REGIONAL DISPARITIES IN THE SLOVAK REPUBLIC FROM THE POINT OF VIEW OF STRUCTURAL EMPLOYMENT

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Recently, much attention has been paid to the topic of employment in Slovakia and regional disparities. The aim of this paper is, on the basis of available data from regional databases and through the use of appropriate methodological apparatus, to draw attention to the development of Slovak regions' structural employment proportion on the total employment according to the sectors of agriculture, industry, construction and services in the time period from 2004 to 2012. The article examined the similarity of regions in terms of structural employment through cluster analysis at NUTS 2 level. Counties are grouped into four mutually similar clusters.

Keywords: employment, region, disparity

The overall situation in the labour market is affected by the labour supply which is conditioned by development and non-economic factors (demographic and social ones in particular). Another factor affecting the labour market situation is demand for labour, which is determined by technological and economic implications arising from the use of labour in combination with other production factors.

Employment in individual regions is significantly differentiated and is largely influenced by social and economic conditions of regions. Economic situation and backwardness of certain regions make it more difficult to create new jobs without which it is impossible to reduce unemployment.

People and businesses are concentrated where they can use various benefits which are important for them. For regional development it is important, inter alia, to define the determinants of competitiveness of regions, and to measure and analyze the major trends of economic performance with the inequality in the regions' development regularly. As stated in the national strategy for regional development (http://www.mpsr.sk/mvrrfiles/003994a.pdf), the main components of regional growth are: functioning labour market (employment) – especially a supply and demand, the common growth of employment, economic activity and the proportion of work force in the total working-age population. Population growth is also a distinctive feature of high-performance and fast-growing regions. Regional factors (productivity, employment rate, population growth, growth in the share of work force in the total working-age population, economic activity of the population) play greater role than national factors in the slow growing regions. Pachingerová (2011) in her publication argues that unemployment is only one of the indicators of regional disparities since it plays an extremely important role in regional development. The effort of each region is to achieve the lowest unemployment rate, or in other words, to maximize the employment. Another factor that provides information on attractiveness of a region is population migration. Trenčín, Banská Bystrica, Prešov and Košice are experiencing a migration loss. On the other hand, there is an increasing migration to the Bratislava region. Nižňanský (2007) stresses that economic development and thereby solution of regional disparities between regions and also within regions is not a task for the national governments primarily. The approach is different in different countries and results from the local conditions. Economic development is increasingly dependent on the degree of cooperation and interaction between the private and public sectors, and it is the role of any government to raise capacities of economic entities and their cooperation. According to the mentioned author, a strong territorial government has an important role in promotion of economic development.

The overall picture of regional differentiation in Slovakia is characterized by north-west – south-east polarization, with the worst indicators showing in the southern and north-eastern regions of Slovakia (Džupinová et al., 2008). The increasing level of regional disparities in Slovakia is also stated in other studies – eg. Matlovič and Matlovičová (2011), Korec (2009). Overall situation in the labour market is affected by labour supply which is conditioned by development and non-economic factors (demographic and social ones in particular). Another factor affecting the labour market situation is demand for labour, which is determined by technological and economic implications arising from the use of labour in combination with other production factors.

Employment in individual regions is significantly differentiated and is largely influenced by social and economic conditions of a region. Economic situation and backwardness of certain regions make it more difficult to create new jobs without which it is impossible to reduce unemployment.

Material and methods

The examination of structural employment was carried out on the basis of the data obtained from the regional databases of the Statistical Office of SR. To analyze regional similarities

in terms of structural employment, we used the method of multidimensional classification – cluster analysis. The method enables the classification of regions (objects) into groups so that we can see the greatest possible similarity of regions within the groups and the largest difference between the groups. We applied this method in our analysis in order to find similar regions (counties) according to the structural employment.

