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CHANGES IN THE HIERARCHY OF SETTLEMENTS AND ATTITUDE OF THE LOCAL POPULATION: EVIDENCE FROM A DEVELOPING REGION

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Abstract: In post-socialist European countries, smaller cities were most vulnerable to economic restructuring during the transition years, as a result of which they suffered political and economic changes. These changes significantly influenced the hierarchy of these settlements in the settlement system. The phenomenon of urban hierarchy and changes in the hierarchy of settlements are rare research topics in Serbia. In this research, Kolubara District (in Western Serbia) is used as a case study because it has a good traffic position, as well as good potential for industrial development, but despite this, its inhabitants migrate to larger cities. This paper tests Schmook's method for the centrality of settlements. A survey was used to examine the attitude of the local population in regard to the centrality and hierarchy of settlements. A closed type questionnaire was used. The results show that the local population has a positive attitude toward the functional development of the cities in the Kolubara District.

Keywords: settlement hierarchy; centrality of the settlements; urban development; Kolubara District; Serbia

Introduction

The effectiveness of the urban system in any country largely depends on the size distribution of the urban centers and the distance between them (Jefferson, 1939). Not all the settlements in a particular area have the same level of importance. Some settlements are differentiated by their centrality, and in terms of their function they are more important than others. Smaller settlements need to fight for their position in the network because they are peripheral and do not have some of the more important city functions in them. In Central and Eastern European countries, medium-sized and smaller cities were very vulnerable to economic changes during the transition years (Burdack & Knappe, 2007; Castells, 2002). In Saxony, it was inevitable that the small towns suffered from a difficult legacy when they didn't have enough city functions. Large number of small towns in Central and Eastern Europe were settlements with no definite urban development perspective (Burdack, 2010). In Estonia, the major cities, Tallinn and Tartu, have traditionally been the main destinations for education-related and employment-

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related migration. The loss of markets and economic restructuring processes in small towns, changed the settlement systems (Leetmaa, Kriszan, Nuga, & Burdack, 2015).

The situation is the same in smaller Serbian towns. In Serbia, there has been a marked influence of large cities on smaller settlements, which has a significant impact on the hierarchical relations between them. There is a strong gravitational pull of large cities in Serbia, such as Belgrade, Novi Sad, Niš, and Kragujevac, which is the same issue faced by many European states (Stamenković, 2004). In addition, Serbia is going through intensive processes of depopulation and population aging (Đerčan et al., 2017; Hirt & Petrović, 2011; Vujnić, 2014). The disproportion in the demographic size of the major cities is a consequence of the divergence and asymmetry of Serbia's settlements. The dominance of Belgrade and Novi Sad shows the index of urban primarity to be 6.3 (Đerčan et al., 2017; Miljanović, Miletić, & Đorđević, 2010; Tošić & Nevenić, 2007).

In this paper, Kolubara District is taken as a case study (Figure 1). This district comprises six municipalities. The largest municipality in Kolubara District is Valjevo (Stančetić, 2009; Uredba o nomenklaturi statističkih teritorijalnih jedinica, 2009, 2010). According to the 2011 Census and the Rank-size rule, known also as Zipf's law rule, Belgrade is the first, Novi Sad is the second, Niš is the third, and Valjevo (center of Kolubara District) is the 14th ranked city (Đerčan et al., 2017). This case study has been taken into consideration because, as it is mentioned above (examples of Estonia and Central Germany), a large number of small towns in post-socialist countries encountered the problem to lose economic



Figure 1. Geographic position of Kolubara District in Serbia. From "The development of transport infrastructure and attitudes of the local population: a case study from the Republic of Serbia," by Đukičin et al., 2018, *Geografska Tidsskrift-Danish Journal of Geography*, 118(1), p. 103.

functions and population. Therefore, this case study from Serbia is not a local matter, but it deals with a problem identified by the authors across Europe (Burdack, 2010; Burdack & Knappe, 2007; Leetmaa et al., 2015).

