THE CHARACTERISTICS OF THE CHANGES IN THE LOCATION AND TRENDS OF THE DEVELOPMENT OF THE INDUSTRY IN SREM

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Abstract

Srem is one of the three regions in the province of Vojvodina where the industry, according to the degree of its development, comes after agriculture. In this paper, we have dealt with the specific changes that occurred in location, structures and trends of the industrial development of Srem. Because of long changes, the food industry has prevailed, as well as the production and manufacturing of paper and caoutchouc, the production of leather goods, textile, etc. These branches of industry have initially been created as a result of the efforts to make a maximum use of solid raw material base. This has given a direction for the development of lower phases of manufacturing, and later complementary industries of higher parts of manufacturing have been extended. In this paper, we have tried to give quantity estimates of the spatial distribution and development of the industry in Srem in the last three and a half decades, by using the method of the location quotient and regional factor. We have found that the industry has had polycentric position. The positive changes in the development have not been emphasized, which shows that the industry of some of the parts of Srem, comparing the average trends in Vojvodina, has not significantly changed its location, distribution or the degree of industrialization.

Key words: Srem, industry, location quotient, regional factor, spatial distribution, and degree of industrialization.

Introduction

Srem is one of the three regions in the province of Vojvodina (21 506 km^2 and 2 013 889 citizens) It covers an area between the southern Serbia, Bosnia and Herzegovina (the Republic of Srpska), Croatia, Banat and Backa. The total surface of Srem is 4 220 km^2, which is 19.6 per cent of the territory of Vojvodina.

As far as the relief of Srem is concerned, there are mountains, loess plataux, loess terraces and alluvial plains of the Danube and Sava. Fruska gora is one of the most beautiful mountains in the entire country and belongs to older mountains with diverse geological content.

Hydrografically, Srem can be divided in three hydrographic zones: the zone of Fruska gora (with a large number of springs and streams), loess zone (percolation water and streams) and alluvial plains with powerful river streams (The Danube, Sava and Bosut)

Considering the geographic position of Srem, The climate is somewhat changed comparing to the other parts of Vojvodina. The average air temperature in January is minus 1.2 $^{\circ}$C; the average July temperature is 21.4°Celsius. The winds are mostly western or southern-western. Srem is the wettest part of Vojvodina. Annually, the average precipitation is 658 mm.

In the past, Srem was inhabited more than Backa or Banat. The first important settlement was during the Roman period. In Srem, there was a famous Roman settlement Sirmium (today Sremska Mitrovica). With the arrival of Turks to Balkan, the multitude of Serbian population moved to Srem. Seventeen marvelous monasteries have remained since that period. Now there are 357 959 inhabitants living in Srem. The majority of them are Serbs (243 125), then Hungarians (26 241), Croats (21 378), etc.

The leading economic branch in Srem is agriculture. It employs the majority of active population, and represents 55% of the national income of Srem. The industry has over 20 000 employees and is the second most important branch.

Srem has significantly less number of towns comparing to other parts of Vojvodina. Larger towns are also the industrial centers: Sremska Mitrovica, Indjija, Sid, Ruma, Stara Pazova, etc.

Figure 1: The Geographic map of Srem.

The general characteristics of the industrial development

The beginning of the industry in Srem in 19th century was based on the developed raw material base provided by agricultural production. This why the lower phases of processing in the food industry were the first ones to appear, and later followed the textile industry and the leather goods manufacturing. Together they all form basic agro-industry, regarding their primary location.

The deposits of non-metal minerals, such as quality clay, marl, etc. have stimulated the development of other industries, mainly the production of cement, gravel and send, the production of building materials (lime, bricks, tiles and manufacturing goods)

The immediate presence of important wood resources on Fruska gora, alluvial forests along side the main streams of the Danube and Sava, their small backwater channels, abandoned meanders and closeness of Slavonic forests have stimulated the production of sawn timber and also final wooden products.

Unlike other parts of Vojvodina Srem has had at its disposal certain energetic resources, which have been used on their own until the appearance of oil and gas as available power supplies. Besides woods, the coal deposits in Vrdnik have been significant to industry, but apart from regional reserves, they used coal from Pecuj before the World War One, and later from Croatia, Slovenia and the neighboring Kolubara basin.

The situation in the Vojvodina industry and consequently in Srem has been characterized by the series of economic and political circumstances which were dictated by the economic policy of Austria up to 1867, and then Hungary until the end of The World War One.