Because the implementation of the cluster analysis requires the fulfillment of a condition of insignificant multicollinearity between variables, the significance of the coefficients of correlation between the variables (employment in a sector) is analyzed by means of the correlation matrix on the significance level of 0.01. The hierarchical clustering method (Ward's method) is used in the study for classifying objects into groups, which creates a stable and approximately equally sized groups – clusters. This method differs from all the others because it uses analysis of variance to determine the distance between the clusters (Stankovičová and Vojtková, 2007). Clusters are formed in such a way that the inner cluster sum of the squares is minimized. Hierarchical clustering methods are based on individual objects that represent clusters. By joining them, the number of clusters gradually decreases until finally all clusters are combined into a single unit. Hierarchical methods lead to a hierarchical (tree) structure, resulting in a graphical tree diagram – dendrogram.

## Results and discussion

Agriculture

In the EU, we are among the countries with a high proportion of the rural population. As stated on the website of the Ministry of Agriculture and Rural Development of SR, the concept of rural development has these key priorities: development of economic activities suitable for rural areas, environmental protection and cultural fund, and improvement of the quality of life of the rural population.

Food production and trading is the most important part of the agricultural industry. An essential aspect of life

is food security. Environmental agriculture allows us to develop rural tourism and use it as a supplementary activity for farmers. Although agriculture currently accounts for only about 3.3% of the total employment in the Slovak Republic, in the light of the above aspects, it is a key sector of the national economy. Gozora (2007) argues that different production-economic conditions determined the significant regional disparities. He notes that production and economic differentiation of the business economic base of the agricultural sector adversely affects the social level of the rural population. Through the development of relative employment in the agricultural holdings in 1994–2004, we got below the EU average agricultural employment (4.5 employee per 100 ha of agricultural land). Development of employment in this sector follows the developments in advanced European countries and it can be expected to be stabilized at the current level.

Regional disparities in the agricultural proportion of employment are visible in both years (2004 and 2012). Nitra and Trnava have significant advantages in employment in agriculture over other regions of Slovakia, but especially over the Bratislava region (Figure 1). In 2004, the Nitra region had the highest proportion share of employment in agriculture (21.22%). In 2012, there was only a slight decrease (to 20.18%). The Nitra region has the best conditions for agricultural production in Slovakia. Its mild and dry climate and soil of the highest quality are excellent conditions for the cultivation of cereals and maize. The region is also famous for the production of quality wines. Another region with the highest representation is the Trnava region. In 2004, the share of total employment in agriculture was 17.2%, in 2012 the proportion fell to 16.99%. The Trnava region was, and still is, a very important agricultural area in Slovakia, particularly for its natural potential. Fertile soils and mild climate are favourable for the cultivation of cereals which had given the southern part of the region its name "Rye Island" (Žitný ostrov).

The lowest share of the employment in agriculture was in 2004 in the Bratislava region (4.87%), in 2012 it was slightly less – 4.53%. In the past, Bratislava region used to belong to the major agricultural producers. Currently, the region is
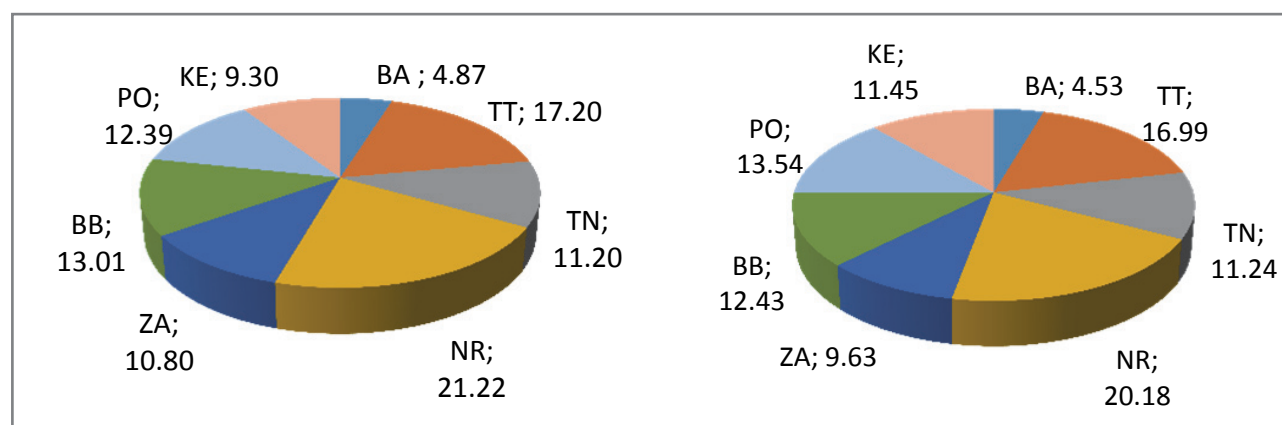
Figure 1   Employment in the agriculture by regions
Explanatory: BA – Bratislava region, TT – Trnava region, TN – Trenčín region, NR – Nitra region, ZA – Žilina region, BB – Banská Bystrica region, PO – Prešov region, KE – Košice region
Source: RegDat, own calculations

