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The Settlement Network in Spatial Plans in the Republic of Serbia – Key Dilemmas

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Abstract

The settlement network represents one of the key segments of spatial plans in Serbia, as well as part of the broader framework that encompasses the population and public services within a given territory. The ways in which this segment has been addressed in practice show considerable variation, which points to the absence of a clearly established and widely accepted approach. This paper presents a comparative analysis of spatial plans at the national, regional, and local levels, with the aim of examining the methodological and substantive consistency in the treatment of this segment, as well as the degree to which individual subsegments and related concepts are included. The results of the research made it possible to identify key uncertainties and inconsistencies, which may serve as a basis for improving planning practice, that is, for enhancing its quality and relevance in the planning of settlement network development.

Keywords: spatial plans; settlement network; comparative analysis; methodological consistency; spatial planning practice

Introduction

By definition, spatial planning represents an activity aimed at designing the rational use, organization, regulation, and protection of space (Živanović, 2025). In this context, settlements, as places of residence, social interaction, economic activities, education, and many other functions, that is, places where people's everyday life takes place, constitute one of the key elements of space as the subject of spatial planning. In many countries and regions, the settlement network serves as the backbone and starting point for comprehensive and regional development planning (Stamenković & Bačević, 1992; Prus et al., 2017; Sołtys, 2017, Song et al., 2023). Thus, although a settlement is one of the most important elements in spatial planning and often its basic unit, only the settlement network, i.e., settlements in their entirety, represent a true factor of development.

In spatial planning, the settlement network is treated as a whole in which each member has a specific position and role, depending on the functions it performs in relation to other settlements (Piha, 1986; Vresk, 1980).

The study and planning of the spatial-functional organization of the settlement network are grounded in the concept of settlement and function centrality, developed within Walter Christaller's theory of central places. Although for the first few decades Christaller's theory did not achieve wider scientific and professional recognition, from the mid-twentieth century onward it became widely accepted in both academic circles and planning practice (Berry & Harris, 1970; Preston, 1983; Taylor, P. & Hoyler, 2021; Parr, 2025).

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In this way, the concept of centrality became fundamental to the spatial organization of systems of various services and settlement networks. Despite certain limitations and criticisms, this concept continues to represent a cornerstone of contemporary analyses and planning approaches to the organization of settlement networks, having moved from the sphere of scientific research into professional practice (Radica et al., 1997; Kovačič et al., 2000).

A central settlement is most commonly defined as a settlement in which tertiary and quaternary functions are concentrated in order to serve not only its own population but also that of the surrounding gravitational area (Laci, 1979; Malić, 1991). In this context, centrality represents a measure of the concentration and diversity of central functions and, consequently, of a settlement's functional significance within the network (Vresk, 2002; Tošić, 2012; Lukić, 2012; Marinković, 2018). Although strongly correlated with settlement size, centrality is not reducible to demographic magnitude alone (Grgurević, 1993).

In the European planning context, the organization of settlement systems and public service provision represents an important component of spatial development, particularly at the regional and local levels (Malý, 2018). The conceptual foundations of European policy in this field were largely shaped by the adoption of key strategic documents that introduced the principles of polycentric development, territorial cohesion, and accessibility of services of general interest. The European Spatial Development Perspective (European Commission, 1999) was among the first comprehensive policy documents to promote the concept of balanced territorial development through polycentric urban systems and improved accessibility. Shortly thereafter, the Green Paper on Services of General Interest (European Commission, 2003) emphasized the importance of ensuring the quality, accessibility, and sustainability of public services across all territorial levels. In parallel with these policy developments, contemporary research on settlement hierarchies and spatial organization of urban systems has increasingly relied on quantitative and network-based approaches, including accessibility modelling and spatial interaction analysis, to better understand the functional roles of settlements within broader territorial systems (Brezzi & Veneri, 2015; Ouwehand et al., 2022). Recent analyses also indicate a growing integration of settlement hierarchy research with fields such as urban systems analysis, regional development, and spatial network modelling (Elburz & Çubukçu, 2025).

Serbian human and urban geography has conceptualized the settlement network as a complex and dynamic geographical category in which functional characteristics, that is, the level and structure of functional equipment, constitute a fundamental determinant of settlement development and hierarchical differentiation (Stamenković & Bačević, 1992; Tošić & Nevenić, 2006). The spatial-functional organization of the network reflects the interplay between spatial relations (location, physical-geographical characteristics, transport connectivity) and functional relations (functional capacities, spheres of influence, and inter-settlement interactions), with functional linkages being particularly dynamic and sensitive to socio-economic change (Stamenković, 1990). Since the mid-twentieth century, especially within the framework of the so-called "new geography," research has increasingly relied on systemic approaches and quantitative methods to analyze functional equipment, interaction patterns, and the optimal spatial organization of human activities (Tošić & Nevenić, 2008; Nevenić, 2012).

In spatial planning practice in Serbia, the theoretical foundations have been operationalized through the identification of central settlements, the establishment of hierarchical levels, and the delineation of their spheres of influence (Simonović & Ribar, 1993; Vresk, 2002; Tošić, 2012, Maksin et al., 2014). This hierarchical arrangement of settlements, where central places provide services to surrounding areas, is considered a key instrument for fostering integrated functional regions and balanced regional development, particularly in the context of Serbia's historically urban-centric development patterns, which have often marginalized rural areas (Đerčan et al., 2024).

Spatial planning in Serbia has a long tradition, with its roots in the early second half of the twentieth century and the adoption of the first law in this field in 1961. In the decades that followed, a large number of plans of different levels and scopes were prepared. This process eventually led to the adoption of numerous spatial plans, resulting in 2015 in the complete spatial planning coverage of the entire territory of the Republic of Serbia at all territorial levels. With the adoption of the new Spatial Plan of the Republic of Serbia, a new planning cycle will begin, for which the critical review of previous documents is of particular importance. In this context, the paper is directed toward their reassessment and the systematization of key dilemmas and inconsistencies in the treatment of the settlement network segment.

