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**DEVELOPMENT OF SMES IN AGRIBUSINESS OF VOJVODINA  
COMMUNES - STATE AND PERSPECTIVES**

**BLAŽENKA S. POPOVIĆ**  
Faculty of Agriculture,  
Belgrade, Serbia.  
E-mail: [blazenka@agrif.bg.ac.rs](mailto:blazenka@agrif.bg.ac.rs)

**TAMARA Ž. PAUNOVIĆ**  
Faculty of Agriculture,  
Belgrade, Serbia.  
E-mail: [tamara@agrif.bg.ac.rs](mailto:tamara@agrif.bg.ac.rs)

**ZORAN M. MALETIĆ**  
Ministry of agriculture of Republic Srpska  
E-mail: [maleticz@rstel.net](mailto:maleticz@rstel.net)



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## **DEVELOPMENT OF SMES IN AGRIBUSINESS OF VOJVODINA COMMUNES - STATE AND PERSPECTIVES**

### **Abstract**

Agriculture as the economic sector is an important factor of economic development of Serbia and an important part of economic structure. Serbia has agrarian resources (land, climate and water) that are not used enough, and therefore, represent a significant economic potential for further development. Vojvodina is the best-developed economic region of the Republic of Serbia, with dominant role of agricultural production. The main economic potential of Vojvodina development is, among other things, the strengthening and improvement of agriculture in the private sector. Economic potential of agriculture impose the need to analyze this situation in the field of small and medium sized entrepreneurship as the bearer of the future development of agriculture in Vojvodina. Cluster analysis is a method that will determine how to group communes in Vojvodina according to the level of development of small and medium-sized enterprises in the field of agriculture, and thus get an insight into the current state of development of this sector of agriculture, as well as point out the possibilities for the future development of SMEs in agribusiness of Vojvodina.

**Key words:** agricultural production, small and medium sized enterprises (SMEs), clusters analysis, clustering of communes in Vojvodina.

### **Introduction**

Increase in volume of production, the optimal use of agricultural resources, the creation of a stable food market, the achievement of greater level of productivity, increase the competitiveness of agricultural products and implementation of integrated agricultural and rural development are the strategic objectives of the development of Vojvodina agriculture. Small and medium sized enterprises in agribusiness have an important role in the realization of these goals. Favorable natural conditions as well as tradition in the production and processing of agricultural products, a relatively favorable geographic position, qualified and relatively cheap workforce, good transport infrastructure, as well as a relatively unpolluted environment, are just some of the stimulating factors for the development of small and medium sized enterprises in Vojvodina.

Although Vojvodina is a part of Serbia with the most developed small and medium-sized entrepreneurship (Popović and Maletić, 2008) in the field of agribusiness, it is also very important to determine the inter-regional development of this sector of agriculture.

Cluster analysis was performed in order to determine grouping of Vojvodina communes according to level of development of SMEs in the agriculture. Based on three-year average (2004-2006 yr.), the following data were determined for all communes in Vojvodina: total income, permanent assets, working capital, total profit, loss, number of enterprises and number of employees. Based on matrix data (45x7), the matrix of ties is formed (45x45), and Euclidian distance is used as a measure of distance.

$$d_{ij} = \sqrt{\sum_{k=1}^p (x_{ik} - x_{jk})^2}$$

Next, clustering of communes in the clusters (groups), according to the level of development of SMEs in the agriculture, was performed by using a method of average linkage.

$$D(O_i, O_j) = \sum d_{si} / n_i \cdot n_j$$

Based on selected indicators, and by applying the square I-distance, the ranking of communes in Vojvodina according to the level of development of SMEs in the agribusiness was carried out.