focused on services and industry. Share of the other regions in agricultural employment ranges from about 9% to 13.5% in both periods.

Despite the significant decline in the employment, agriculture and forestry are still offering most of the jobs in certain regions. Last but not least, it should be noted that the age structure of those employed in agriculture is changing.

Industry

The employment in the industry accounted for almost one-third during the entire period. All regions are very similar, only the Trenčín region with a share of 18.48% in 2004 and 18.07% in 2012 exceeds the other regions (Figure 2). The most important manufacturing sectors of the region are automotive, mechanical engineering, electrical and electronics industry, textile manufacturing. Engineering production was in the past mainly focused on the army purposes. The region is also developing new progressive sectors. Electrical production in Nová Dubnica constitutes more than 75% of industrial production of the city. Foreign investors are behind the major investments in production of cable harnesses and control elements. AUO Corporation, one of the largest manufacturers of LCD panels in the world, has invested 191.3 million Euros in Trenčín, promising that they will create around 1,300 direct and 2,000 indirect jobs (http://www.sario.sk/).

The lowest representation of employment in the industry has the Prešov region (in 2004 10.5%, in 2012 10.15%). In the other regions, the figure was around 11–13% in both years. The Košice region has an important place in the Eastern Slovakia region, although its share of employment is not one of the highest. In 2004 it was 12.15%, by 2012 this was down to 12.06%. The region has an industrial character, covering all sectors. The Košice region is also particularly important for its production base which has a key position in the economy of the whole country. The industry is mainly concentrated in the districts of Košice, Michalovce and Spišská Nová Ves and covers all sectors, from food to metallurgy. In terms of industrial structure, the most important sectors in the region are metallurgical, chemical and electrical industries. Metallurgy is undoubtedly dominant and accounts for 60%

of industrial production of the region and 50% of its export. The largest company in the region, U.S. Steel Košice operates in this sector. The other two sectors are also strongly export-oriented. Chemko Strážske develops activities in the field of organic and inorganic chemistry. Companies with foreign capital such as BSH Drives and Pumps Michalovce operate in electrical sector.

Important position is being held by the Žilina and Nitra regions, where the share of employment in industry increased in 2012. The best performing companies in the Žilina region are active in the automotive industry, metallurgy, mechanical engineering, production of wood, pulp, paper and similar products. The region has a relatively important position in electrical engineering and telecommunications. Its importance is growing mainly due to the activities of foreign investors. Currently, the fastest growing industry is the automotive industry thanks to VW, KIA and their suppliers present in the region and many other companies related to the automotive industry. Three industries are concentrated in the Nitra region: paper, chemical industry and mechanical engineering. Industries in the region have a specific character because they are concentrated in cities which then obtain a homogeneous character. For example, Šaľa is the center of chemical production, Komárno is the center of shipbuilding, Tlmače is focused on engineering. Only the county town Nitra has significantly diversified industries. Industry is the only sector that is spread most proportionally.

Construction industry

The sector's share on the employment in Slovakia is less than 5% (3.41% in 2004, 4.85% in 2012). Employment in construction is in Slovak regions significantly differentiated. Most employed in construction are in the Bratislava region. While in 2004 it was 21.07% of all builders in Slovakia, in 2012 there was a decrease of 0.85 percentage points (Figure 3).

