Geographical Basis for the Distribution and Organisation of Industry in Bačka

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Abstract
Bačka is situated in the north-western part of Serbia in the centre of the Panonnian basin. To the west and south it is framed by the Danube and to east the by the river Tisza. To the north it touches the Hungarian border. In addition to the morphological entity which frames the river flows (alluvial plateau and dilluvial terrace), Bačka is dominated by the loess plateau. With its geomorphological features, it is hydrologically and pedologically well predetermined for agricultural production. This economic activity has had major influence on the structure, distribution and organisation of industry, especially agroindustry.
In this paper we have tried to study characteristic distribution models of industry, forms of specific distribution, characteristic examples of the functioning of spatial inertness in the industry of Bačka. Since mainly economic and geographical methods have been used, priority has been given to the conditions and factors, which essentially come from natural resources, as well as from specific historic and socio-economic factors.
Key words: industry, Bačka, Bačka loess plateau, Titel hill, distribution, location

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Structure and principles of spatial distribution of industry in Bačka

General conditions of the structure and distribution of industry in one area are influenced by individual factors which are results of more or less continual development of certain principles, which are, as a rule, followed within the scope of relevant capabilities. This is also a characteristic of Bačka. If we carefully analyse the distribution and organisation of industry in the region we can notice that a series of economic and political decisions have had a significant influence on them, being a consequence of economic policy or decisions made by various interest groups throughout the twentieth century. Not rarely have these decisions been contrary to the principles of positioning and distribution of certain industrial estates and industry in general.

Since these principles have primary significance, and accordingly represent the starting point, we will categorize them into following groups:

1. Respect for principles of spatial distribution
2. Principle of rational spatial organisation
3. Material and market-dependent space
4. External economy as the factor of spatial distribution
5. Permanent tendency to achieve policentric development of industry as the middle optimum solution between two extremes – concentrated and dispersive distribution.

Characteristical forms of the distribution of industry in Bačka

The determination of one regional entity, such as Bačka, to develop a certain concept of the spatial distribution in general or of its individual activities, is of extreme practical importance. An adequately chosen model of distribution offers a chance to avoid the creation of individual factors which can continually or occasionally slow down the development of industry. In this way we can avoid the creation of double capacities, follow the rules of economic scope, create opportunities for the optimum usage of industrial capacities, etc.

Bačka is characterised by the phenomenon of the distribution and organisation of industry of *polycentric* and *dispersive* models. The choice of individual models depends on the type of economic activity, groups and subgroups of the industry, when they began to operate, etc.

Apart from global forms of distribution, there have also been formed models of distribution of objects which are specific for the distinctive features of Bačka as a regional entity and which can have influence on the state of industry. They are so-called *specific forms of distribution*. In the world they appear in different variants. Some of them characterise the territory of Bačka:

- The creation of the development poles which become the carriers of the expansion of economic and other elements of the geographical area;
- Higher concentration of the industry in sociopolitical and administrative centres;
- Traffic crossroads and refraction points become within time the centres and instigators of development in certain spatial entities;
- Bigger natural-geographical and socio-geographical objects of linear distribution become the axes of development and
- Specific features of the development and organisation of industry in bordering areas.

Such complex forms of organisation and distribution of industry, which can be differentiated into several characteristical models, are conditioned by the types of primary positioning factors specific for certain time periods, changes in economic policy of the country, needs for inter-regional spatial coordination, a policy for the equal development of all parts of the region and other factors.

