ANALYSIS OF REGIONAL DISPARITIES IN AGRICULTURE FOCUSING ON ECONOMICALLY WEAK REGIONS OF THE CZECH REPUBLIC*

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The objective of this study is to identify the regions of the Czech Republic with the economically non-effective agriculture industry. The methodology is based on an orginal approach as the economically weak regions are identified on the LAU 1 level, comparing to the existing studies using only NUTS III level. The input data describe the economic results of 6,031 agricultural entities from 75 different regions LAU 1. The data covering the period between 2006 and 2014 were gained from the database Amadeus. The study deploys the methods of Principal Component Analysis, Kaiser-Meier-Olkin test, Bartlett's test and hierarchical cluster analysis. The study determinates two key components: the Company Size and the Company Profit. These key components are used as the input variables for the cluster analysis. The cluster analysis identifies four clusters of regions from the agricultural entities economical results point of view. Subsequently the Standardized Variable Method is used to determinate the mutual order of the regions. The results of LAU 1 regions analyses show that the agrucultural entities, located in the border regions, reach economical results below average of the Czech Republic regions.

agriculture, border regions, cluster analysis, development, disparities, company

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INTRODUCTION

The paper is focused on important participants in the regional development of the Czech Republic – the agricultural enterprises. The aim of this article is to determine aggregate indicators in order to set economically troubled regions in the field of agriculture, based on finding key indicators in individual regions of the Czech Republic at the level of Local Administrative Units LAU 1, with a potential focus on border regions. The establishment of an aggregate indicator in the agricultural sector is part of a comprehensive research, within which indicators in other areas are determined in order to define economically weak regions in the country. Regional disparities are the subject of long-term exploration of many researchers from the Czech Republic and elsewhere. The key to eliminating the disparities is a regional development which is a set of processes in order to achieve economic prosperity and overall improvement of the socio-economic level

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of the regions. The issue of regional development is a part of the context of regional policy which is one of the policies of the European Union (EU). The aim of the EU regional policy is to promote job creation, competitiveness of companies, economic growth, sustainable development and improve the quality of life of citizens (European Commission, 2016). As the main theoretical (and practical) approaches to regional development can be considered exogenous and endogenous approaches. While the exogenous approach is based on the activity of the external environment (support from the part of higher territorial units, e.g. state or EU support), endogenous development means the use of local resources and local participants from the private and public sector (Bernard, 2010). Regional policy is thus more focused on changing the social and economic atmosphere in lagging regions (Blazek, Uhlir, 2011). Endogenous regional development (the theory of the so-called bottom-up approach) is currently the preferred approach to development that is based on the principle of the most efficient use of available resources of the region in combination with its capacities (Blakely, Leigh, 2010).

In order to meet the regional policy objectives and to solve various development needs of individual EU regions, 351.8 billion euros were allocated for cohesion policy in 2014–2020 (European Commission, 2016). Drawing from EU structural and investment funds in the Czech Republic is managed by the Ministry of Regional Development CZ on the basis of the Partnership Agreement for the programming period 2014–2020. The Partnership Agreement analyzes on the basis of European, national and regional strategic documents the current socio-economic situation, disparities, development needs and potential in the Czech Republic (Ministry of Regional Development CZ, 2016a).

Agricultural enterprises can be considered as one of the major participants in the endogenous development of the regions because they use the internal potential of regions – its resources (land) and capacity (human capital). Generally, internal resources include economic, natural, human and social capital. Successful are those communities that have these capitals at disposal and are able to use them properly or reproduce them (Bernard, 2010). In the Czech Republic, small and medium business is supported by the Ministry of Industry and Trade. The key implementation document is the Action Plan the structure of which includes four priority areas covering a favourable business environment for small and medium enterprises (SME), access to finances, internationalization of SME business, and energy savings in the SME business (Ministry of Industry and Trade of the Czech Republic, 2015).

Support to agriculture and agricultural enterprises is related to the current functions of agriculture which does not only serve to provide food, but it acquires other important social and environmental functions. In the current concept, agriculture becomes an integral part of the rural area, participates in its formation through the creation and maintenance of cultural landscape. These formerly additional functions of agriculture come to the forefront and they deserve care and support. Farmers are therefore motivated to these socially beneficial activities through a wide range of subsidy instruments, both national or European. Also in agriculture, there are disadvantaged areas which are subject to additional special aid. This concerns areas with natural or other specific constraints – Less Favoured