Another Slovak region where the construction industry makes a significant percentage is Žilina. Like in the Bratislava region, there was a slight decrease in 2012 compared to 2004 (14.65%). A significant decrease occurred in the Košice region – from 13.91% share in 2004 to 8.68% in 2012 (-5.23 pp). The
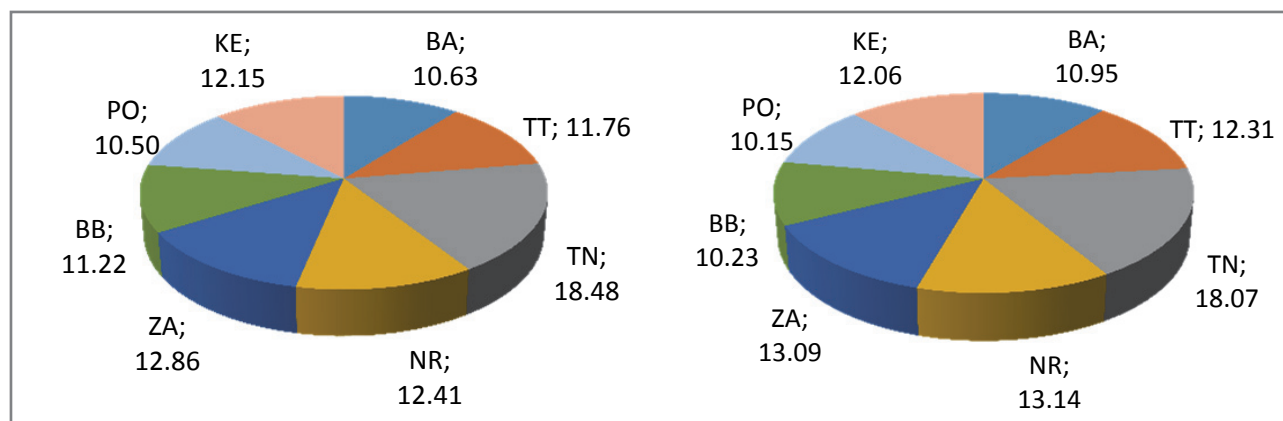
Figure 2   Employment in the industry by regions
Explanatory: BA – Bratislava region, TT – Trnava region, TN – Trenčín region, NR – Nitra region, ZA – Žilina region, BB – Banská Bystrica region, PO – Prešov region, KE – Košice region
Source: RegDat, own calculations
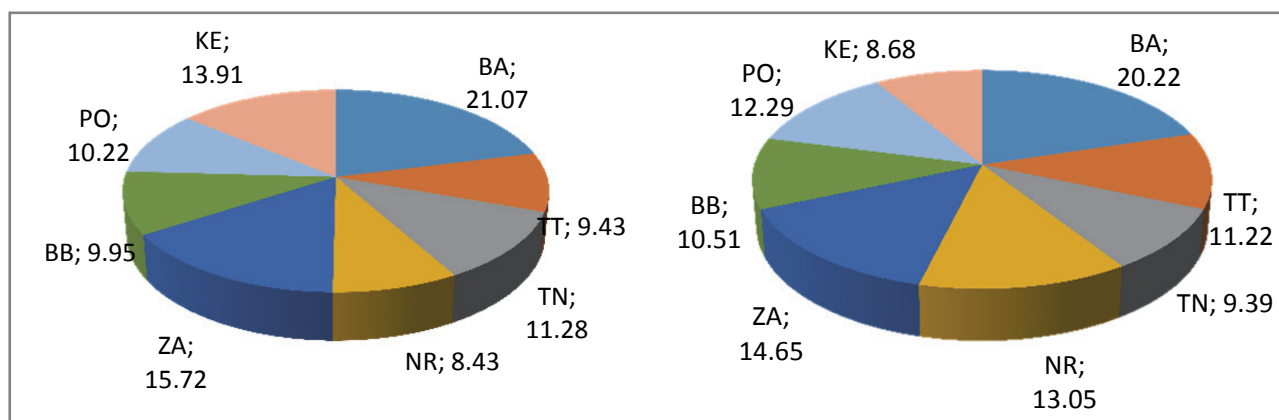
Figure 3   Employment in construction industry by regions
Explanatory: BA – Bratislava region, TT – Trnava region, TN – Trenčín region, NR – Nitra region, ZA – Žilina region, BB – Banská Bystrica region, PO – Prešov region, KE – Košice region
Source: RegDat, own calculations