Polycentric distribution of industry

Polycentric distribution of industry represents such spatial solution which ena-

Table 1 *The structure of the participation (%) in national income of important economic activities in Bačka as a determiner of the level of industry in Bačka in 2004*

Municipality – region	Agriculture, hunting, forestry, hydro-industry	Mining and quarrying	Processing industry	Production and supply of electricity, gas and water	Civil engineering	Other
Ada	33.31	2.99	35.57	10.77	1.75	45.61
Apatin	7.87	-	71.48	2.68	1.35	16.62
Bač	59.52	-	14.65	0.30	6.41	19.12
Bačka Palanka	22.30	-	53.55	7.93	1.86	14.36
Bački Petrovac	56.09	-	13.20	1.42	2.83	26.46
Bačka Topola	41.46	0.16	27.94	6.59	2.24	21.61
Bečej	36.17	5.04	33.93	10.43	0.89	13.54
Vrbas	19.82	0.01	60.56	7.65	1.25	10.71
Žabalj	39.65	-	23.40	16.73	0.78	19.44
Kanjiža	19.04	11.07	44.52	6.48	3.22	15.67
Kula	27.28	-	41.41	5.28	1.41	24.62
Mali Iđoš	58.56	-	18.16	6.23	0.63	16.67
Novi Sad	9.71	1.30	41.37	18.60	13.03	15.99
Odžaci	41.43	-	28.08	14.65	1.08	14.76
Senta	31.99	1.87	33.66	9.84	1.30	21.34
Sombor	35.40	0.04	24.01	10.38	2.76	27.41
Srbobran	54.66	5.81	12.90	1.34	1.80	23.49
Subotica	15.87	1.40	29.98	12.06	4.59	36.10
Temerin	37.78	-	31.58	0.22	6.47	23.95
Titel	72.46	-	8.68	1.12	3.45	14.29
Bačka	38.07	1.56	34.10	7.92	3.11	

Source: Statistical Yearbook of Municipalities in Serbia, 2005. Statistical Office of Serbia, Belgrade.

bles the achievement of maximum effect made of specifically structured spatial elements. Within this system you usually start from the development poles, i.e. optimum number, distribution and interrelations of big, primary and crucial carriers of the industrial development. The application of this concept means avoiding, on the one hand, an extreme dispersion of industry in space which results in low productivity and partial usage of capacities. Dispersion was present in the beginning of the industrial development of Bačka.

In Bačka, most of the industry is distributed polycentrically. The biggest poles of development, which are under the incentive influence have formed corresponding regions, are situated in the Danube area, Bačka Loess Plateau, along the Veliki Bački canal, the Tisza area and along the border with Hungary (Subotica).

The question is which circumstances have influenced the fact that the key role in initiating, development and further organisation of industry has been granted more to urban and economic centres which are, globally speaking, situated along important navigation areas or motorways and crossroads. The key role was also given to the conditions for the development of agricultural production which has initiated the development of food processing and agroindustry in general from the very beginning. Great significance was also given to the non-metallic raw materials suitable for the immediate use and production of building materials, as well as anthropogenic and natural forests concentrated mainly in the alluvial areas of rivers. Consequently, natural resources and conditions were of the crucial importance for the creation of industral centres as poles of development. Their distribution along the waterways was influenced by the needed for cheaper transport. The multiplication of such centres has brought about the gradual transformation from the monocentric into polycentric distribution of industry.

It should be mentioned that the location of bigger places as the development poles in Bačka is a result of the long economic development as well as their function as administrative centres of different importance. Thus they have gained a chance to assimilate, almost continually, the investments which have enabled them to establish and expand educational, professional, scientific, research and other similar institutions which could strengthen external, urban economy. Such form of economy has influenced the development of industry, especially technologically intensive sector, groups and subgroups.

In order to distinguish certain incentive factors, then the character of their influence and forms of creation of the development poles, we will give examples of a few biggest cities of Bačka – Novi Sad, Subotica, Sombor, Bačka Palanka, Apatin, Senta and others. These cities have been typical for the economic space of Vojvodina with the way they have constituted the poles of the development. Their role as the development poles, has brought to the fact that by the middle of the 1970s they became centres of newly formed integration systems (agricultural and industrial complexes).