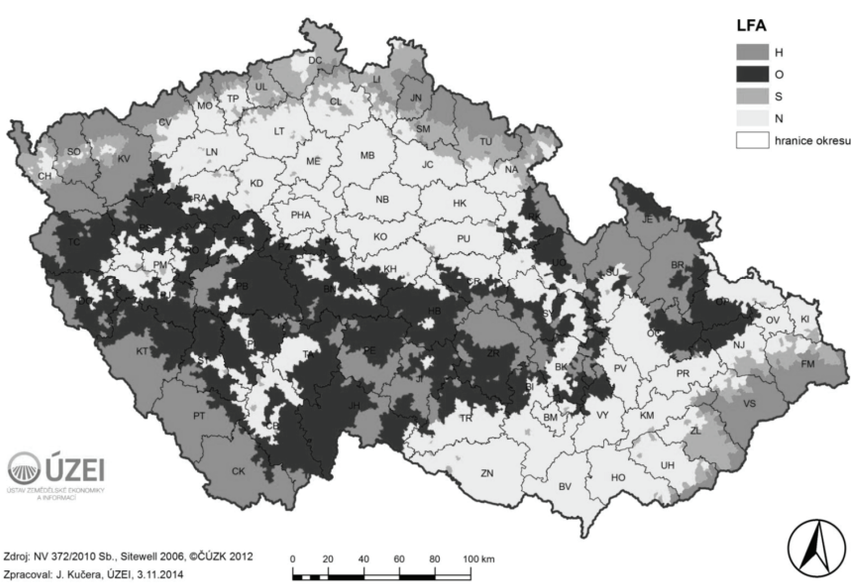

Fig. 1. Less Favoured Areas (LFA) regions in the Czech Republic
Source: Ministry of Agriculture of the Czech Republic (2015): The rural development programme 2014–2020

Areas (LFA), which are defined on the basis of the Government Regulation No. 505/2000 Coll. dividing LFA into mountain areas – H (according to altitude), other areas – O (according to the productivity of agricultural land and Bonita Soil-Ecological Units), and specific areas – S (according to conditions). Support is aimed at agricultural enterprises that operate in areas with less favourable conditions. The aim is to contribute to the stabilization of rural areas, their population and ensuring an adequate level of income for farmers. The support takes the form of compensation, which is determined by the rate per 1 ha of agricultural land and is graded according to the type of LFA (Government Regulation No. 72/2015 Coll., § 4). Categorization of cadastral areas in LFA is specified in Annex No. 1 to the mentioned Government Regulation. Regions that are designated for the support by many state institutions are located mainly in border areas of the Czech Republic (Fig. 1). This contribution will therefore also focus on those areas that are designated as problematic, whether in terms of economic and social or in terms of less suitable natural conditions.

Theoretical background

The Czech Republic is not always completely successful in drawing funds from the EU and their targeting. Smekalova et al. (2015) compared the targeting of resources in economically weak regions in the Czech Republic and Poland. Although the definition of these regions is similar in both countries, the results are quite different, because they are obtained through a different implementation of cohesion policy. Also in the Slovak Republic, in comparison with the Czech Republic, the financial allocation per capita in a disadvantaged region is higher (Hajek et al., 2014). To identify regions in which support from higher units (region, state, EU) is desirable there is in the context of various troubled but for the sustainable development of regions important areas (agriculture, economic problems, small and medium business, social problems, etc.) set out a range of indicators. They are designed to identify problem areas and determine the regions requiring support to eliminate the problems.

For statistical monitoring and analysis of the economic and social situation in the regions, the unified Nomenclature of Units for Territorial Statistics (NUTS) has been introduced within the EU. For the purpose of the effective procurement of resources from the European Funds, cohesion regions (NUTS II), that comprise one or more regions, were created in the Czech Republic (Ministry of Regional Development CZ, 2016b). In addition to the three NUTS levels, there exist two lower levels of territorial statistical subdivision, Local Administrative Units (LAU 1 – districts, LAU 2 – municipalities), which, however, are no longer decisive for the allocation of resources from EU funds (Ministry of Regional Development CZ, 2016b). Regional Development Strategy of the Czech Republic 2014–2020 defines the regions supported by the state and divides them into economically troubled and others. The category 'other regions' includes (a) socially disadvantaged areas and (b) current and former military districts. Economically weak regions are defined as those which within the national comparison show in terms of selected economic and social indicators significantly lower level than the average level (Fig. 2). Economically weak regions are determined on the basis of these specific indicators

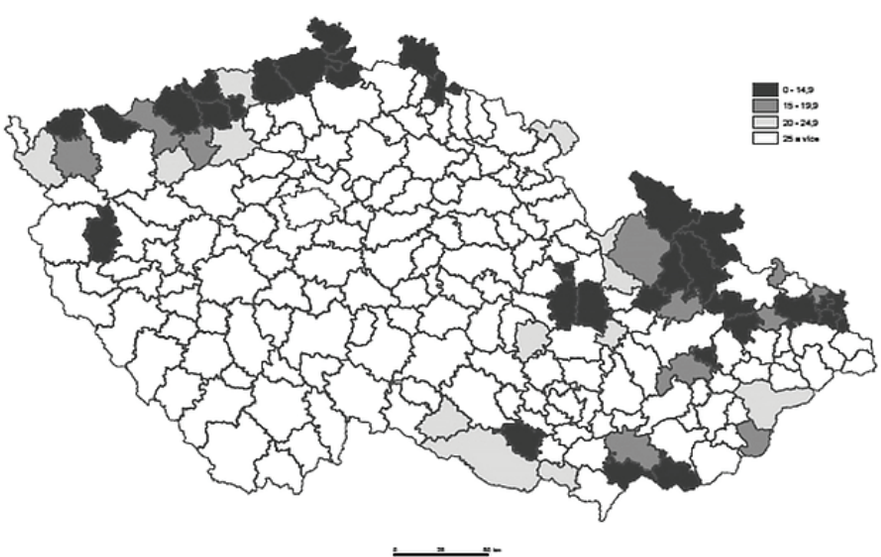

Fig. 2. Economically weak regions

Source: Ministry of Regional Development CZ (2013): Regional Development Strategy of the Czech Republic 2014–2020.