lowest representation of construction workers in 2004 had the Nitra region, but in 2012 it was ranked third behind the Bratislava and Žilina regions. In 2012, the situation was worst in the Košice (8.68%) and Trenčín regions (9.39%).

Services

The highest employment rate in Slovakia is in the service sector which accounts for around 60%. Its development since 2004 has been gradually increasing from 58.01% in 2004 to 60.31% in 2012. The Bratislava region is the leader in employment in services. The employment situation had been increasing since 2004 until 2008 (from 23.59% in 2004 to 25.52% in 2008). By 2010, the employment fell by 0.86 percentage points, followed by an increase to 24.49% in 2012 (Figure 4).

The Košice region is the second one in the employment in services. The development during 9 years was almost stagnant. While the employment in the sector had been 13.96% in 2004, in 2012 it decreased by only 0.18 percentage points. The Nitra, Žilina, Banská Bystrica and Prešov regions are very similar in terms of the share of employment in services. There was a slight decline everywhere, the greatest in the Žilina region by 0.44 percentage points, despite the

fact that the share of employment in services for the whole Slovakia increased. In contrast, the Trnava and Trenčín regions saw a slight increase.

Classification of Slovak regions according to the structural employment

The aim of this part of the paper is to divide the regions of Slovakia into parts that are similar to each other in terms of the structural employment (agriculture, industry, construction and services). We applied the hierarchical cluster analysis in order to classify the regions multidimensionally. Given the number of regions, these are relatively small groups characterized by similar size of the intensity indicators of sectors' representation. We have decided to create four clusters for more logical interpretation.