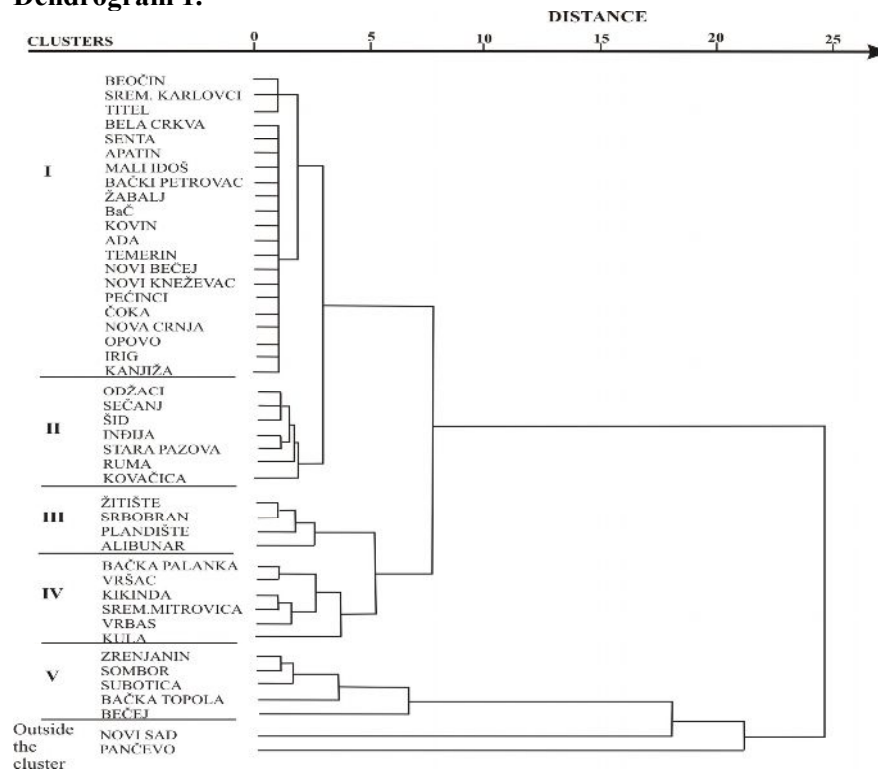
$$D^2 = \sum_{r=1}^k \frac{d_r^2}{\delta_r^2} \prod_{j=1}^{i-1} (1 - r_{ij;1,2,\dots,j-1}^2) \quad d_i = |x_{ir} - x_{jr}|.$$

Profit is the leading characteristic, and ordering other indicators was found on the basis of correlation coefficient with the leading characteristic.

## Results

Based on applied cluster analysis, Vojvodina communes are classified in five clusters (groups), and two other communes are left outside the cluster: Pančevo and Novi Sad (dendrogram 1.)

**Dendrogram 1.**



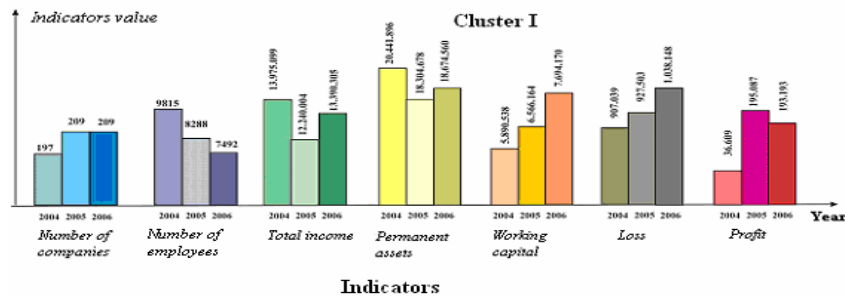
The structure of the observed indicators of the extracted clusters is shown in Table 1.

**Table 1 - Indicator structure separated by clusters**

Cluster	Total income		Permanent assets		Working capital		Loss		Profit		Number of employees		Number of companies	
	Amount (000 din)	%	Amount (000 din)	%	Amount (000 din)	%	Amount (000 din)	%	Amount (000 din)	%	No.	%	No.	%
I	13201802	16.09	19140378	20.99	6716957	16.57	957563	23.54	141629	7.08	8531.7	21.86	205	21.34
II	10762695	13.12	15778346	17.31	5318650	13.12	399135	9.81	334407	16.72	5270	13.50	134	13.95
III	4532514	5.52	10589632	11.61	2750275	6.79	989994	24.34	82378	4.12	2997.3	7.68	70.3	7.32
IV	16545298	20.17	17487358	19.18	8026191	19.80	743591	18.28	409029	20.45	7108.7	18.21	200.7	20.89
V	22644986	27.60	19118339	20.97	10253382	25.30	794595	19.54	504176	25.21	11106.3	28.46	204.7	21.30
Outside the cluster	14356708	17.50	9058029	9.94	7463155	18.41	182118	4.48	528052	26.41	4014	10.28	146	15.20
total	82044003	100.00	91172081	100.00	40528610	100.00	4066998	100.00	1999674	100.00	39028	100.00	960.7	100.00