(Ministry of Regional Development CZ, 2013): U1 Estimated economy performance – gross domestic product (GDP), U2 Unemployment rate, U3 Indebtedness per inhabitant, U4 Social allowances and benefits, U5 Balance of migration per 1000 inhabitants.

Many authors in their research and contributions are engaged in identifying other indicators or precision calculation methods. To determine disadvantaged regions (qualified for state support) Brozova, Hornicka (2015) suggested to use the method of the Data Envelopment Analysis (DEA) and they compared the proposed results with the results of the Simple Additive Weighting (SAW) used by the Government of the Czech Republic. Brozova, Hornicka (2015) stated that the advantage of this method is the evaluation of inputs (Unemployment and Demand for the job) and outputs (Tax Revenue, Number of entrepreneurs and Purchasing Power). For determining appropriate tools to reduce regional disparities Jansky (2010) used multivariate statistical methods analysing the factors. From a total of 68 indicators there were chosen 11 indicators (the number of enterprise-type registered units in agriculture, industry, civil engineering, trade, accommodation, boarding, transport sector, warehousing and communications, per capita gross domestic product in CZK, per capita gross added value in thousands of CZK, per capita gross fixed capital generation in CZK and per capita receipts and expenditures in CZK) and on that basis he determined the index of development potential which can quantify the differences between regions. The analysis is focused on the regions of the Czech Republic, i.e., on the regions at NUTS III level. Also other authors deal with methodological tools to compare (classify) the regions in the Czech Republic at NUTS III. Hlavsa (2010) classifies NUTS III regions using selected economic indicators, Svatosova, Svobodova (2015) present the classification of regions at NUTS III level on the basis of similar situation in the conditions of living, based on five quantitative indicators. Sotkovsky (2013) classifies the regions in the Czech Republic at NUTS III level according to the index of population ageing and explains the differences using the dynamic index of population ageing in the years 1991–2011. Some authors investigate the relationship between the unemployment and other economic indicators in Czech NUTS III regions. Mertlova (2012) evaluates and compares NUTS III regions using some of the key economic indicators such as regional GDP, gross value added, gross fixed capital creation, unemployment rate, economic activity of the inhabitants, and net disposable income of households. Ramik, Stavarek (2012) tested the level of co-integration of the regional unemployment rate and the national unemployment rate and they verified the long-term relationship between the regional unemployment rate and the national one.

MATERIAL AND METHODS

The data to be assessed were obtained from the Amadeus database. Amadeus database is a database of comparable financial information for public and private companies across Europe (Bureau van Dijk, 2017). For performance assessment, agricultural enterprises in the Czech Republic were selected. The period analysed consists of data collected in 2006–2014 and covers approximately 6031 agricultural subjects which create a file consisting of 75 regions (LAU 1) for each factor (lines in the created database file analyzed). The analyzed group of subjects consists of companies established in the Czech Republic meeting the classification criteria of the NACE 01 group (Crop and animal production, hunting and related service) at once – and the US SIC 01 and US SIC 02 groups (Agricultural production-crops, Agricultural production-livestock and animal specialities). It means the hunting and relating activities are excluded from the final surveyed group.

The Principal Component Analysis (PCA) is a tool of data exploratory analysis, which can be used before creating an aggregate index (Mares et al., 2015). PCA creates linear combinations (components) of original variables, these components explain maximum of the variability of original variables (Hebak et al., 2013). Kaiser-Meier-Olkin (KMO) test and Bartlett's test provide information if the variables are suitable for calculation of PCA. Bartlett's test is testing a null hypothesis, which says the variables are not correlated. KMO shows if the selected items are adequate. PCA checks if all the selected items for creating aggregate index represents one dimension. Hierarchical cluster analysis is used the most often for aggregate data, therefore the aim is to find the most homogeneous groups of variables inside one group (Mares et al., 2015). To create aggregate indicators, the Standardized Variable Method was used with a formula:

$$u_{ij} = \frac{x_{ij} - x_{imax}}{s_{x_i}}$$

and

$$u_{ij} = \frac{x_{imin} - x_{ij}}{s_{x_i}}$$

u_{ij} = standardized quantity of *i*-variable for *j*-region
s_{xi} = standard deviation of *i*-variable (Tuleja, 2008).

Data classified as per the districts were subjected to PCA. All calculations were done using IBM SPSS Statistics 24.

RESULTS

This section presents the results of the data analysis of agricultural enterprises in the Czech Republic. The default matrix was statistically cleaned and the

Table 1. Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test

Kaiser-Meyer-Olkin measure of sampling adequacy		0.853
Bartlett's test of sphericity	approx. Chi-Square	1601.869
	Df	78
	P-value	0.000

Source: own research

Table 2. Variance explained

Component	Initial eigenvalues			Extraction sums of squared loadings		
	total	% of variance	cumulative %	total	% of variance	cumulative %
1	7.765	59.731	59.731	7.765	59.731	59.731
2	1.964	15.104	74.836	1.964	15.104	74.836

Source: own research

exploratory data analysis was conducted. Data on the regions of Prague and Ostrava were excluded from the matrix. The matrix input data were the following variables divided according to the districts of the Czech Republic:

Operating revenue, Profit/Lose (P/L) before tax, P/L for period, Cash flow, Total assets, Shareholders funds, Current ration, Profit margin, ROE using P/L before tax, ROE using P/L after tax, Solvency ratio, Number of employees, Operating P/L, Taxation, Profit per employee, Average cost of employee and EBITDA margin.