Research Hypotheses

Based on the current understanding of spatial plans and the literature on settlement networks, the following research hypotheses have been formulated:

1. The significance of the settlement network in existing spatial plans is not fully operationalized

through clear criteria, indicators, and implementation measures.

2. There is a lack of consensus regarding the subject matter and structure of the settlement network segment in spatial plans, both across different territorial levels and within the same level.

3. The treatment of the settlement network segment is primarily focused on describing the current state and the development processes that led to it, while the specification of adequate objectives and spatially defined planning solutions is limited.

These hypotheses will be tested through a comparative analysis of spatial plans at different territorial levels in the Republic of Serbia. They provide a basis for identifying potential inconsistencies, gaps, and opportunities to improve the quality of planning solutions, thereby contributing to both the scientific and practical value of the study.

Data and Methods

The methodological approach is based on a comparative and content analysis of spatial plans at different territorial levels in the Republic of Serbia, with the aim of examining how the settlement network segment has been addressed in spatial planning practice. Plans at the national, regional, and local levels were analyzed. Although the Law on Planning and Construction defines four types of spatial plans, Spatial Plans of Areas of Special Purpose were not considered, given that the settlement network segment in these plans is addressed selectively and primarily in relation to the designated special purpose. Settlements are examined in a fragmented manner, mainly through the lens of the impacts of the special purpose on their development or the constraints arising from it, which reduces the comparability of the settlement network segment with the corresponding segment in other types of spatial plans.

The research was conducted through several interrelated phases, including the identification, analysis, comparison, and evaluation of planning documents, as well as the formulation of conclusions and recommendations for improving the methodological approach.

The analysis relied on qualitative and quantitative interpretation of the content, applying a tabular systematization of data to enable a more precise comparison of the scope and manner in which the settlement network segment is treated. This approach made it possible to determine the presence or absence of certain analytical and planning elements, as well as differences in terminology, hierarchy of centers, and criteria for defining spheres of influence.

Results

Settlement network in spatial plans at the national level

Spatial Plan of the Republic of Serbia, 1996.

In the Spatial Plan of the Republic of Serbia adopted in 1996 (Official Gazette of the Republic of Serbia, No. 13/1996), the settlement network was addressed within the chapter *Population, Settlements, Activities, and Regional Division*, specifically in the subchapter *System of Urban Centers and Functional Areas*. The settlement network was treated in line with the classical approach to spatial development, with a clearly defined hierarchical structure and designated levels of centers. The starting point of this document was the problem of excessive concentration of population, economic activities, and services in Belgrade and along the main development axes, namely the Danube–Sava and Morava corridors. As a response, the concept of polycentric development was adopted, aiming to integrate the national center (Belgrade), macro-regional centers (Novi Sad, Niš, Priština), as well as regional and sub-regional centers into a functional network that would mitigate spatial disparities.

Spatial Plan of the Republic of Serbia 2010–2020.

In the second Spatial Plan of the Republic of Serbia 2010–2020 (Official Gazette of the Republic of Serbia, No. 88/2010), the *settlement network* segment was addressed as part of the chapter *Population, Settlements, and Social Development*, within the subchapter *Polycentric Urban System*. The plan highlighted key problems in Serbia's settlement network, including uneven spatial and demographic distribution, long-term rural depopulation, functional imbalances between central and surrounding settlements, insufficient polycentric development, and inconsistencies with EU (Eurostat) statistical standards.

As in the previous plan, the foundation was the pursuit of polycentric development, this time enriched with modern European concepts and aligned with spatial development strategies. The polycentric model was complemented by the concept of Functional Urban Areas (FUA), shifting the focus from a purely hierarchical organization of the settlement network to functional connections and the interactive relations among urban centers. This approach made it possible to view cities of different ranks as integrated nodes within broader regional and transnational systems. Special importance was given to medium-sized towns, which were recognized as key actors of decentralization and as counterbalances to Belgrade and other major centers.

Spatial Plan of the Republic of Serbia until 2035.

In the Draft Spatial Plan of the Republic of Serbia until 2035, which is currently in the process of adoption, the *settlement network* segment is addressed as part of the chapter *Population and Social Development*, primarily within the subchapters *Urban Systems and the Organization of Urban Settlements* and *Rural Development and the Organization of Villages*. Urban centers with functionally dependent surroundings are defined as the basic units of the spatial organization of the urban system. The shift in the approach to the organization of urban systems involves moving from a hierarchical model of urban centers to a model of urban areas with a "general urban context." This model aims to equalize conditions for quality living across the entire urban system by serving as a tool for more balanced and rational spatial, demographic, and economic development, thereby supporting a stable economy and improved quality of life for the population.

Taken as a whole, these plans reflect the evolution in the approach to the settlement network in Serbia: from an emphasis on internal hierarchy and the pursuit of demetropolization, toward a more contemporary model that integrates European concepts of polycentric development, functional urban areas, sustainable rural–urban relations, and, ultimately, the model of urban areas with a "general urban context."

Settlement network in regional spatial plans

According to the Rulebook on the Content, Method, and Procedure for the Preparation of Spatial and Urban Planning Documents (Official Gazette of the Republic of Serbia, No. 32/2019), regional spatial plans are required to address the settlement network within the planning solutions of the second planning area entitled *Spatial Development and Distribution of Population, Settlements, and Public Services: population; functional integration of settlements and centers; organization of public services*.