Kolubara District was taken as a case study since it has much potential due to its favorable traffic position, numerous opportunities, and resources for the development of industry and mining (Đukičin, Đorđević, & Milanković, 2014; Đukičin Vučković et al., 2018). This paper studies centrality and hierarchy of the settlements, as well as the citizens' perception of the region they live in. Namely, understanding of the local population's attitudes can give some guidance in planning and developing of the secondary, tertiary, and quaternary sector. The development of these sectors in settlements makes their position in the hierarchy better. Study of the attitudes of the local population is a type of research which has been increasing in recent years (Đukičin Vučković et al., 2018; Kirkpatrick, Davison, & Daniels, 2012; Ryan, 2006; Santos & Buzinde, 2007).

The main hypothesis of the paper is that changes in demographic indicators greatly influence the hierarchy of settlements in some area. The second hypothesis is that negative

changes in the hierarchy of the settlements affect the local population in different ways causing the moving of the population to larger centers and leaving the area. One of the solutions for this could be to strengthen the country economy and the economy of smaller centers in the area.

Over four fifths of Kolubara District consist of hilly and mountainous area, and a little less than a fifth is plainland (Đukičin Vučković et al., 2018). Kolubara District covers the area of 2,474 km². According to the 2011 population census, the number of the inhabitants in the district was 174,513 (Statistical Office of the Republic of Serbia [SORS], 2012a). The population density is 70.5 people per km² (Đukičin Vučković et al., 2018; SORS, 2012b).

Data and methods

To show the connections between the lack of active population in secondary, tertiary, and quaternary sectors and the processes of depopulation, the population number, age structure, and migration flows in Kolubara District were analyzed. When determining the hierarchical relations among the settlements, activities in the secondary sector and the centrality of the settlement were taken as parameters. The secondary sector, primarily industry, greatly influences the growth and development of a settlement, and its distinctive features strengthen differentiation within a network of settlements (Vresk, 1980). The industry has always been a factor influencing the location of other functions in a settlement (Đukičin, Milanković, & Đorđević, 2011). Research into the significance of the secondary sector in the network was carried out using a quantitative method. Schmook's method was applied to the secondary sector which is the most accurate method for determining developing parameters (Đerčan et al., 2017; Vresk, 1980). The results obtained were based on the formula:

$$SSA = An \cdot (SCn/An - SCr/Ar) \quad (1)$$

The details of the formula are as follows: An – active population in the settlement, SCn – active population in the secondary sector in the settlement, SCr – active population in the secondary sector in the district, Ar – active population in the district.

A quantitative method based on the activity of the population in the different sectors was used to determine the centrality of the settlements in Kolubara District. One of the procedures that was successfully applied was Schmook's method, which is the most accurate method for determining these parameters. In this method centrality was calculated using the following formula:

$$C = An \cdot (TQn/An - TQr/Ar) \quad (2)$$

The elements of this formula are as follows: An – active population in the settlement, TQn – active population in the tertiary/quaternary sector in the settlement, TQr – active population in the tertiary/quaternary sector in the district, Ar – active population in the district. Greater SSA and C values mean a higher position of the settlement in the hierarchy (Vresk, 2002). Official data from the censuses of population (1971, 1991, 2002, and 2011) were used.

In order to investigate how much changes in the hierarchy of settlements affect the local population and to find out the attitudes of the population toward these changes, a questionnaire was used. The sample included 0.1% of the population (176 inhabitants of the district). The research was conducted during 2017 and the first four months of 2018. The questionnaires were anonymous. The sample was randomly stratified. The share of the respondents from different socio-demographic

groups was proportional to their share in the Kolubara District population according to the last population census (SORS, 2012a, 2012b, 2013a). Cronbach's alpha test value was .81 which is a tolerable level of validity (Mišćević-Kadijević, 2009). The questionnaire was divided into two groups of items (socio-demographic items and the attitudes of respondents). To research the attitudes of respondents, a Likert-type scale was applied. The scale was from one (strongly disagree) to five (strongly agree). The obtained data were analyzed statistically in Version 20 of IBM SPSS Statistics for Windows (IBM Corp., 2011). A descriptive statistical analysis followed by a *t*-test analysis for independent samples (Đukičin Vučković et al., 2018; Sheldon & Abenoja, 2001) and one-way analysis of variance (ANOVA) with the post-hoc Scheffe test was used (Đukičin Vučković et al., 2018; Pec, 1981; Vargas-Sánchez, Porras-Bueno, & Plaza-Mejía, 2011).