Firstly the correlation matrix was calculated, demonstrating the relationships among variables using the Pearson's correlation coefficient. On the basis of the correlation matrix the PCA was carried out. According to these methods, the following variables were not taken into account for further analyses: Average cost of an employee, EBITDA margin, Solvency ratio and Current ratio. The PCA result recalculated using the KMO test was 85.4% (Table 1). This means that the model is very useful when using PCA. According to Scree Plot two or three components should be made (Fig. 3). The first component Company Size (CS) explains 59.73% of variability of the original variables and the second component Company Profit (CP) 15.10% of variability of the original variables. In total, the two components explain 74.84% of variability of the original variables (Table 2).

Based on the PCA two components were formed. The first component includes the following variables: Shareholders funds, Operating P/L, Cash flow, Total assets, P/L before tax, P/L for the period, Taxation, Operating revenue, Number of employees.

The first newly formed component correlates with the variables as follows: Shareholders funds, very strong positive relationship $r = 0.973$; Operating P/L, very strong positive relationship $r = 0.964$; Cash flow, very strong positive relationship $r = 0.962$; Total assets, very strong positive relationship $r = 0.962$; P/L before tax, very strong positive relationship $r = 0.956$; P/L for period, very strong positive relationship $r = 0.941$; Taxation, very strong positive relationship $r = 0.938$; Operating revenue, very strong positive relationship $r = 0.869$; Number of employees, moderate positive relationship $r = 0.713$.

The second component includes the variables Return on Capital Employed (ROCE) using P/L before tax, Return on Equity (ROE) using P/L before tax, Profit per employee and Profit margin and Number of employees. This newly formed component correlates with the variables as follows: ROCE using P/L before tax, moderate positive relationship $r = 0.723$; ROE using P/L before tax, moderate positive relationship $r = 0.680$; Profit per employee, moderate positive relationship $r = 0.647$; Profit margin,

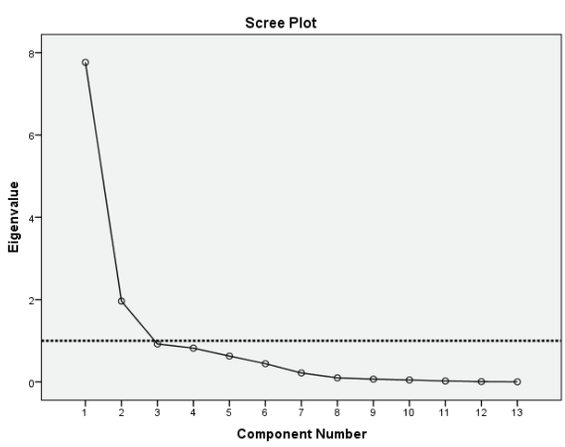

Fig. 3: Scree Plot
Source: own research

Table No. 3. Component matrix

	Component	
	Company Size	Company Profit
Shareholders funds	0.973	
Operating P/L (=EBIT)	0.964	
Cash flow	0.962	
Total assets	0.962	
P/L (Profit/Loss) before tax	0.956	
P/L for period (= Net Income)	0.941	
Taxation	0.938	
Operating revenue (Turnover)	0.869	
Number of employees	0.713	–0.337
ROCE (*Return on Capital Employed)* using P/L before tax		0.723
Profit per employee		0.680
ROE (*Return on equity)* using P/L before tax		0.647
Profit margin		0.519

Source: own research

Table 4. Report – Ward's method

Ward's Method	REGR score 1 for analysis 1	REGR score 2 for analysis 1
1	0.4599288	–0.9056989
2	0.8021630	0.5092671
3	–0.9435508	–0.7914899
4	–0.8902451	1.2370270
Total	0.0000000	0.0000000

Source: own research

moderate positive relationship $r = 0.519$; Number of employees, moderate negative relationship $r = –0.337$.

Due to the identified relationships (Table 3), the first newly created component can be called Company Size (CS) and the second newly formed component Company Profit (CP).

The main components that were established on the basis of previous analyses were used as input variables for the analysis of clusters. For the analysis of clusters Ward's Method was applied using the Euclidean distance, under which four homogeneous clusters of districts LAU 1 were created.

Based on the cluster analysis (with the use of Ward's Method) a Cartogram was developed, showing the units LAU 1 classified into four homogeneous clusters according to economic results of the analysed agricultural enterprises from individual districts (Table 4, Figs. 4 and 5).

The first cluster includes districts (LAU 1) in which analysed agricultural enterprises indicate slightly above-average results in the first component (CS) and below-average in the second component (CP) (Table 6). To this category belong the border districts of Hodonín, Jindřichův Hradec, Uherské Hradiště, Ústí nad Orlicí and Znojmo (Fig. 5). Only the districts Jindřichův Hradec and Ústí nad Orlicí pertain to the LFA (Fig. 1). Regions of Znojmo and partially Hodonín, Uherské Hradiště, Ústí nad Orlicí are also defined as Economically Weak Regions (Fig. 2).