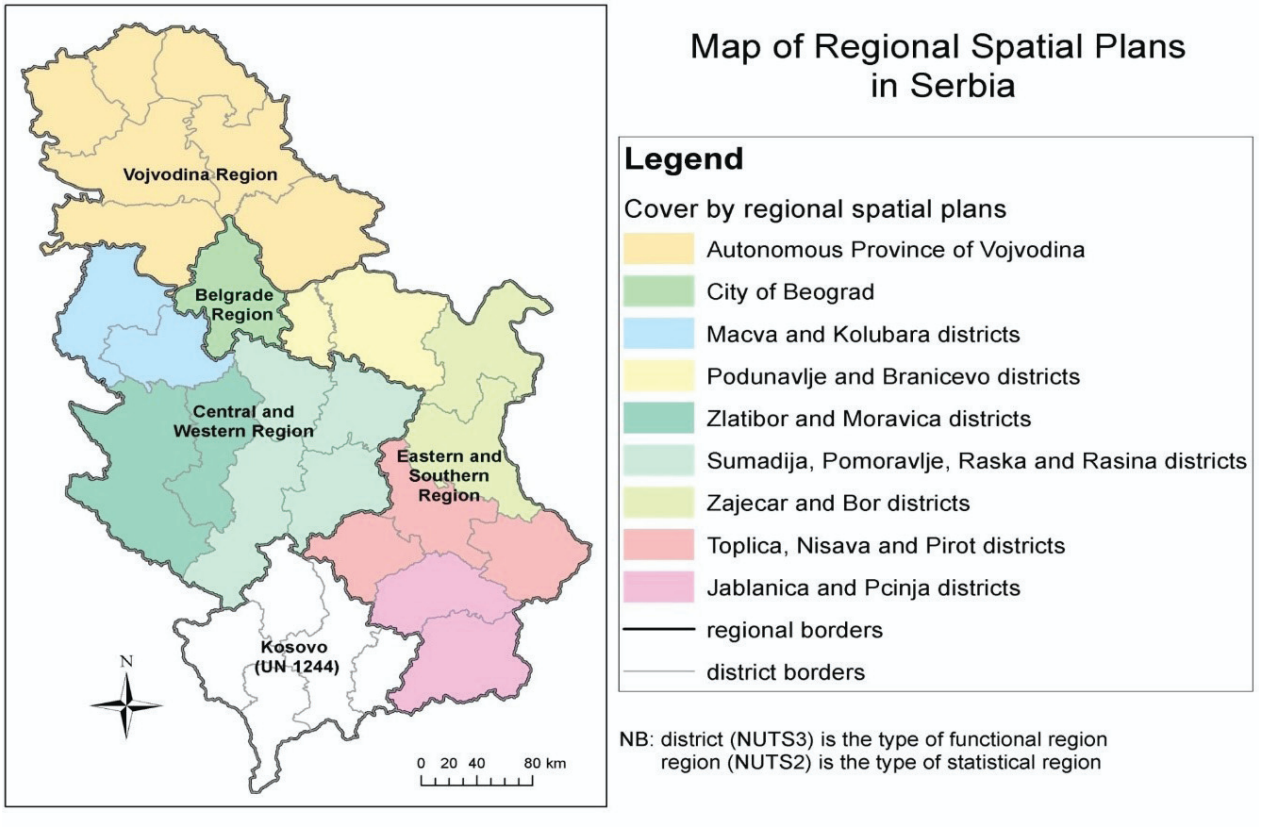

Figure 1. Map of Regional Spatial Plans
Source: Author's elaboration

In Regional Spatial Plans (RSPs), the settlement network is analyzed in the chapter entitled *Population, Settlement Network, and Public Services*. The only exceptions are the RSP of the Autonomous Province of Vojvodina, where the settlement network is addressed within two chapters (*Urban Settlement and System Development* and *Rural Development and the Organization of Villages*), and the RSP of the Administrative Area of the City of Belgrade, where the settlement network is treated in the chapter *Functional Integration of Settlements and Centers*. Based on the results of these analyses, goals and planning solutions are then defined. However, a detailed review of nine regional plans reveals that the *settlement network* segment is treated differently in terms of quality, scope, and content (Table 1).

Table 1. Settlement Network in Regional Spatial Plans

Contents of RSP related to the settlement network	Regional Spatial Plans								
	1	2	3	4	5	6	7	8	9
ANALYSIS AND ASSESSMENT OF THE SITUATION									
Number of settlements (urban/other)	+	+	+	-	+	+	+	+	+
Share of urban population	+	+	-	-	+	+	+	+	+
Functional Urban Areas	+	-	-	-	+	-	-	+	-
Average size of settlement area	-	-	+	-		+	+	-	-
Settlement size categories (by population)	-	+	+	-	+	+	+	+	+
Settlement size categories (by population) across the last three censuses	-	-	+	-	-	+	-	+	+
Typical rural settlements by municipalities and districts	-	-	-	-	+	-	-	-	-
Potentials and limitations	-	+	+	+	+	+	+	+	+
DEVELOPMENT GOALS	+	+	+	+	+	+	-	+	+
CONCEPTS, PROPOSALS, AND PLANNING SOLUTIONS FOR SPATIAL DEVELOPMENT									
Network of centers and settlements (number of hierarchical levels of centers)	5	5	8	4	5	5	5	4	5
Model of polycentric regional development – daily urban system	-	-	+	-	-	+	-	+	-
Integration, functional interdependence, and functional connectivity of settlement and spatial systems	-	-	+	-	-	+	+	-	-
Preservation and transformation of rural settlements and areas	-	-	+	-	-	+	+	+	-
Concept of spatial development of rural areas	-	-	-	-	+	-	-	-	-
Rural development and the organization of villages	-	+	-	-	-	-	-	-	-
Measures and instruments for the implementation of the plan	+	-	+	-	-	+	+	+	+
Planning solutions	-	-	2	-	-	2	2	2	1
Priority activities	5	3	2	-	14	7	6	7	4
Basic measures and instruments of settlement network development policy	-	-	+	-	-	-	-	+	+

