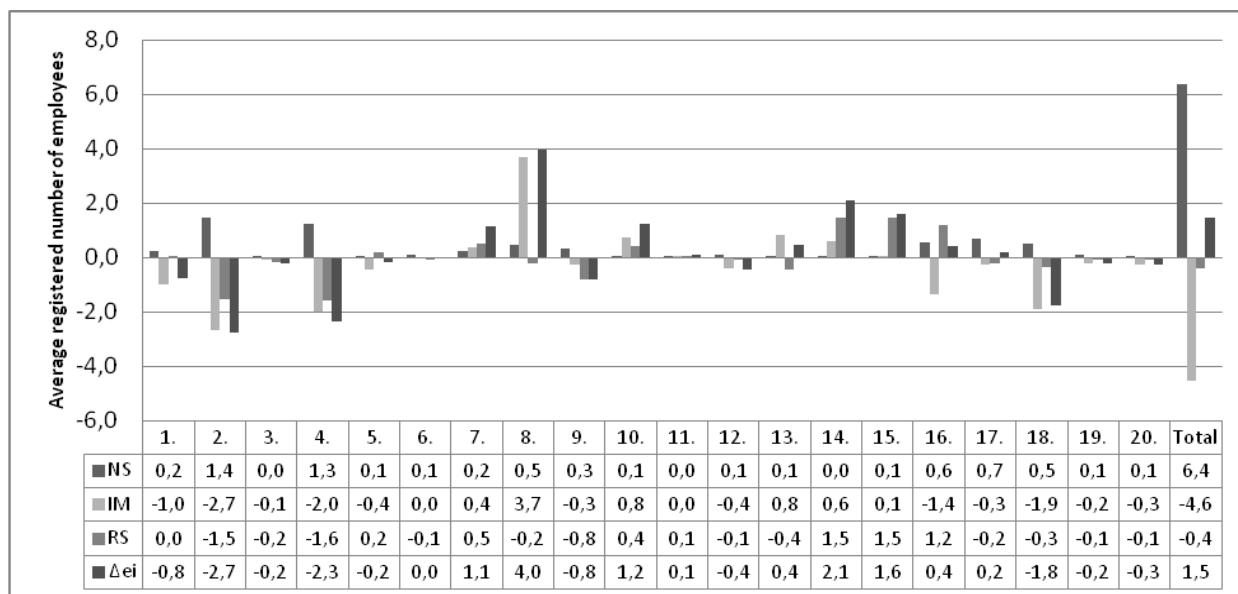


Figure 11. Components of shift share analysis in Prešov region

Source: adapted by the author

Košice region

The results for NS component in Košice region can be interpreted as meaning that in period 2009-2011 there was an increase in number of employees about 7718 jobs in whole national economy. Only component IM has negative value that means, that sectors in region grew than in national level. The region has comparative advantages in sectors: 8. and 18.

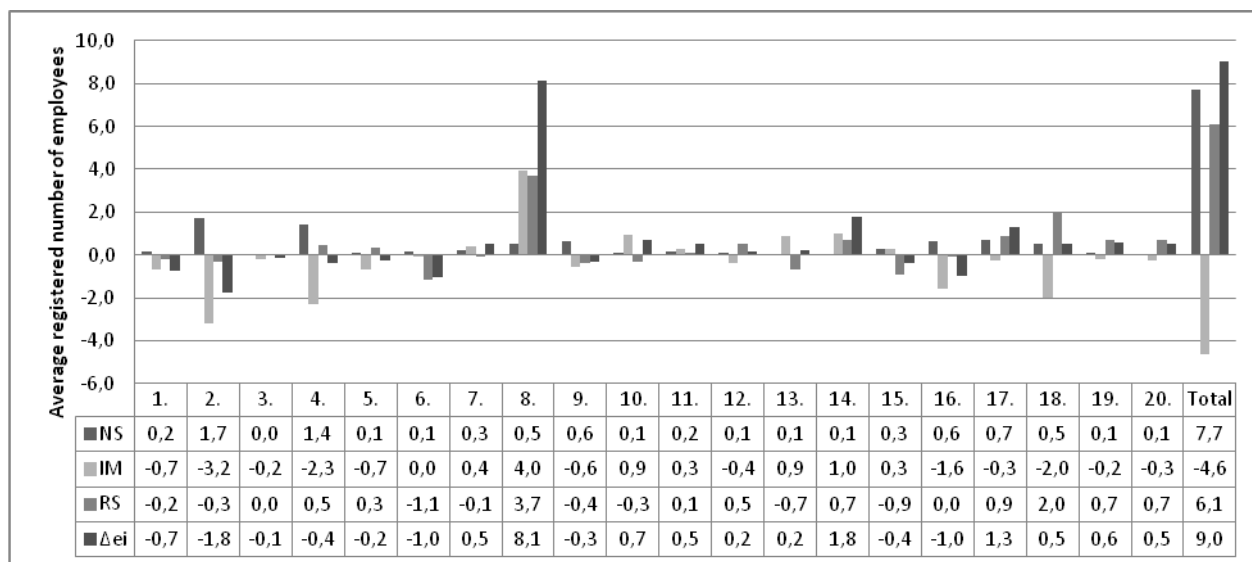


Figure 12. Components of shift share analysis in Košice region

Source: adapted by the author

4. Discussion

The formation and development of clusters in the European countries is considered as a tool for the regional competitiveness increasing, which the principle of "clustering" has become a key element for regional, innovation and industrial policies. Cluster is an element of the local economy,

which is the result of evolution and natural advantages of the region resulting from the close proximity to the location and intense collaborations. Enterprises concentrated in or around the cluster can on one hand to compete strongly and on the other hand they can cooperate. The success of the cluster depends mainly on the links with the region, resources, investment activities, encourage through various projects and legislation. Cooperation and competitions is a potential tool for improving regional values because it uses a combination of knowledge, skill, knowledge and know-how of several individual entities, thereby being he requested synergy.

The analysis and survey results show, that quantitative and qualitative level of Slovak clusters are very low. Clusters in the Slovak regions were mainly created as a result of natural competitive advantages, market forces, or even randomly. Clusters are mainly on a voluntary basis of their individual participants with low level of state support. For participants they are often a financial burden. For example it is necessary to pay membership fees and the effect of participation in the cluster is often very low, which is a major disadvantage, especially for small businesses. The biggest problem is legislation and financial support from national level, which are both absenting. Despite the great popularity in the EU, in the environment of the Slovak economy, clusters are not supported adequately according to their requirements. The overall development of cluster policy is at an early stage.

Only a few clusters, mainly technological, reach benefits for their participants. Active clusters help exploit the economic and scientific potential of the region, thus they contribute to enhancing the competitiveness of regions.

After performing the calculations, we can conclude that the shift share analysis as such cannot provide comprehensive information for recommendations regarding the establishment of the cluster in the analyzed sectors. The analysis does not examine the causes of the increase in employment in the various sectors of the national economy, respectively, in the regions studied. The actual ones show the increase in employment but in practice it does not have to mean that there is sufficient economic potential of enterprises in the sector, which could be used in setting up clusters.

For this reason, it is necessary to shift share analysis application supplemented by other research based on more elaborated analysis of regions and detailed survey of participants in cluster.

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