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Revealing the relationship between city size and spatial transformation of large housing estates in post-socialist Serbia

Abstract

This paper considers the links between the city size and transformation of inherited socialist large housing estates within the process of post-socialist urban changes in Serbia. Based on the theoretical and contextual framework, we investigate the following: 1) whether there is a relationship between different city sizes and types, pace and intensity of large housing estates physical and functional transformations, and 2) which type(s) of transformation are dominant in different city size categories. To highlight the relationship, this research draws on the empirical evidence from cities which represent four city size categories in Serbia: Belgrade (capital city), Nis (second-tier city), Leskovac (third-tier city), and Bor (fourth-tier city). Research reveals that transformation of large housing estates is shaped by an unregulated urban environment, relaxed legal culture, and entrepreneurial attitudes of the local authorities to urban planning. Recognizing the power of specific local imperatives, the investigation indicates the interrelation between a certain city size and types and intensity of transformations - they are most diverse in the capital, while diversities decrease with the cities downsizing. Dominant transformation types also vary, reflecting the city categories and their economic power - those that require high/moderate investments and involve many actors dominate in the capital and the second-tier city, while the types based on small individual actions and investments dominate in the third and the fourth-tier city. This initial research aimed to create a platform for further investigation that will provide broader insights into this underrepresented issue and set the ground for urban regeneration strategies.

Keywords: large housing estates; city size; physical and functional transformation type; post-socialist development; Serbia

1. Introduction

The fall of socialism and radical political changes in Serbia in the 1990s established a new social, economic and cultural environment which shaped a new urban reality of the post-socialist city. Despite the differences caused by peculiarities of Serbia's development (Mandic, 2001), Serbian cities have undergone similar post-socialist urban changes to those in other Central East European (CEE) and South East European (SEE) countries. One of them relates to inherited large housing estates (from here on, LHEs), one of the most striking spatial legacies of socialism, whose future is considered as one of the key challenges in the urban development of the post-socialist city (Tosics, 2004; Sailer-Fliege, 1999; Szelenyi, 1996). Although massive privatization of the existing LHEs housing stock became the most common and powerful systematic measure in all CEE and SEE countries (Bodnar, 2001), previous research indicate that other transformations types vary from one country to another. They are dependent on country's development path, shaped by different political, economic and social processes (Tsenkova, 2014).

Specifically, LHEs spatial changes, observed through physical and functional transformation types (from here on, TTs), show great variety in terms of their presence, pace and intensity (van Kempen et al., 2005; Kovács and Herfert, 2012; Hess, Tammaru and van Ham, 2018). In general, three LHEs post-socialist development modes, followed by different TTs, can be recognized (Gunko et al., 2018; Bouzarovski et al., 2011): 1) *total neglect and decay of buildings and/or public open spaces*, caused by unregulated development and planning conditions, lack of resources for maintenance (Kahrik and Tammaru, 2010), or by unwillingness of sitting tenants to respond to new responsibilities (Temelova et al., 2011). Within this mode, decrease of public open space and degradation of existing buildings occurs as a key TTs, while small extensions on buildings and functional transformation of their ground floors are present with lower intensity; 2) *uncontrolled and uncoordinated*

development and renovation falling under the umbrella term "do-it-yourself" urbanism, exemplified by the individual building-based extensions in the form of new balconies or new storeys (Bouzarovski et al., 2011), or by functional transformation of premises on the ground floors (Hirt, 2012); and 3) *fully renovated housing stock*, achieved through large and small-scale LHEs *urban regeneration projects*, making them attractive to different socio-economic groups, as in the case of Poland, Slovakia, Hungary, Czech Republic, and Romania (Szafranska, 2014; Hess, Tammaru and van Ham, 2018).

Besides that, national and local governments response to LHEs development in the post-socialist context can be recognized through three major strategies (van Kempen et al., 2005; Kovács and Herfert, 2012; Hess, Tammaru and van Ham, 2018): 1) extreme one - *wholesale demolition of existing housing stock and areas*, usually replaced with mix-use areas or new apartment buildings, implemented in former East Germany cities (Bernt, 2009) and Moscow, for instance (Gunko et al., 2018); 2) "*doing nothing*", i.e. not intervene and leave the market to shape changes, with minor state and local authority involvement. In fact, many CEE and SEE countries operated in this way during the mid-1990s in the first, so called 'Wild-East phase' of transition, after which they consolidated their housing and urban policies; and 3) *integrated one - regeneration*, based on policies and planned interventions aiming to rehabilitate and improve LHEs physical, social and environmental characteristics on large and small spatial and investment scale. The integrated strategies are implemented through three types of policy interventions: place-based, connectivity-based and people-based. The most present are the place-based interventions, especially those related to upgrading physical environment of LHEs in order to comply with EU energy directives and energy efficiency standards, as in case of Hungary, Slovakia, Czech Republic, Poland and Romania (Marin and Chelcea, 2018). In addition, remodelling of flats, regeneration of panel buildings and public spaces are the most common interventions (Simacek et al., 2015). Although some LHEs

experienced negative effects (densification and gentrification, see Hess, Tammaru and van Ham, 2018), and several LHEs significantly downgraded, even moving to slums (Teodorescu, 2018), most of LHEs still remain vital parts of CEE and SEE cities' housing stock in post-socialist period and represent desirable living environment for different socio-economic groups.

In addition to the TTs differences between countries, we presume that they also vary between cities within the same country. This assumption is based on the contemporary research on urban development, as well as on the national and sub-national urban policies that recognise specificities of small and mid-size cities compared to large ones, and suggest regeneration strategies (Cox and Longlands, 2016; ESPON 1.4.1, 2006).

Transformations of LHEs in Serbia were marked by the deep political and economic crisis and the 1990s civil war. This slowed down the overall development processes, including the housing and urban reforms. In such environment, additionally marked by unregulated planning conditions and a relaxed legal culture, LHEs have undergone significant and specific spatial transformations.

Previous research was mainly focused on urban and housing policies and their spatial, economic and social implications at the national level (Petrovic, 2001; Nedovic-Budic, 2012); on the capital city Belgrade (Hirt, 2009), or on the second-tier cities (Vasilevska et al., 2014; Vasilevska et al., 2015; Vranic et al., 2016). Although these studies have identified TTs in the LHEs at general level, the academic and empirical research on their presence, pace and intensity in different city size categories were neglected in Serbia's post-socialist discourse.

