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Natural climatic conditions as a determinant of productivity and economic efficiency of agricultural entities

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Abstract: The scientific contribution builds on the previous scientific studies analysing the determinants of productivity and economic efficiency of the agricultural entities and extends the knowledge of the spatial econometrics area at the NUTS IV level (at the district level) for the reporting period. The paper aimed to assess the development of productivity and economic efficiency of the agricultural entities in the reporting period based on the synthetic evaluation of the selected economic indicators by the methods of cluster analysis, and so to create a spatial map according to the regional differentiation at the NUTS IV level. On the basis of the completed analysis, we can conclude that the natural and climatic conditions have a dominant influence on the achievable productivity and economic efficiency of the agricultural entities in ensuring the sustainability of the economic performance of agriculture in different regions of Slovakia. On the basis of conducting the analysis, there were clearly defined two relatively coherent areas in Slovakia (at the district level), which are characterized by differences in the achieved production indicators and allow the regional differentiation of Slovakia into districts with more and less prosperous agricultural enterprises.

Key words: economic performance, agrarian businesses, spatial econometrics, cluster analysis

The agricultural sector is one of the most important parts of the economy of each country and plays an important role in the production, exports, employment of people as well as meeting the nutritional needs of the individual countries. The development of the agricultural sector is a prerequisite and a fundamental need of economic development of every country and the growth and development of other sectors are dependent on the removal of barriers precisely in this sector (Emamverdi 2012).

Olajide et al. (2012) sees the importance of agriculture in the fact that it contributes to the growth of the economy, provides the employment opportunities for the population and incomes from export and reduces poverty in the economy. The stagnation in agriculture is the main explanation for the poor economic performance, while increasing agricultural productivity is the most important part of a successful industrialization. In general, the agricultural sector contributes to the economic development in four main directions – the benefit in terms of product, production factor, the market benefit and the benefit in terms of the foreign trade.

After the year 1990 (after the entry into the new market environment), the agricultural entities entered the road of difficult structural, economic and social changes. The measurable improvements were reflected only in some aspects of technical performance and competitiveness. There were created new forms of business, the number of subjects increased and their

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average concentration was reduced. Subsequently, the entry of Slovakia into the European Union opened a large European agricultural market to Slovak agricultural producers and simultaneously removed all barriers to the domestic market. It led to new challenges in terms of productivity and economic efficiency of the domestic agriculture (Bielik and Rajčániová 2004; Grznár et al. 2009; Bujňáková 2010; Dubravská 2013; Širá 2013).

The agricultural production activities provide both the livelihood for the inhabitants of towns and villages, but also raw materials and starting materials for the industrial production as well as the employment for a relatively large portion of the workforce or other resources. The agricultural sector as well as other sectors of the processing industry must make the optimal use of resources and use them with the highest level of efficiency. The principle of expertise and efficiency is one of the fundamental issues in the economic science, especially in the terms of economic growth and price stability and the concepts of productivity and efficiency are frequently cited indicators of competitiveness. The economists show a the long-term interest in the study of agricultural productivity. They identify and analyse differences between countries in agricultural productivity, in order to obtain a better understanding of those factors which are the most effective in the terms of its increasing. To achieve a higher performance in the agricultural sector, which provides basic materials for the industry and the livelihood or jobs for large numbers of people, it is important to identify those factors that affect the productivity in this sector (Besharat 2011).

The optimal use of production factors in relation to productivity and economic efficiency of the agricultural entities as well as their determinants are examined by a number of domestic and foreign authors in many published scientific studies (Kalirajan and Shand 2001; Rosochatecká 2002; Juřica et al. 2004; Covaci and Sojková 2006; Dinar et al. 2007; Sojková et al. 2008; Papoušek 2011; Střeleček et al. 2011; Chrastinová and Burianová 2012).