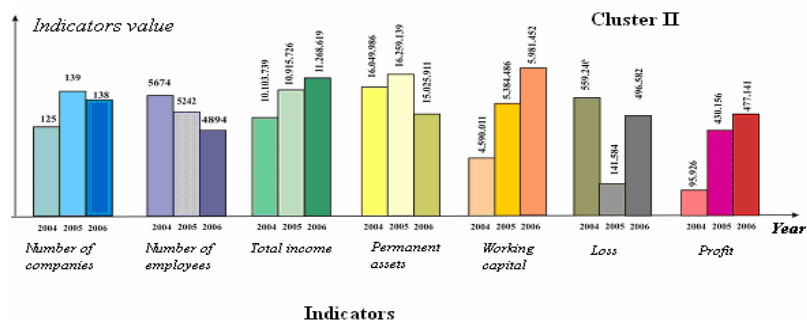
**The first separated cluster** is the largest one and it consists of 21 communes: Beočin, Sremski Karlovci, Opovo, Titel, Kanjiža, Bela Crkva, Senta, Kovin, Mali Idoš, Bački Petrovac, Žabalj, Apatin, Bač, Ada, Temerin, Novi Bečej, Pećinci, Novi Kneževac, Čoka, Nova Crnja, Irig. Although this cluster includes 47% of all Vojvodina communes, in the structure of the observed indicators of the separated clusters, in the total number of companies, this cluster is involved with only 21.34%, which is similar with number of employees (21.86%), while in total, get involved with only 7.08%. The returns by the municipality from this sector of agriculture is 6 744 279 dinars, which is the lowest amount in comparison with other clusters. The average for the municipality was about 10 companies, and the average number of employees in the SME sector in agriculture by the municipality was 406. Mobility of the selected indicators in the considered period is shown in figure 1, where, among other things, the constant decline of the number of employees and permanent growth of both, working capital and loss is observed.

**Figure 1** - The observed indicators in the cluster I



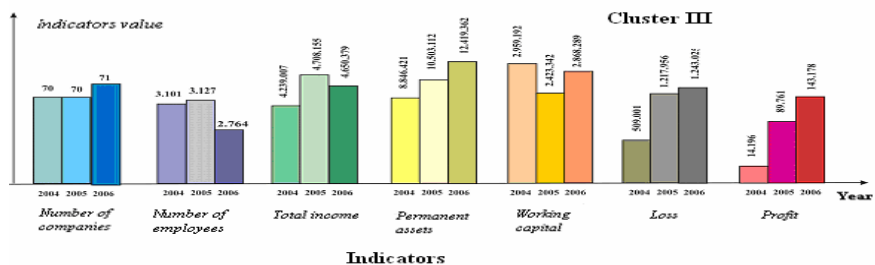
**The second cluster** includes seven communes: Šid, Stara Pazova, Odžaci, Sečanj, Indija, Ruma, Kovačica. Characteristics of this cluster are the following: the average per municipality is 19 SMEs engaged in agricultural production, with about 750 employees by the municipality. Although there are only seven communes, this cluster participated in the total profit with 16.72%. Characteristics of this cluster are constant decrease in number of employees, and increase in total revenue, assets and profit (Figure 2). In the observed period, average profit by municipality was 47 772 500 dinars, which is significantly better than the results of previous cluster.

**Figure 2 - The observed indicators in the cluster II**



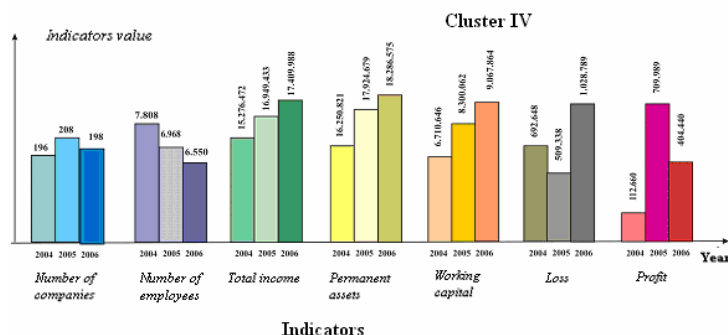
**The third cluster** is the cluster with the smallest number of selected communes: Plandište, Žitište, Srbobran, Alibunar. There were approximately 17 companies and 749 employees by municipality from SMEs sector in the agriculture. What separates this cluster from the others is very high participation in the total loss, and in the structure of all the clusters it is 24.34%. These four communes make almost one quarter of loss that is realized in the SME sector in Vojvodina. Presence of this cluster in total profit is the lowest and is only 4.21%, or 20 594 660 dinars by the municipality. Mobility of selected indicators in the considered period is shown in Figure 3.