Results and discussion

The analysis of the population started with the year 1948. That year was taken as starting point because the most intensive changes in Kolubara District have happened since then. As shown in Figure 2, the population number decrease in Kolubara District has been visible since the eighties.

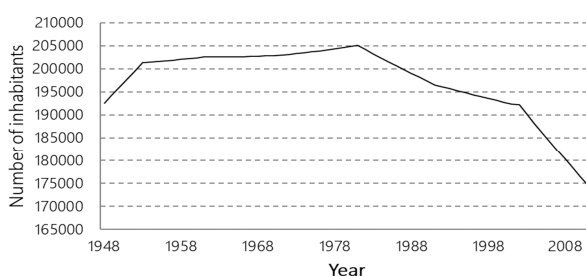


Figure 2. Number of the population in Kolubara district from 1948 to 2011. From *Population Census, 2002: Comparative overview of the number of population 1948, 1953, 1961, 1971, 1981, 1991, and 2002*, by Statistical Office of the Republic of Serbia, 2004b (<https://publikacije.stat.gov.rs/G2002/Pdf/G20024009.pdf>); *Population Census, 2011: Population According to Ethnicity and Gender*, by Statistical Office of the Republic of Serbia, 2012a (<https://publikacije.stat.gov.rs/G2012/Pdf/G20124001.pdf>).

The modern trend of social development shows migrations to be a very important component among the main demographic categories with significant consequences for the areas they are taking place in. During the observed period (Table 1), the share of the indigenous population was decreasing at the expense of an increasing migrant population.

Table 1
The indigenous and migrant population of Kolubara District in Census years

| Census years | Population in total | Indigenous | | Migrant | |
|--------------|---------------------|------------|------|---------|------|
| | | Total | % | Total | % |
| 1971 | 202,990 | 127,591 | 62.9 | 75,399 | 37.1 |
| 1991 | 196,556 | 111,815 | 56.9 | 84,741 | 43.1 |
| 2011 | 174,513 | 102,828 | 58.9 | 71,685 | 41.1 |

Note. Adapted from *Population Census, 1971: Migrations*, by Federal Statistical Office, 1974b, Belgrade; *Population by age and gender*, by Statistical Office of the Republic of Serbia, 1994 (<https://publikacije.stat.gov.rs/G1991/Pdf/G19914023.pdf>); *Population census, 2011: Migration*, by Statistical Office of the Republic of Serbia, 2013 (<https://publikacije.stat.gov.rs/G2013/Pdf/G20134010.pdf>).

The conclusion is that in the last two or three decades, migration processes in Kolubara District have been quite common. Figure 3 clearly illustrate that population age in Kolubara District was growing in the respective census years. In 2011, the average age of inhabitants in Kolubara District was of 43.4.