In the economic literature, there is used a variety of terms expressing the ideas about efficiency. Hubbard and O'Brien (2012) define the economic efficiency as a result of the market in which the marginal benefit of the consumer of the last unit produced is equal to the marginal cost of production and in which the sum of the consumer surplus and the producer surplus is at the maximum. According to Kilmer and Armbruster (1984), it is an economically efficient allocation of resources, maximizing the consumer and producer surpluses. Skaggs and Carlson (1996) define the economic efficiency as obtaining the maximum benefit for the given cost or minimizing the cost for the given benefit. Basically, the overall economic efficiency is achievable if the individuals in the society maximize their utility relative to the available resources in the economy. In other words, increasing economic efficiency increases the welfare of the community, which represents the ultimate goal of most policies or regulatory efforts (Kirigia and Asbu 2013).

The economic effectiveness is a way of the economic expansion of countries across different sectors, not excluding agriculture, and it also leads to the country's competitive advantage in the global field. Whereas all activities should be aimed at increasing efficiency, so just its measurement should be discussed as one of the fundamental tasks of the increasing process efficiency and the subsequent optimal use of resources and improving the quality of production. In order to measure the effectiveness of the organization which uses several production factors, there is used the index of the overall productivity of factors. For the calculation of the efficiency in agriculture, there is often also used the Mamlquist index (Emamverdi 2012).

An important group of factors which greatly influence the size and volume of production as well as the economic efficiency are the natural climatic conditions. These determine the spatial distribution of agricultural production, its specialized zones as well as the development of the interregional food market. The most important of these conditions is land which is of the paramount importance as a production factor. It is the original source of all material wealth. The economic prosperity of every country is closely linked to the wealth of its natural resources. The quality and quantity of agricultural land of the country depends primarily on the nature of soil, the climate and the rainfall. The soil quality represents more than the ability to receive, store and recycle water, nutrients and energy. It is also about the ability of the soil to maintain the ecological productivity, the environmental quality and promote the health of plants and animals (Scott 2002). The importance of this production factor is so great that ultimately affects the living standards of people. .

The relations between the climate change and agriculture are complex and diverse. The factors that affect the climate are constantly changing and this phenomenon has a multidimensional impact on hu-

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man livelihoods. From all areas, mainly agriculture is very dependent on the climatic conditions. Regarding these conditions, there are changed also the indicators related to agricultural sustainability such as the volume, yield, areas and production value. When the agricultural sustainability is revealed as vulnerable, the economic indicators such as the total quantity of production, the trade margin of crops and final products or the wage rates fluctuate (Alam et al. 2013). In addition, the climatic factors influence the social and economic sustainability of farmers either directly or indirectly. They cause the damage to crops, leading to the low productivity and high production costs. It leads to a loss of income of farmers, increasing the level of poverty and the seasonal unemployment rate.

The natural climatic conditions are the primary determinant of the agricultural productivity. The possible effects of the long-term climate changes on agriculture have been examined by several scientific authors in their research studies (Adams 1998; Wiebe 2003; Iglesias et al. 2009; Alam et al. 2013).

The change of climate and the associated physical conditions affects the crop and livestock production, the water balance, inputs and other components of agricultural systems. The yields of crops and livestock are directly affected by the changes in climatic factors such as the temperature, rainfall, the frequency and severity of extreme events as droughts, floods and windstorms. The climate change can also change the type, frequency or intensity of the pest outbreaks of various crops and livestock as well as the availability and timing of the water supply for irrigation and the severity of soil erosion (Adams 1998).

Slovak agriculture has experienced several institutional and economic changes in the last two decades. These changes had a significant impact on the performance, structure and size of Slovak agriculture (Pokrivčák et al. 2006; Matejková et al. 2008). However, despite the aforementioned tendencies, Slovak agriculture is characterized by the differentiation of the achieved economic results, regarding the size of agricultural enterprises (measured by the number of employees) and the size of agricultural land, the legal form of enterprises and natural conditions (Chrastinová 2012).

The agricultural production in Slovakia is available in different natural conditions that are one of the decisive factors of its different economic efficiency. This fact significantly affects the production orientation as well as the production efficiency. On the basis of soil and climatic conditions such as the categories of soil, soil type, soil depth, granularity, altitude, the exposure of soil blocks, as well as the climatic conditions (the average annual temperature, the annual rainfall, wind) and many others, the Slovak territory is divided into the areas with better natural conditions (productive areas) and the areas with worse natural conditions (less favoured areas) (Chrastinová and Burianová 2012; Buday and Vilček 2013).