This research is an attempt to fill this gap by presenting, analysing and comparing TTs within LHEs in four selected cities - representatives of major city size categories, understood in this study as population size according to planning tradition in Serbia. Conducting such a study should be important for defining the character of LHEs post-socialist transformation at

local level, but also for understanding the broader spatial, economic and social reality in today's Serbia in order to develop effective LHEs regeneration strategies.

Besides the conceptualization of the post-socialist urban and housing policy and their influence on the transformation of LHEs in Serbia's cities, the paper is organized around two key research aims:

- Firstly, we investigate whether there is a relationship between the city size and the types, pace and intensity of physical and functional LHEs transformation. The investigation is conducted in selected cities which represent four city size categories: 1) Belgrade (capital city); 2) Nis (second-tier city) 3) Leskovac (third-tier city) and 4) Bor (fourth-tier city).
- Secondly, if the relationships exist, we investigate which physical and functional transformation type(s) are dominant in different city size categories, with the focus on their implications at the neighbourhood level.

The first part of the paper provides the theoretical and contextual framing for an understanding of LHEs transformation in the post-socialist period in Serbia. Following the methodology, the paper investigates TTs through the case studies of four selected cities and chosen LHE within them, and discusses the relationship between the city size and TTs of LHEs. We conclude by reflecting on relationship implications for the urban planning practice in post-socialist context.

2. Transformation of LHEs in post-socialist Serbia: Framing and setting the context

2.1. Framing the context

There are several conceptual approaches that provide a theoretical understanding of the LHEs transformation in the post-socialist period. The first group concerns political-

economic studies that reflect on spatial and social relationships within capitalism (Harvey, 1982; Smith, 1990). Since spatial development within them is considered as a product of social and political forces, that is, different forms of economic relations produce their own space adapted to specific needs (Lefebvre, 1974 [1991]), LHEs transformation can be seen as a spatial manifestation and product of specific political, economic, social and institutional changes in Serbia in the post-socialist period.

More obviously, the phenomenon of LHEs transformation can be interpreted within the post-socialist conceptual approaches that deal with the relation between the socialist legacies and neoliberalism in the transition period. It seems that the 'hybrid spatialities' (Golubchikov et al., 2014) is the most appropriate conceptual approach for understanding of the LHEs transformations. Namely, if the forms of their transformation are understood as a product of the transition process and transformation modes of the socialist spatial legacy, they can be seen as a hybrid product of the old/socialist, and new, transition/post-socialist process. Golubchikov (2014) believes that the socialist spatial legacy, which LHEs certainly are, lost their authenticity in the transition process and, following the logic of new mechanisms for development regulation, became the 'neoliberalization infrastructure' suitable for capitalist processes.

Within the concepts related to the relationships between social resilience and socio-spatial change in the built environment of the post-communist city in the context of everyday life (Boren and Gentile, 2007; Sykora and Bouzarovski, 2012), the LHEs transformation can be seen as an emergent mode of urban development of inherited built landscapes (Bouzarovski et al., 2011), or as an *exit strategy* - extreme case of *in situ* housing alterations with broader socio-spatial impact on everyday life (Mandic, 2001). These concepts also relate to the idea of collective action in changed political and economic conditions (Ostrom, 1990), where LHEs transformation can be explained as a product of collective actions between

homeowners, developers and public institutions' representatives in the wider context of an unregulated housing environment and a relaxed legal culture in the transition period (Mandic, 2010; Soaita, 2012).

2.2. Setting the context

Housing policy in the former Socialist Federal Republic of Yugoslavia was generally based on the East European housing model (Hegedus and Tosics, 1996), where the LHEs with socially-owned flats became a dominant type of housing provision, especially in capitals, administrative and industrial centres. Guided by the fundamental values of social equality and 'common interest', LHEs urban and architectural design was based on a mixture of a rigid socialist urban planning and the CIAM modernism movement, manifested through a recognizable urban pattern: spatial over-scaling, mono-functionality, urban and architectural uniformity, and large but poorly equipped common open spaces (Bodnar, 2001). However, liberal nature of Yugoslav self-management socialist system (Petrovic, 2001) resulted in a better urban and architectural design, and higher quality of living in LHEs in Yugoslav than in cities of other socialist countries (Hirt, 2012).

Although the housing system was used as an important mechanism to diminish social inequalities, it failed as a social policy because of its economic inefficiency. Spatial distribution of socially owned flats and LHEs in administrative centres, allocated to the members of the elite, led to a new type of social inequality - while the average Yugoslav share of socially owned flats was 22.0%, in political and industrial centres it was between 30 and 50% (1991 Census). However, constant housing shortage, caused by the inefficiency of the housing model, forced people to develop 'exit' housing strategies. This made self-built construction the dominant type of housing, particularly in the third and fourth-tier cities and

rural areas (1991 Census). Still, in the first year of transition, share of LHEs housing stock in the total was 31%.

The disintegration of the country and fall of socialism in the 1990s led to a new political and economic system, which affected urban and housing transformation in terms of socio-spatial changes, socio-economic changes, and policy reforms. In an attempt to create a new housing policy, Serbia abandoned a forty-year housing model and shifted to a market-oriented restructuring, based on a higher share of private ownership over the housing stock, a less prominent controlling and subsidizing role of the state in the housing sector, and the absence of market exchange restrictions (Clapham et al., 1996). However, deep political-economic crisis and civil war slowed down the housing and urban reforms. Central authorities rapidly withdrew from the housing sector in the early 1990s, transferring jurisdiction regarding urban and housing policy to the local authorities, with far-reaching consequences on the housing sector. As the real scope of local authorities' competences remained relatively weak due to the tight budgets and higher dependency on intergovernmental transfers (Sailer-Fliege, 1999), housing and urban policy actions attempted to remediate the problems rather than to intervene strategically.

Those circumstances affected the transformations of LHEs. As in other CEE and SEE countries, the most powerful transformation measure was privatization, with far-reaching consequences on LHEs further urban (re)development. Playing the role of 'shock absorber' (Struyk, 1996), it was realized in the low-price form in the early stage of transition - by 1995 almost 98% of the existing housing stock within LHEs in Serbia had been privatized. In addition, the expansion of homeowners' property rights (Mandic, 2010), the urgent need for renewal of aging housing stock, and the lack of regulation, increased role of private investors and free market property transaction, and generated a platform for the LHEs transformation (Vranic et al., 2016). In such circumstances, spatial legacy became a suitable 'infrastructure'

for market-driven activities, and LHEs in Serbia's cities faced a significant changes followed with diverse TTs. They were marked with uncontrolled, uncoordinated, fragmentary and often illegal actions, rather than clearly defined urban renewal strategy and projects.

