DEMOGRAPHIC AND FUNCTIONAL DETERMINANTS OF THE DEVELOPMENT OF BRENICA VILLAGE (THE CITY OF NIŠ)

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Abstract: The subject matter of this paper's research is the rural settlement of Brenica, which is located in the sphere of influence of the City of Niš. Based on the relevant quantitative indicators, main types of population movement and the reached degree of the population's demographic age were defined. Beside intense demographic changes, the settlement is also characterized by functional changes, so a series of analytic measures was used to determine the settlement's functional capacity and the settlement's functional self-sufficiency. The functional type of this settlement was defined through the analysis of these parameters. An intense functional transformation of the settlement was identified, along with the workforce transfer from agrarian to service-providing activities. Possibilities for the village revitalization were found in favourable natural conditions for fruit growing and winegrowing. The fact that a large number of households still own agricultural holdings implies that there is a possibility for the population to work in agriculture as an additional activity.

Key words: Brenica village, population, functional development, revitalization

1. Introduction

Contemporary trends of demographic and economic processes identified on the territory of the Republic of Serbia have also been noticed on the territory of the City of Niš. Due to intense industrialization and urbanization happening in the second half of the 20th century, a series of demographic, economic, sociological and other changes occurred in cities but also in rural settlements. At the same time, there was an economic and demographic development of the city, which distinguished itself as the pole of growth and development, whereas on the other hand, depopulation in the rural settlements occurred as a result of a constant population decline. For

that reason, it is necessary to analyze demographic and functional development components for both cities and rural settlements.

The subject matter of the research is the village of Brenica (the City of Niš). The author chose to examine the reached degree of demographic development and functional capacity of the village itself by using a series of parameters. Beside such a defined goal, through the analysis of the spatial components and demographic processes in the village, the aim was to recognize the developmental potential of the village and possibilities of its exploitation, with the specific intention of identifying possible ways of the village revitalization.

The rural settlement of Brenica is characterized by a specific geospatial position. The village is located in the sphere of influence of the City of Niš, to which it administratively belongs. It is located at the northern edge of the Niš Basin, alongside both valleys of the Brenica River (the right creek of the Nišava River), 8m away from the downtown. The first official records on the village were obtained by the Turkish Census from 1454/1455, when the village had only 7 households (Enciklopedija Niša, 1995, p. 12). Nowadays the village has 522 inhabitants and is categorized as a smaller rural settlement.

2. Material and methods

Statistical and quantitative methods were used for the purposes of this paper. The first phase of this work included forming a wide range of statistical indicators. Various types of publications issued by the Statistical Office of the Republic of Serbia were used: census books, vital statistics books, special editions and others. This phase was defined as desk research and the base of necessary data was formed and then analyzed. Determining the reached stage of the settlement's demographic development was done through the analysis of the total population movement (natural and migratory) and through defining the demographic age stage. The method developed by Friganović M. (1978 and 2001, p 49) was used for defining the types of population movement. Each population can be classified into one out of 8 types according to the ratio between the component percentage of natural and migratory movements (more about the method in Friganović M. (1978) and Friganović M. (2001).

Table 1. Types of population movement (Source: Friganovic M., 2001.)

Types of population movement			
Immigration types		Emigration types	
I1	Immigration trend	E1	Emigration trend
I2	Regeneration due to immigration	E2	Depopulation trend
I3	Weak regeneration due to immigration	E3	Extreme depopulation trend
I4	Very weak regeneration due to immigration	E4	Extinction trend

For the determination of the achieved level of aging, we used technique that is widely spread in Serbian demographic and geographic scientific community, first shown in (RZS 1993, p 168). Based on the population percentage of 4 age groups (youth, young middle-aged, old middle-aged and old population), the aging index and the average population age, every population can be classified into one out of seven stages of demographic age: 1. Early demographic age, 2. Demographic youth, 3. Demographic maturity, 4. Threshold of demographic ageing, 5. Demographic old age, 6. Deep demographic old age, 7. The deepest demographic old age.

Functional typology of the settlement is based on the conception of the economic basis, i.e. this conception is based on the relationship of certain economic activities to the other activities in the village (Grčić M., 1999, p. 7). In this way, each settlement can be defined as: 1. Agrarian, 2. Agro-industrial, 3. Agrarian and service-providing, 4. Industrial, 5. Industrial-agrarian, 6. Industrial and service-providing, 7. Service-providing, 8. Service-providing and agrarian, 9. Service-providing and industrial (Tošić D., 1999, p. 262).