The presented scientific contribution builds on the previous scientific studies analysing the determinants of productivity and economic efficiency of the agricultural entities and extends the knowledge of the spatial econometrics area at the NUTS IV level (at the district level) for the reporting period. The added value of this contribution due to the existing studies can be seen in the fact that it represents an original research output with highly relevant data. The long time period of the analysed data allows to objectify at a higher rate the provided conclusions in the period before the Slovak Republic entering the European Monetary Union.

MATERIAL AND METHODS

The paper aimed at assessing the development of productivity and economic efficiency of the agricultural entities based on the synthetic evaluation of the selected economic indicators by the methods of cluster analysis in the period before the Slovak Republic entering the European Monetary Union, and so at creating a spatial map according to the regional differentiation at the NUTS IV level with the districts with more and less prosperous agricultural enterprises. The present highly specialized issue fills a gap in the area of the examination for the reporting period, which was specific by the integration processes associated with entering the Slovak Republic to the European Union. We assume that the natural and climatic conditions have a dominant influence on the achievable productivity and economic efficiency of the agricultural entities in ensuring the sustainability of the economic performance of agriculture in the individual regions of Slovakia. This analysis confirmed our assumption.

The starting point for the realization of the analysis was processing of the relevant selected results of the operations of business entities operating the soil for a longer period of time. Anonymised data were summarized for the individual districts of the Slovak Republic, while they monitored the available data

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for the period from 1998 to 2008. The economic and financial indicators of primary agricultural production for the monitored period were analysed from the data of agricultural enterprises. These data were ensured by the Ministry of Agriculture of the Slovak Republic in the form of the information sheets and they were obtained from the company Radela, Ltd. The evaluated file included 2509 subjects of legal and natural persons with up to 19 even over 20 employees. The information sheets capture the data from agricultural enterprises which cultivate 81.3% of the area of the utilized agricultural land of Slovakia (1 930 570 ha) and form a set which is not exhaustive, so some results may have a particular validity for the evaluation analysis.

The data were presented in thousands SKK (thousands of Slovak crowns) and in the natural units (the number of workers and the acreage in ha). To ensure the comparability of the data, it was necessary to recalculate the data expressed in absolute amount on the common conversion base. The comparability of the data was secured over the time (the database size was different year on year) and also in the space (data per the NUTS IV had different size of the covered entities). From among the available financial and non-financial data on the management of the subjects, there were selected such that we believe can provide the most comprehensive information on the management and also eliminate the possible specifics of management (costs, revenues, added value, economic result). In the analysis, we did not distinguish between the legal form of the analyzed entities, because we have already examined the given problem in another scientific contribution (Adamišin and Kotulič 2013).

The analysis processing was realized in the computer programs STATISTICA, NCSS and SYSTAT.

For the cluster analysis, were selected the following parameters: costs, added value, yields with subsidies and subsidies. The data of these parameters represented the cumulative values for the selective entities of the individual districts for ensuring of the comparability over time (in the individual years, a different number of entities from the district was involved in the selection) and in the space (the individual districts are not homogeneous units, since they also differ in size) and so the monitored parameters were converted to the level parameters. The conversion was carried out per 1 ha of agricultural land, one permanent worker and unit labour costs. The mutual combinations of the original four parameters with three recalculated parameters were obtained by the total of 12 parameters, which formed the criteria for the cluster analysis (see Table 2).