Based on the total scope and diversity of industrial production and economic activity in general, Novi Sad has become the most developed industrial centre in Bačka and Vojvodina. This was instigated by a series of favourable conditions: the role of the major provincial administrative centre; immediate proximity of the meeting point of the loess plateau, alluvial plateau of the Danube and Fruška gora, which formed a complex of specific prerequisites for certain forms and types of economy. In addition, the crucial elements were its position on the crossroads of major motorways and close proximity of the Danube which possesses all the advantages of the international waterways, enabling the positioning of the industry that needs technological and processing power of water, than the presence of waste water collectors and navigation zone as a cheaper alternative for the transport of raw materials and final products.

Subotica has based its earlier development on good connections with Hungarian settlements – Segedin, Bekeščaba, etc. With the retrieval of the borders this connection was broken. The location near the border has resulted in the economic stagnation of Subotica. For a long time, it was not possible to build industrial estates of strategic and economic importance. The most significant treshold of development was the period of tension between former Yugoslavia and the countries of eastern Europe. Later, with the development of more open political and economic relations between Yugoslavia and Hungary, the industry has suddenly begun developing. In 1970s, Subotica became the industrial centre with the outstanding rate of development compared to other cities in Bačka. It grows into the centre of chemical industry and electroindustry. The other complex has been created in agroindustry according to the connections of agriculture and processing industry of different phases of processing (milling, pasta production, confectionery production, fruit and vegetables processing industry, industry of alcoholic and soft drinks, meat production and processing industry). Secondary importance has been given to the metal industry which is very old and according to the characteristics of its creation, development and structure its similar to other metal industries located in other settlements of Bačka. This means it has the features of extensive industry organised within smaller estates, adjusted to the needs of agriculture and has the character of the industry which does not have a real justification for its existence (local inertness).

Sombor has had a similar position and development flow as other cities in Bačka of similar size and geographic position. As a powerful centre of machine-building industry, it experienced stagnation and regression between two World Wars, and revitalisation after the World War Two. In addition to this, other industries have been operating as SMEs of machine-building, food processing, knitwear and garment and chemical industries. In 1980s its investment has strategically been directed to agroindustry (which gets the form of industrial complex) and production of transport vehicles. Agroindustry and some other forms of engineering industry have still kept primary role, whereas others in the form of SMEs have had secondary role and in the time of change of the economic policy of the country have fallen into crisis which has caused long-lasting depressive tendencies.

Other mentioned cities have formed a basis for the system of polycentric distribution of industry, but they mainly have a secondary significance and complementary character.

Forms of dispersive distribution of industry and its problems

Forms of dispersive distribution of industry have been created mainly as a result of the positioning of certain industries in smaller settlements.

Small settlements are the most numerous in the urban structure of Bačka. Their individual industrial potentials participate in the smaller part of the total industry of the region. However, taking into account total industry of smaller cities we can notice their significant participation.

Traditional industry in market conditions is characteristically based on the effects of the scope economy. These effects have been manifested in lower production cost and higher profit. Small cities, individually analysed, do not leave the possibility to create and use the effects of the scope economy. If they, however, with such segemented capacity, form a unique regional industrial (economic) system, in the circumstances they create favourable conditions for achieving positive economic effects. The realisation of positive effects becomes possible due to the fact that dispersively distributed industrial estates can in rational and economic way use local resources, without huge investments and with simple corrections can fit into optimum regional economic structure. Besides, smaller enterprises create an elastic spatial and technological system contributing to the more outstanding dynamics of regional economy.

According to samples, time and length, the dispersive distribution of industry in Bačka can be divided into several groups:

- Industries which are location-dependent on the dispersive distribution of raw materials;
- Industries which have had an outstanding dispersion periodically, i.e. within a definite time limit;
- Industries that have developed early and kept wide dispersion by the World War Two;
- There is part of industry which has had dispersive distribution from the beginning, and kept that character today, because of the fact that the basis of its production is on numerous production units;
- Industries which are relatively new;
- Dispersive distribution of industrial estates within borderlines of big cities.