Although the links between Serbia's cities and LHEs transformation have not been thoroughly explored, recent research indicates that, in addition to massive privatization of existing housing stock, the post-socialist environment and urban and housing policies have influenced the emergence of the following TTs: 1) new infill market-oriented residential development (Vasilevska et al., 2014); 2) new infill commercial development; 3) multi-story extensions, in the form of additional stories or lofts on top of existing host buildings, with new flats for market (Vranic, et al., 2016); 4) a quantitative and qualitative decrease of public open spaces (Vasilevska et al., 2014); 5) the origin and expansion of small scale retailing and services through the transformation and adaptation of ground floor spaces of existing housing stock, so called 'garage capitalism' (Vasilevska et al., 2015); and 6) small scale extensions on the host buildings based on the individual actions, in terms of construction of new balconies, transformation of common spaces into flats, expansion of existing flats on the last floors, flat roof upgrades, etc.

3. Methodology

Comparative case study strategy was applied, since the main goal of this exploratory study was to describe the character of physical and functional changes of LHEs in local context, and to reveal whether there are differences in LHE spatial transformations between cities of different size in Serbia. It involves the analysis and synthesis of the similarities, differences and patterns across two or more cases that share a common focus, as well as detailed and coordinated description of each case in order to establish the foundation for cross-case comparison (Goodrick, 2014). Based on this, our research was organised in two

phases. The first phase focuses on selection of cases - at the city and LHEs neighbourhood level, and the second on their analysis and comparison. The case study protocol has been designed to gather and present qualitative and quantitative data in uniform way, and included: a) overview of the case study project, and b) field procedures for collecting and use of different sources of information.

In order to be able to perform a detailed study of presence, pace and intensity of specific TTs in LHEs in the local context of various-sized Serbian cities, the typical socialist LHE neighborhood in central location of each city has been chosen as the analytical unit. Neighbourhood is understood as a comprehensive residential system - a spatial and social unit that people relate to, and in which face-to face social interaction occur (Talen, 2019). It serves as a basic element in development of urban structure, provides for basic human needs, and supports building local community ties (Kallus and Law-Yone, 2000). In socialist LHE development, neighborhood mostly refers to “micro-rayon” or “superblocks” (Hess and Tammaru, 2019) in larger cities, but also to the group of blocks which represent functional spatial-social unit in smaller cities (Vranic et al., 2016). The literature on LHE transformation recognizes neighborhood level as important for studying social and physical changes (Szafranska, 2014; Hess and Tammaru 2019; Vasilevska et al. 2014, 2015; Temelova et al., 2010), as well as for investigating inhabitants use and perception of urban environment, and their participation in urban renewal (Usca, 2010; Benko et al., 2018; Van Kempen et al., 2005).

Both qualitative and quantitative methods were used in this study. Literature review was conducted for setting the post-socialist context of urban development, for providing an overview of LHEs transformation in CEE and SEE countries, as well as in Serbia. Document analysis and literature review were also performed for exploration of TT's in Serbia. Data

collection included national and local statistic, official planning and legislative documents.

Quantitative methods were used for analysis of individual cases.

a) Selection of cases - Cities and LHEs neighbourhoods

The rationale for selecting the specific cases is linked to the key research questions. In our research, key features to guide the selection were *the size of the city* and *inherited socialist LHE neighborhood as an analytical unit*.

Based on territorial classification of settlements in Serbia, the size of the city in this study is understood according to the *population size*. Currently, there are 28 cities¹ in Serbia, while the capital city Belgrade has a special status. Hierarchical division of cities, as used in *Spatial plan of Republic of Serbia*, includes: a) cities over 1 million inhabitants; b) cities between 100,000 and 1 million inhabitants; c) cities between 50,000 and 100,000 inhabitants; and d) cities between 20,000 and 50,000 inhabitants.

In this initial research, the basic idea was to investigate the phenomena of TTs within LHEs in different city size categories in one region of Serbia, in order to contextually frame the results of the study. Our findings are supposed to provide an adequate platform for further research that will consider not only the relationship between different city size and LHEs within them, but also to contextualize this relationship within regional context.

But in Serbia, Belgrade is the only first-tier city and, at the same time capital city with a special status and a region by itself - the most developed one. So, in order to have the

¹ The *Law on Territorial Organization of the Republic of Serbia* (2007, 2016, 2018) recognizes the following territorial units: 1) municipalities, 2) cities, and 3) city of Belgrade, where the city is considered as "a territorial unit established by this law, which represents an economic, administrative, geographical and cultural centre of a wider area and has more than 100,000 inhabitants. Exceptionally, where there are particular economic, geographical or historical reasons, it may be established that a city and a territorial unit having a population of less than 100,000 are subject to all other criteria provided for by law" (Paragraph 17). Leskovac and Bor received status of the city based on this criterion.

opportunity to include all size categories in our research, we decided to include Belgrade in our study, and to follow the logic of *extreme cases* (Yin, 2009) in choosing the region to compare it with. It was based on the assumption that if phenomena (TTs of LHE) exists in extremes, it will exist in all in-between cases. In that sense, Belgrade was chosen as the city where all TTs were supposed to be the most developed and expressed. On the other side, the cities where we expected the least developed phenomena were chosen from the least economically developed Region of South and East Serbia (from here on, RSES). In this region Nis is the macro-regional centre and the only second-tier city. At the same time, it is the city where our previous research on TTs was conducted in depth, and as such formed the basis for comparison with other cities in region. The choice of representatives of third and fourth- tiered cities in RSES was based on the research on: a) *their size*, b) *development context* - with a focus on ex-industrial cities in post-socialist transformation, and c) *existence and location of LHEs in each city*. The third level cities (Smederevo, Leskovac, Vranje) and fourth level cities (Pozarevac, Pirot, Bor, Zajecar) in RSES were identified, and preliminary analysis (based on planning documents, field-work and Google-Earth time-maps) have revealed that almost all of them have physically transformed LHEs. However, taking all the criteria and limits into consideration, Nis, Leskovac and Bor were chosen as representatives of RSES second, third and fourth -tiered cities (Fig. 1).