The degree of the development of the industry of Srem comparing to Hungary can be established according to the quantitative survey of the social and economic structure of the population based on the official census in Hungary in 1910. We have had to define the territory of Srem as Srem prefect district, which covered larger territory than present-day Srem, including the so-called western Srem, which now belongs to Croatia. According to these surveys 0.5 % of the total population number worked in the mining industry, 13.2% in the industry and handicraft. Because of this Srem prefect district was under the average for Hungary (all three branches 18.2 %). Regionally, this meant that comparing to other three districts Srem was only slightly better than Torontal district (12.5 %), i.e. Banat in broader sense. Therefore, Srem was, as well as other parts of Vojvodina, was

predominantly an agricultural area. Nevertheless, the facts show that 71.5% of the population in the Srem district worked in agriculture.

In spite of a number of problems and stimulative or regressive selective measures of the government, the industry has still developed in Srem and Vojvodina. This was strongly influenced by the raw material base coming from agriculture, workers coming from handicraft industry and finally the accumulated and available investment funds.

In that period, smaller companies were predominant, especially the ones with 20 – 50 employees. The other characteristic of Srem was, however, the fact that companies with the 4 619 surpassed the total number of employees in Backa (4 578) and Banat (3 356). This was a result of the fact that two extremely large companies were located in Srem: The cement factory in Beocin with 1 833 employees and the coal mines in Vrdnik with 708 employees.

When Vojvodina and Srem became part of the Kingdom of Serbs, Croats and Slovenians, i.e. Yugoslavia, a different situation occurred. The agriculture of Srem was mainly product oriented and proved as a reliable supplier of raw materials for the mid-European industry, especially agro-industry. Consequently, its trading system was very ahead in this European region. Besides, Srem, as well as Vojvodina, and then Croatia and Slovenia managed to save form destruction a majority of industrial capacities during the World War One. If we analyze the role of Vojvodina and Srem in the total situation in the industry, an then agriculture and other branches of newly-created state, we can conclude that having been industrially advanced territories, they can be a very reliable factor of the survival and development of the government economy.

According to the 120 data records, Srem and other parts of Vojvodina had food industry, textile and metal industry, i.e. the branches of manufacturing and processing industries, but unlike other parts of Vojvodina Srem was the only part to include extracting industries – coal mine in Vrdnik and strip mine for the cement industry in Beocin.

One hand, this specific situation in Srem represented a problem of great disproportion of the types and capacities of some branches of industry comparing to other parts of the country, and on the other hand opened huge possibilities for the regions with different industrial orientation to initiate the exchange of products within the new state. Theoretically, it means that by connecting different and geographic areas there have been created positive economic and political conditions for the intensive development of the new state and Srem within it.

Since the end of the World War Two until present day in Yugoslavia, and accordingly in Srem, there have been major changes of economic system, and numerous economic and political operations which influenced the position of the industrial economic firms, and their role in the social and economic development of the country. Its indisputable that this influenced not only the trends in industry, its branches, groups and subgroups, but also its place in the economy in general.

In accordance with general social and economic progress in Yugoslavia between the end of the World War Two and the beginning of the civil war, the industry of Srem was moving forward and making use of relevant local advantages and politically improvised more or less successful solutions.

According to the 1997 data records, the largest participation percentage in the general industrial production in Srem belongs to the food industry with 42. 69 %. It is followed by the paper production and manufacturing (8. 95 %), caoutchouc manufacturing (8.92 %) and the production of leather goods. The four mentioned industries have an essential role covering 68.66 % of the total industrial production. We can see that a great presence of these industries was a result of the aims to

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use solid organic raw material base at its maximum. It served as an orientation towards lower phases of manufacturing to be followed with complementary advanced phases.

The second group of industries that individually have smaller participation consists of: the textile production (4.84 %), the production of leather and furs (4.25 %) and the production of the sawn timber and panels (3.43).

The third group has frequency of participation between 2 and 3 % and consists of: the production of the final wooden products (2.65 %), the production of basic chemical products (2.64 %), machine building industry (2.29 %), the manufacturing of chemical products (2.16) and the transport industry (2.11 %).

The fourth group consists of three industries with the participation between 1 and 2 %: the production of fodder (1.81 %), the printing industry (1.68 %) and metalworking industry (1.12 %). The other five industries participate with less than one per cent in the industrial production of Srem: the production of building materials (0.88 %), the beverage production (0.78 %), the production of stone, gravel and sand (0.41 %), electric-power industry (o.20 %) and the production of textile (o.11%).