The second cluster contains districts (LAU 1), in which according to the performed analyses agricultural enterprises show above-average results in both components (CS and CP) (Table 5). To this cluster the following districts are ranked on the basis of the cluster analysis: Domažlice, Opava, Rychnov nad Kněžnou, Šumperk, Vsetín, and Zlín. All the mentioned districts are classified as LFA areas (or at least half of their areas). Zlín, Vsetín and partially Opava are also defined as Economically Weak Regions. The above-average results in the component CP are influenced by subsidies that are directed to most agricultural enterprises in the mentioned districts.

The third cluster includes the largest number of border regions. The cluster is made up of districts (LAU 1), in which the analysed agricultural enterprises show below-average results in both components (Table 5).

Table 5. Average *vis*-à-*vis* Clusters and Components

Cluster	Company Size Component								
	Shareholders funds (ths CZK)	Operating P/L (=EBIT) (ths CZK)	Cash flow (ths CZK)	Total assets (ths CZK)	P/L before tax (ths CZK)	P/L for period (ths CZK)	Taxation (ths CZK)	Operating revenue (ths CZK)	Number of employees
First cluster	66 861	7 198	14 008	108 538	6 248	4 969	1 206	35 224	16
Second cluster	74 866	9 466	16 407	111 346	8 955	7 431	1 611	34 632	13
Third cluster	27 893	2 780	5 860	46 794	2 438	1 973	519	16 921	9
Fourth cluster	26 704	3 882	6 868	46 909	3 503	2 814	647	16 315	8
Total verage	53 078	6 318	11 609	83 939	5 752	4 687	1 077	27 348	12
Cluster	Company Profit Component								
	ROCE using P/L before tax (%)	Profit per employee (ths CZK)	ROE using P/L before tax (%)	Profit margin (%)					
First cluster	7.52	162	6.15	6.80					
Second cluster	11.60	349	13.35	11.33					
Third cluster	7.32	174	5.07	4.72					
Fourth cluster	15.47	489	17.84	10.99					
Total average	10.38	290	10.56	8.64					

Note: P/L = Profit/Loss; source: own research

At the same time, the CS component indicates worse results than the CP component. To these border regions belong the districts Břeclav, České Budějovice, Český Krumlov, Děčín, Frýdek-Mistek, Jablonec nad Nisou, Klatovy, Liberec, Náchod, Prachatice, Semily, Trutnov and Ústi nad Labem. All these districts but for Břeclav are integrated into the LFA (mostly mountain areas – H and specific areas – S), better results obtained by the component CP influence the subsidies in LFA. Most of these regions are not defined as Economically Weak according to Ministry of Regional Development CZ (2013), but the question is if the methodology is appropriate.

The fourth cluster includes districts (LAU 1), in which the analysed agricultural enterprises show below-average results in the first component (CS), but above-average results in the second component (CP) (Table 5). The cluster consists of Bruntál, Česká Lípa, Cheb, Chomutov, Jeseník, Karlovy Vary, Most, Karviná, Sokolov, Tachov, Teplice. Most of these districts (or parts of them) are ranked among economically weak regions (Ministry of Regional Development CZ, 2013), and also in the LFA. Above-average results in the component CP influence subsidies to agricultural enterprises from the LFA areas.

Based on the analysed agriculture regions at level LAU 1, the following aggregate indexes were determined using the Standardization Variable Method: Company Size Index of Regional Disparities (CS Index) and Company Profit Index of Regional Disparities (CP Index). The rank of regions (LAU 1) by CS Index can be seen in Table 6 as Company Size Rank. The rank of regions (LAU 1) by CP Index is shown in Table 6(called also Company Profit Rank). Calculated aggregate indexes explain the variability of original variables from two different dimensions. CS Index explains more variability of original variables, therefore Table 6 is sorted by its Company Size Rank. Border districts, where agricultural enterprises reported below-average results in both indicators, ranked in the order of regions on the scale as the Břeclav, České Budějovice, Český Krumlov, Děčín, Frýdek-Mistek, Jablonec nad Nisou, Klatovy, Liberec, Náchod, Prachatice, Semily, Trutnov and Ústi nad Labem, which are by CP Index and

Table 6. Order of regions (LAU 1) – Index (Standardized Variable Method)