- Please, insert Figure 1 here-

Figure 1. Selected cities - position within the national territory and population changes (1948-2011)

The choice of LHE neighbourhoods was also based on preliminary fieldwork and document analysis. We sampled four representative LHE neighbourhoods for detailed

analysis, based on previously defined criteria: a) neighbourhood should be typical representatives of the LHEs in the selected city, in terms of their size, functional organization, morphology and architectural characteristics, b) neighbourhood should be located in the central city zone, and c) neighbourhood should rely on primary street.

Different surface area of typical LHE neighbourhood between first and second-tiered cities (Belgrade and Nis: 14 -15 hectares) and third and four-tier cities (Leskovac and Bor: 3,7- 4,8 hectares), reflect differences in their size and administrative level. In addition, neighbourhoods in Belgrade and Nis were built from the mid-1970s to 1980 as a spatial and functional entities based on the application of the CIAM principle, unlike the neighbourhoods in Leskovac and Bor which were built gradually, from the mid-1950s to 1980, with combination of continuous building construction along the streets and freestanding buildings (Fig. 2 to Fig. 6). Still, they are all typical representatives of the LHEs within each selected city.

b) Methods for analysis and comparison of LHE neighbourhood cases

We conducted detailed mapping of post-socialist TTs within chosen LHE neighborhoods, based on fieldwork, and the use of Google-Earth time-maps and National Spatial Data Infrastructure (GEOSrbija). Each LHE neighborhood was analyzed in order to reveal TTs presence, diversity, pace, intensity, and to identify the dominant one. To evaluate the TTs, the study relies on the criteria and values designated for the purpose of this research, but based on our previously published research. Criteria for evaluation are shown in Table 1.

	Criteria/ Type of LHE transformation	Criteria value			
		none	low	medium	high
1.	Privatization of existing housing stock	/	0 - 40% of existing housing stock	40 -80% of existing housing stock	>80% of existing housing stock
2.	New infill housing development	/	< 5 % of neighbourhood surface area	5-10 % of neighbourhood surface area	>10% of neighbourhood surface area

3.	New infill commercial development	/	< 5 % of neighbourhood surface area	5-10 % of neighbourhood surface area	> 10% of neighbourhood surface area
4.	Multi-story extensions in the form of additional stories or lofts on top of the existing host buildings	/	< 30% of the total number of existing housing buildings	30 - 80% of the total number existing housing buildings	>80% of the total number existing housing buildings
5.	Quantitative and qualitative decrease of public open spaces	/	<20% occupation of public open spaces compared to 1991	20-50 % occupation of public open spaces compared to 1991	>50% occupation of public open spaces compared to 1991
6.	Origin and development of small scale retailing - 'garage capitalism'	/	<5 (number/ha)	5-10 (number/ha)	>10 (number/ha)
7.	Small scale extensions on the host buildings based on the individual actions	/	<5 (number/ha)	5-10 (number/ha)	>10 (number/ha)

Table 1. Criteria for evaluation of post-socialist LHEs transformation at the neighbourhood level

In order to draw conclusions on similarities and differences of specific and overall outcomes, comparison through “map table” (Fig. 6), as analogue to “word table” (Yin, 2009), was used for analysing the pattern of changes. It displays the data from the individual cases according to uniform framework, capturing the findings of four case studies in relation to set of different TTs. Analysis was then oriented to identify whether different groups of cases appear to share some similarity. But, since this is the preliminary research based on small number of cases, the cross-case synthesis relied on argumentative interpretation, not numeric tallies.

4. Relationships between the city size and TTs in a LHEs - Analysis, results and discussion

4.1. Analysis of TTs of selected LHE neighbourhoods within chosen cities

4.1.1. Belgrade: The Capital city

Belgrade is the capital and the largest city in Serbia, with a special administrative status and population of 1,659,440 inhabitants (24% of Serbia’s population) in the administrative area of the city, and 1,166,763 inhabitants in urban settlements (2011 Census)

(Fig. 1). It is also the most densely populated region in Serbia, with a density of 514 inh/km² (Djukanovic and Zivkovic, 2017). As the capital of former Yugoslavia, the city experienced rapid expansion in the second half of the 20th century. In order to provide homes to a large number of new inhabitants, the socialist government built the new Belgrade's housing area - New Belgrade - as the symbol of the new society. It was planned, designed and built for 250,000 inhabitants on the area of 4,160 ha. New Belgrade's urban structure is characterized by the functional segregation of space, numerous LHEs in the form of super blocks, and a strong hierarchy of hubs for communication (Zivkovic, 2014).

At the beginning of the post-socialist era, Belgrade faced an economic and population decline, as well as substantial social and structural changes. But in 2000s, similar to other CEE and SEE capitals, it attracted a large share of investments in banking, retail and office developments, and solidified its position of a financial and business centre in the Balkan region (Tsenkova, 2014). Today, Belgrade's economic power is reflected by a fact that its region accounts for 40% of Serbia's GDP, has 71% higher 'per capita' than the national average, and 3 times higher than RSES (Republic of Serbia Statistical Office, 2015).

LHEs transformation in post-socialist period is observed on the chosen neighbourhood *Blok 11c*, located in the central area of New Belgrade. Conducted analysis indicate that this modernist 'superblock', clearly divided into two functional areas - commercial and housing, underwent planned and unplanned transformation in post-socialist period, marked by various spatial changes. Neighbourhood data and TTs are shown in Fig. 2.

- Please, insert Figure 2 here-

Figure 2. Belgrade. *Blok 11c* neighbourhood within New Belgrade LHE

4.1.2. Nis: Second-tier city

With a population of 183,164 inhabitants in an urban settlement, and 260,237 inhabitants on the administrative territory (2011 Census), the city of Nis is the third largest Serbian city, macro-regional and RSES administrative and socio-economic centre (*Spatial Plan of Republic of Serbia 2010-2013-2020*). During socialism, Nis was an important industrial centre in the former Yugoslavia, with an economic development based on the labour-intensive electrical, tobacco, mechanical and textile industries. The 70% of current multi-storey housing stock in Nis was built between 1960 and 1980, when numerous LHEs appeared as a dominant type of housing. In 1991, the first year of transition, share of housing units within LHEs constituted 31.4%, which is close to the national average (Mandic, 2001).