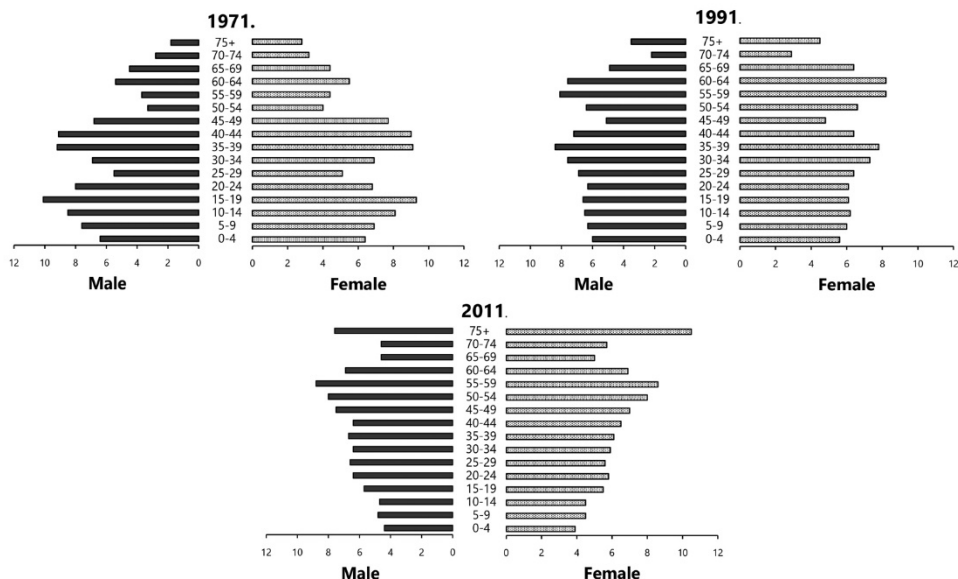


Figure 3. Age-structure of the population in Kolubara District according to the 1971, 1991, and 2011 Censuses. From *Population Census, 1971: Sex and age*, by Federal Statistical Office, 1974a (<https://publikacije.stat.gov.rs/G1973/Pdf/G19734003.pdf>); *Population census, 1991: Population by age and gender*, by Statistical Office of the Republic of Serbia, 1994 (<https://publikacije.stat.gov.rs/G1991/Pdf/G19914023.pdf>); *Population Census, 2011: Age and gender*, by Statistical Office of the Republic of Serbia, 2012b (<https://publikacije.stat.gov.rs/G2012/Pdf/G20124002.pdf>).

Analyzing the share of the economically active population in Kolubara District (Figure 4) a decrease can be noticed in the number of economically active population and an increase in the number of people with a personal income.

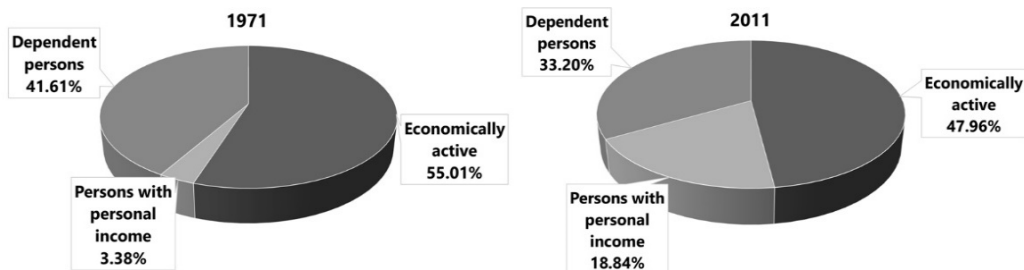


Figure 4. The population by economic activities in 1971 and 2011. From *Population Census, 1971: Activity*, by Federal Statistical Office, 1974c (<https://publikacije.stat.gov.rs/G1974/Pdf/>); *Population Census, 2011: Economic activity*, by Statistical Office of the Republic of Serbia, 2013b, (<https://publikacije.stat.gov.rs/G2013/Pdf/G20134007.pdf>).

Table 2 illustrates the absolute numbers and shares of inhabitants of primary, secondary, and tertiary/quaternary sectors in the total population by municipalities of Kolubara District in 1971, 1991, and 2011.

Table 2
Absolute numbers and shares of inhabitants of primary, secondary, and tertiary/quaternary sectors by municipalities of Kolubara District

| Municipality | 1971 | | 1991 | | 2011 | |
|----------------------------|-----------------|-------|-----------------|-------|-----------------|-------|
| | Absolute number | % | Absolute number | % | Absolute number | % |
| Primary sector | | | | | | |
| Valjevo | 26,091 | 57.58 | 16,821 | 35.66 | 9,605 | 27.06 |
| Lajkovac | 7,064 | 70.53 | 3,643 | 56.75 | 2,006 | 30.18 |
| Mionica | 8,167 | 78.11 | 4,990 | 62.25 | 2,929 | 49.63 |
| Ljig | 11,142 | 89.39 | 6,800 | 72.76 | 3,594 | 56.70 |
| Osečina | 10,903 | 89.18 | 7,649 | 76.95 | 4,327 | 71.43 |
| Ub | 17,865 | 84.36 | 12,350 | 71.67 | 6,739 | 54.12 |
| Secondary sector | | | | | | |
| Valjevo | 8,728 | 19.26 | 15,920 | 33.75 | 9,651 | 27.19 |
| Lajkovac | 778 | 7.77 | 1,217 | 18.96 | 2,330 | 35.05 |
| Mionica | 825 | 7.89 | 1,544 | 19.26 | 1,304 | 22.09 |
| Ljig | 212 | 1.70 | 1,399 | 14.97 | 1,121 | 17.68 |
| Osečina | 262 | 2.14 | 1,117 | 11.24 | 781 | 12.89 |
| Ub | 508 | 2.40 | 2,275 | 13.20 | 2,190 | 17.59 |
| Tertiary/quaternary sector | | | | | | |
| Valjevo | 8,062 | 17.79 | 14,350 | 30.42 | 13,616 | 38.35 |
| Lajkovac | 1,741 | 17.38 | 1,536 | 23.93 | 1,774 | 26.69 |
| Mionica | 1,142 | 10.92 | 1,466 | 18.29 | 1,374 | 23.28 |
| Ljig | 745 | 5.98 | 1,141 | 12.21 | 1,329 | 20.97 |
| Osečina | 618 | 5.05 | 1,169 | 11.76 | 810 | 13.37 |
| Ub | 1,685 | 7.96 | 2,601 | 15.09 | 2,867 | 23.02 |