Number	Region	Cluster	Company Size Index of Regional Disparities	Company Size RANK	Company Profit Index of Regional Disparities	Company Profit RANK
1	Vyškov	2	0.2537	1	3.5806	13
2	Jičín	2	0.6724	2	4.0941	37
3	Šumperk	2	1.2258	3	4.0079	35
4	Kutná Hora	2	1.4598	4	3.6533	20
5	Praha-západ	2	1.6422	5	3.7763	24
6	Svitavy	2	1.822	6	3.9683	33
7	Olomouc	1	1.9167	7	4.4029	48
8	Rokycany	1	1.9825	8	4.1353	39
9	Žďár nad Sázavou	1	1.9904	9	4.5046	53
10	Kroměříž	2	2.2029	10	3.9547	31
11	Pelhřimov	1	2.2253	11	4.1672	40
12	Příbram	2	2.2345	12	3.1935	5
13	Beroun	2	2.2522	13	3.8109	27
14	Jihlava	1	2.3282	14	4.9324	67
15	Domažlice	2	2.3424	15	3.922	29
16	Prostějov	2	2.3705	16	3.7	21
17	Mladá Boleslav	1	2.4051	17	4.6468	58
18	Kladno	2	2.4426	18	3.1535	4
19	Benešov	1	2.5014	19	4.5777	56
20	Opava	2	2.5185	20	3.4005	10
21	Ústí nad Orlicí	1	2.525	21	4.8833	65
22	Přerov	2	2.5365	22	4.0809	36
23	Nymburk	2	2.6952	23	3.4384	12
24	Plzeň-jih	1	2.6975	24	4.4213	49
25	Plzeň-sever	1	2.7078	25	4.5451	55
26	Uherské Hradiště	1	2.7501	26	4.335	44
27	Pardubice	2	2.7699	27	3.796	25
28	Nový Jičín	1	2.8156	28	5.0486	70
29	Blansko	1	2.8859	29	4.8066	64
30	Mělník	1	2.8978	30	4.997	69
31	Třebíč	2	2.9004	31	3.84	28
32	Písek	2	2.9842	32	3.6237	18
33	Hodonín	1	2.9883	33	4.4618	50
34	Rychnov nad Kněžnou	2	3.0031	34	3.9928	34
35	Chrudim	2	3.0775	35	3.9464	30
36	Znojmo	1	3.0783	36	4.7505	63
37	Jindřichův Hradec	1	3.0827	37	4.3824	47
38	Zlín	2	3.1074	38	3.7567	23
39	Hradec Králové	2	3.111	39	3.9638	32
40	Strakonice	1	3.1515	40	4.7186	62
41	Kolín	2	3.2809	41	4.2695	42
42	Brno-venkov	4	3.2823	42	3.5822	14
43	Havlíčkův Brod	1	3.3313	43	4.8935	66
44	Jeseník	4	3.3474	44	3.2108	6
45	Náchod	3	3.3546	45	4.6022	57
46	Tábor	1	3.429	46	4.9501	68

47	Klatovy	3	3.4734	47	4.6484	59
48	Karlovy Vary	4	3.4905	48	3.6074	16
49	Litoměřice	4	3.5096	49	3.7161	22
50	Vsetín	2	3.5677	50	4.1037	38
51	Louny	4	3.5945	51	3.6437	19
52	Rakovník	3	3.6049	52	4.5127	54
53	Trutnov	3	3.6234	53	4.4897	51
54	České Budějovice	3	3.6461	54	4.2893	43
55	Česká Lípa	4	3.6814	55	3.6168	17
56	Plzeň-město	4	3.7874	56	3.2853	8
57	Chomutov	4	3.7941	57	3.396	9
58	Bruntál	4	3.8179	58	2.587	2
59	Český Krumlov	3	3.8234	59	4.4969	52
60	Semily	3	3.8365	60	4.3657	46
61	Cheb	4	3.9483	61	3.2755	7
62	Frýdek-Místek	3	3.9797	62	5.4876	75
63	Prachatice	3	4.0562	63	4.3601	45
64	Praha-východ	3	4.1513	64	4.6731	60
65	Liberec	3	4.1708	65	4.2654	41
66	Tachov	4	4.2398	66	2.2499	1
67	Břeclav	3	4.2573	67	5.0634	71
68	Brno-město	3	4.2582	68	5.4765	74
69	Most	4	4.3019	69	3.4029	11
70	Sokolov	4	4.3558	70	3.6062	15
71	Jablonec nad Nisou	3	4.3863	71	5.1989	72
72	Děčín	3	4.4207	72	5.4018	73
73	Karviná	4	4.5298	73	2.893	3
74	Teplice	4	4.5749	74	3.8014	26
75	Ústí nad Labem	3	4.7401	75	4.7057	61

Note: The border regions with below-average results in both indicators are highlighted in dark grey and the border regions with below-average results in one component in light grey.

Source: own research

CS Index at the end of the table (the worst rank). Border districts, where agricultural enterprises reported below-average results in one of the two indicators (Bruntál, Česká Lípa, Cheb, Chomutov, Jeseník, Karlovy Vary, Most, Karviná, Sokolov, Tachov, Teplice, Hodonín, Jindřichův Hradec, Uherské Hradiště, Ústí nad Orlicí and Znojmo), are also mostly ranked at the end of the table by both indexes (Table 6, border regions with below-average results in both indicators are highlighted in dark grey and the border regions with below-average results in one component in light grey).

DISCUSSION

Researchers dealing with the issue of regional disparities in the Czech Republic focus particularly on regions at NUTS III level (regions). At this level, there are analysed primarily objective economic indicators in the region, such as gross domestic product (GDP), gross added value, etc. (Jansky, 2010) or GDP per capita, unemployment rate etc. (Hlavsa, 2010). Brzakova, Kraft (2017) show in their study the relationship between the amounts drawn from the selected operational program of ESI funds and per capita income level in various regions NUTS III during 2007–2015 in the Czech Republic. Regional disparitites were evaluated also by means of less common indicators, as the index of development potential (Jansky, Matejkova, 2016) or the subjective respondents' opinions (Svatosova, Svobodova, 2015).