The level of functional capacity of the settlement could be expressed through the calculation of functional self-sufficiency of the settlement.

$$F1 = \frac{Z}{A} \qquad , \qquad F2 = \frac{T}{S}$$

According to that:

Z – Number of employees

A – Total number of the active population

T – Number of employed people in commerce, hospitality industry and tourism

S – Total number of population (Grčić M., 1999, p. 13)

Using comparative review of demographic and functional indicators, we tried to identify the basic factors of demographic dynamics and economic development of this rural settlement.

3. Characteristics of demographic development

Demographic dynamics of certain population is under the influence of a large number of factors. Natural and migratory population movement influence the population number directly, whereas the socio-economic, cultural, environmental conditions of life as well as the ethno-psychological population characteristics can be regarded as indirect factors.

The village of Brenica is located in the sphere of influence of the City of Niš, whose demographic development has also had a great impact on the demographic picture of this rural settlement. The settlement itself is defined as an area of noticeable depopulation because the population number has continuously been decreasing. During the observed 50-year period, the population number has decreased for more than 30%. The changes in household number show opposite trends, where an increase in household number was recorded until 2002, after which there was a decrease. The process of household nucleation is the result of accepting the contemporary sociological dogmas, which imply an independent lifestyle of young married couples. The average household size is reduced to almost a half, in comparison to 1961, and follows the trends of an average household size in the rural settlements on the territory of the City of Niš, which on average amounts to 3.17 (Radivojević, et al. 2014, p. 5).

Table 2. Changes of some demographic indicators in Brenica village (Source: * Population Census data)

| Year	No. of inhabitants	Change index	No. of households	Average size of households
1961.	773	100	131	5.9
1971.	634	82.2	131	4.84
1981.	596	77.1	139	4.29
1991.	600	77.6	142	4.22
2002.	555	71.8	171	3.25
2011.	522	67.53	144	3.62

The constant interconnection of influences between natural and migratory population movement determine the type of population. Five 10-year periods were observed. The birth rates were positive during the 1981-1991 period, after which there was a drastic decrease. During the 1961-1971 period, the natural growth of Brenica population increased approximately 5‰. The next 10-year period was characterized by slightly lower birth rates, around 4‰, while the highest rates of the natural growth were recorded during the 1981-1991 period, when the rates were around 7‰. After that period, due to negative changes in the age structure, a decrease in an average natural growth rate occurred ranging from - 4,5‰ during the 1991-2002 period, to below - 7 ‰ after 2002. During the entire observed period, the rates of migration balance were negative.

During the 1961-1971 period, the population of the village of Brenica is defined as an emigration population type E3 with the trend of extreme depopulation. This type of population movement has the characteristics of positive natural growth and a negative total population movement, causing the birth rates to be lower than the rates of the total change in the population number. During the next decade, the process of emigration continued, with the positive natural growth rates so that the population belongs to the same type.

The population number of Brenica slightly increased during the 1981-1991 period, while the natural growth rates were positive. Such a trend defined the area as emigratory and belonging to the type E1. The process of the population number decrease was again intensified during the period after 1991, which together with negative rates of natural population movement brought about the most unfavorable demographic situation in the village, declaring Brenica as a settlement of the type E4, which is characterized by the trend of extinction.

The process of population ageing was taking place at the same time as negative movement trends. Low birth rates as well as extended lifespan brought about an increase in the percentage of the elderly population contingent at the expense of the young. The percent of the people older than 60 was 9% out of the total population number in 1961, while in 2011 this contingent amounted to as much as 24%. Negative birth rates as well as emigration of the young population to the city brought about intense changes in the percentage of the young population. The people up to 20 years of age

suffered the greatest changes. The percent of this age contingent was reduced from 42.7%, as it was in 1961, to only 19.3% in 2011.
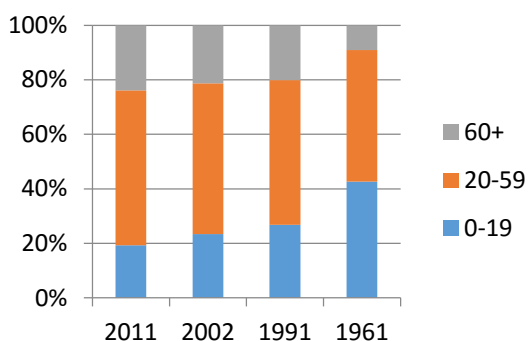
Graph 1. Age structure of Brenica settlement in period 1961. – 2011. Source: Author's calculation based on Population Census data*

The analytic parameter most effectively used to track changes in a certain population's age structure is the ageing index, which shows the ratio between the elderly and young population. It is considered that the ageing process has started when the value of the ageing index exceeds 0.4 (Rančić M., 1980, p. 190). If the values of the ageing index exceed the limit of 1.00, it is considered that the ageing process is extremely difficult, almost impossible, to prevent (Živić D., Pokos N., 2005, p. 211).

