

Defining urban regions in Serbia

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Abstract

The purpose of this paper is to examine the coverage of Serbia's national territory with urban regions. In order to acquire the status of an urban region, a city and its surrounding area have to meet certain criteria. There is a set of criteria that apply to cities as the centres of urban regions, and there is another set of criteria relating to the settlements in their surroundings. The analysis and evaluation of the characteristics of a selected set of urban regions are very important both for urban geographical research and the planning of spatial and functional relations and links, as well as the management of regional development in Serbia.

Keywords: urban geography, urban regions, city, surrounding area, spatial planning, criteria, Serbia

Introduction

The intensified industrialization and urbanization, which are marked by an intensive concentration of population and functions in cities and their surroundings, gave rise to the formation of new regional structures – *urban regions*, which are a result of the integration of the city and the surrounding area. The emergence of this type of regions has revealed that it is not possible to monitor current processes in the surroundings of cities by applying the conventional concept of geographic regions and has highlighted the need to define a new concept – nodal regions.

The founder of the “new” geography was Friedrich Kurt Schaefer (1953). Its underlying concept is the paradigm of functional processes – the paradigm of spatial organization (Tošić, 2012) or nodal regionalization (as opposed to homogeneous regionalization, which underlies traditional descriptive geography, founded by Carl Ritter, Paul Vidal de la Blache and Alfred Hettner). It became dominant in Yugoslav, Serbian and Croatian geography (in the studies of Vresk, Veljković, etc.) in the 1980s (Tošić, Krunić, 2007).

Nodal regions can be defined as spatial forms stemming the role of cities in the regional organization of

space. According to the concept of functional or nodal regions, a region is defined as a space whose individual parts are complementary and able to establish with each other, and particularly with a dominant centre, connections that are stronger in intensity than those established with any other neighbouring region. “The functional connectivity and organization of these regions largely rely on the transport network, which channels the more or less intensive gravitation of people, goods and information towards the centre of the region” (Papić, 1987). Vresk confirms that the principle of functional integration and the interdependence that arises from the spatial circulation of people, goods and information is the distinguishing feature of nodal regions and that “... the size of the gravitational area is usually in accord with the size of the city and the importance of its functions” (Vresk, 1980). The urban region, which consists of a city with its urbanized surroundings, i.e. predominantly non-agricultural settlements in its surroundings, is a convenient instrument of spatial analysis and a spatial category that is being developed in accordance with the socio-economic conditions in a country. From the standpoint of urban geography and its application in various forms of social practice, and

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primarily spatial planning, defining urban regions is seen as an imperative, among other things, because it is necessary to treat an urban region as an inseparable whole in future planning documents. In order to establish an adequate spatial and functional organization of the state into smaller units it is necessary to know the basic characteristics of urban regions (the number of urban regions, their spatial extent, which depends on intensity of functional contacts, population concentration and the coverage of the national territory with urban regions¹). This would facilitate the strategic management and coordination of development processes and would ultimately help achieve one of the priority objectives relating to the reduction of disparities in the regional development, in an effort to achieve a higher level of overall development. The need and the necessity to define urban regions is also highlighted through an examination of possibilities for ensuring the necessary preconditions for an efficient, cohesive and sustainable development by applying the concept of polycentricity, which rests on a greater plurality of centres and the establishment of an integrated urban system.²

Defining an Urban Region: the state-of-the-art of the current research

Defining a set of conditions that towns and villages in their surroundings need to meet in order to be included in an urban region, i.e. devising a model for determining the boundaries of urban regions is a very delicate task in urban geographical research.

The concept of urban regions or urban zones of influence can be traced back already in Christaller's (1933) theory of central places. In German geography, the concept of the *Stadt-Umland Regionen* has been developed. This is an urban region consisting of a central city and the area of its urban impact (Tošić, 2012). One of the priorities of French urban geography has also been associated with the role of the cities in their regional environment. The works of Raoul Blanchard and Jean Levenville are considered to be the pioneer works in this field (Tošić, 2012).

In the European Union, in the studies undertaken within ESPON projects, the city has been defined as an economic and social entity, which consists of three main parts (ESPON 1.4.1 Programme, 2005):

1. the urban core;
2. the inner ring, which covers the area surrounding the core;

¹ In developed countries, urban regions cover up to two-thirds of the national territory (Vresk, 1986).