Figure 5 shows via dendogram a sequence of joining similar regions on different levels of clustering. The first cluster includes the whole eastern region, Košice, Prešov and Banská Bystrica. The second cluster includes Žilina, Nitra and Trnava. The third cluster is only the Trenčín region. The fourth cluster consists only of the Bratislava region.
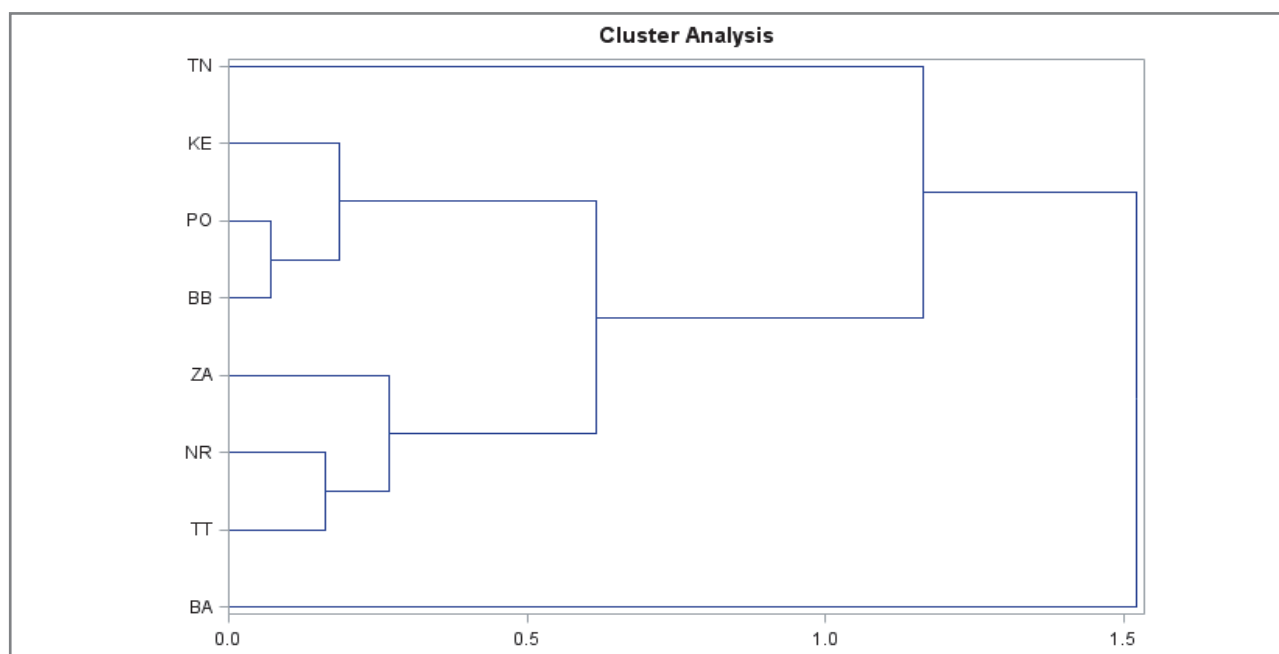
As already mentioned, the first cluster consists of the eastern regions (Figure 5). These regions are similar to each
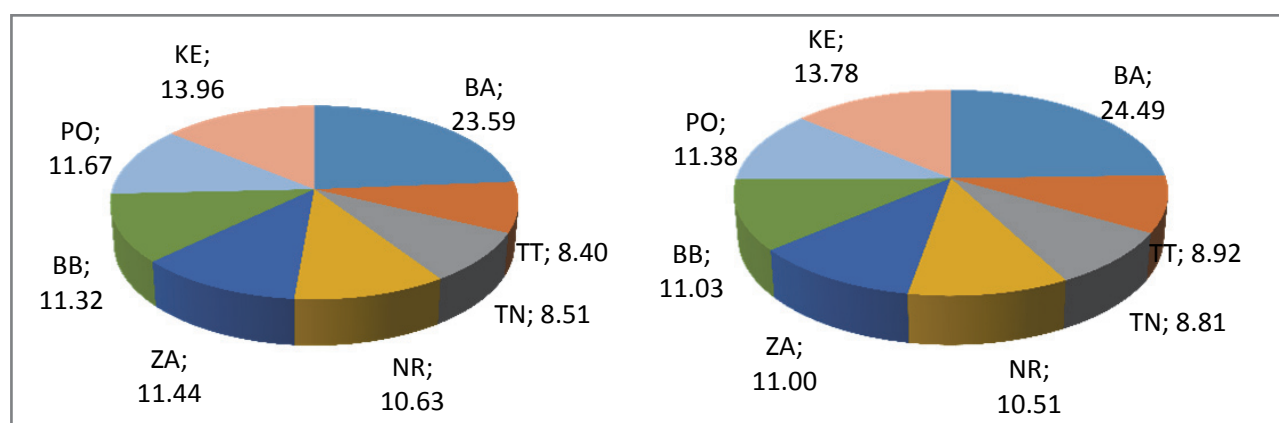
Figure 4   Employment in services by regions
Explanatory: BA – Bratislava region, TT – Trnava region, TN – Trenčín region, NR – Nitra region, ZA – Žilina region, BB – Banská Bystrica region, PO – Prešov region, KE – Košice region
Source: RegDat, own calculations

Figure 5   Dendogram of regional clusters according to relevant sectors
Source: own calculations using SAS software

other in terms of percentage representation of employment, particularly in industry (average 29.38%) and the share of employment in services (average 62.59%) (Table 1). The shares of employment in the construction sector (average 4.45%) and agriculture (average 3.58%) in the regions are also similar. The regions are dominated by high employment in services. The cluster is characterized by a relatively high employment in industry (excluding Bratislava).