The ageing index was 0.21 in 1961, which together with other representative parameters set the population of Brenica apart as demographically mature (the 3rd stage). The intense ageing process is reflected in the value of the ageing index which was 0.75 in 1991. Even over this period, the population was in the 5th stage of demographic age, and therefore declared as demographically old. The ageing process continued even during the last decade of the 20th century, and at the very beginning of the new millennium the ageing index value rose to 0.97. The population in this period was characterized by deep demographic old age (the 6th stage). The latest census from 2011. showed that the population entered the deepest demographic old age, which represents the 7th and the last stage of demographic ageing. The maximal value of the ageing index in this period was recorded to be 1.25.

The demographic dynamics of Brenica population undoubtedly shows an extremely regressive population type with a small percentage of the young and a high percentage of the elderly population. The decreased percentage of

fertile women represents a special problem. According to the latest census, this population contingent makes up only 44% out of the total female population, and displays tendencies of further decline. Taking all into account, we can conclude that the projections of natality will record extremely negative values.

4. Functional determinants of development

Brenica village with its 522 inhabitants and with no significant production capacities is characterized by a limited and very low functional capacity. As in the majority of rural settlements, external functions are poorly developed.

According to the methodology of the Statistical Office of the Republic of Serbia, all inhabited places are divided into urban and others, and according to it, Brenica village is categorized as "other" settlement. Still, the urbanity and rurality degree can be calculated based on 3 criteria: the percent of agricultural population in total population, the percent of households with no agricultural holding, and the percent of the employed persons in the total active population.

Table 3. Settlement typology according to the degree of urbanization Source: (Tošić D., 1999, p. 245)

Urbanisation degree	Agricultural population in total population	Households without agricultural holding in total no. of households	Employed persons in the active population
Urban	≤ 10 %	≥ 70 %	≥ 70 %
More Urbanized	≤ 15	≥ 20%	≥ 70%
Less Urbanized	≤ 30	≥ 10 %	≥ 50%
On the threshold of urbanity	Satisfies two of the three conditions		
Rural	doesn't satisfy two or all three conditions		

With the total of 17% of agricultural population in the total population, 35% of households with no agricultural holding, and 67.6% of the employed individuals in the total active population, Brenica can be set apart as a settlement on the threshold of urbanity.

An intense functional transformation of the settlement was identified during the 1971-2002 period. In the first post-war period, the settlement had characteristics of a typically agrarian settlement with the dominant

agricultural function. In the second half of the 20th century, the process of intense industrialization occurred on the territory of the City of Niš, which brought about the transfer of workforce from the primary to the secondary and the tertiary sector of economic activities. Brenica village is under the direct sphere of influence of the City of Niš, which, being the pole of concentration, attracts daily a great number of workforce who commute from the village. In 2002, the majority of the villagers were employed in the secondary and tertiary sectors which defined the village as an industrial and service-providing settlement.

Table 4. Functional typology of Brenica village according to the structure of active population based on sectors of economic activity. P – primary sector of economic activity; S – secondary sector; T – tertiary sector; Q – quaternary sector (Source: Author's calculation)

	Total of the employed population	P	%	S	%	T + Q	%	Functional type
1971	386	254	65,80	83	21,50	44	11,4	1. Agrarian
2002	190	31	16,32	87	45,79	68	35,79	6. Industrial - service-providing

Although the majority of the active population are employed in the production and service-providing sector, a great number of households with agricultural holding have been identified, which undoubtedly shows that the population is engaged in agriculture as an additional activity.

According to the degree of functional self-sufficiency, Grčić M. (1999) identifies the following types of settlements:

- self-sufficient (F1≥75; F2 ≥ 6)
- partly self-sufficient (75≥F1≥ 50; F2 ≥ 4)
- partly dependent settlements (50≥F1≥ 25; F2 ≥ 2)
- completely dependent settlements(F1 ≤ 25; F2 ≤ 2)

The fact that the values for the examined settlement are: F1= 67,62; F2= 4,32 classifies it as partly self-sufficient. However, the lack of production capacities in the village point to certain elements of the settlement's dependence.

Beside the residential and work functions, public and service-providing functions as well as infrastructure objects are of a great importance for demographic, economic and social development for every settlement. As Tošić D. and Nevenić M. (2005, p. 173) state, the organization and

distribution of the entities of the public and social infrastructure is dependent on the Law on Public Service. The main principle which has to be applied is that the primary education service, health protection service and veterinary services have to be available to all citizens under approximately equal conditions.