² It is also believed that the application of polycentric urban systems and functional urban areas could facilitate the integration of Serbia into the urban system of Europe (Tošić, Maksin-Mičić, 2009).

3. the outer ring, which covers the outer boundary of an urban area and, very often, settlements with a greater territorial extent.

The area defined based on the aggregation of these three parts is an urban region (urban influence area).

To illustrate this, we will mention some methods of determining the outer ring of an urban region³ in some Western European countries as examples that may be instructive for local practice: in France, this ring covers municipalities in which at least 40% of the employed population works in the centre; in Switzerland, these are municipalities in which at least one-sixth of the employed population works in the centre, though other indicators are also taken into account and they are related to the continuous built urban area, the population and employment density, changes in population number and the share of the agricultural population; in the United Kingdom, these are the municipalities which are the source of the most intensive commuting to the observed centre, etc.

Therefore, in a broader sense, an urban region may tentatively be identified with a city's area of influence and the basis for defining the area of influence is undoubtedly its daily urban system (Vrišer, 1974; Vresk, 1984; Tošić, 1999; Karlsson, Olsson, 2006; Konjar, et al., 2010; Marvin, et al., 2006; Tosics, 2007; etc.). However, the daily urban system and the urban region do not necessarily coincide spatially (Vresk, 1984), as an urban region consists of a city and an urbanized, non-agricultural surroundings, while the daily migration system includes a city and that part of its surrounding area which has a daily interaction with the city (Bourne, 1975), i.e. which is functionally linked to the city.

Models used in defining the impact area of a city usually belong to one of the two basic types: theoretical and empirical. The most commonly applied theoretical models, which belong to the area of social physics, include: the gravity model, graph theory, Rayleigh fading, etc. Empirical methods define the impact area of a city based on detailed analyses of regional characteristics, i.e. specific data that are usually related to commuting (Yu D, et al., 2010). The model applied in this study belongs to the latter group because it is not abstract and it seems more realistically feasible in space.

William Bunge (1962) and Ernest Neef (1967) - cited after Tošić, Nevenić, (2007) - insisted on the application of quantitative methods in geography and the application of exact models in delimiting the boundaries of regions. A concise overview of the development and

³ The definitions of the urban core and the outer ring vary from country to country. For more details cf. ESPON 1.4.1 Programme, 2005.

application of mathematical models in geography was presented by Clarke and Wilson (Clarke, Wilson, 1989).

Diverse methods have been recently used for the purpose of defining urban regions, e.g. multifractal geometry, which can be employed to describe or define the urban and rural terrain with regard to the level of urbanization (Yanguang, 2016), or the analysis of the roadway coverage and population density variables (Rodrigues de Silva, et al., 2014).

The defining of the “urban region” is limited due to the fact that there is no internationally standardized method and “many countries still apply their own definitions, which may differ substantially from one another” (Haisch, Müller, 2015).

One of the first attempts in the urban geography of the former Yugoslavia to determine the impact areas of cities was related to Ljubljana⁴ and its sphere of influence (Bohinec, 1926). Furthermore, a theoretical framework for the study of the interdependence of a city and its surroundings was discussed by Rubić in 1949 (Rubić, 1949/1950); Zagreb’s urban region was defined by Žuljić in 1964 (Žuljić, 1964); the impact spheres of Yugoslav cities were defined in 1974 by Igor Vrišer (Vrišer, 1974), etc. One of the greatest contributions to the study of urban regions was made by Milan Vresk, who was continuously been involved in the analysis of the relationship between cities and their environment already since the 1970s. The professional circles in Serbia got familiar with the methodology and results of his research primarily through the work of Aleksandar Veljković and, subsequently, other researchers.

In his latest study dealing with Croatia, Vresk identified urban regions for cities with more than 18,000 people employed based on the 1991 Census data (Vresk, 2002). In his previous studies, conducted for 1981 and 1971, the minimum number of employed people was 20,000 (Vresk, 1978; Vresk, 1979–1980; Vresk, 1984). In the study conducted for 1991, Vresk, partially altered the criteria that settlement should meet in order to be included in an urban region, (Vresk, 2002):

- the share of agricultural population in the total population was to be less than 20%
- the share of the employed population in the active population was to be higher than 50% (i.e. the share of the active population employed outside the agricultural sector was to be greater than 50%),
- the share of commuters to the central city was to be greater than 25% of the active population of the settlement.