The quality of the clusters, respectively their degree of credibility is assessed using a variety of techniques, which are based on two criteria - the cophenetic correlation coefficient (CC) and the delta parameter (Řezanková et al. 2009). The cophenetic correlation coefficient (CC) is the correlation coefficient between the elements of the primary matrix of distances between objects and between the elements of the cophenetic matrix (between the actual and the predicted distance). We can describe it by the formula:

$$CC = \frac{\sum_{i<j}(x_{(i,j)} - x)(t_{(i,j)} - t)}{\sqrt{\sum_{i<j}(x_{(i,j)} - x)^2 \sum_{i<j}(t_{(i,j)} - t)^2}}$$

where:

$x_{(i,j)}$ = the ordinal Euclidean distance between n-th and j-th observation

$t_{(i,j)}$ = the dendrogram distance between the model points t_i and t_j

The second criterion is the parameter delta (ΔA), which measures the degree of the deformation of the data structure rather than the degree of similarity.

$$\Delta_A = \left[\frac{\sum_{i<j}^{N} \left| d_{ij} - d_{ij}^{*} \right|^{1/A}}{\sum_{i<j}^{N} (d_{ij}^{*})^{1/A}} \right]^{A}$$

where:

d_{ij} = the distance in the original distance matrix

d_{ij}^{*} = the distance obtained from the dendrogram

A = 0.5 or 1

For determining the suitable number of clusters, there were selected three indices: CHF index, Index RMSSTD and DB index (Řezanková et al. 2009).

The CHF index (I_{CHF}, Calinski-Habarasz F-index), sometimes also referred to as the pseudo F-index, measures whether or not the VRC index is based on the analysis of the variance of clusters, and it can be specified as follows:

$$I_{CHF} = \frac{\frac{SS_B}{k-1}}{\frac{SS_W}{n-k}} = \frac{(n-k).SS_B}{(k-1).SS_W}$$

where:

SS_B = the total variance between clusters, the so-called between-cluster variability

SS_W = the total variance within the cluster, the so-called intra-cluster variability

k = number of clusters

n = number of observations

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The index RMSSTD identifies the root mean square standard deviation of all variables within the clusters. The result is a measure of the homogeneity of the clusters that were created. The smaller index value represents the better created cluster (homogeneous) and the indicator is calculated as:

$$\mathrm{RMSSTD} = \sqrt{\frac{W_k}{v(N_k - 1)}}$$

where:
W_k = the within-group sum of squares of cluster k
N_k = the number of elements in cluster k
v = the number of variables

The third of the indicators is the Davies-Bouldin index (DB index), which quantifies the average similarity between a cluster and its most similar antithesis. Due to the fact that the clusters should be compact and separated, the lower value of the index DB represents their better configuration. The DB index is defined as the mean of the values of R_h:

$$\mathrm{I_{DB}} = \frac{\sum_{h=1}^{k} R_h}{k}$$

where:
R = the similarity of clusters
k = the number of clusters.

while

$$R_\mathrm{h} = \max_{h',h'\neq h}\left(\frac{s_{D,h} + s_{D,h'}}{D_{hh'}}\right)$$

where:
$S_{D,h}$ = the average distance within the cluster from its centroid, rate of dispersion
D_{hh} = the distance between the centroids of clusters

The rate of dispersion of $s_{D,h}$ cluster C_h is defined by the following:

$$\mathrm{s_{D,h}} = \sqrt{\frac{\sum_{x_i \in C_h} D^2(x_i, x_h)}{n_h}}$$

where:
D = the distance of clusters
n = the number of clusters.

From this relationship, the distance of clusters represents the distance of centroids (vector of averages), i.e.

$$D_{\mathrm{hh'}} = D(x_\mathrm{h}, x_{\mathrm{h'}})$$

where x_h is acentroid of cluster C_h

RESULTS

For determining the appropriate number of clusters, there was analysed the implementation of the RMSSTD index, the CHF index and the DB index, which showed that it is best to divide the districts into six clusters (for more see Figure 1). A local maximum of indices represents (at the selected clustering methods) the optimal number of clusters.

For the spatial arrangement of districts and the creation of the relevant map, there were applied more clustering methods, where the values of the cophenetic correlation coefficient (CC = 0.923) and both parameters of delta (Delta (0.5) = 0.218; Delta (1.0) = 0.249)) as criteria tightness of transhipment, indicate the presented dendrogram as the best from the set of the possible dendrograms at the study (the final dendrogram is shown in Figure 2).