According to the situation at the end of 1997, there were 686 industrial firms in Srem. The majority was financed by domestic capita. Only seven firms had foreign and 15 had mixed capita. The form of ownership shows that in short period of time there have been drastic but positive changes toward private ownership. Thus, private ownership includes 610 firms, followed by firms that have mixed ownership (43). In once prevailing social (government) ownership, there are only 32 firms and only one belongs to cooperative ownership. (The Report of the Srem Chamber of Commerce, Sremska Mitrovica, 1997).

A location quotient and a regional factor as markers of the spatial distribution and development of industry

The aim of this part of the paper is to establish the character of the spatial distribution and development of industry in Srem in the last three decades by quantitative methods – location quotient and regional factor used in the Yugoslav industrial geography (Vriser, 1975; Feleter, 1984; Maric, 1987; Romelic and Radjevic, 1997 etc.).

The location quotient shows where the industry is located in Srem, in other words it shows the degree and concentration of the industry in the municipalities of Srem comparing to Vojvodina, which is a larger territorial unit and complex geographic environment where industry is developed.

By location quotient, it is possible to establish the changes of location models (concentration, dispersion, and polycentrism) of the industry of Srem characteristic for 1961, 1971, 1981, 1991 and 1995. For the year 1953, we haven't had data because of the specific census methodology. The year 1995 is one of the more recent years for which statistics was published. All these rates were calculated in relation to the same parameters for the situation in Vojvodina.

Location quotient was calculated by the formula Lq= a:A/b:B, when:
      a= number of industry workers in a municipality of Srem
      A= Number of industry workers in Vojvodina
      b= population number in a municipality
      B= population number in Vojvodina.

In order to establish the degree of industrialization we have used regional factor. It shows how much the employment index has changed in industry between the two characteristic years for the Srem municipalities, comparing to Vojvodina. This means that regional factor enables us to see different rate of industrialization of certain parts of Srem comparing to Vojvodina.

Regional factor can be expressed by the formula:

$$RF = no_2 : no_1 / NO_2 : NO_1$$

when:

no$_2$= number of workers for the last year in a municipality of Srem

no$_1$= number of workers for the starting year in a municipality of Srem

NO2= number of workers for the last year in Vojvodina

NO1= number of workers for the initial year in Vojvodina.

The value for both quantitative indicators for Vojvodina is 1.000. Beginning with this indicating value, we can distinguish the following typology of spatial distribution, i.e. the employment index for the industry of the Srem municipalities:

a = (< 0.399) – undeveloped industry (very low trend of industrial development)

b = (0.400 – 0.669) – poorly developed industry (low trend of industrial development)

c = (0.700 – 0.999) – close to average industrial development (close to average industrial development)

A= (1.001 – 1.300) – industrial development above average (the rate of industrial development above average)

B = (1.301 – 1.600) – industrial function emphasized (relatively high rates of industrial development)

C = (1.601 – 2.000) – industry is major economic sector (high rates of industrial development)

D = (> 2.000) – strongly developed industry (booming rates of industrial development.

The model of the degree of regionalisation has been used with two temporal aspects. In the first one we has established the degree of industrialization of individual municipalities in Srem comparing to Vojvodina in the period 1961 – 1991, and in the period 1961- 1995. The period 1961 – 1991 shows most authentically the degree of industrialization. The situation in the period 1961 – 1995 is not reliable. In 1995, many of the employees, whose number was decreasing (Figures two and three), although registered for the statistic records were actually on so-called forced (compulsory) vacation and the firms maintained the minimum of production. In other words during that critical period, the number of workers was not the real indicator of the situation in industry in certain parts of Srem, Vojvodina and country in general. This also means that a number of people employed in industry cannot be an absolute indicator of the development of the industry in the countries such as Yugoslavia, where we can always question the effectiveness of its usage in a system where employing sometimes meant only a solution for social and economic position of certain population categories and was not a result of the real needs in industry.

We believe that the obtained results for both models have certain disadvantages since the statistical number of industrial worker in one municipality dos not necessarily show the degree of the development of its industry. Still, the uncertainty of this parameter is more emphasized in location quotient. The regional factor, however, does not compare the number of workers with the total number of population, so the factor of commuters does not influence the uncertainty of this calculating technique, which is the case for relocation quotient. The only limiting factor is the fact that a number of workers can be relevant for the industries in lower and middle technological intensity. And such industry is characteristic for Srem.