⁴ Ljubljana still has the largest surrounding area of all Slovenian cities. The only other city (apart from Ljubljana) with a great territorial impact is Maribor (Kušar, 2013).

Sanja Klempić Bogadi identified urban regions in Croatia based on the 2001 Census data. Due to the considerable decline in employment in Croatia in the transition period and the decentralization, i.e. the shifting of some jobs from the cities to their surroundings, urban regions were identified only for the cities that had more than 15,000 employed people (Klempić Bogadi, 2010). The criteria to be fulfilled by settlements in order to be included in an urban region were also partially modified. In fact, the basic criterion was that daily commuters made more than 25% of the employed and not the active population of the settlement of residence, as it was the case in Vresk’s model.⁵ Klempić Bogadi did not change other criteria defined by Vresk.

In the local scholarly literature, the relationship of the city and its surroundings in the Republic of Serbia has been discussed by many authors. We will mention only some of them. Olga Savić studied the sphere of influence of cities on numerous examples from Serbia (Savić, 1955), while Jovan Ilić discussed this issue in the local context in his paper entitled “The Functional relationship between town and vicinity with particular attention to the SR of Serbia” (Ilić, 1970). Dimitrije Perišić, who focused on the principles of agglomeration development and agglomeration systems in Serbia (Perišić, 1985). Branislav Bukurov studied the impact spheres of urban settlements in Vojvodina (Bukurov, 1980), whereas Dragutin Tošić sought to define functional regions⁶ of individual urban centres.

Finally, a review of the available literature allows to conclude that commuting is the crucial criterion in defining the impact area of a city, both in a wider and in a narrow sense, though the limit varies depending on the general characteristics of the daily migration system, and the power of the urban entity under whose influence it has been created.

Dilemmas in Defining Urban Regions in Serbia

The boundaries of urban regions within the national territory of Serbia can only be determined by relying on a clearly defined methodology that uses quantitative criteria applied in urban geographic research. Cit-

⁵ Having in mind that the active population includes all employed persons, all persons seeking for their first job and all unemployed persons, who are considerably less active in terms of migration and have a low impact on the transformation of settlements in the surroundings of cities, the author of this model believes that the share of commuters in the employed population is a more relevant indicator.

⁶ The development of the concepts of nodal regions and the form of their spatial and temporal manifestation are discussed in detail in the studies authored by Dragutin Tošić “City in a Region” (Tošić, 1999) and “Spatial and Functional Links and Relations in Urban Regions” (Tošić, 2000).

ies and regions are elements of wider systems, so that the system of cities is seen in relation to the system of regions (Parr, 2015).

Administratively defined boundaries will not be taken as relevant, having in mind that their determination is usually not accompanied with adequate analyses. Furthermore, the purpose for which they were created did not require them to coincide with the actual impact zones of the centres. On the contrary, the method of defining administrative boundaries has often reflected the political views of ruling groups, i.e. these regions were used, to a certain extent, as an instrument in implementing national goals at lower territorial levels.

An urban region is merely a part, often the smaller one, of the municipal territory of an urban centre, which also includes a significant rural area (World Urban Areas, 2011). This rural area, which covers the largest number of settlements within municipal territories in Serbia, gravitates towards the centre of the municipality, i.e. its sphere of influence. This is the most clearly indicated by the mode of use of public service facilities. However, the data on the definitive resettlement of the population, which are not monitored at the settlement level by the national statistic office, would corroborate the claim that these settlements are the source of a large number of out-migrants, whose target destination is usually not the municipal centre. Accordingly, this is not a clear indicator of their mutual dependence. Namely, between 2002 and 2011, every fourth person who left the territory of the municipality moved to its municipal centre (Živanović, 2012). Compared to the current situation, during the second half of the 20th century, municipal centres had a considerably greater impact on the population movement from a local environment, and these relocations revealed a correlation with the intensity of commuting to the centre (Lukić, 2009). It should also be borne in mind, as already noted, that the spatial extent of the area exposed to the strong influence of an urban centre, measured by the intensity of commuting, is usually considerably smaller than the territory the municipality (Živanović, 2015)!⁷

Functional, i.e. functional urban areas defined in spatial plans at the national level provide a general framework for identifying urban regions.⁸

⁷ Not because the population of this area more intensively gravitates to another centre but because these settlements are inactive in terms of migration, since they are far away from the centre and are located on the outskirts of municipalities.