Certain specific features of spatial and macrospatial distribution models of the industry of Bačka

Traffic crossroads and refractions as centres and instigators of the industrial spatial development. Important industrial centres have eventually become points in space, which assume the position of traffic refraction points. These are the places where different transport routes meet, hav-

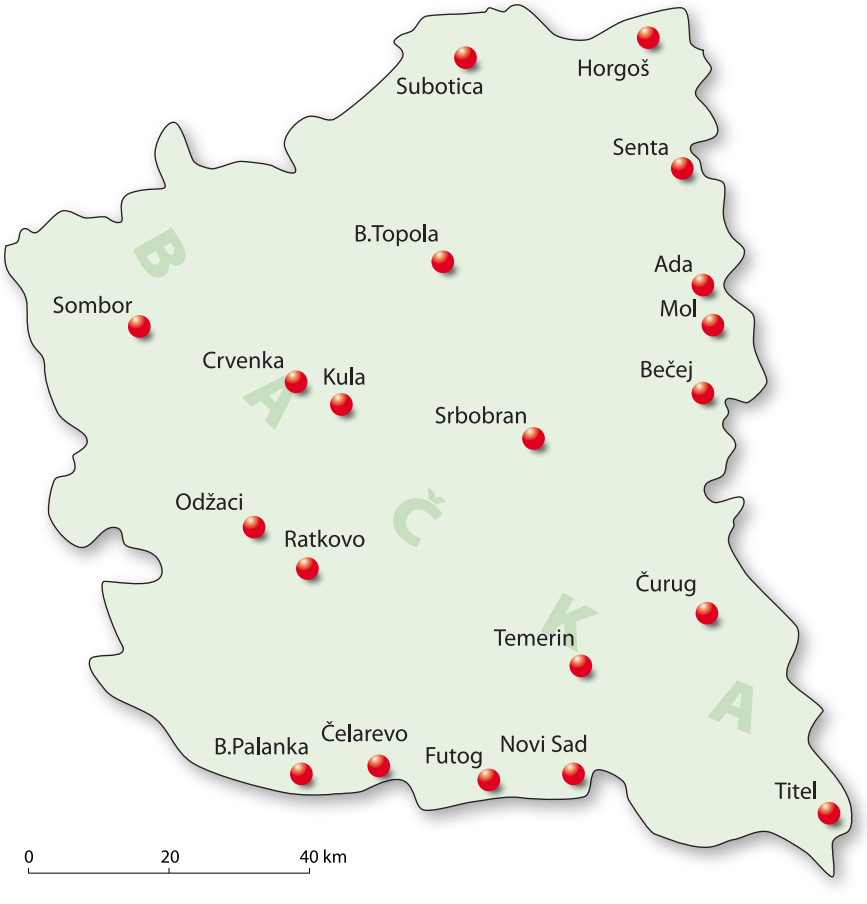

Figure 1 Spatial distribution of chemical industry in Bačka

ing different toll rates, so that it is possible to choose longer but cheaper transport routes. In Bačka such position is obtained by the places which are meeting points of road, rail, river and canal traffic. Bigger city centres, in particular Novi Sad, Vrbas, Senta and Bačka Palanka are typical examples.

Refraction points have enabled significant advantages of the location in two specific cases:

1) In industrial processing of primary raw materials when they are transported by cheaper routes, in the refraction point they are processed into the final product which is smaller in quantity (because certain amounts of raw materials have been inbuilt into the product or wasted). This means that final products are transported further with other more expensive traffic routes, and since they are smaller in quantity some saving has been achieved. The saving is even larger by the fact that waste materials have been used for further processing in the refraction point in other establishments of the industrial complex, meaning that transport costs of those secondary raw materials are much cheaper comparing to others. This case could have been applied to Vrbas in the past, when sugar beet was transported by the canal as the cheaper traffic route. Sugar, as the final product, was transported by road, because in quantity there was much less of it, so saving was achieved even though it was transported by more expensive traffic routes. By-products stayed in Vrbas and were processed further into other final products. An even better alternative is to use sugar in processing establishments that exist within the industrial complex of Vrbas and use them further as semi-products (for example, in confectionary industry).
2) If raw materials and energy are transported from one direction, and final products or semi-products are transported into two or more directions. The same case is if raw materials or energy materials are economically transported for processing through the same refraction route, and final products are directed in one means of transport to the customer. The location of the processing activity in one refraction point can lower gaps and return routes in space.