Similar to other industrial centres in Serbia, in the years after 1990 Nis experienced the collapse of its economy, when leading industrial enterprises crashed down and numerous privatizations of state-owned enterprises failed. The dramatic downturn of urban economy also continued during the 2000s, followed by multi-fold decrease of the city budget, an unemployment rate of 39.4% and an average monthly income of 150 €, keeping Nis far below the national average (Gradska stambena agencija Nis - HACN, 2006). Affected by economic decline and decreased budget for housing development, the housing sector in Nis also experienced regressive changes. The most important were: the absence of public investment in housing development, the absence of investment in rental and social housing, and twofold decrease in housing production.

The analysis of LHEs transformation was conducted in *Krive Livade* neighbourhood, which is a representative of Boulevard Nemanjica LHE, the largest from the socialist past in Nis. Developed on the edge of the city in the mid-1970s as a typical socialist mono-functional housing area, the LHE and chosen neighbourhood have been integrated into the wider central

city zone in recent decades. This led to their transformation into a multifunctional area with land use diversification, even during the socialist period. In post-socialist period, observed neighbourhood underwent additional planned and unplanned transformations. Neighbourhood data and TTs are shown in Fig. 3.

-Please, insert Figure 3 here-

Figure 3. Nis. *Krive Livade* neighbourhood within Boulevard Nemanjica LHE

4.1.3. Leskovac: Third-tier city

The city of Leskovac is the administrative centre of Jablanica District and a regional centre (*Spatial Plan of Republic of Serbia 2010-2013-2020*), situated in the southern part of RSES (Fig. 1). It is the second largest urban settlement in the south of Serbia, with 60,288 inhabitants in the urban settlement Leskovac and 144,206 inhabitants in the administrative area of Leskovac, followed by a density of 59 inh/km² (2011 Census). The city was a significant industrial centre before the WWII and kept its role as one of the leading industrial centres in socialist Yugoslavia in labour-intensive textile and chemical industries. The intensive urban economic development during socialism, led to the population growth (Fig. 1). However, in the post-socialist period, Leskovac experienced a dramatic economic downturn, and underwent changes marked by the collapse of major economic entities. This resulted in reduction of economic activity and employment, as well as in a population decline at city and district level. Today, Leskovac belongs to the extremely underdeveloped local self-government unit (group IV, with development level below 60% of the national average), as well as to the category of devastated areas (Republic of Serbia Statistical Office, 2015).

Chosen neighbourhood *Block 6 and 7* is a part of the City core -Subunit 1a LHE (*Master Plan of Leskovac 2010-2020*), located between the main city streets. Its integration into the central city zone led to transformation into a multifunctional area with land use diversification even during the socialist period. In the post-socialist period observed neighbourhood underwent additional spatial changes. Its data and TTs are shown in Fig. 4.

-Please, insert Figure 4 here-

Figure 4. Leskovac. *Blocks 6 and 7* neighbourhood within Subunit 1a LHE

4.1.4. Bor: Fourth-tier city

The city of Bor is the administrative centre of the Bor District (Fig. 1) and one of RSES regional centres (*Spatial Plan of Republic of Serbia 2010-2013-2020*). According to the 2011 Census, the city's administrative territory has a population of 48,615 inhabitants, while 34,160 inhabitants lived in the urban settlement. During the socialist period, Bor was one of the largest European copper mines. This has led to its intensive spatial development and economic growth, as well as to the increase of its population size (most rapid urbanization in the whole former Yugoslavia). In response to the increased housing demand, numerous LHEs were built as dominant housing type. The consequence of this was high density of 720 inh/km² and high share of LHEs in total housing stock. In 1991, the first year of transition, the share of socially owned flats in Bor was close to 40%, which is more than the national average (Mandic, 2001). Today, multi-family housing occupies about 35% of the total housing area (*Master Plan of Bor 2015*).

In the transition processes, city failed to reposition itself, and experienced the collapse of its economy. The leading industrial enterprise '*Rudarsko-topioničarski basen Bor - RTB*

Bor ('*Copper Mining and Smelting Complex Bor*') crashed down after a large number of failed privatization attempts in previous decades. Consequently, the urban economy underwent a dramatic downturn, reaching a multi-fold decrease of the city budget. Additionally, environmental pollution, caused by spatial proximity and production technology of '*RTB Bor*', became a long-term problem. Namely, although mining and metallurgy were the generic force of socio-economic development, they were at the same time the main source of environmental pollution and degradation of the wider area. The housing sector in Bor experienced regressive changes, where inherited LHEs were exposed to degradation and deterioration.

The analysis of LHEs transformation were conducted in a neighbourhood within a LHE called Spatial unit III (*Master Plan of Bor 2015*), which represents the inherited multifamily housing zone with central activities. In the post-socialist period, observed neighbourhood faced transformation in a smaller extent. Neighbourhood data and TTs are shown in Fig. 5.

- Please, insert Figure 5 here-

Figure 5. Bor. Chosen neighbourhood within Spatial unit III LHE

4.2. Results and discussion

As the analysis shows, transformation of LHEs is a common post-socialist urban change of all selected cities. It is a spatial-functional manifestation and product of specific political, economic, social and institutional changes in Serbia in the post-socialist period and specific local imperatives. All identified and observed TTs have emerged and have been

shaped by the new post-socialist urban reality that chosen cities and LHE neighbourhoods have experienced in different ways. In general, they are in relation to the population size of the city, which is, as the analysis points out, correlated with cities economic power and role in the national urban system, as well as with the size of the typical LHE neighbourhood.

Besides the fact that *some TTs are common* to all categories of chosen cities, analysis and comparative overview of LHE neighborhoods reveal that *differences in presence, pace and intensity of specific TTs in cities of different sizes exists.*

In all chosen cities, privatization of the existing housing stock in LHEs appeared in first years of transition regardless of city size (Fig. 6 and Fig. 7) but, unlike some other post-socialist countries (Kempen, 2005), privatization did not bring improvement of the existing building stock in observed cities, regardless of their population size. Renovation of buildings, replacement of windows or improvement of energy efficiency did not occur in observed neighbourhoods, as in case in CEE and SEE countries that implemented integrated regeneration strategies in order to improve LHEs physical, social and environmental characteristics. Still, privatization created a platform for emergence and development of other TTs, especially building-based one: 1) *multi-story extensions in the form of additional stories or lofts on top of the existing host buildings*; 2) *small scale retailing - 'garage capitalism'*, and 3) *small scale extensions on the host buildings based on the individual actions*. The latter two are common to all analyzed cities, although their presence and intensity vary in relation to the city size (Fig. 6 and Fig. 7). These *small scale* building-based transformations can be explained as a product of: 1) awakened entrepreneurial energy of the urban population that found expression in the development of small-scale retailing; 2) growing need for retail and urban services within inherited mono-functional LHEs; or 3) individual 'exit strategies' in the wider context of economic decline, unregulated housing environment and a relaxed legal culture in the extended transition period.