⁸ Both functional and functional urban areas have been identified based on data relating to the municipal level. The municipalities in Serbia are among the largest in Europe (Miovčić, 2007), with an average territory of 500km² and a population of about 40,000 inhabitants (Tošić, Živanović, 2010).

Based on the knowledge of the fundamental characteristics of the network of (urban) settlements in Serbia, it is assumed that the boundaries of urban regions should be somewhere within the area or belt which is on one side delimited by an administratively defined boundary of an urban settlement (municipal centre), as the core of an urban region, while on the other, it is delimited by the boundary of the municipal territory, which is, conditionally speaking, the area of influence of the municipal centre, and, most commonly, the spatial context for the delivery of public services. Generally speaking, a mismatch between the administrative boundaries, functional roles and morphological dimensions of cities is common. This is one of the most controversial aspects that sometimes make it extremely difficult to define and delimit urban regions and even cities. Along with the environment, the problem is further complicated by the fact that not all urban centres have formed an urban region, which indicates that it is necessary to define specific criteria that a settlement must meet in order to have a defined urban region.

A Method of Defining Urban Regions in Serbia

Selecting a set of cities

When choosing settlements whose urban region may be the subject of research, the criteria that are the most suitable for Serbia and are the most commonly used in countries with comparable national settlement networks (Vresk, 1984) are those relating to population and/or the employed population in a city (urban settlement), where the lower limit, i.e. the minimum value of the indicator, is a mandatory requirement. According to the literature data, the threshold is most commonly taken to be 50,000 residents and 20,000 employees.⁹

However, as the economic developments in Serbia in the past two decades have resulted, above all, in a significant reduction in employment, we deem it reasonable to lower the minimum of the employed pop-

⁹ As the census statistics in Serbia do not record the employed population on the level of settlements, we have calculated the employed population in individual settlements by deducting the active agricultural population from the active population performing an occupation, relying on the assumption that the share of the employed active agricultural population performing an occupation is negligible (including only those employed at agricultural pharmacies, institutes, etc.), while the majority of them are individual farmers. The employed population does not include those who live outside the place of work but it does include those who work outside their place of residence (the census statistics record the active population performing an occupation by their place of residence).

Table 1. Population and employed population in the set of cities in Serbia

City*	Population in 2002	Employed population in 2002	Population in 2011	Employed population in 2011	Population change 2011–2002	Employed population change 2011–2002
Beograd	1119523	393200	1166763	428353	47240	35153
Novi Sad	191656	70549	231798	86862	40142	16313
Niš	175631	59258	183164	57764	7533	-1494
Kragujevac	146373	50471	150835	46806	4462	-3665
Subotica	99283	34359	97910	31827	-1373	-2532
Zrenjanin	79773	27215	76511	24399	-3262	-2816
Pančevo	77087	26864	76203	24988	-884	-1876
Čačak	72698	25758	73331	23860	633	-1898
Smederevo	62805	21327	64175	18984	1370	-2343
Kraljevo	58847	19257	64175	19526	5328	269
Leskovac	63185	20333	60288	16019	-2897	-4314
Valjevo	61035	21279	58932	20256	-2103	-1023
Kruševac	57347	19886	58745	17167	1398	-2719
Vranje	55052	20674	55138	17176	86	-3498
Šabac	55163	18157	53919	17425	-1244	-732
Užice	55083	20915	52646	18382	-2437	-2533

Source: 2011 Census, 2002 Census

Note: Cities: Novi Sad, Subotica, Zrenjanin and Pančevo are in the territory of the Autonomous Province of Vojvodina.

ulation to 15,000 persons. Cities with a population greater than 70,000 inhabitants have more 20,000 employed persons.¹⁰