The axes of development as a specific form of spatial distribution of industry and other activities

The axes of development appear on the higher degree of economic development as unique spatial entities. The axes of development represent the basis of specific macrospatial models. One of the prerequisites of the creation, growth and significance of development axes is the presence of infrastructural connection. What is meant by this is a diversity and quality of traffic infrastructure, and the importance can then be given to common waterways (river, canals, etc.). This is because such water flow can represent an important infrastructural (traffic) and technological and productive (use of technological and processing water and the role of the waste water collectors) factors of the entire content of development axes. In Bačka, this is true for the Danube, Tisza, parts of the system Danube-Tisza-Danube.

The formation of the development axes can have negative and positive consequences for one space. Negative consequences can be seen in the fact that along the axes there can be excessive concentration of the industry in the circumstances of unsolved communal problems. In Bačka, this phenomena has been manifested in the overpollution of waterways (Veliki Bački canal, for instance), destruction of soil either through the appropriation of fertile land, pollution of land or air pollution. However, the advantages of the development axes is in the fact that such agile space entity becomes an important instigator of the structuring of the secondary activities, i.e. the movement of economic resources in the gravitation area.

The axes of development can represent the connection, i.e. the system of refraction points, individual activities, as well as entire development and urban centres and different combinations of them.

The appearance of spatial and positioning inertness in industry

Geographic distribution of certain industries have been created as a result of the decisions of the positioning of certain objects. These already distributed objects create, with their production and complementary infrastructure, specific circumstances which can be called external economy. This specific economy with its state and character influences the positioning of new objects and thus influences the tendency for further distribution structure. For example, the location and distribution of certain objects in lower phases of agricultural processing will create the conditions for the positioning of new objects with higher phases of production. New objects process semi-products or secondary raw materials which are produced by the objects with lower phases of processing. For instance, oil industry initiates margarine industry. The fruit processing industry initiates fruit juices industry. This is why Krešić (1981) emphasizes that already created spatial features and distribution create a basis for the distribution of all industrial complexes in the area for a long time.