Legend: 1 - RSP of the Administrative Area of the City of Belgrade (Official Gazette of the City of Belgrade, No. 10/2004); 2 - RSP of the Autonomous Province of Vojvodina 2021–2035 (draft); 3 - RSP for the Nišava, Toplica, and Pirot administrative districts (Official Gazette of the Republic of Serbia, No. 1/2013); 4 - RSP for the Podunavlje and Braničevo administrative districts (Official Gazette of the Republic of Serbia, No. 8/2015); 5 - RSP for the Šumadija, Pomoravlje, Raška, and Rasina administrative districts (Official Gazette of the Republic of Serbia, No. 56/2010); 6 - RSP of the Timok Region (Official Gazette of the Republic of Serbia, No. 15/2009); 7 - RSP of the municipalities of Southern Pomoravlje (Official Gazette of the Republic of Serbia, No. 83/2010); 8 - RSP for the Zlatibor and Moravica administrative districts (Official Gazette of the Republic of Serbia, No. 219/2013); 9 - RSP for the Kolubara and Mačva administrative districts (Official Gazette of the Republic of Serbia, No. 11/2015)

\+ exists

\- does not exist

Source: Authors' research

The analysis of the *settlement network* segment shows that the manner of its treatment is largely determined by the specific approach developed within the institution responsible for preparing the plan. When plans are compared, certain differences in approach are observed, but even more pronounced are the similarities within the plans prepared by the same institution. In addition, methodological specificities are particularly evident in the RSP of the Autonomous Province of Vojvodina and the RSP of the Administrative Area of the City of Belgrade, which clearly differ from other regional plans.

In all RSPs, as a planning solution, either a five-level or four-level hierarchy of centers was defined, except in the case of Vojvodina where only urban centers were considered. An exception is the RSP of the Nišava, Toplica, and Pirot administrative districts, which distinguished eight different hierarchical levels of centers. The lowest hierarchical level included village community centers (centri zajednice naselja), local centers, or micro-development centers, which could again fall into categories such as subcenters, village community centers, or settlements with specific functions. In the RSPs, except those for Belgrade, Vojvodina, and the Kolubara and Mačva districts, centers at the lowest hierarchical levels were identified, while the definition of their zones of influence was left for elaboration within local spatial plans (SPLSGUs).

In the draft RSP of the Autonomous Province of Vojvodina for the period 2021–2035, the analysis and assessment of the settlement network are presented in two chapters, *Urban System and Urban Settlements* and *Rural Development and the Organization of Villages*. Planning solutions related to the settlement network are included in the chapter *Functional Integration of Settlements and Centers*, which consists of three subchapters: *Urban Systems*, *Urban Settlement Development*, and *Rural Development and the Organization of Villages*.

The RSP of the Administrative Area of the City of Belgrade was adopted in 2004, with amendments adopted in 2011. The settlement network was addressed in the chapter *Functional Integration of Settlements and Centers*. The analysis also partially refers to daily migration, which in other RSPs, where present (plans 3, 6, and 8), is included under the section *Concepts, Proposals, and Planning Solutions for Spatial Development*. In the SWOT analysis, no potentials or limitations directly concerning the settlement network were identified. Thus, potentials and limitations concerning the settlement network were defined in all RSPs except the plan relating to Belgrade. Furthermore, in the RSPs marked 3, 6, 7, 8, and 9, the potentials include a detailed elaboration of nodal centers and areas.

In addition to the hierarchy of centers (as a planning solution), in the RSPs marked 3, 6, 7, and 8, two additional planning solutions related to the settlement network were provided: Functional Strengthening of the Role of Urban Centers and Preservation and Transformation of Rural Settlements and Areas. In plan no. 9, another planning solution was given, entitled Development of Functions of Centers within the Settlement Network. These were further elaborated through four to seven priority activities. Priority activities were not defined in the plan for the Podunavlje and Braničevo districts.

Integration, functional interdependence, and functional connectivity of settlement and spatial systems were addressed only in three RSPs, namely those for the Nišava, Toplica, and Pirot administrative districts, the Timok region, and the municipalities of Southern Pomoravlje. In the same plans, as well as in the plan for the Zlatibor and Moravica districts, the topic Preservation and Transformation of Rural Settlements and Areas was also included.

Measures and instruments for the implementation of the plan in the field of settlement networks were not defined in the RSPs for Vojvodina, the Nišava, Toplica, and Pirot districts, and the Šumadija, Pomoravlje, Raška, and Rasina districts, whereas they were included in the remaining six RSPs. Similarly, measures and instruments of settlement network development policy were not defined in three plans, namely those for Vojvodina, the Nišava, Toplica, and Pirot districts, the Zlatibor and Moravica districts, and the Kolubara and Mačva districts.

Settlement network in spatial plans of local self-government units

All local self-government units (LSGUs) in the Republic of Serbia have adopted spatial plans. The analyzed sample of eight Spatial Plans of Local Self-Government Units (Table 2) was selected so as to include territories with different physical-geographical characteristics (such as their position within the national territory, spatial size, relief, and natural resources) as well as different socio-geographical characteristics (including the level of economic development, transport position, and population dynamics). Another criterion considered during the selection was that the plans were prepared by different planning institutions (Figure 2).