The criteria for selecting a set of cities in Serbia for which urban regions should be defined are the following:

1. *settlements with a population greater than 50,000 inhabitants,*
2. *settlements with more than 15,000 employed persons.*

According to the data provided by the latest Census, there are 18 settlements in Serbia that meet these requirements.¹¹ Two settlements meet one of these requirements. Novi Pazar has 66,527 inhabitants, but only 12,706 employees. The employed population in the urban neighbourhood of Borča is greater than 15,000, but its total population is 46,086. However, having in mind the position of the urban neighbourhood in the City of Belgrade, i.e. in the Municipality of Palilula, as well as the fact that it is poorly equipped with public service facilities and that it does not provide services to the surrounding areas, we do not con-

sider it a relevant development centre in terms of the potential to establish an urban region that could be the subject of this research.

Hence, an analysis of the surroundings of 16 centres: 12 in Central Serbia and four in Vojvodina (Table 1 and Figure 1) will enable us to establish the coverage of Serbia's territory with urban regions.

The testing of various methods of defining urban regions, primarily devised by international authors, as this area of research is rather poorly covered in Serbian urban geography, shows that there is no standard methodology that could be applied for each specific case (state).

The selection of settlements in the areas surrounding the cities

Based on the analysis of international experiences and the knowledge of the basic characteristics of the settlement structure in a territory and the analytical assessment of the current situation in the spatial functional organization of the settlement network in Serbia, a model for identifying settlements that belong to an urban region, i.e. a model for determining urban regions, has been established.

In our opinion, the relevant requirements that a settlement should meet in order to be included in an urban region are the following:

¹⁰ In the network of settlements in Serbia, there are as many as 147 settlements where no employees have been recorded by the official statistics, 869 settlements with fewer than 10 employees, 1303 settlements with 11–50 employees, 679 settlements with 51–100 employees, as many as 1152 settlements with 101–500 employees and 181 settlements with 501–1000 employees, which means that there are only about 10% of settlements in Serbia with more than 1000 employed persons.

¹¹ No data are available for Kosovo and Metohija.

1. *the share of commuters to the central city in the active population is greater than 25%*¹²
2. *the share of the employed population in the active population performing an occupation is greater than 50%*,
3. *the share of the active population performing an occupation in the primary sector is smaller than 20%*.¹³
4. *the continuity of the urban region.*

The Key Features of Urban Regions in Serbia

Urban regions are a spatial category that develops in accordance with the country's social and economic circumstances. In the most developed countries, urban regions are becoming the dominant spatial form of settlements where more than two thirds of the national population live and work, while in developing countries, urban regions are still in the initial stages of development and they cover a smaller area, with a smaller population (Vresk, 1986).

The results of the analysis that has been carried out, according to which, 3,243,546 people live in 16 defined urban regions in Serbia and make 45% of the total national population, suggest that there are few urban regions in Serbia and that their spatial extent and demographic concentration are rather small. The system of urban regions lacks cities with a population between 300,000 and one million inhabitants, which would strongly foster the socio-economic transformation of the surrounding settlements and would contribute to a greater homogeneity in the hierarchy of urban regions in Serbia.

According to the analyzed characteristics, urban regions in Serbia show great differences. The number of settlements covered by urban regions in Vojvodina is far smaller compared to Central Serbia (Table 2); in the case of Subotica (Novi Žednik, Palić, Višnjevac)

and Zrenjanin¹⁴ (Elemir, Ečka, Stajićevo), as little as three settlements belong to the urban region. The reason for this is the sparse network of settlements in the territory of Vojvodina. In fact, the distance between settlements and the centre is greater, compared to settlements in other parts of Serbia. The “surrounding areas” defined in these terms are inhabited by as little as 10% of the total population of urban regions, which could make them unsustainable.¹⁵ Similar examples can be found in Central Serbia, in the case of Valjevo and Kragujevac, where the small number of residents in the surrounding settlements fails to reach more than 10% of the population of urban regions. Quite oppositely, an analysis of the impact area of Novi Sad and Pančevo¹⁶ shows clearly defined urban regions, where the population from the “surrounding areas”, inhabiting a small number of settlements with a large population, accounts for about 35% of the total population.