Our research of individual indicators focuses on the differences between the regions at LAU 1 level, the

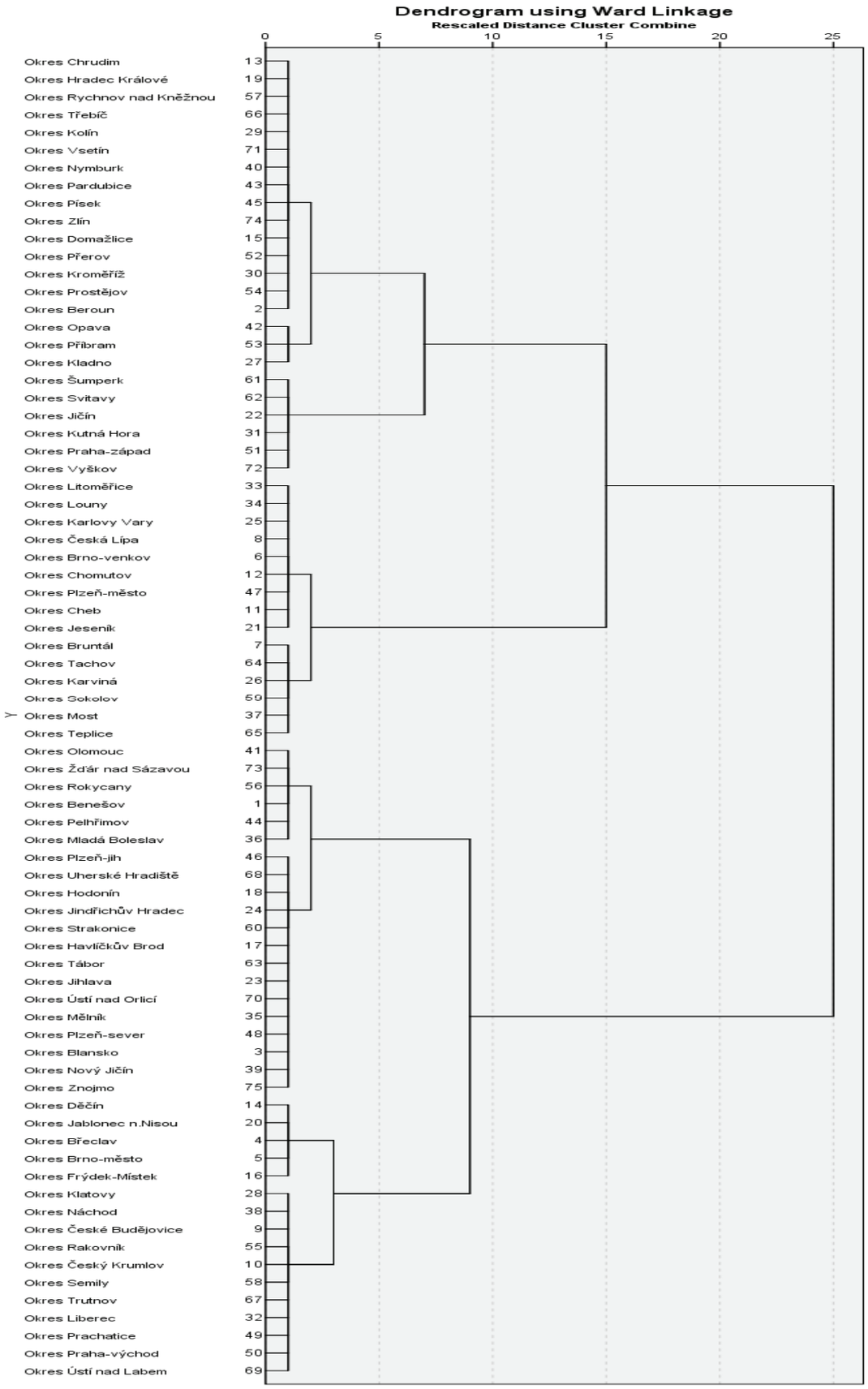

Fig. 4. Dendrogram using Ward Linkage
Source: own research

results are more detailed, thus it is possible to target support more precisely on a particular smaller area. Differences between regions LAU 1 were determined by Brozova, Hornicka (2015), utilizing traditional statistics, such as unemployment rate or tax revenue. They determined the structurally disadvantaged regions, economically weak regions and regions with highly above-average unemployment using Data Envelopment Analysis Method, and compared it with the method used by the government. Their research identified as economically weak regions the districts of Blansko, Bruntál, Děčín, Hodonín, Jeseník Přerov, Tachov, Třebíč, Šumperk, Znojmo. Our research is focused on the selection of possible indicators from other areas which may contribute to the clasification of the differences between regions for this time being from the view of agriculture topic. This part of the research is focused on agriculture, that is why we used data concerning the results of agricultural enterprises that play entirely unique role in regions. Based on the new set of components and calculated aggregate indicator, as the most problematic border regions in agriculture were identified: Břeclav, České Budějovice, Český Krumlov, Děčín, Frýdek-Místek, Jablonec nad Nisou, Klatovy, Liberec, Náchod, Prachatice, Semily, Trutnov and Ústí nad Labem. Furthermore, less problematic border regions in agriculture than in the previous group were defined: Bruntál, Česká Lípa, Cheb, Chomutov, Jeseník, Karlovy Vary, Most, Karviná, Sokolov, Tachov, Teplice, Hodonín, Jindřichův Hradec, Uherské Hradiště, Ústí nad Orlicí and Znojmo. The regional disparities evaluation from the active commercial entities concentration point of view, at the LAU 1 level, were dealt with by Hamplova, Kovarnik (2017). They evaluated the existence of the relationship between unemployment in particular districts and the number of active entrepreneurs per 1000 inhabitants. Our research is also focused on entrepreneurial activities, but in the specific field of agriculture.