Another common TT, which appears with the same intensity in all selected LHEs, is *quantitative and qualitative decrease of public open space* (Fig. 6 and Fig. 7). Its emergence and continuity can also be explained in different ways, as a: 1) systemic ambiguities and transfer of responsibilities related to their management and maintenance between local authorities and homeowners, which lead to degradation of public open space, and 2) occupation of public open spaces for the new infill development, which lead to decrease of public space and the reduction of living and ecological comfort in LHE. The first reason is common to all cities. The second primarily relates to the capital city and the second-tier city, i.e. to those where economic interests and funds for new development existed, as well as the higher amount of open space (due to typical LHE neighbourhood size).

The most economically-demanding TT, *new infill housing development*, is present at medium level in the two largest and most developed cities, Belgrade and Nis, while in Leskovac and Bor is not present at all (Fig. 6).

- Please, insert Figure 6 here-

Figure 6. Evaluation of presence and diversity of TTs within selected LHE neighbourhoods and cities

In relation to this, the *diversity* of TTs in LHE neighbourhood varies in relation to city size and *decrease with city size category* (Fig. 6 and Fig. 7). Highest level of diversity is present in the capital city (7/7), moderate in second and third-tier city (6/7), and only several TTs are present in the forth-tier city (5/7).

The intensity of specific TTs also varies in relation to the city size. Figure 7. shows that TTs which require higher investment, such as new infill housing and commercial development, are dominant and more intense in Belgrade, while less-economically demanding

TTs based on individual actions, such as 'garage capitalism', is a defining feature and a dominant form of transformation in Bor.

-Please, insert Figure 7 here-

Figure 7. Intensity of observed neighbourhoods TTs in relation to city size

Our research also reveals that different TTs can be dominant in different local development contexts, but, there is no rule that one type is always dominant. There are cities/LHEs in which all TTs are present but none can be characterised as dominant.

The pace of TTs are shown in Figure 8.

-Please, insert Figure 8 here-

Figure 8. Pace of observed neighbourhoods TTs in relation to city size

5. Conclusion

With regard to the first research aim - *to investigate whether there is a relationship between the city size and the types, pace and intensity of physical and functional transformation of LHEs*, conducted research indicate that this relationship exists in the following: 1) *the presence and diversity of types of LHEs transformation are decreasing along with the decreasing city size category* - they are most present and diversified in the capital city, where all TTs are identified, less in the second and third-tier cities (Nis and Leskovac), while the least in the fourth-tier city (Bor); 2) *the pace and intensity of TTs also vary depending on the city size*. The most dynamic pace of changes is in the capital city

Belgrade, and they are still going on. Nis has undergone intense changes in the first decade of the 21st century, which are still running with reduced dynamics, while the changes in Leskovac and Bor reached their peak and their re-intensification is not expected. Besides this, the area size of the typical LHE neighbourhood, which is in relation to city size and administrative position, also seems to influence the appearance of specific TTs - in first and second-tier cities neighbourhood areas are larger and with greater amount of open space, and thus had a capacity for infill-kind of TTs.

With regard to the second research aim - *to investigate which physical and functional type(s) of transformation are dominant in different city size categories, with the focus on their implications at the neighbourhood level* - we can conclude that there is a connection between the city size and the dominant type(s) of LHEs transformation. The investigation indicates that, despite the same initial institutional and spatial conditions at the beginning of the transition period, there is an interrelation between a certain city size and intensity and dominance of specific TTs, excluding quantitative and qualitative decrease of public open spaces which is common to all cities. Conducted research points to the mutual interdependence among the city size and its economic power - all three cities, besides Belgrade, experienced population stagnation or a decline in the post-socialist period, followed by a dramatic economic downturn. In general, in Belgrade all TTs were recognized, but dominate are those that require a higher investment and involvement of a large number of actors - *new infill housing development* and *commercial development*. In second-tier city Nis, almost all TTs were also recognized, but mass multi-story extensions of existing buildings dominated. Multi-story extensions were based on individual actions of small investors and realized in the process of direct negotiations with the homeowners, started from the end of 1990-s. They were result of the reduced economic power of investors, withdrawal of the state from the housing sector and a housing shortage. In the third and fourth-tier city (Leskovac and

Bor) the TTs that demand larger investments are manifested sporadically or are not present at all. Dominant TTs in these cities are building-based small individual actions.

These initial research findings allow some generalization, but some questions remain open for further research. Generalization of findings refers to the nature of LHEs transformation and support the concept of “*hybrid spatialities*” (Golubchikov et al , 2014) as framework for understanding their post-socialist change. Namely, the specific development path of Serbia created a complex urban world in which spatial legacy from the socialist past became a suitable “*infrastructure*” for neoliberalization processes, where the patterns of divergence of LHEs transformation became more explicit, producing spatial and temporal differentiation of TTs among different city sizes. In line with this, TTs can be seen as *emergent modes of urban development* that significantly transform inherited built landscape, but also as an “*exit strategy*” (Mandic, 2001) with broader socio-spatial impact on everyday life.

Unlike other CEE and SEE countries, Serbia had gone through specific transition period where deep political and economic crisis have slowed down reform processes, including those related to the LHE development. Serbia is still in an "extended" phase of transition, during which the institutional and planning attitude towards LHE has not changed much since the 1990s - the state and local authorities have been "silent witnesses" while other actors, primarily private investors, have assumed the primary role.

Shaped by these circumstances, our research indicates the existence of two post-socialist LHEs development modes in chosen cities, which are similar those recognised in our introductory literature review on LHEs transformation in CEE and SEE countries: 1) *neglect and decay of buildings and/or public open spaces*, and, more present, 2) *uncontrolled and uncoordinated development and renovation*. But, although these LHEs development modes gave rise to development of some regressive TTs within chosen LHEs (degradation of buildings or decrease of public open space), *none of them is present in their extreme*

(ghettoisation or total degradation) like in some CEE and SEE countries (LHE Ferentary in Bucharest, for instance). On the other side, the third LHEs development mode - *fully renovated housing stock*, typical for more developed CEE and SEE countries, has not been identified in analysed cities and LHEs. This can be explained by the fact that although “*extreme*” CEEs and SEEs post-socialist LHE development strategy - *wholesale demolition of existing housing stock* does not exist in Serbia, *integrated regeneration* strategy, aimed to improve LHEs physical, social and environmental conditions, does not exist either. Intensity of transformation mostly follows “*doing nothing*” national and local governance response to development, supported by “*do-it-yourself*” approach, and depends on: 1) market, with minimal state and local authority involvement; 2) spatial capacities of LHEs; and 3) interests of individual stakeholders - investors and residents.