The urban region of Belgrade stands out in the territory of Central Serbia both in terms of spatial extent and the number of settlements. However, the population of the 60 settlements that meet the requirements defined by the model accounts for only 15% of the total population. On the one hand, this indicates an extreme centralization of the area, while on the other, it suggests a significant power of sub-centres within the City of Belgrade – Lazarevac, Obrenovac and Mladenovac. Owing to the mining and energy complex, these centres attract the local population (Tošić, Djordjević, 2004). Therefore, there are no settlements in the municipalities of Lazarevac and Mladenovac that belong to the urban region of Belgrade; at the same time, there are nine such settlements in the Municipality of Obrenovac.

The urban region of Niš includes by far the largest number of settlements. The population of the “surrounding area” accounts for almost 40% of the total population of the region. Another specific feature of the region is a pronounced spatial discontinuity, due to which it is necessary to include as many as 16 settlements in the region (with 17,667 inhabitants, accounting for 15% of the population of the surrounding area) that do not meet the defined requirements, as well as to exclude eight peripheral and often remote settlements that meet them.

¹² The active agricultural population performing an occupation is not taken into account, as it may be generally considered to be inactive in terms of migration. In addition to the most commonly used data on work-related migration, for the purpose of this study, we have also included indicators related to the commuting associated with the service sector (education, trade, public and social services, etc.), as the centrality of cities is based on these activities. These migrations should be treated equally to those used in assessing the functions of a labour centre. This will contribute to a greater accuracy in determining the territorial extent of urban regions.

¹³ While the fulfilment of the first requirement was assessed based on the 2002 Census, due to lack of more recent data, the fulfilment of the latter two requirements was assessed based on the 2011 Census. In this period, the employed population certainly declined. Accordingly, it may be assumed that the number of commuters decreased, too. Therefore, it can be concluded that the number of settlements that meet the above-mentioned requirements also decreased, i.e. that the territorial extent of urban regions is now smaller.

¹⁴ Industry collapse in the city has led to attempts to reassign industrial heritage for tourism purposes (Čopić, Tumarić, 2015), which would in the longer term contribute to the spread of that urban region.

¹⁵ The settlements in Vojvodina, especially in the border areas, have a large share of the unemployed population and, accordingly, the share of commuters is small (Pantelić, et al. 2011).

¹⁶ It will particularly grow with the expansion of new industrial zones around Novi Sad (Milošević, Đorđević, 2015).