The second cluster is formed by the Nitra, Žilina and Trnava regions (Figure 6). The cluster differs from the

previous one in terms of share of employment in industry (average 35.89%). The employment in industry in this cluster is substantially higher, and in the services sector (average 53.98%), compared to the previous cluster, it is significantly lower. There is also a significant difference in the proportion of employment in the construction sector, where the share is higher than in the first cluster (average 5.55%). Percentage in agriculture (average 4.58%) is also higher when compared to the previous cluster. The cluster is characterized by the predominant employment in services and the employment

Table 1   Regional clusters according to relevant sectors
            Report Listing

CLUSTER = 1

	Agriculture	Industry	Construction industry	Services
BB	3.80	29.88	4.72	61.60
PO	4.02	28.82	5.37	61.79
KE	2.92	29.46	3.26	64.36

CLUSTER = 2

	Agriculture	Industry	Construction industry	Services
TT	5.41	37.45	5.25	51.89
NR	5.65	35.19	5.37	53.79
ZA	2.69	35.02	6.03	56.26

CLUSTER = 3

	Agriculture	Industry	Construction industry	Services
TN	3.13	48.13	3.85	44.89

CLUSTER=4

	Agriculture	Industry	Construction industry	Services
BA	0.77	17.85	5.07	76.31

Source: own calculations using SAS software

in the industry is also relatively high. The cluster is specific by the highest proportion of representation of employment in agriculture, which is determined by the geographical location of regions and suitable conditions for agriculture and related activities.

The third cluster, as presented in Table 1 and Figure 6, constitutes of a separate region of Trenčín. This differs from all the other clusters in the majority share of employment in the industry (48.13%). Employment in the services in this region is lowest (44.89%) when compared to the other clusters. Its share of employment in agriculture (3.13%) and construction (3.85%) is rather close to the first cluster.

The fourth cluster (Figure 6) also represents only one region – Bratislava. This one differs from all other clusters in a high share of employment in the services sector (76.3%), which significantly exceeds the share of employment in all areas of Slovakia (Table 1). There is also a significant difference in the proportion of employment in industry (17.85%). Compared to the other clusters, there is a lower proportion of employment. The share of employment in agriculture (0.77%) is the lowest. The employment in construction sector (5.07%) is similar to the first and second cluster.

Similarity of regions based on the results of cluster analysis confirms the above results on the representation of employment in the regions.

Conclusion

The highest share of employment in agriculture in SR have the Nitra (20.18%) and Trnava regions (16.99%), the Bratislava region has the lowest share (4.53%). In the industrial sector, the Trenčín region (18.07%) has the highest share of employment and the Prešov region (10.15%) has the lowest. The construction sector represents the highest proportion in the Bratislava region (20.22%) and the lowest in the region of Trenčín (9.39%). The Bratislava region has the highest share of employment in services (24.49%) and Trnava has the lowest one (8.81%).

It is interesting to compare the proportion of Prešov (the least developed) and Bratislava (the most developed) on the overall structural employment. While their employment proportion in the industry is approximately equal (10.15%) and (10.95%), the situation is vastly different in the construction sector. The Bratislava region has the highest proportion (20.22%), Prešov has only (12.29%). Counties' share of employment in the services sector is also significantly different – 11.38% in Prešov and 24.49% in Bratislava.

By applying multidimensional cluster analysis method for multidimensional classification of Slovakia's regions under structural employment, the regions of Slovakia are grouped into 4 clusters according to their similarity. The first cluster consists of the eastern Slovakia regions: Košice, Prešov and Banská Bystrica – high share of employment in services, the second cluster: Nitra, Trnava and Žilina – having the highest share of employment in agriculture, the third cluster consists of Trenčín alone – the highest share of employment in the industry and fourth cluster consists of the Bratislava region with the highest share of employment in services.

The paper pointed out regional disparities (between regions) in the structural employment. We have to note that significant disparities are also within the individual regions.

For instance, the Banská Bystrica region is a typical example where we can see significant differences in unemployment due to the districts such as Rimavská Sobota, Poltár, Revúca, or Lučenec and other ones which have a high proportion of Roma population, persistently high unemployment, inadequate business environment, lack of investors for entrepreneurial activities, and thus only few employment opportunities. In further analyses it would therefore be useful to focus on examining regional disparities at a lower level (NUTS 3 – districts), and to highlight their significant differences in relevant indicators of socio-economic levels.

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