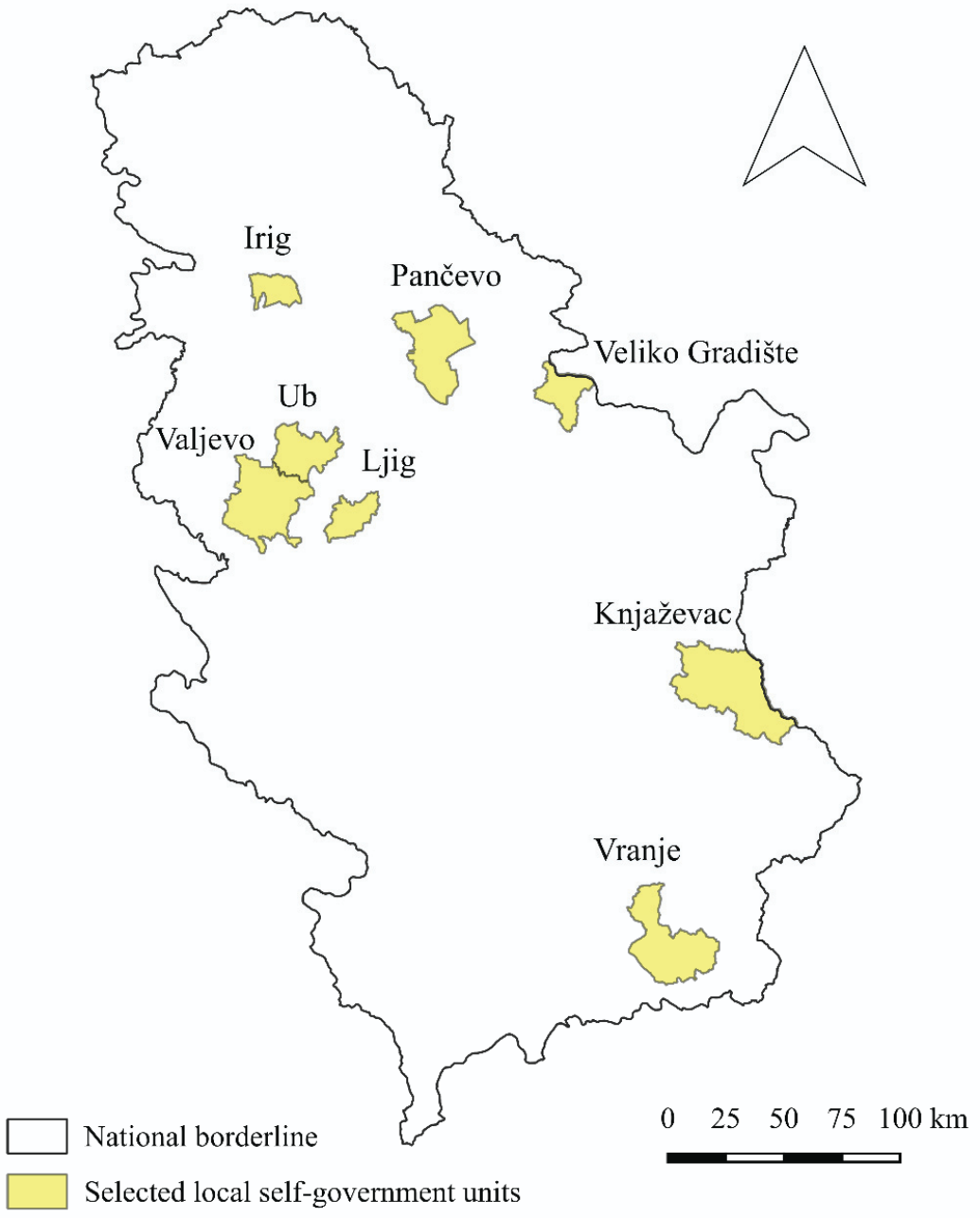

Figure 2. Analyzed sample of Spatial Plans of Local Self-Government Units
Source: Author's elaboration

According to the Rulebook on the Content, Method, and Procedure for the Preparation of Spatial and Urban Planning Documents (Official Gazette of the Republic of Serbia, No. 32/2019), in SPLSGUs the settlement network must be addressed within the planning solutions of the third planning area, entitled *Spatial Development, Distribution of Population, and Settlement Network and Public Services* (population; relationship between urban and rural settlements and functional integration of settlements and centers, organization of public services, etc.).

With the latest amendments to the Rulebook, the section concerning the analysis and assessment of the current situation was removed from the starting basis for the preparation of SPLSGUs. An analysis of several SPLSGUs shows that this section has generally been omitted in plans adopted after these amendments (Irig, Veliko Gradište, Ub). In the SPLSGU of Ljig, however, the analysis and assessment of the situation remain an integral part of the plan, even though it was prepared after the mentioned amendments to the Rulebook.

Table 2. Settlement Network in Spatial Plans of Local Self-Government Units

Contents of SPLSGUs related to the settlement network			SPLSGUs					
	1	2	3	4	5	6	7	8
ANALYSIS AND ASSESSMENT OF THE SITUATION								
Settlement network	+	-	+	-	+	+	+	-
Settlement size categories (by population) across the last three censuses	+	-	-	-	-	-	+	-
Spatial-functional organization of settlements	-	-	-	-	+	-	-	-
Functional determinants of the settlement network	-	-	-	-	+	-	-	-
Potentials and limitations	-	-	-	-	-	+	+	-
GOALS – settlement network	-	+	+	+	+	+	+	+
PLANNING SOLUTIONS – settlement network								
Relation between urban and rural settlements and functional integration of settlements and centers: hierarchy of centers	+	+	+	+	+	+	+	+
Coverage of village communities (Serbian: zajednice naselja)	+	+	+	+	-	+	+	-
IMPLEMENTATION – settlement network	-	-	-	-	+	+	+	+
Priority planning solutions, activities, and projects	-	+	-	-	+	+	+	+

Legend:
1– Ljig (Official Gazette of the Municipality of Ljig No. 4/2021), 2 – Irig (Official Gazette of the Municipality of Irig No. 39/2021), 3 – Vranje (Official Gazette of the City of Vranje No. 4/2016), 4 – Veliko Gradište (Official Gazette of the Municipality of Veliko Gradište No. 25/2021), 5 – Pančevo (Official Gazette of the City of Pančevo No. 22/2012), 6 – Valjevo (Official Gazette of the City of Valjevo No. 3/2013), 7 – Knjaževac (Official Gazette of the Municipality of Knjaževac No. 9/2011), 8 – Ub (Official Gazette of the Municipality of Ub No. 9/2012)
\+ exists
\- does not exist

Source: Authors' research

Within the planning solutions, the settlement network is most often addressed in the chapter entitled *The Relationship Between Urban and Rural Settlements and the Functional Integration of Settlements and Centers*. In addition, there is a wide range of chapter titles related to the settlement network: *Network and Function of Settlements* (Pančevo), *Settlement Network and Functional Zoning of the Municipality* (Veliko Gradište), *Development of the Settlement Network, Rural Settlements, and Areas* (Knjaževac), *Concept of Development and Organization of the System of Settlements and Centers* (Vranje), *Organization of the Settlement Network and Rural Areas* (Valjevo), etc.