**Figure 3 - The observed indicators in the cluster III**



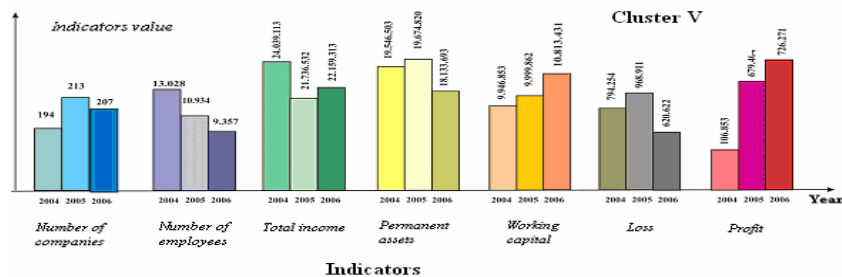
**The fourth cluster** includes six communes: Kikinda, Sremska Mitrovica, Vrbas, Bačka Palanka, Vršac, Kula. This cluster is characterized by a considerably greater number of companies by the municipality in comparison with the previous three clusters (in average 33), as well as the considerably greater number of employees by the municipality from this sector of agriculture, which in average is 1185 employees. The values of the examined indicators in the fourth cluster are displayed in Figure 4.

**Figure 4 - The observed indicators in the cluster IV**



The fifth cluster consists of five communes: Zrenjanin, Sombor, Subotica, Bačka Topola, Bečej. The average in this cluster was 41 companies with 2,221 employees, by municipality, from SMEs sector in the agriculture. Characteristics of this group of communes are constant decrease in the number of employees, but also increase of returns (Figure 5).

**Figure 5 - The observed indicators in the cluster V**



This cluster has the highest representation in almost all indicators, except in the realized losses and profit. Communes that are outside the cluster achieved greater participation in the realized profit, but this group of communes has achieved average annual income by the municipality in an amount of 100 835 200 dinars, which exceeds all the other clusters and classify this communes in the group with the best business results.

**Outside the cluster**, or outside the defined homogeneous group, are communes of Novi Sad and Pančevo. First, we are talking about the large communes that have a significant capacity for agricultural production and are located near the great consumer centers. After all, they represent one of them. They have well-established road network, which also



contributed to classify them as communes with the most developed sector of small and medium sized entrepreneurship in the agricultural production in Vojvodina. In the observed period, in the municipality of Novi Sad, the average was 114 companies with 1,956 employees, and average annual profit of 189 260 400 dinars was achieved at the level of the municipality. In the municipality of Pančevo there was smaller number of companies, or 32 of them, with a higher number of employees, i.e. 2058, and average annual profit of 338 792 000 dinars, which is the highest profit achieved by the municipality in Vojvodina. Although Vojvodina is a region with the most developed SME in the field of agriculture in the Republic of Serbia (Popović and Maletić, 2008), there is inequality within inter-regional development of SME. The main concentration of SMEs in this sector of economy is in the large urban communes (Pančevo, Novi Sad, Subotica, Sombor, Zrenjanin and Bečej). First, these are communes with very favorable conditions for agricultural production, and after all, represent great consumer centers. This is also the area that is situated on the crossroads of the most important main roads and borders with four countries: Romania, Hungary, Croatia and Bosnia and Herzegovina. Water traffic in this area is also very developed. Favorable transport infrastructure facilitates marketing of agricultural products and stimulates the development of SMEs. Private entrepreneurship has a long tradition, so, communes have experience with stimulating private investment. The presence of financial institutions allows greater availability to necessary investment capital. Greater activity of advisory services as well as better availability of necessary information is noted, which classified these communes as the communes with the most developed SMEs in the field of agriculture in the region of Vojvodina.

Discrimination analysis was performed for ranking Vojvodina communes according to the level of development of SMEs in agriculture. For the assessment of rating development level and for ranking communes special parameters were used. Each of them, in a special way, measured the level of development, but also has complementary character. In that way, development level of each municipality may be evaluated. Total income ( $x_1$ ), permanent assets ( $x_2$ ), working capital ( $x_3$ ), loss ( $x_4$ ), total profit ( $x_5$ ), number of employees ( $x_6$ ) and number of companies ( $x_7$ ) are indicators that were used to define values of I-distance for each municipality. Observed indicators are defined based on three-year average (period 2004-2006) for each municipality in the Vojvodina. Basic statistical data for the observed indicators are shown in Table 2.