Accordingly, the character of the object location influences the spatial physi-

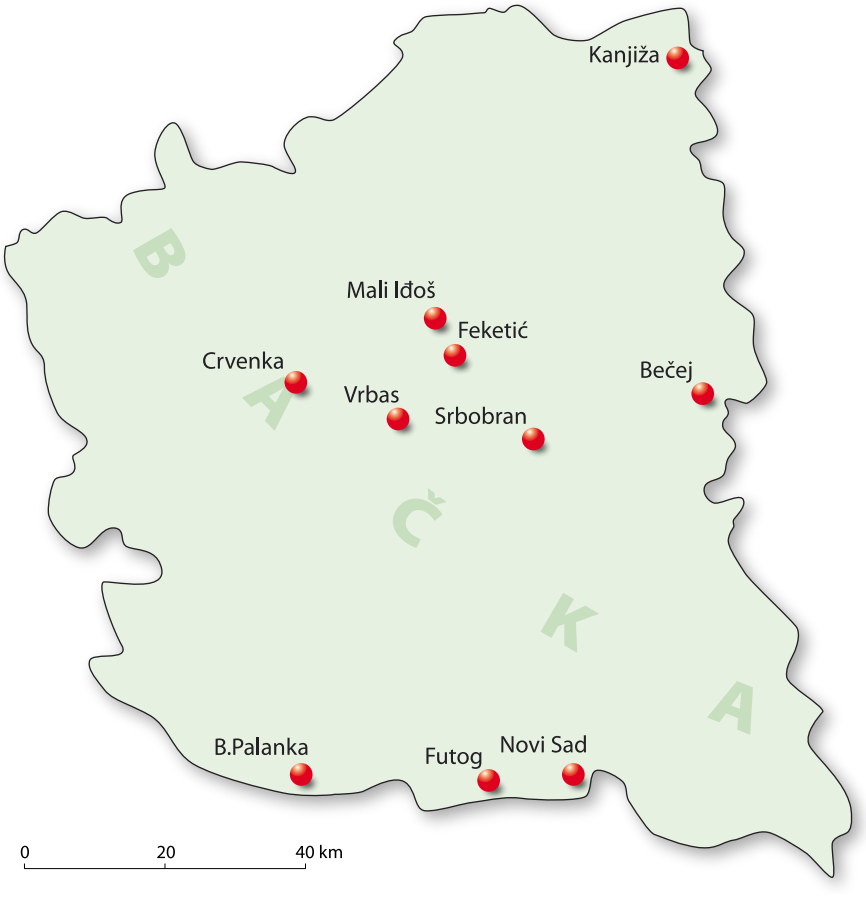

Figure 2 Spatial distribution of animal food industry in Bačka

ognomy of objects in the wider area. When such conditions are once established they simultaneously resist positioning and spatial changes. Research has shown that such changes do not happen even when all the positioning and spatial advantages are lost over a certain period of time, which were the reasons for the initial solution.

The system of such petrified relations is not only formed on the space where there is an industrial object, but on the entire space which comprises raw materials, for example, the space with the traditionally developed production of sunflower, sugar beet, soy and similar things and which has developed due to the planned usage of the object. It can also operate in the conditions of the successful concentrated market, which, no matter how small it is, means a certain security for the object. In this case it is understandable to have a dilemma about its repositioning, because it would be placed in the situation of the changed state of the entire system.

The most outstanding case of the location stability in Bačka is related to metallurgy.

Conclusion

In the total structure of the industry in Bačka, the most prominent participation belongs to the industrial activities belonging to the system of agroindustry. They are, above all, based on good agricultural prerequisites of wide loess plateaus in the region. But, having only this type of interrelation is not sufficient guarantee for its development, since this sort of industry is directed into lower phases of processing, with the creation of large mass of unused secondary raw materials. This is why, if key orientation of Bačka is towards agroindustry, it should include the closure of production cycle in all its production segments.

On the other hand, the appearance of the dispersion in distribution is characteristic of borderline areas of loess plateaus and dilluvial terraces, because of the specific petrographic and mineral content of the terrain which is favourable for the development of building materials, non-metallic and chemical industries.

The problems and difficulties of the transition process will certainly be endured by agroindustry, chemical industry and building materials industry. Optimistically speaking, their stable development should contribute to the slow, but certainly continual devlopment of revitilised traditional industries, which were primarily in the function of survival based on the need for mass employment of the working force, as well as the industries which would be based and secured by their connection with agricultural production.