Within chapters under these titles, a hierarchy of centers is defined, most often three-tiered (two-tiered in Veliko Gradište, four-tiered in Knjaževac, and single-tiered in Ljig). At the top of the hierarchy is the LSGU center, while at the bottom are the primary rural settlements. Between these two categories, different types of centers are defined:

- In the plan for Ljig, besides the municipal center to which all settlements gravitate, no other centers are identified.
- In the plan for Irig, in addition to the municipal center, the following levels are defined: First- and Second-Level Village Community Centers.
- In the plan for Vranje, apart from the municipal center, Village Community Centers and Rural Settlements with a Developed Center are distinguished.
- In the plan for Veliko Gradište, Sub-Municipal Centers are the only hierarchical tier between the municipal center and the primary rural settlements.
- In the plan for Pančevo, besides the LSGU center, Larger Local Centers and Local Centers are defined.
- In the plan for Valjevo, in addition to the LSGU center, Subcenters and Village Community Centers (or Micro-Development Centers) are distinguished. Furthermore, two categories of settlements are noted: more developed villages and settlements with specific functions.
- In the plan for Knjaževac, besides the municipal center, Sub-Municipal Centers, Local Centers, and Settlements with Tourist Functions are identified.

- In the plan for Ub, alongside the municipal center, two more types of centers are noted: Village Community Centers and Local Centers.

The analysis of local-level spatial plans unequivocally indicates the absence of consensus regarding the terminology for centers in rural areas that occupy hierarchical levels between the LSGU center and primary settlements, distinguished by a certain development of central functions. In addition to village community centers, which are most frequently included in local hierarchies, other terms are encountered, such as sub-municipal centers, subcenters, secondary centers, development centers, development nuclei, local centers, village centers, rural settlements with a developed center, etc.

Gravitational spheres, i.e., the settlements belonging to the zones of influence of centers identified in rural areas, are precisely defined in most SPLSGUs analyzed, with the exceptions of Pančevo and Ub.

Regarding the implementation of planning solutions in the area of settlement networks, this is generally expressed through priority planning solutions, activities, and/or projects. In some plans, the implementation section carries titles such as *Development and Organization of Centers in the Settlement Network* (Valjevo), *Functional Strengthening of the Municipal Center and Preservation and Transformation of Rural Settlements* (Knjaževac), or, in accordance with the planning part, *The Relationship Between Urban and Rural Settlements and the Functional Integration of Settlements and Centers*. However, in the plans for Ljig, Vranje, and Veliko Gradište, no priority planning solutions, activities, and/or projects related to the settlement network were defined.

Discussion

The analysis of the theoretical and planning framework for addressing the *settlement network* segment, as well as the content of selected spatial plans at different territorial levels, provides the basis for identifying and systematizing dilemmas and inconsistencies that are essential for improving the planning approach to this segment in the future.

Although the present analysis does not aim to provide a comprehensive evaluation of planning quality at each territorial level, the identified dilemmas point to several structural issues that may influence the coherence, transparency, and implementation capacity of spatial plans. These findings therefore provide an analytical basis for future research that could examine these implications in greater methodological depth.

Differences in the number and themes of subsegments in spatial plans (at different or within the same territorial levels)

The textual and tabular parts of the analysis clearly point to the absence of a basic consensus regarding the subject matter and structure of the *settlement network* segment in spatial plans, both across different territorial levels and within the same level. More specifically, apart from the definition of settlement hierarchy and the spheres of influence of central settlements (within which a pronounced terminological and methodological diversity is evident), none of the other subsegments of the analytical, conceptual, or implementation sections were identified as common to all analyzed spatial plans.

From the perspective of ensuring a minimum level of quality and content consistency in spatial plans, this situation raises the issue of the need to define a more uniform structure for this segment, one that would apply to all planning document developers in the Republic of Serbia. In other words, such variability in the number and thematic scope of subsegments may have several important implications for planning quality, coherence, and implementation. First, the lack of a more standardized structure reduces the comparability of spatial plans across territorial levels, which complicates vertical coordination within the planning system. Second, uneven analytical frameworks may lead to selective or incomplete consideration of key settlement network issues, thereby affecting the reliability of planning solutions. Third, differences in the treatment of conceptual and implementation subsegments may weaken the operational dimension of plans, resulting in documents that remain predominantly descriptive or strategic, without sufficiently defined instruments for implementation and monitoring. Ultimately, this heterogeneity may contribute to inconsistencies in decision-making, difficulties in evaluating plan effectiveness, and reduced transparency of the planning process.

The connection between segments in (strong) causal-sequential relations

The segments *population*, *settlement network*, and *public services*, although combined under a common chapter title, are in practice addressed as separate units. Moreover, the fact that they are often prepared by different experts (in some cases from multiple institutions) leads to insufficient integration, meaning that cause-and-effect relationships among them are

not considered to a significant degree. In the context of planning the development of the settlement network, this specifically implies a questionable grounding in demographic trends and the planned functional provision of settlements with public services. Since the establishment of the spatial-functional organization of the settlement network is practically a reflection of the existing or planned spatial organization of settlement functions (Popović, 2025), potential inconsistency is evident in terms of the unclear manner of linking future population dynamics (if included at all in a given spatial plan) with the planning of public service development (Živanović & Popović, 2024).