However, if the future of LHEs is considered as one of the key challenges in the urban development of a post-socialist city, it is important for planning practice to develop tools and mechanisms that would support the diversity and specificity of their changes. If trends of Serbia's urban changes continue, two sets of problems within LHEs are possible. The main problem in larger cities relates to the occupation and privatization of public open spaces for new infill development, where the challenge will be to protect them in order to sustain quality of life. In smaller cities, the main problem may be further degradation of existing built environment, where the challenge will be to find appropriate regeneration strategies and maintenance models.

Our findings also indicate that in both most and least economically developed regions of Serbia all TTs exist, and it is to be expected that similar conclusions may apply to other cities in RSES. However, we cannot claim with certainty that this relates to all Serbia's cities from the same city size category. In this direction, findings of our initial research serve the

purpose of creating a platform for further investigation on patterns and types of LHE transformations that will provide broader insights into this underrepresented issue.

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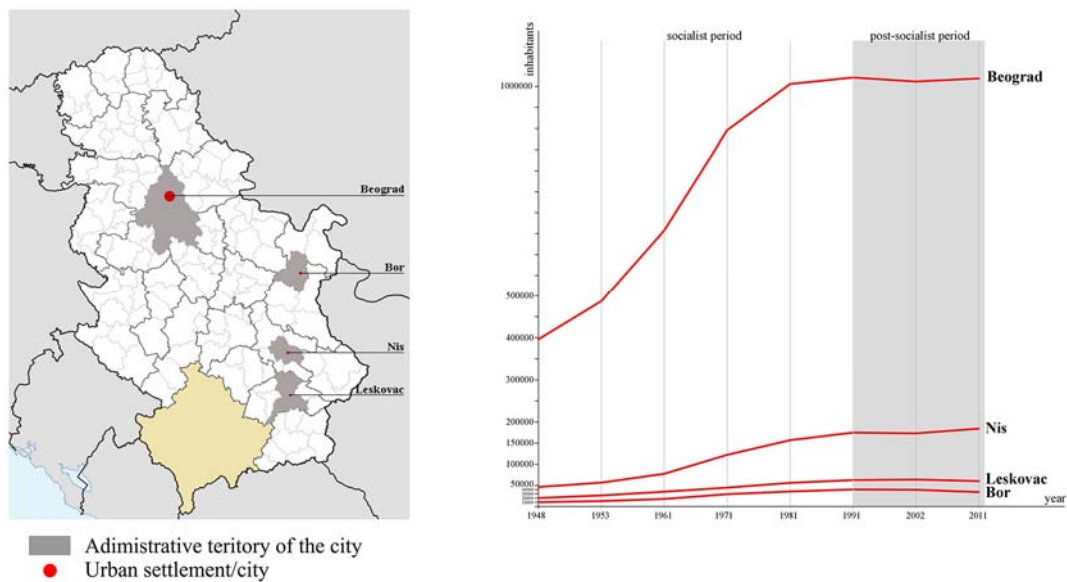
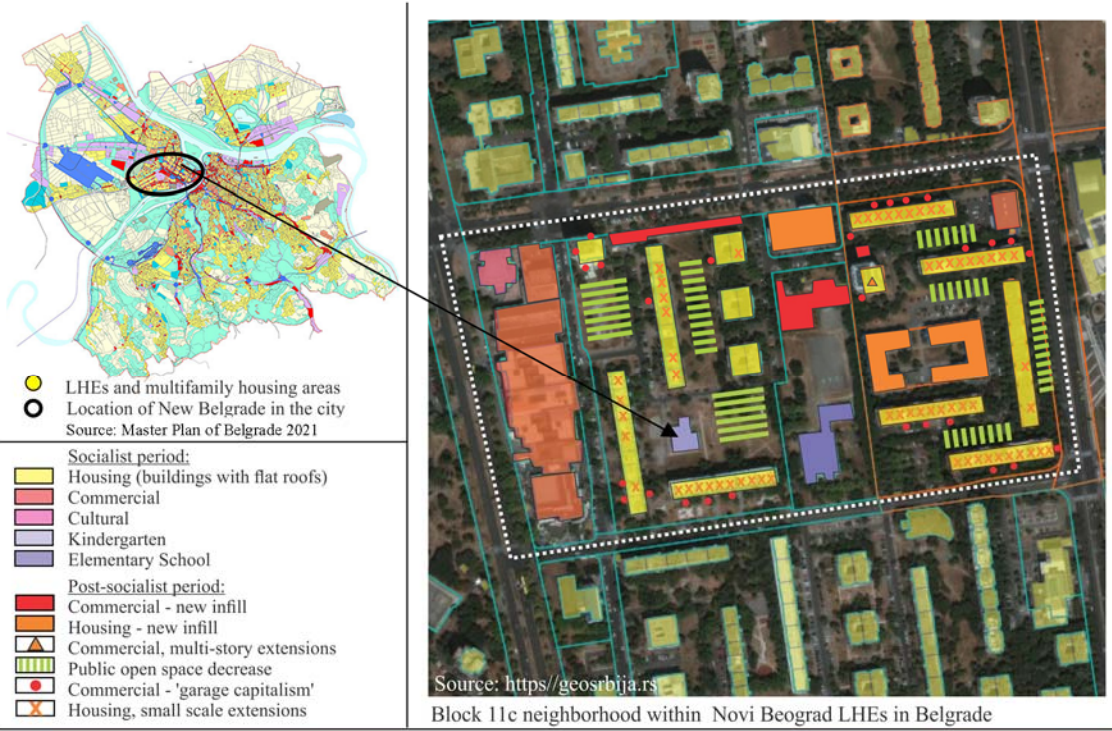


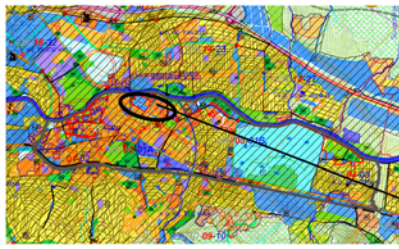
Figure 1. Selected cities - position within the national territory and population changes (1948-2011)



Post-socialist transformations (order reflects level of presence of TTs): A) New infill housing development; B) New infill commercial development; C) Small scale extensions on the host buildings based on individual actions; D) Quantitative and qualitative decrease of public open spaces; E) 'Garage capitalism'; F) Multi-story commercial extensions in the form of a loft on top of the existing building. Source of photos: Authors.