On the other hand, more reliable indicator is the participation of the industry in the national income of a municipality. It can be used for calculating the location quotient because it is applicable for the calculations viable for the fixed period of time. But, regional factor compares the national incomes of different periods. And since its value in dinars (YUD) has often change, this factor cannot be used.

Figure 2 – The trends of number of employees in some of the Srem municipalities.

Figure 3 – Number of employees in the Vojvodina industry.

By using the mentioned models for calculating location quotient and grouping results according to the frequency of distribution, we ended with the situation in table 1.

Table 1 – The values of the location quotient of the industry for the municipalities in Srem.

Community	1961.	1971.	1981.	1991.	1995.
	Lq Tip	Lq Tip	Lq Tip	Lq Tip	Lq Tip
Beo~in	1.837799 C	1.758759 C	1.190371 C	0.854313 c	1.811910 C
In|ija	0.826863 c	0.642065 b	0.550343 b	0.610148 b	0.574651 b
Irig	0.796326 c	0.016394 a	0.334393 a	0.595747 b	0,688346 b
Pe}inci	0.130114 a	0.002277 a	0.336605 a	0.395489 a	0.422550 b
Ruma	0.595268 b	0.745724 c	0.717192 c	0.877014 c	0.841383 c
Sr. Mitrovica	0.805378 c	0.888995 c	0.931630 c	0.954523 c	1.149326 A
Stara Pazova	0.351642 a	0.636317 b	0.516289 b	0.477186 b	0.527.837 b
[id	0.365474 a	0.487887 b	0.630408 b	0.760441 c	0.970394 c

In 1961, the area of undeveloped industry (a) included three municipalities: Pecinci, which did not have almost any industry at that time, Stara Pazova and Sid. In 1971, in addition to Pecinci there is also Irig, which shows instability in poorly developed industry. The same situation goes for 1981, and finally in 1991 only Pecinci remained in this group. Only in 1995, Pecinci moved up into group (b) because the decrease in the average number of industrial workers in Vojvodina.

In 1961, the second regressive type (b) marked as poorly developed industry included only Ruma. In 1971, Stara Pazova and Sid followed, which shows their relative industrial progress during a decade, as well Indjija, which experienced a regressive industrial movement. In the beginning of 1980s, the structure was unchanged. In 1991 and 1995, there were Indjija, Irig, Stara Pazova, and in 1995 Pecinci.

The industrial development close to the average (c) is characteristic for Sremska Mitrovica excluding the last period, and for Ruma excluding the first period. This actually shows the balance

in the development and relative position of the industry in these two municipalities. Sid municipality belongs to this type in the last two years, which shows a significant progress in the development of its industry. On the other hand, Indjija and Irig belonged to this type in 1961. In the following periods, Indjija was characterized by stagnation and turning to handicraft, and Irig was characterized with regression and stagnation, because of the constant changes of different industrial branches.

A global survey shows that between 1961 and 1991, there is a tendency to decreasing the number of municipalities belonging to the type of undeveloped industry, and increasing number of municipalities with industries close to the average, although this other tendency stopped in 1995. On the other hand, the increase of the number of municipalities with location quotient over 1.000 in 1995 shows a tendency of degrading the industry in municipalities where the process of industrialization was significant. This is why the municipalities with already more developed industries are now more exposed. It means that this phenomenon is not the result of their real industrial development.

The former analysis brings us to a conclusion that majorities of municipalities in Srem have location quotient under1.000, i.e. they are behind the Vojvodina average. In the first three years seven in eight municipalities of Srem belonged to groups of territorial units with industries above average – in 1991 all municipalities and in 1995 six municipalities (because of the emphasized regressive tendencies in Vojvodina. This means that since the beginning of 1960s to mid-1990s Srem has had almost entirely lower degree of industrial development than Vojvodina average. The exceptions are Beocin (1991- type c) which mostly belonged to the areas where industry is main economic sector (C) and Sremska Mitrovica which belonged to the type of the industrial development above average (A) only in 1995.

Accordingly, we can conclude that in the entire period, there have not been any significant movements of the distance from the average industrial development in Vojvodina. This shows that the industry of Srem has had periods of stagnation comparing to Vojvodina in general, in other word, neither parts of Srem have showed above average continual development If there were any such movements they were sporadic and short. The closeness of Novi Sad and Belgrade did not have the expected influence that such centers usually have on their gravitation areas. They influenced the development of only one industry (Beocin) by using the gravitation are of Srem as a raw material area, and stimulated the development of tertiary sectors, especially handicraft, trade and catering industry (Stara Pazova and Indjija).