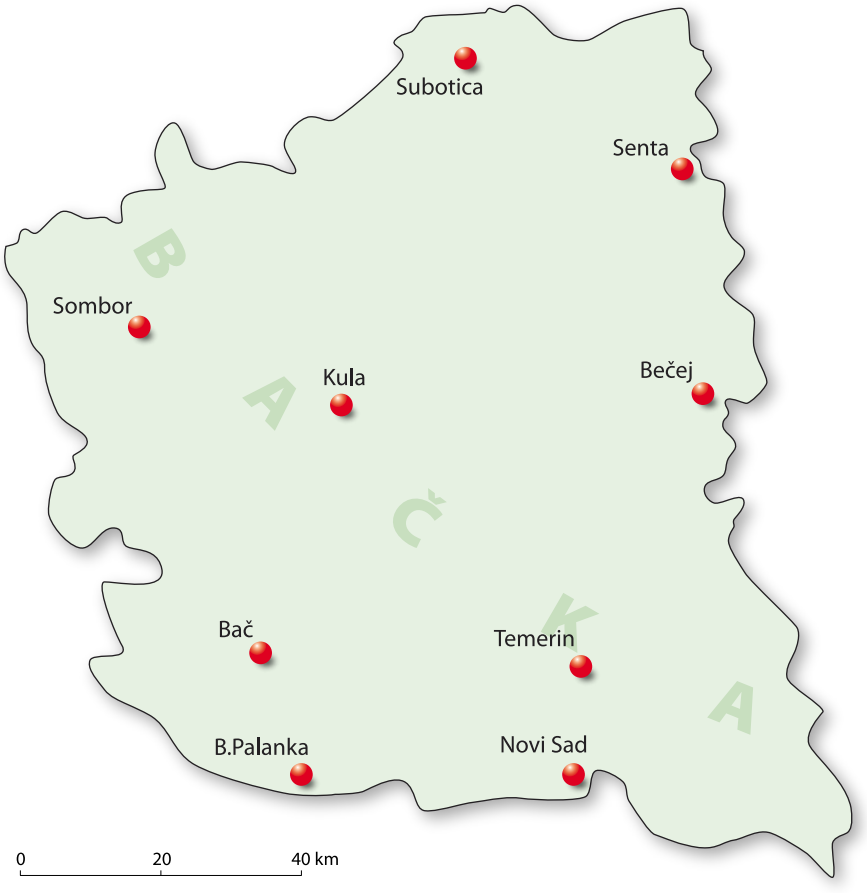

Figure 3 Spatial distribution of metal industry in Bačka

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References

Krešić, I. (1981): Prostorna ekonomija. *Informator*, Zagreb.

Kugler Jozsef, Romelič Jovan, Szilagyi Györgyi (2004): Egymastol elzarva: - településekölesek (Kübekhaza, Obeb, Oroszlamos) a harmas hatar menten. Lehet-e Harom Arca Tajnak? Tanulmanyok a delkeleti hatarregio ujraszervezödo kapcsolatairol, MTA Refionalis Kulatasok Központja Bekescsaba-Pecs.

Marinić, I. (1999): Regionalni i prostorni uslovi razvoja privrede u malim gradovima. Parametri i kriterijumi za definisanje urbane mreže u malim gradovima. Posebno izdanje, broj, 19, Fakultet tehničkih nauka, Novi Sad, strana 37-47.

Romelić J., Rađević, D. (1997): Lokacioni kvocijent kao merilo prostorne distribucije i trendova razvoja industrije Banata, *Zbornik radova Instituta za geografiju*, br. 27, Prirodno-matematički fakultet, Novi Sad, strana 100-107.

Romelić, J. (1997): Specific Features of Spatial distribution and Relative Degree of Development of Agro-Industry in Vojvodina. *Geographica Pannonica*, International Scientific Journal, No. 1, Institut za geografiju, Prirodno-matematički fakultet, Novi Sad, strana 26-28.

Romelić, J., Tomić, P. (2000): Karakateristike i problemi disperzivnog modela razmeštaja industrije u Vojvodini, Regionalni razvoj i demografski tokovi balkanskih zemalja, broj 5, Naučni skup sa međunarodnim učešćem, Niš, strana 91-101.

Romelić, J., (2007): A Vajdasag Regionalis Szerkerzete es Területi Különbsegei, XV Fejezet, A Karpat-Medence Regioi 7, Vajdasag, Magyar Tudomanyos Akademia, Regionalis Kutatasok Központja, Dialog Campus Kiado, Pecs-Budapest. P. 486-545.

Statistical Yearbook of the Republic of Serbia, 1990-2006. Statistical Office of Serbia, Belgrade.

Tomić, P., Romelić, J., Jovanović, G, (2005): Industrija Bačke, Prirodno-matematički fakultet, Departman za geografiju, turizam i hotelijerstvo, Novi Sad.