Some of the analysed districts did not contain enough relevant data base, so before the clustering, these were excluded from the analysis (it was the district Košice I, Košice II and Košice III). Although

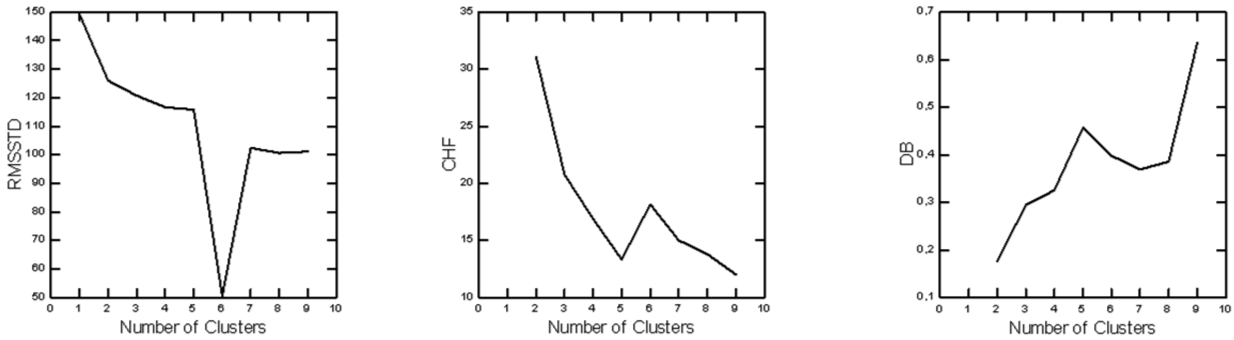

Figure 1. Validity index plot

Source: author’s calculation and research processing

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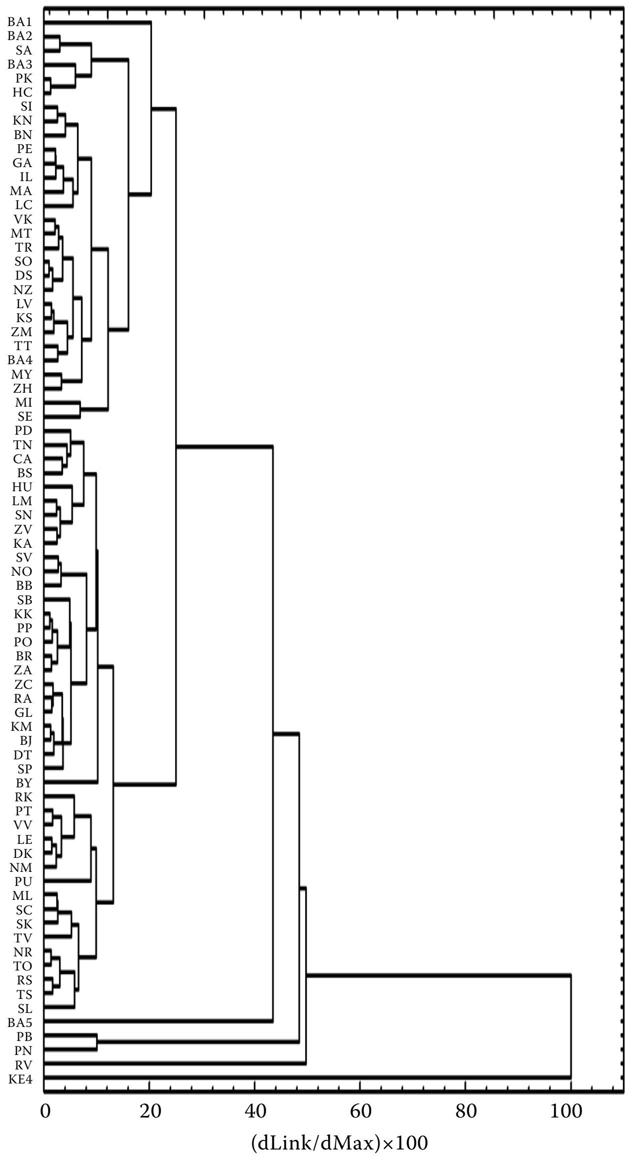