**Table 2 - Descriptive statistics**

Indicators	Min. value	Max. value	Arithmetical mean	Standard deviation	Coefficient of variation (%)
Total income (000) din	12710.96	7428895	1823200	1793098	98.34893
Permanent assets (000) din	76967.27	5641498	2026046	1361449	67.19735
Working capital (000) din	5233.33	4250960	900635.8	870849.7	96.69277
Loss (000) din	1842.582	286797.7	90377.74	75067.9	83.06016
Profit (000) din	0	338792	44437.2	65880.37	148.255
Number of employees	16	2661.333	866.6333	659.3404	76.08067
Number of companies	1.333333	114	21.33704	19.64407	92.0656

High values of coefficients of variation point out to a very inhomogeneous data series. The highest dispersion in the data is within the profit, and then in the following characteristics: total income, working capital, the number of companies, etc... Both, indicator characteristics and their order of significance are important for the result of discrimination analysis. Therefore, profit was taken as the leading feature, and the order of other characteristics is determined by the correlation matrix.

The model first entered the leading feature - profit ( $x_5$ ), and then the following: working capital ( $x_3$ ), total income ( $x_1$ ), permanent assets ( $x_2$ ), number of employees ( $x_6$ ), number of companies ( $x_7$ ) and loss ( $x_4$ ). Ranking list of communes in Vojvodina, according to level of development of SMEs, was obtained by applying a square I – distance. It is shown in table 3.

**Table 3 - Ranking list of communes in Vojvodina**

Rang	Opština	Rang	Opština	Rang	Opština
1.	Pančevo	16.	Vršac	31.	Bački Petrovac
2.	Novi Sad	17.	Ruma	32.	Kanjiža
3.	Sombor	18.	Vrbas	33.	Apatin
4.	Bačka Topola	19.	Bečej	34.	Mali Idoš
5.	Kula	20.	Novi Bečej	35.	Pećinci
6.	Zrenjanin	21.	Indija	36.	Čoka
7.	Subotica	22.	Odžaci	37.	Kovin
8.	Srbobran	23.	Šid	38.	Bač
9.	Žitište	24.	Sečanj	39.	Senta
10.	Alibunar	25.	Stara Pazova	40.	Opovo
11.	Kikinda	26.	Temerin	41.	Novi Kneževac
12.	Kovačica	27.	Ada	42.	Bela Crkva
13.	Sremska.Mitrovica	28.	Žabalj	43.	Titel
14.	Plandište	29.	Irig	44.	Sremski Karlovci
15.	Bačka Palanka	30.	Nova Crnja	45.	Beočin

Discrimination analysis confirmed the results of cluster analysis and provided a better insight in the level of development of SMEs in the communes of Vojvodina, but also the order of the municipality according to the development.

## **Conclusion**

The main economic development potentials of Vojvodina are in strengthening and improvement of agriculture in the private sector, improving the food industry and in development of tourism and trade. Vojvodina, with its agricultural production and potentials, has significant advantages to sell its own quality products on greater and more profitable markets. Economic development of Serbia, and also Vojvodina, must be based on the recognition of private ownership and market economy, from the standpoint of a more favorable and more efficient environment for direct foreign investment and the development of SMEs in the field of agriculture. There is a great competition on domestic and foreign markets in a placement of agricultural and food products and only high quality products with specific source and geographical origin have greater export opportunities. Potential development programs of SMEs in agribusiness should be related to the organic way of production in livestock breeding (meat, milk, and products), vegetable crops and fruit growing (fresh and refined products), as well as for products that are produced in traditional ways. SME should be also direct to the production of vegetables in greenhouses and hothouses with the use of geothermal energy sources whose presence is in the area of Vojvodina very significant, but unused. Production and processing of quality species of fish, a wide range of products that can be obtained by processing corn, as well as the production of biodiesel (from harvest remains, oilseed rape, sunflower and corn) are also potential opportunities for the development of SMEs. These are just some of the products that represent the opportunity for the promotion of SMEs in the domestic and international market. Development of SMEs in agribusiness of Vojvodina would enable better utilization of agricultural resources, prevent departure of young people from the village, make opportunities for their employment, and, in the end, would come to stronger inter-regional and balanced development of the province of Vojvodina.

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