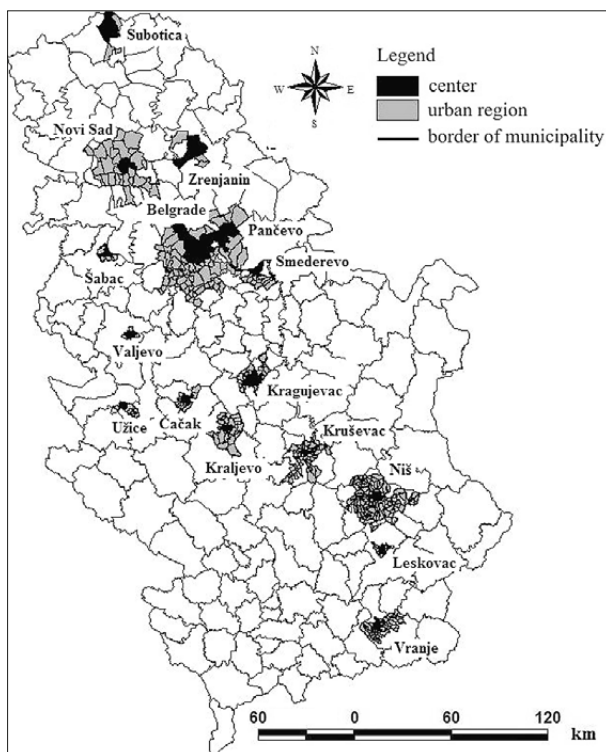


Figure 1. Urban regions in Serbia

Table 2. The basic features of urban regions in Serbia in 2011

Urban settlement	Population of the urban region	Population of the urban settlement	Number of settlements in the "surrounding area"	Population of the "surrounding area"	Share of the urban settlement's population in the total population of the urban region (%)
Beograd	1388505	1166763	60	221742	84.03
Novi Sad	370316	231798	24	138518	62.59
Niš	298275	183164	113	115111	61.40
Kragujevac	156124	150835	20	5289	96.61
Subotica	108605	97910	3	10695	90.15
Zrenjanin	86789	76511	3	10278	88.16
Pančevo	117268	76203	8	41065	64.98
Čačak	82261	73331	10	8930	89.14
Smederevo	84465	64175	11	20290	75.98
Kraljevo	97141	64175	25	32966	66.06
Leskovac	72947	60288	7	12659	82.65
Valjevo	62535	58932	3	3603	94.24
Kruševac	103787	58745	53	45042	56.60
Vranje	76164	55138	39	21026	72.39
Šabac	74740	53919	5	20821	72.14
Užice	63624	52646	7	10978	82.75

Source: 2011 Census, vol. 15

Only in the immediate surroundings Kruševac a comparably significant share of the population of the defined urban region (43%) is concentrated. In the other regions covered by this study, the share of the population living in the "surrounding area" does not exceed 30% of the total population, with the exception

of Kraljevo (34%). An extremely high concentration of population in the urban settlement (more than 90%) is observed in Kragujevac (the number of settlements is fairly large – twenty – but they have a small population, while the concentration of the population in the regional centre is high), Valjevo and Subotica

The results of the analysis aimed at defining urban regions in Serbia, as well as the analysis of the relationship between the demographic capacity of the core of the urban region and its immediate surroundings, suggest that urban regions in Serbia are in the initial stage of development, marked by pronounced centralization, i.e. the domination of the urban core (with an average population concentration of 77%¹⁷).

As far as the degree of fulfilment of the requirements defined in the model is concerned, there are great differences among urban regions in Serbia.

The first condition is associated with daily migration systems in the observed cities. The number of settlements in the surrounding area where commuters to the central city account for more than 25% of the active population greatly varies, from 10 to 149 – 56 settlements on average. By far the largest number of them belong to the municipal territory (Table 3). The

¹⁷ As early as his studies of urban regions in Croatia conducted on the basis of the 1981 Census, Vresk observed a comparable domination of the urban cores of Croatian cities (75.8% on average). However, the results of studies of the urban regions of the four largest cities in Croatia show that the average share of the population living in the centre of the region decreased by 10% (Klempić Bogadi, 2010).

share of these settlements in the total number of settlements that meet this requirement ranges from 27% in Niš to 100% in Kraljevo and Belgrade (the entire administrative area of Belgrade, i.e. the City of Belgrade, is taken as the municipal territory).

The settlements outside the municipal territory of the observed centres where the share of commuters to the centre is larger than 25% are few in number and they often fail to meet one of the remaining two conditions. The settlements that are outside the municipal territory and meet all of the three conditions are slightly more numerous only in the surroundings of big cities: Niš (68), Novi Sad (13) and Kragujevac (9), while in the urban regions of other cities, such settlements either cannot be found or are very few in number: Kruševac (4), Vranje (2) and Čačak (1).

The employed population accounting for more than 50% of the total active population is a requirement that many settlements cannot meet, although the share of commuters to the city centre is greater than 25% of the active population. At the same time, it may be observed that in the case of large cities all (Belgrade and Novi Sad) or almost all (Niš) settlements which meet the first requirement also meet the other two. Quite oppositely, in the case of Leskovac, Šabac and, particularly, Valjevo, the settlements that could be included in an urban region based of the share of commuters account for less than 50%

when the share of the employed population is taken into account.

A large share of the population employed in the primary sector (over 20%) is the reason why more than three-quarters of settlements that meet the first two requirements are excluded from the urban regions of Subotica and Zrenjanin, which is in line with the functional structure of settlements in Vojvodina. More than 60% of settlements in the surroundings of Čačak, Leskovac, Valjevo, Šabac and Užice are excluded for the same reason, due to which, their urban regions are reduced to a very small number of settlements.