Figure 2. The final dendrogram of clustering of the districts according to the analysed parameters

Source: author's calculation and research processing

Bratislava I (BA1), Bratislava II (BA2), Bratislava III (BA3), Bratislava IV (BA4), Bratislava V (BA5), Malacky (MA), Pezinok (PK), Senec (SC), Dunajská Streda (DS), Galanta (GA), Hlohovec (HC), Piešťany (PN), Senica (SE), Skalica (SI), Trnava (TT), Bánovce nad Bebravou (BN), Ilava (IL), Myjava (MY), Nové Mesto nad Váhom (NM), Partizánske (PB), Považská Bystrica (PB), Prievidza (PD), Púchov (PU), Trenčín (TN), Komárno (KN), Levice (LV), Nitra (NR), Nové Zámky (NZ), Šaľa (SA), Topoľčany (TO), Zlaté Moravce (ZM), Tvrdošín (TS), Žilina (ZA), Bytča(BY), Čadca (CA), Dolný Kubín (DK), Kysucké Nové Mesto (KM), Liptovský Mikuláš (LM), Martin (MT), Námestovo (NO), Ružomberok (RK), Turčianske Teplice (TR), Veľký Krtíš (VK), Zvolen (ZV), Žarnovica (ZC), Žiar nad Hronom (ZH), Banská Bystrica (BB), Banská Štiavnica (BS), Brezno (BR), Detva (DT), Krupina (KA), Lučenec (LC), Poltár (PT), Revúca (RA), Rimavská Sobota (RS), Stará Ľubovňa (SL), Stropkov (SP), Svidník (SK), Vranov nad Topľou (VT), Bardejov (BJ), Humenné (HE), Kežmarok (KK), Levoča (LE), Medzilaborce (ML), Poprad (PP), Prešov (PO), Sabinov (SB), Snina (SV), Spišská Nová Ves (SN), Trebišov (TV), Gelnica (GL), Košice I (KE1), Košice II (KE2), Košice III (KE3), Košice IV (KE4), Košice – okolie (KS), Michalovce (MI), Rožňava (RV), Sobrance (SO)

the results of the analysis of the validity of indices point to the optimal size 6 clusters, the analysis of the degree of similarity pointed to the need of creating a lower number of clusters. With the analysis of the frequency of clusters and the shape of dendrograms, we came to the conclusion that several clusters contain only one representative. This is particularly the case of urban districts, which are characterized by a significantly different structure of agricultural activity compared to rural districts. These are the districts Košice IV (KE4) and Bratislava V (BA5), further Rožňava (RV) and a cluster composed of two representatives (Považská Bystrica (PB), Piešťany (PN) – a significantly heterogeneous component of districts differing in their economic development and geographic localization. Analysing such low numerous clusters would not lead to an objective analysis of the between-cluster similarities based on the mean values of the monitored parameters. A low numerous cluster is not very conclusive, therefore the remaining districts are appropriate to be divided into two separate and multiple clusters in this case, and a further analysis and conclusions will be appropriate to be done only with these two clusters.

On the basis of the conducted analysis, we can summarize the distribution of districts into two large and many numerous clusters. Other clusters contain from one to two representatives (through the verification analysis via the k-means clustering with a pre-defined number of clusters 6). The number of representatives in other clusters corresponded with the given analysis and the distribution of districts into clusters with the exclusion of the extreme low numerous clusters is given in Table 1. The average

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Table 1. The inclusion of districts to the resulting clusters

Cluster	The representatives of cluster	Number of members	The most appropriate representative
1.	BB, BJ, BR, BS, BY, CA, DK, DT, GL, HU, KA, KK, KM, LE, LM, ML, NM, NO, NR, PD, PO, PP, PT, PU, RA, RK, RS, SB, SC, SK, SL, SN, SP, SV, TN, TO, TS, TV, VV, ZA, ZC, ZV	42	KA
2.	BA1, BA2, BA3, BA4, BN, DS, GA, HC, IL, KN, KS, LC, LV, MA, MI, MT, MY, NZ, PE, PK, SA, SE, SI, SO, TR, TT, VK, ZH, ZM	29	GA