Insufficient integration between these causally interrelated segments may have particularly important implications for planning the development of the settlement network. If demographic trends and projections are not consistently aligned with the planning of public services, the resulting spatial-functional organization of settlements may be based on unstable or contradictory assumptions. This may lead to the designation of settlement hierarchies and spheres of influence that are not supported by realistic population dynamics or service capacities. Consequently, central settlements may be overburdened or underutilized, while smaller settlements may face further functional decline. In addition, the absence of clearly articulated causal linkages complicates the formulation of coherent settlement development strategies, as decisions regarding the strengthening, transformation, or specialization of settlements risk being made without a reliable demographic-functional foundation. During implementation, such inconsistencies may generate difficulties in prioritizing investments, aligning sectoral policies, and evaluating whether the planned settlement network structure corresponds to actual development processes. Ultimately, the fragmentation of these segments undermines the role of spatial plans as instruments for guiding balanced and functionally sustainable settlement network development.

Representation and approach to defining goals and concrete planning solutions

Similar to the situation in addressing the *public services* segment identified by Živanović and Popović (2024), in the case of the *settlement network* segment it can also be noted that greater emphasis is placed on the analytical part, that is, on the description of the existing situation and the developmental processes that led to it, while less attention is given to concretization in the form of defining adequate goals and spatially determined planning solutions.

Such an imbalance between analytical content and the definition of goals and concrete planning solutions may reduce the effectiveness of settlement network planning. When analytical insights are not translated into clearly articulated objectives and spatially explicit interventions, the strategic direction of settlement development remains ambiguous. This may weaken the rationale for defining settlement hierarchies and functional roles, while limiting the operationalization of concepts such as polycentric development or functional integration. In the implementation phase, insufficient concretization may lead to inconsistent interpretation of planning intentions, selective investment decisions, and difficulties in monitoring the achievement of development objectives. Ultimately, spatial plans risk functioning more as descriptive than as proactive instruments of settlement network transformation.

The relationship between the spatial organization of individual public services and the settlement network

The spatial organization of public service facility networks represents the basic determinant for defining the functional hierarchy of settlements and their spheres of influence. In order to maximize accessibility in line with the realistic possibilities of equipping settlements, the main idea of public service development is their concentration in a smaller number of settlements, which thereby gain greater hierarchical significance. Reference maps and accompanying textual descriptions are focused on highlighting these better-equipped, i.e., central settlements, and defining their predominant spheres of influence, without examining in detail the problems arising from differences in the spatial organization of individual public service facilities (Figure 3). In this context, as also emphasized by Živanović and Popović (2024), the open question is to what extent the different spatial organization of individual public services is taken into account in planning the spatial-functional organization of the settlement network. Consequently, a dilemma arises as to whether addressing this segment is substantively oriented toward solving concrete problems of service provision to the population.

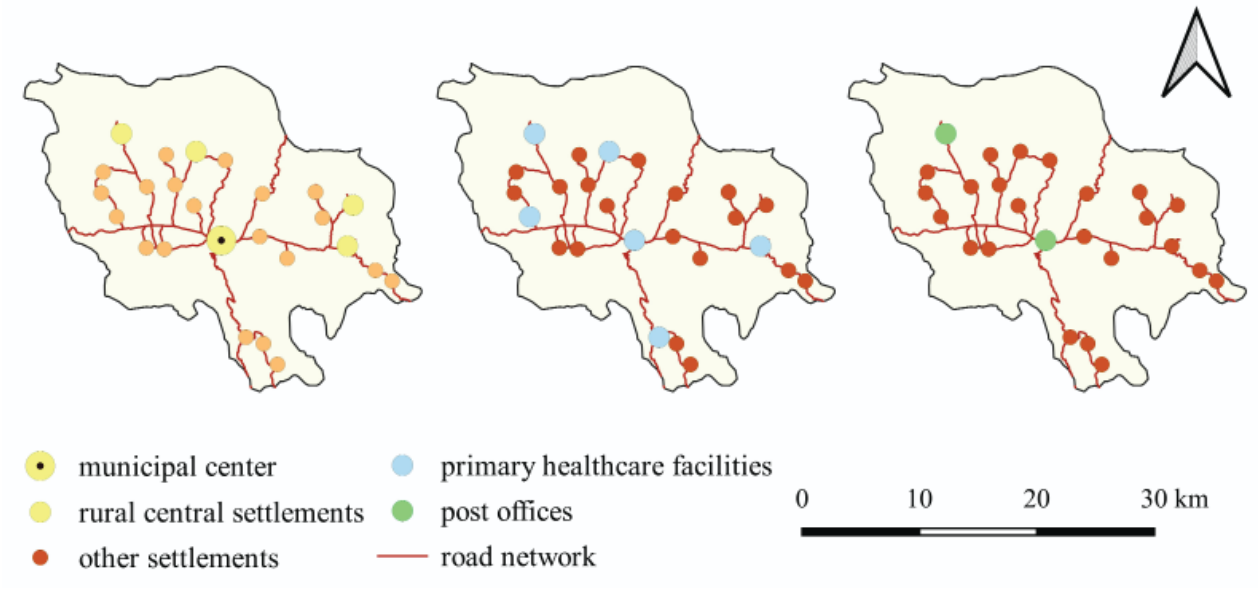

Figure 3. Differences in the spatial distribution of central settlements in relation to the spatial distribution of individual functions.
Data source: Spatial Plan of the Municipality of Sokobanja

Failure to adequately account for differences in the spatial organization of individual public services may significantly affect the validity of the planned settlement hierarchy and spheres of influence. If the functional significance of settlements is inferred from aggregated or simplified representations of service provision, important discrepancies between sectoral service networks may remain obscured. This may result in the designation of central settlements whose functional roles are not consistently supported across different service domains. In planning terms, such inconsistencies can weaken the reliability of spatial-functional models of the settlement network and reduce their capacity to reflect actual accessibility conditions. During implementation, this may contribute to uneven service availability, inefficient allocation of investments, and difficulties in coordinating sectoral policies. Ultimately, insufficient consideration of service-specific spatial patterns may limit the extent to which settlement network planning effectively addresses real problems of population service provision.