Although regional factor was based on the comparison of two years and thus shows some dilemmas and unexpected relations, we can still see the relative parallels considering industrial development of certain areas of Srem.

Table 2- The values of the regional factor of the industry of the municipalities in Srem

Community	1961-1991.	1961-1995.
	Rf	Rf
	Tip	Tip
Beocin	0.530067	1.064896
	b	A
Indjija	0.822892	0.775018
	c	c
Irig	0.548268	0.633488
	b	b

Pecinci	29.170951 D	31.166971 D
Ruma	1.650272 C	1.559777 B
Sr.Mitrovica	1.468613 B	1.768334 C
St. Pazova	1.754888 C	1.941164 C
Sid	1.871697 C	2.388462 D

According to the regional factor data, we can see in which municipalities the greatest industrialization occurred comparing to the total for Vojvodina. These were the municipalities that in 1961 had a small number of vacancies (compare graph 1), and therefore the growth index is often very high and does not present real situation. This is significant for Pecinci (D) in both relations (1991/61. and 1995/61), then Ruma Stara Pazova and Sid.

For Beocin, Indjija and Irig during the analysis of the location quotient it was fount that they have a relatively numerous population employed in the industry, in other words that they belong to old industrialized municipalities, with (1991/61) low trend of industrial development (b) or the trend close to the average (c). Accordingly, the old industrialized municipalities, except Srem, have shown a smaller increase or stagnation. Sremska Mitrovica, because of its pre-conditions, the old industrial center that belongs to type B (relatively quick industrial development).

The similar global structure is characteristic for 1995/61, except Beocin which now belongs to type A (above average) which is a result of the constant increase of the number of employees in industry. Pecinci and Stara Pazova belong to the same group as in previous period, Ruma, one level lower, and Sremska Mitrovica one level up.

If we analyze the obtained values for the location quotient and regional factor, we can see certain changes in comparison to spatial distribution of the industries in Srem in the period from 1961 to 1995. This is also shown by the difference between the highs and lowest location quotient, i.e. between the difference of the industrialized and not industrialized municipalities. In 1961, that difference was 1.708 because the smallest location quotient was o.130114 (Pecinci), and the highest 1.837799 (Beocin). In 1995, the difference was slightly smaller – 1.389. The smallest value was also in Pecinci – 0.422550, and the highest 1.811910 (Beocin). On the other hand, in the more relevant year 1991 the difference between the location quotients was smaller – 0.559034. This means that in the year the tendencies towards the relatively even distribution of the industry were emphasized. In other words, on the territory of Srem small poles of development are formed – Sremska Mitrovica, Sid and Ruma as primary and Indjija and Irig as secondary. Beocin with its high marks is developed within Novi Sad. If we compare this situation with the characteristics of the spatial models in industry, we can conclude that they have polycentric character. If we consider other indicators, the role of primary poles of development belongs to Sremska Mitrovica and Ruma. On the other hand, Pecinci have agricultural function and Stara Pazova handicraft and tertiary function because of belonging to the gravitation area of Belgrade.

Figure 4 – The types of the municipalities according to the values of the location quotient for year 1995.

Figure 5 – The types of municipalities according to the regional factor for years 1995/61.

According to the comparison of the location quotient and regional factor, we can se the oscillations in the volume of the mentioned parameters, which obviously points at the crisis in some older industrialized municipalities. As local administrative centers, with the initial concentration of the industry, they did not have any dispositions to transform into real poles of the development and forming of the regions.

The functional combination of the local quotient and regional factor (Figure 6 and 7) enables the observation of other phenomenon characteristic of temporal changes into spatial models of the industry.

Figure 6 – Concentration of the municipalities according to the values of location quotient and regional factor for year 1961.

Figure 7 – Concentration of municipalities according to the location quotient and regional factor for the year 1995.

Namely, the comparative graphic presentation of the location quotient and regional factor shows that some municipalities are coming closer together on the Vojvodina level. In 1961, a considerable dispersion of the municipalities compared to Vojvodina average is significant, and the municipalities have such a position in the quadrant of coordinate system that points out the factors below the average location quotient, and above regional factor. In 1995, we can see that the concentration of the municipalities is greater along the line that represents the Vojvodina average, with the higher number of municipalities above average. Unfortunately, these essentially positive changes are not emphasized enough, which is shown when we study three and a half decades of the industries in certain parts of Srem, comparing to the Vojvodina average. It did not considerably change its spatial distribution or the degree of industrialization.

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