The road infrastructure of the village is poorly developed. The connection with the city is poor, especially during the winter months when the local buses run only to Kamenica village, forcing Brenica villagers to walk 2 km to the nearest bus stop. The number of the bus departures is reduced to 11 on working days, while the number of departures on Sunday is only 3. Within the framework of the planned infrastructure project for road construction of the northern Niš rural circle, at the end of 2015, the villages of Brenica and Hum were connected via a new asphalt road. This only partially solved the problem of the village's connection with the City, since there is still no a bus route running on this road. Through the realization of the entire project of the construction of the northern Niš rural circle road, 6 rural settlements will be connected, from Hum through Brenica to Malča, which would greatly contribute to the traffic availability of this area.

Energetic infrastructure, water supply, sewerage and sanitation system are underdeveloped. Water is supplied via the local autonomous system for water supply. A special problem for the villagers is the non-existence of wastewater treatment system. Although there is a plan to connect the settlement to one of the city's wastewater collection system, the high price of the construction of such an infrastructure system does not allow for its realization. There is no an organized system for collection and separation of waste in the village, which leads to negative environmental implications. A few smaller dumps have been identified on the village's territory, mainly located in the riverbed of the Brenica River, by the road and in deserted furrowed fields.

Primary education (the first four years) takes place in the separate class of the Primary School "Stevan Sinđelić" from Kamenica. After the completion of the fourth year, the pupils continue their education in the central primary school in Kamenica. The school had only 16 pupils encompassing all four years in 2002 (Stamenković S., p. 60). The number of pupils did not significantly change even over the last decade when it was around 20, counting the preschoolers too.

Health system is not developed, there is no ambulance station, while a medical team comes a few times a year, just to check the health of the senior villagers. The village has neither a pharmacy nor a veterinary clinic. The nearest health center is located in Kamenica village and is open 3 days a week. By organizing mobile medical teams who would come to the village regularly, once or twice a week, the villagers' daily lives would be made easier to a great extent.

There is one shop and one sports bar in the village. The lack of administration and management functions is a special problem, because the post office, the local office, and the police station have not been working in the village for a long time now.

By analyzing the existing functions in the rural settlements, Simonović Đ. and Ribar M. (1993.), identified 6 types of rural settlements: 1) primary rural settlements, 2) villages with village center, 3) community centers of rural settlements, 4) tourist or spa settlements, 5) rural settlements – municipality center, 6) suburban rural settlements. When applying this typology, Brenica village can be classified as a primary rural settlement due to the lack of functions, where only work and residential functions are developed to a significant extent.

5. Conclusion

The rural settlement of Brenica underwent significant changes in the 20th century. Depopulation was recorded during the entire observed period, which together with the age structure characteristics points to an extremely regressive population. The village population belongs to the type E4, which is characterized by a complete depopulation i.e. extinction. The percentage of the young population is constantly being reduced, which results in great socio-economic problems in the village. The percent of fertile women is also decreasing, which points to the birth rates continuing to be low over the next period.

The intense process of demographic changes in the village was followed by a functional transformation. The village completed a development journey from a typically agrarian to an industrial and service-providing settlement. As there are no important industrial complexes, we come to the conclusion that the majority of the economically active population is comprised of daily commuters who work in the City of Niš. The

functional capacities of the settlement are small, and the village is characterized by the functions of residence and work, while other functions are present to a lesser extent. Poor sanitation, water supply and public and social infrastructure represent other problems.

The development potentials of the village are numerous, but a dominant factor to be emphasized is the auspiciousness of the village's micro position. A slight slanted terrain with a very favourable exposition gives great possibilities for the development of winegrowing and fruit growing. The village territory belongs to a once-famous winegrowing region of Matejevac. The agricultural census from 2012 shows that the number of households with agricultural holdings is growing, which points to the fact that the population works in agriculture as an additional activity. It is precisely in this that we should look for possibilities for the village revitalization. Subsidies and improvement of road infrastructure could prevent a complete emigration to the city and in such a way create a stable contingent of daily commuters. It is exactly this population group interacting with the city on a daily basis that has a possibility of revitalizing agricultural activities as additional ones and making extra profit by doing so. By encouraging alliances between agricultural producers and forming rural cooperatives a simpler placement of agricultural products would be enabled. Along with regulation of spatial and environmental problems, these measures should be a basis for further potential revitalization of the settlement itself, which would create a small suburban settlement of mixed economy and functions, whose inhabitants would interact with the city on a daily basis.

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