Consistency of methodology for establishing the spatial-functional organization of the settlement network

In practice, the spatial-functional organization of the settlement network entails establishing a functional hierarchy of settlements and defining the gravitational spheres of central settlements. Although spatial plans generally state that this is based on a set of relevant factors, most often including traditional ties between settlements, the spatial distribution of public facilities, characteristics of the transport network, and similar, methodologically it remains unclear how the integration of these factors leads to the concrete, spatially defined solutions that are proposed. When defining the functional hierarchy of settlements, although certain guidelines exist for distinguishing between different ranks of central settlements, methodological clarification is lacking on several precise issues: how the functional threshold for defining central settlements is determined in specific cases, how the number of settlement ranks is decided, how differences among settlements of the same rank are established, etc. Regarding the definition of spheres of influence, in addition to the previously mentioned dilemma concerning the relationship between individual public services and the settlements in which they are located, there is no clearly defined criterion for determining the boundaries of influence zones. Given this situation (while acknowledging the real impossibility of establishing an approach that could be entirely universally applicable across different regional/local contexts), the question arises whether this process is excessively left to the *discretionary judgment* of the plan developers.

Methodological ambiguity in establishing the spatial-functional organization of the settlement network may affect the robustness and credibility of planning solutions. Without sufficiently transparent procedures for defining settlement hierarchy, functional thresholds, and spheres of influence, resulting classifications may appear insufficiently justified. This can weaken the analytical foundation of the plan and reduce confidence in the proposed spatial-functional

model. In practice, inconsistent methodological approaches may produce variations in the identification of central settlements and the delineation of influence zones, complicating inter-territorial comparisons. During implementation, such uncertainties may hinder decision-making, coordination, and investment prioritization. Ultimately, excessive reliance on discretionary judgment may undermine the consistency and predictability of settlement network development.

Terminological consistency in planning the spatial-functional organization of the settlement network

Partly in connection with the previously mentioned methodological issues regarding the determination of the number and characteristics of specific settlement ranks, there is a pronounced diversity of terms used to designate them. The results of the conducted analyses indicate that this situation is particularly noticeable at the local level, where practically every one of the eight analyzed plans employs a different terminology for designating certain hierarchical ranks of settlements (as well as a different number of ranks themselves). The diversity in defining settlement ranks may have important implications for the coherence and practical application of settlement network planning. The use of inconsistent or non-standardized terminology can generate ambiguity in interpretation, hinder communication between planning levels, and complicate the comparison of planning solutions across territories. In methodological terms, differing labels for similar hierarchical categories may obscure substantive similarities or differences between settlements. During implementation, terminological inconsistency may contribute to misunderstandings among institutional actors, challenges in aligning sectoral policies, and reduced clarity in monitoring and evaluation processes. Ultimately, the absence of a more harmonized terminological framework may weaken the overall consistency of settlement network development policies.

Conclusion

From the presented theoretical framework and the analysis of selected spatial plans, it is evident that the *settlement network* segment is addressed in different ways depending on the territorial level, and within the same levels largely depending on the institution responsible for plan preparation. This diversity is reflected in the structure and content of planning documents, as well as in the methodological foundations and terminology used in defining categories and subsegments.

At the national level, as might be expected, there has been constant innovation in planning approaches to this segment. Each of these approaches reflected the dominant socio-economic circumstances of its time, with a clear effort to mitigate depopulation, encourage diversification of economic activities, and improve the socio-economic position of rural communities identified as the most vulnerable.

Regional spatial plans, as the intermediate level between national and local, display considerable heterogeneity. Differences are evident in the structure of the *settlement network* segment, in the number and content of subsegments, as well as in the methodology used to define the settlement hierarchy and their spheres of influence.

At the local level, i.e., in spatial plans of local self-government units, the diversity is even more pronounced. The analyzed examples show that there is practically no elementary consensus regarding uniform criteria, methodology, and terminology for the spatial-functional organization of local settlement networks. This situation can create confusion not only in the process of drafting documents but also in the actual implementation of planning solutions.

In general, a significant problem is the lack of a clearly defined methodology for determining the functional hierarchy and spheres of influence of settlements at all territorial levels. In addition, the analysis revealed limited integration of the segments population, settlement network, and public services. Although formally combined within the same chapter, in practice they are often prepared by different experts, which results in insufficient elaboration of cause-and-effect relationships. Without an integrated approach, this segment risks remaining at the level of general assessments and cartographic representations, without sufficient connection to the real needs of the population.

Importantly, the findings of this research do not imply the need for a rigidly uniform methodology applicable to all spatial plans regardless of scale or territorial context. Given that spatial plans form a hierarchical system addressing territories of varying size, complexity, and functional characteristics, a certain degree of methodological adaptation is both necessary and justified. Rather than advocating strict uniformity, this paper highlights the need for establishing a minimum level of methodological and terminological consensus. Such a framework would support comparability, improve coherence across planning levels, and enhance the transparency and practical applicability of planning solutions, while still allowing context-sensitive approaches. Strengthening this balance between consistency and flexibility would contribute to the

more effective planning and implementation of settlement network development policies.

With the adoption of the new Spatial Plan of the Republic of Serbia and the start of a new planning cycle, there is an opportunity to mitigate and potentially overcome the identified inconsistencies. The analysis of past experiences can serve as a foundation for more precise definition of methodological procedures and content, as well as for adopting a specific terminology whose applicability would be tested in practice. In this way, the quality of addressing the settlement network as a segment of fundamental importance for balanced spatial development and the quality of life of the population in Serbia would be enhanced.

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