Source: author's calculation and research processing

Table 2. The average values of indicators of clusters and the most appropriate representatives

Indicator (numerator/denominator)	The average value of 1st cluster	The value of the most appropriate representative of 1st cluster	The average value of 2nd cluster	The value of the most appropriate representative of 2nd cluster
Yields with subsidies/Number of employees	885.469	873.298	1180.835	1227.534
Yields with subsidies/Wage costs	6.247	6.258	7.317	7.797
Yields with subsidies/Acreage of agricultural land	29.560	29.162	58.658	48.630
Subsidies/Number of employees	252.419	230.529	167.703	165.747
Subsidies/Wage costs	1.573	1.473	0.911	0.881
Subsidies/Acreage of agricultural land	7.005	7.112	5.769	5.439
Costs/Number of employees	888.829	895.905	1194.605	1202.458
Costs/Wage costs	6.281	6.446	7.372	7.639
Costs/Acreage of agricultural land	29.849	29.931	59.974	47.634
Added value/Number of employees	88.937	89.317	188.974	227.174
Added value/Wage costs	0.638	0.700	1.212	1.526
Added value/Acreage of agricultural land	3.758	3.244	11.185	9.606

Source: author's calculation and research processing

values of the analysed parameters as well as the most suitable representatives are shown in Table 2.

In the analysis of the selected economic indicators for the monitored period 1998–2008 using the methods of cluster analysis, we can conclude that the best companies were included among the group of districts of the second cluster. The most appropriate representative was represented by a set of enterprises

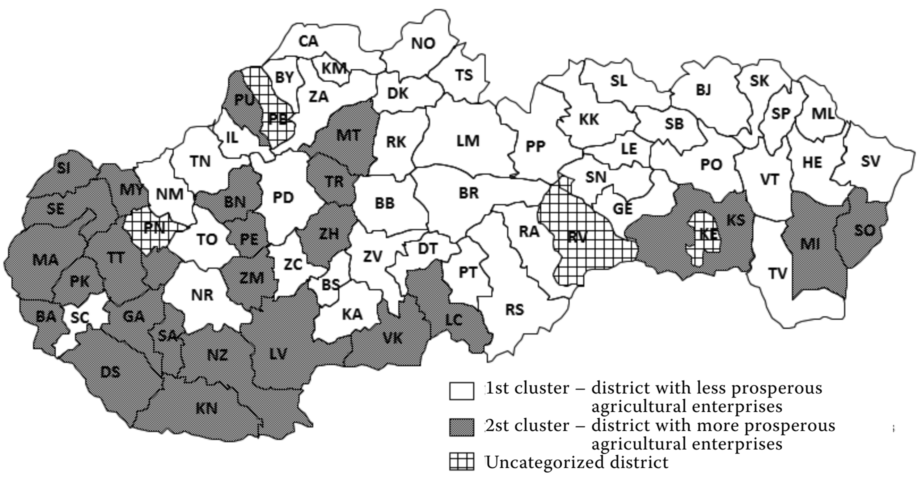

Figure 3. The groups of districts with more and less prosperous agricultural enterprises in Slovakia

Source: Own processing

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situated in the district of Galanta (GA). The group of districts of the first cluster represents the districts with less economically prosperous enterprises, where we found the most appropriate representative in the district Krupina (KA). The inclusion of agricultural enterprises into the groups of districts with more and less prosperous agricultural enterprises in Slovakia is shown in Figure 3.

DISCUSSION AND CONCLUSION

The differentiation of regional differences is often the result of the different localization assumptions for the specific economic activities that define a certain dimension of the requirements with the subsequent adaptability in the individual regions. There is a different ability of regions to absorb these requirements and to create a realization environment for the given economic activity. As problematic regions, there may appear to be the regions of mostly industrial character, which, although they belonged to wealthy areas in the past, their structure in the context of economic transformation is viewed as problematic from the aspect of adaptability. As a major determinant of the spatial differentiation of society and economic structure, there can be considered a low competitiveness of regions, resulting from the interaction of a wide range of factors: from the troubled sector structure, the lack of the capacity, the quality of the population potential to the absence of the inter-market environment and the centralistic way of managing of the companies (Slavík et al. 2011).