Note. Adapted from *Population Census, 1971: Activity*, by Federal Statistical Office, 1974c (<https://publikacije.stat.gov.rs/G1974/Pdf/G19744003.pdf>); *Population Census, 1991: Population by age and sex*, by Statistical Office of the Republic of Serbia (<https://publikacije.stat.gov.rs/G1991/Pdf/G19914023.pdf>); *Population Census, 2011: Industry*, by Statistical Office of the Republic of Serbia, 2014 (<https://publikacije.stat.gov.rs/G2014/Pdf/G20144002.pdf>)

*Data for Unknown activities are not included in shares of primary, secondary, and tertiary/quaternary sectors in Census years 1971, 1991, and 2011 in this research.

Based on SSA formula, the importance of the secondary sector for municipal centers was calculated for the 1971 and 2002 censuses. The results are shown in Table 3. The most recent census of the Serbian population, the one from 2011, does not provide data on the activities of the population at settlement level, but instead only summarizes them at the level of municipalities. For this reason, the results in Tables 3 and 4 show the values for 1971 and 2002. There are no major changes in the SSA (secondary sector activities) and C (centrality) values in 2011, indicating that the same parameters for individual municipal centers would not show significantly different values to those from the 2002 census (SORS, 2014).

Table 3

Importance of the secondary sector in municipal settlements in Kolubara District according to Schmook's method for the 1971 and 2002 censuses

| Municipal centre | SSA 1971 | SSA 2002 |
|------------------|----------|----------|
| Valjevo | 3,540.0 | 2,322.6 |
| Lajkovac | 46.6 | 323.2 |
| Ljig | 29.2 | 43.5 |
| Mionica | -21.2 | 91.8 |
| Osečina | 68.0 | 190.7 |
| Ub | -47.8 | 289.8 |

Note. Adapted from *Population Census, 1971: Activity*, by Federal Statistical Office, 1974c (<https://publikacije.stat.gov.rs/G1974/Pdf/G19744003.pdf>); *Population Census, 2002: Activity and gender of the active population and their occupations*, by Statistical Office of the Republic of Serbia, 2004a (<https://publikacije.stat.gov.rs/G2002/Pdf/G20024006.pdf>)

As seen in Table 3, Valjevo, the municipal center, showed the greatest importance with regard to the secondary sector, and it therefore had the highest position in the hierarchy. This situation is expected, but it is noteworthy that the significance of the secondary sector had a lower value in 2002 than in 1971. This is explained by a growth in the importance of tertiary/quaternary activities in Valjevo as the municipal center and the center of Kolubara District.

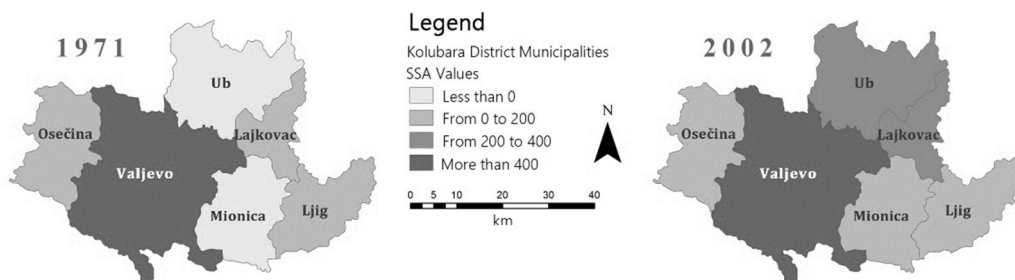


Figure 5. The significance of the secondary sector in municipal settlements in the Kolubara District using Schmook's method for the 1971 and 2002 censuses.