The continuity of an urban region, or defining its border zone with all settlements included in it, is the last requirement defined by the model. In order to meet this requirement, it was necessary to exclude some settlements even though they meet the other requirements. They are mostly located beyond the boundaries of urban regions and/or at a greater distance from the city. As it has already been pointed out, the largest number of settlements that are excluded for this reason can be found in the surroundings of Niš and Leskovac. Also, in order to meet the requirement of continuity, some settlements have to be included in urban regions borders although they do not meet all requirements defined by the model. The largest number of settlements (16) that are included in those areas are also found in the urban region of Niš (Table 3).

Table 3. The number of settlements which meet individual criteria defined by the method

Urban settlement	Number of settlement				
	commuters > 25% (the number of settlements in the municipal territory)	commuters > 25%, the share of employed population in the active population <50%	commuters > 25%; the share of employed population in the active population >50%; the share of agricultural population in the active population >20%	Continuity	
				excluded	included
Beograd	77 (77)	0	17	3	3
Novi Sad	38 (13)	0	13	2	1
Niš	149 (41)	13	31	8	16
Kragujevac	71(40)	29	19	5	2
Subotica	20 (18)	4	12	1	/
Zrenjanin	19(13)	4	12	/	/
Pančevo	10 (9)	0	2	/	/
Čačak	53 (49)	17	22	4	/
Smederevo	27 (26)	7	9	/	/
Kraljevo	56 (56)	19	14	1	3
Leskovac	80 (78)	41	26	7	/
Valjevo	59 (52)	50	6	/	/
Kruševac	100 (89)	21	28	/	2
Vranje	51 (47)	8	6	1	3
Šabac	52 (44)	33	13	1	/
Užice	41 (33)	18	16	/	/

Conclusion

The assessment of the demographic and socioeconomic characteristics of urban regions – both their cores and the surrounding areas, is important in facilitating strategic planning in the territory of Serbia. It is therefore necessary to monitor and coordinate future developments in these areas, as the main poles and bearers of development, and this is crucial for the management and planning of the overall development of the country.

Based on the results of the analysis of urban regions in Serbia, selected according to the criteria defined by the discussed model, it is possible to single out the basic characteristics of cities and their surroundings. In summary, they are the following:

- urban regions show a marked heterogeneity, both in terms of their spatial extent and population, and the number of settlements in the surrounding area;
- the total number of urban regions (16) and the large share of the population of cities in the population of urban regions (77% on average) indicate a low stage of development of urban regions in Serbia, especially in cases where the population of the surrounding area accounts for less than 10% of the total population of the region (Kragujevac, Valjevo and Subotica);
- different population numbers and, especially, the different number of settlements in the surrounding area (3–113) are not correlated with the size of cities, as cores of urban regions, nor are they correlated with the characteristics of the settlement network in Vojvodina and Central Serbia;
- the settlements in the surrounding areas that meet the first two of the three quantitative criteria defined by the model are significantly more numerous than the settlements that meet all of the requirements;
- the impact of the continuity, as a qualitative criterion, on the spatial extent of urban regions is negligible, except in the case of the Niš region;
- based on the synthetic evaluation of urban regions in Serbia, it may be concluded that differences in demographic and socio-economic characteristics of cities and their surrounding areas are a result of other factors (the level of development of centres and their accessibility, the characteristics of settlements in the surrounding area, soil fertility and morphological characteristics of the terrain, historical conditions, traditions, etc.), along with those covered by the method.

Based on the current research and the knowledge of the process of development of urban regions in developed countries, and especially in those with a higher

level of urbanization, it may be expected that the process would proceed along the same lines in less developed ones. However, having in mind the pronounced depopulation in Serbia, the significantly diminished process of intense urbanization, including in-migration in the areas surrounding the cities, it is not reasonable to expect that in the so-called “mature” stage of development of urban regions the population in the immediate and wider surroundings would grow to exceed the demographic size of the cities.¹⁸ The peripheral growth of the larger cities is expected to intensify suburbanization/periurbanization processes, which could cause nearby settlements to disappear according to statistical organization and to become part of the cities. Furthermore, it is not expected that the process of the development of urban regions in Serbia would result in a significant redistribution of population and jobs from the urban cores into the surrounding areas, which is also an indicator of the possible emergence of a new phase in the development of urban regions.

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¹⁸ In the United States, where the process of metropolization has gone the farthest, the population of the surrounding areas outnumbered the population of central cities already in the 1960s (Berry, 1973).

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