CONCLUSION

The research was focused on Czech agricultural enterprises and their results in different regions at LAU 1 level with a special aim at border districts. In the individual regions, the agricultural enterprises have an irreplaceable position, because of their economic and social contribution (creation or maintenance of jobs, incomes of the population), and landscape maintenance. This contributes to the sustainable development of border regions, but very often in difficult conditions for agricultural activities.

Based on the analysis of economic results in individual regions (at LAU 1 level) of the Czech Republic there were established components Company Size (CS) and Company Profit (CP), which were used as input variables for the cluster analysis. With their use, four clusters of districts were defined where agricultural enterprises show different results in the individual components.

On the basis of the performed analyses an aggregate indicator (via Standardization Method) in agriculture was set. The research determined two of the possible indicators for identifying problematic regions at LAU 1. The completely newly designed indicators characterize problematic regions from a different perspective than the indicators commonly used at present (e.g. Estimation of GDP, Unemployment rate). Their importance stems from the role of agriculture (and thus of the agricultural enterprises) in the regions of the country. Based on the research of the given issue in the area of agriculture it can be stated that the economically weak regions are mainly those located in

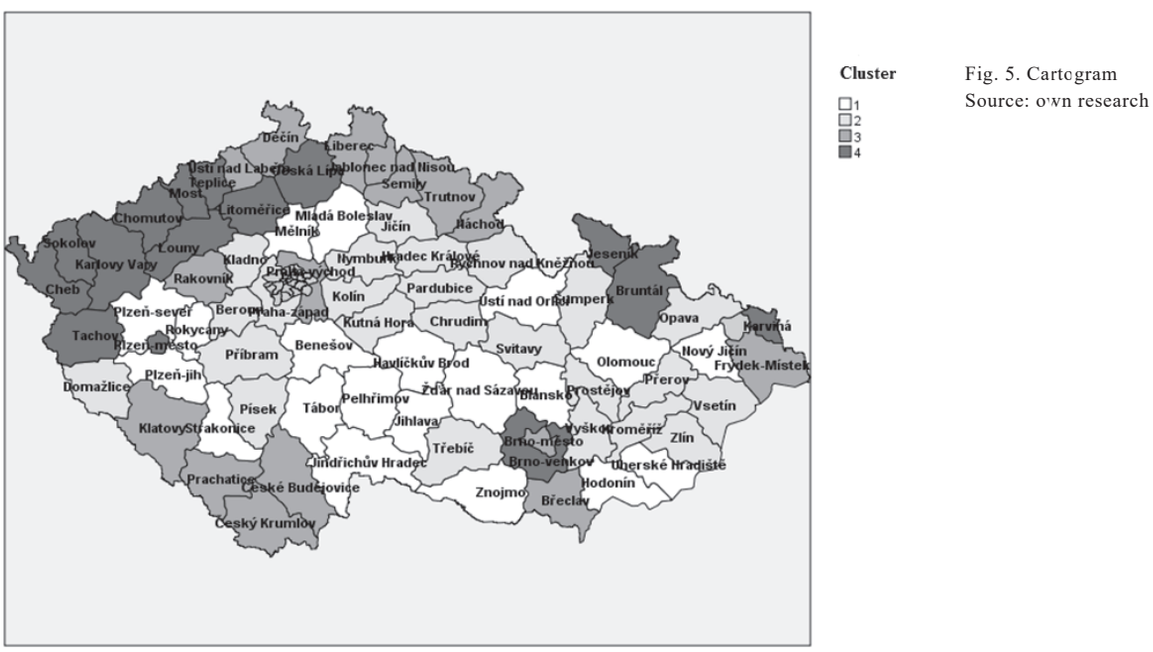

Fig. 5. Cartogram
Source: own research

the border areas of the Czech Republic. The aggregate indicator created for the area of agriculture indicated as the most problematic border regions the districts Břeclav, České Budějovice, Český Krumlov, Děčín, Frýdek-Místek, Jablonec nad Nisou, Klatovy, Liberec, Náchod, Prachatice, Semily, Trutnov and Ústí nad Labem. The mentioned indicator for determining the problematic regions at LAU 1 level is one of a number of analysed indicators. Further research should determine some other indicators for the other industries and subsequently a comprehensive methodology for determining problematic (economically weak) regions with a potential focus on border regions and needs of their suppor should be developed.

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