The growth in the value for the significance of the secondary sector in the given period in Lajkovac is interesting. Even as early as in 1971, according to its activities, Lajkovac was a settlement that was distinctly non-agricultural. Thus, it could be concluded that its activities in the secondary and tertiary/quaternary sectors were quite significant in this settlement. Table 4 shows the centrality of municipal centers in Kolubara District in 1971 and 2002.

As seen in Table 4, Valjevo had the greatest centrality. The difference in value for the centrality of Valjevo between 1971 and 2002 was huge (2,735.6). This points to the fact that the centrality, or the significance of tertiary/quaternary activities in Valjevo, almost doubled during the given period. The centrality of Valjevo is more than 35 times higher than the centrality of other municipal settlements in Kolubara District. According to Matijević (2005), because of its functions, Valjevo has the dominant role.

Table 4

Centrality of municipal settlements in Kolubara District using Schموok's method for the 1971 and 2002 censuses

| Municipal centre | 1971 census | 2002 census |
|------------------|-------------|-------------|
| Valjevo | 3,668.4 | 6,404.0 |
| Lajkovac | 636.8 | 54.2 |
| Ljig | 446.4 | 175.5 |
| Mionica | 264.2 | 82.6 |
| Osečina | 212.0 | -43.5 |
| Ub | 755.7 | 168.3 |

Note. Adapted from *Population Census, 1971: Activity*, by Federal Statistical Office, 1974c (<https://publikacije.stat.gov.rs/G1974/Pdf/G1974003.pdf>); *Population Census, 2002: Activity and gender of the active population and their occupations*, by Statistical Office of the Republic of Serbia, 2004a (<https://publikacije.stat.gov.rs/G2002/Pdf/G20024006.pdf>).

When observing other settlements in Kolubara District, a significant decrease in the value for centrality can be seen in all of them. Figure 6 is given to illustrate the comparison of C values at the level of municipalities.

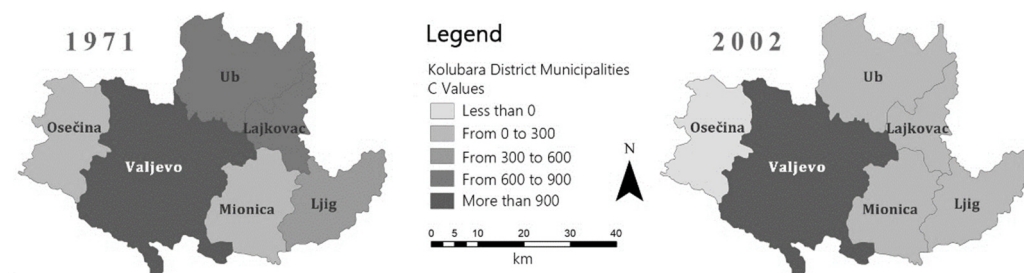


Figure 6. Centrality of municipal settlements in Kolubara District using Schموok's method for the 1971 and 2002 censuses.

Ljig and Mionica experienced a decrease in their centrality value for the given period, but at the same time, no increase in the SSA value was recorded. In these municipal centers there is still a large share of the population engaged in agriculture.

Of the 176 respondents, who filled the questionnaire, 48.3% were male and 51.7% female. The largest share (40.9%) consisted of the inhabitants over 51. Second-ranked was the population aged 26–50 (33%), and the third-ranked was population under the age of 25, only 26.1%. The largest portion of the respondents completed secondary education (65.9%), and 22.2% had only an elementary education. Only 11.9% of the respondents had a college or university education. The distribution of the respondents according to the municipalities was Valjevo 51.1%, Ub 17%, Lajkovac 9.1%, Ljig and Mionica 8% each, Osečina 6.8%.

Results of the t-test

When examining the statements from the questionnaire, there was no statistically relevant difference by genders. The female respondents agreed most strongly with the following statement: “Aging, migration, and unemployment are the greatest cause of the stagnation in the development of Kolubara District” (mean response value 4.51). The female respondents disagreed most strongly with the following statement: “The proximity of Belgrade, its expansion, and gravitational area have a strong influence on Kolubara District” (mean response value 3.00). There is a large number of studies that showed different opinion between the genders (Đukičin Vučković et al., 2018; Kirkpatrick et al., 2012).