In Slovakia, similarly to the most countries of the Central and Eastern Europe, the development of the agricultural sector into 1989 was affected by the collectivization realized on the principle of the central planning. After the year 1990 (after entering a new market environment), the agricultural entities entered the road of difficult structural, economic and social changes. The measurable improvements were reflected only in some aspects of the economic and technical performance and competitiveness. There were created new forms of business, the number of subjects increased and their average concentration was reduced (Adamišin and Kotulič 2013). The monitored period in the range of years 1998 to 2008 was marked by the economic loss regarding the farm production, which was to a large extent caused by the effects of climate impacts (droughts and local floods) and the ongoing process of transformation.

On the basis of the conducted analysis, there can be clearly defined two relatively contiguous area in Slovakia (at the level of districts), which are characterized by differences in the achieved indicators of the productivity and economic efficiency. The districts of the 1st cluster achieved a quantitatively higher mean values than the districts of 2nd cluster in only three parameters from all monitored parameters of clustering. In all monitored cases, it was a ratiometric indicator with subsidies (subsidies per worker, subsidies to wage costs, subsidies per acreage of agricultural land). At 12 ratiometric indicators (on the basis of which the analysis was realized), there were three variables with the parameter “subsidies” in the numerator, and thus the entities operating the soil in the districts of the 1st cluster cashed usually a much direct support calculated per unit in all ratiometric indicators of subsidies. In general, it can be stated that the districts of the 1st cluster (in addition to a higher average level of support in all relevant indicators of subsidies) are concentrated in the Northern part of the territory of the Slovak Republic. The higher value of the indicators can then be directly related to the worse natural, climatic or production possibilities of the territory, which are compensated by the increased direct support of the entities of the given territory.

In all other monitored ratiometric indicators, the agricultural entities of districts of the 2nd cluster achieved better mean values than the entities of the districts of the 1st cluster. The results lead to the conclusion that the entities at the districts of the 2nd cluster receive a lower direct support in the form of subsidies, but they compensate it by a higher economic performance in all other parameters. The natural-climatic conditions determining sustainable production capabilities of the territory are a global indicator, which in our opinion essentially indicates the affiliation of the districts into a relatively homogeneous cluster (based on the pattern of the dendrogram and the parameters of tightness of the dendrogram transhipment), due to the fact that there were the entities of districts with a heterogeneous set of microeconomic indicators (at the NUTS IV level). The group of districts of the 2nd cluster is composed mainly of the representatives of agricultural enterprises of the districts of Southern Slovakia, thus from the districts with better production conditions.

Natural and climatic conditions are an important factor determining the sustainable economic performance of the entities operating the soil. The entities

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of districts of 1st cluster are unable to achieve the economic performance of the entities of the 2nd cluster (of course to the exceptions). It is not possible to identify the factors of the economic success of agricultural enterprises which could be stimulated (or inhibited) with only the targeted human activity.

The transformation of the centrally planned economy to the market economy meant the initialization of the process of the regional differences growth primarily in terms of the loss of output and employment. For the elimination of regional differences in the a given sector of the national economy (due to the pan- European tendencies), there will also need to continue the direct support activities the benefits of which are multiple and cross-cutting (support activities in rural areas, the elimination of deepening of the regional differences, supporting of the non-productive functions of agriculture, etc.).

Other factors have a direct impact on the economic performance and efficiency to a limited extent, but this does not mean that we should not deal with them. For example, the effective management of the agricultural entity even in worse weather conditions can be a good inspiration not only to other companies in the neighbourhood. The validated effective elements in the management could be applied in the entities operating in better conditions and so they can contribute to an even higher economic performance of the individual entities or agriculture as a whole.

In the context of the climate change, the impact of which on the macro level is indisputable, it will be interesting over the time to monitor the changes in the performance of subjects, respectively in the transfer of the sets of economically more efficient districts.

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