Results of one-way analysis of variance – ANOVA

The one-way analysis of variance (ANOVA) was applied to explore if there was a statistical difference between the dependent and independent variables. Table 5 shows five statements and three of them show that there was a statistically significant difference in the answers.

Table 5

Results of the analysis of variance ANOVA: attitudes of the local population of different educational levels toward settlements hierarchy

| Statement | Educational attainment | M | σ | F | p |
|--|------------------------------|------|----------|-------|-------|
| The poor economic situation has a strong negative effect on the development of Kolubara District. | Elementary school | 4.41 | 0.637 | 0.049 | .952 |
| | Secondary school | 4.35 | 1.065 | | |
| | College/University education | 4.38 | 1.117 | | |
| The proximity of Belgrade, its expansion and gravitational area have a strong influence on Kolubara District. | Elementary school | 3.54 | 1.253 | 3.237 | .042* |
| | Secondary school | 2.90 | 1.404 | | |
| | College/University education | 3.05 | 1.322 | | |
| If more investments were made in the development of smaller municipalities in the district, residents would not move to Valjevo or outside the district. | Elementary school | 3.85 | 1.065 | 7.683 | .001* |
| | Secondary school | 4.49 | 0.880 | | |
| | College/University education | 4.48 | 0.680 | | |

Table 5
 Continued

| Statement | Educational attainment | M | σ | F | p |
|--|------------------------------|------|----------|-------|-------|
| Some city functions need to be moved from Valjevo to other municipal centers in order to support their development. | Elementary school | 3.44 | 1.231 | 3.673 | .027* |
| | Secondary school | 3.92 | 1.166 | | |
| | College/University education | 4.19 | 0.873 | | |
| Aging, migration, and unemployment are the greatest cause of the stagnation in the development of Kolubara District. | Elementary school | 4.26 | 0.850 | 2.133 | .122 |
| | Secondary school | 4.55 | 0.838 | | |
| | College/University education | 4.33 | 0.730 | | |

* $p < .05$; $F \geq 3.00$.

Table 6 presents the questionnaire results for inhabitants from the Kolubara District municipalities.

Table 6
 Results of the analysis of variance ANOVA: attitudes of the local population from different municipalities toward settlements hierarchy

| Statement | Municipality | M | σ | F | p |
|--|--------------|------|----------|-------|-------|
| The poor economic situation has a strong negative effect on the development of Kolubara District. | Valjevo | 4.39 | 0.956 | 1.139 | .342 |
| | Lajkovac | 4.63 | 0.719 | | |
| | Ljig | 4.64 | 0.633 | | |
| | Mionica | 4.36 | 1.151 | | |
| | Osečina | 4.42 | 0.996 | | |
| | Ub | 4.03 | 1.217 | | |
| | Valjevo | 2.96 | 1.306 | | |
| The proximity of Belgrade, its expansion and gravitational area have a strong influence on Kolubara District. | Lajkovac | 3.69 | 1.352 | 1.884 | .100 |
| | Ljig | 2.71 | 1.490 | | |
| | Mionica | 2.57 | 1.505 | | |
| | Osečina | 2.92 | 1.240 | | |
| | Ub | 3.47 | 1.456 | | |
| | Valjevo | 4.14 | 0.978 | | |
| If more investments were made in the development of smaller municipalities in the district, residents would not move to Valjevo or outside the district. | Lajkovac | 4.69 | 0.602 | 2.421 | .038* |
| | Ljig | 4.29 | 0.914 | | |
| | Mionica | 4.86 | 0.363 | | |
| | Osečina | 4.50 | 0.798 | | |
| | Ub | 4.50 | 1.075 | | |

Table 6
 Continued

| Statement | Municipality | <i>M</i> | σ | <i>F</i> | <i>p</i> |
|--|--------------|----------|----------|----------|----------|
| Some city functions need to be moved from Valjevo to other municipal centers in order to support their development. | Valjevo | 3.60 | 1.169 | 2.824 | .018* |
| | Lajkovac | 4.31 | 1.014 | | |
| | Ljig | 4.07 | 1.072 | | |
| | Mionica | 4.29 | 1.139 | | |
| | Osečina | 3.42 | 1.379 | | |
| | Ub | 4.20 | 1.031 | | |
| Aging, migration, and unemployment are the greatest cause of the stagnation in the development of Kolubara District. | Valjevo | 4.33 | 0.807 | 2.032 | .077 |
| | Lajkovac | 4.19 | 1.223 | | |
| | Ljig | 4.79 | 0.579 | | |
| | Mionica | 4.57 | 0.938 | | |
| | Osečina | 4.83 | 0.389 | | |
| | Ub | 4.63 | 0.765 | | |

* $p < .05$; $F \geq 3.00$.

The process of urbanization, the growth of urban settlements, and the movement of people from smaller to larger settlements are all connected with the general numerical decrease of inhabitants. The intensive migration processes in this district are the result of urbanization. As stated by Vresk (2002), settlements with positive SSA and C values have a more prominent position in the hierarchy of settlements: the greater SSA and C values, the higher the position in the hierarchy.

Local population attitudes are in accordance with demographic statistics. The analysis of the results obtained by the *t*-test showed that the level of agreement among the respondents with the statement that the strengthening of Valjevo and smaller centers in the district positively affects the hierarchical position of the whole district. Although the results did not show statistically significant differences between the respondents of different genders, based on the average values of the answers it can be concluded that they have different attitudes toward the issue. It was expected that there would be statistically significant differences among the respondents with different levels of education and different places of residence, as these are groups that are much more sensitive to the position of the settlement in the network and the hierarchical relations between the settlements.

There isn't a statistically significant difference between age groups. The inhabitants under the age of 25 strongly agree with the statement: "Aging, migration, and unemployment are the greatest cause of the stagnation in the development of Kolubara District." Such results indicate that younger individuals recognize all the weaknesses of underdeveloped areas. It was predictable that the ANOVA results would show differences in the answers of people with different educational attainment. This indicates that educational attainment is an important issue in the explanation of the population opinion (Perry, Link, Boelter, & Leukefeld, 2012). Statistically significant differences among the respondents from different municipalities were reported, since the population from Valjevo, on one hand, and smaller municipal settlements on the other, are aware of the difference and inequality in the position, functions and potential of the settlements in which they live. Here the correlation between the values for SSA and centrality (Tables 3 and 4) and the answers of the

respondents can be clearly seen. These results can be used by other countries to identify the problems of small towns that are economically and functionally weakened (Burdack, 2010; Burdack & Knappe, 2007; Leetmaa et al., 2015). Urban primacy and changes in smaller settlement hierarchy are important questions in different countries, and this case study has similar findings as some previous studies (Sarkar & Maji, 2013; Yousuf & Shah, 2014).

Conclusion

A large number of post-socialist countries have encountered the problem of inequality in the development of the large, medium, and small urban settlements. In recent decades, in countries in transition and development, there has been a large movement of the population from smaller to larger towns and cities, resulting in smaller towns losing their young and working population and facing a struggle with aging population. Those towns are facing a struggle with an aging population and losing their significance in the network of settlements.

In Serbia, there is insufficient investment in the development of smaller and medium-sized towns. A large number of city functions are moved from smaller to larger towns/cities, resulting in the centralization of important functions in larger cities which then have primacy. Kolubara District is a typical example of this.

Despite its favorable position, good opportunities for industrial development, and possibilities for the development of the service industry, the proximity of Belgrade, as the capital of Serbia and the strong influence of Valjevo, as the center of the district, it does not allow smaller municipal settlements in Kolubara District to be significantly positioned in the hierarchy of settlements. In the given period, smaller towns in the district record growth in activities in the secondary sector, but at the same time record a significant reduction in the centrality value, which indicates an insufficient presence of tertiary/quaternary activities within them. Very similar indicators were recorded in some European countries (Estonia and Germany) during the first transition decades.

The local population is aware of the problem in which smaller municipal centers find themselves in Kolubara District and the opinions of the local population support the idea to move tertiary/quaternary activities from larger settlements to smaller ones in order for the smaller settlements to gain greater significance in the network of settlements.

European countries that have overcome the weaknesses of small towns have strategies to cope with the problem of changes in the urban hierarchy. In Serbia, there is still no strategy of that kind. The relevant state authorities do not have an adequate mechanism for the equal development of all the districts and settlements in Serbia.

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