LHE neighborhood data	Changes during observation period
Surface area: 19 hectares (housing area 14,5 hectares)	Fewer individual, building-based extensions - one "garage capitalism" and three flat extensions on the top of existing host buildings
Population: 5800 (approximately)	(September 2018 - May 2019)
Population density: 400 inh/ha	
Origin number of floors of residential buildings: GF+4 to GF+18	
Building coverage ratio of housing area in 1990: 15,9%	
Building coverage ratio of housing area in 2019: 21,6%	
Source: Master Plan of Belgrade 2021; GEOSrbija	

Figure 2. Belgrade. *Block 11c* neighbourhood within New Belgrade LHE



- LHEs and multifamily housing areas
- Location of Boulevard Nemanjica LHE in the city

Source: Master Plan of Niš 2015-2025

- Socialist period:**
- Housing (buildings with flat roofs)
 - Housing (buildings with pitched roofs)
 - Commercial
 - Kindergarten
 - Park/Riverfront
- Post-socialist period:**
- Housing - new infill
 - ▲ Housing - multi-story extensions
 - Public open space decrease
 - Commercial - 'garage capitalism'
 - Housing, small scale extensions



Source: <https://geosrbija.rs>
Krive Livade neighborhood within Boulevard Nemanjica LHE in Niš



Post-socialist transformations (order reflects level of presence of TTs): A) Multi-story extensions in the form of additional stories of lofts on top of the existing host buildings; B) New infill housing development; C) 'Garage capitalism'; D) Quantitative and qualitative decrease of public open spaces; E) Small scale extensions on the host buildings based on individual actions; F) New infill residential development and quantitative and qualitative decrease of public open spaces. Source of photos: Authors.

LHE neighborhood data

Surface area: 17 hectares (housing area 15 hectares)
 Population: 6000 (approximately)
 Population density: 400 inh/ha
 Origin number of floors of residential buildings: GF+4 to GF+10
 Building coverage ratio of housing area in 1990: 12,3%
 Building coverage ratio of housing area in 2019: 17,0%

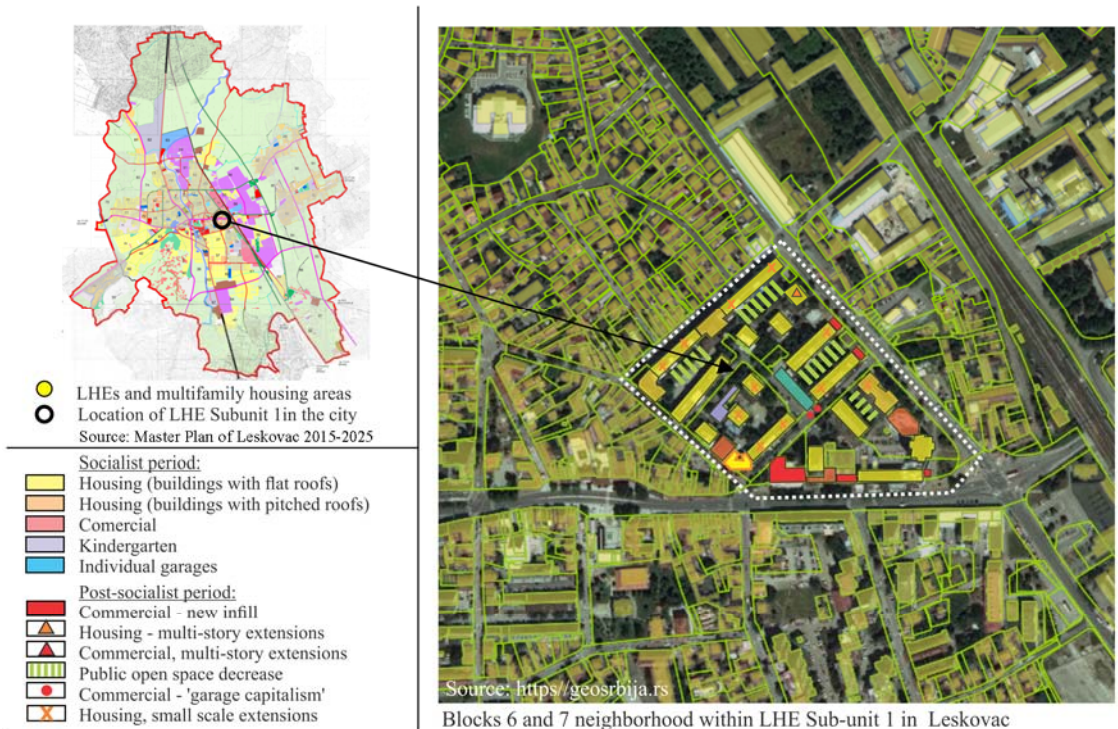
Source: First Amendments to the Master Plan of the Mediana City Municipality 2015; GEOSrbija

Changes during observation period

One building-based transformation in the form of "garage capitalism"
 Reducing the quality and quantity of public open spaces, especially around new infill housing development

(September 2018 - May 2019)

Figure 3. Nis. *Krive Livade* neighbourhood within Boulevard Nemanjica LHE



Post-socialist transformations (order reflects level of presence of TTs): A) New infill commercial development; B) and C) Small scale extensions based on the host buildings based on individual actions; D) Quantitative and qualitative decrease of public open spaces; E) 'Garage capitalism'; F) Multi-story extension in the form of additional stories of lofts on top of only one existing host building. Source of photos: Authors.

LHE neighborhood data

Surface area: 4,8 hectares
 Population: 1700 (approximately)
 Population density: 350 inh/ha
 Origin number of floors of residential buildings: GF+4 to GF+15
 Average housing density: 88 flats/ha
 Building coverage ratio in 1990: 30,9%
 Building coverage ratio in 2019: 32,00%

Source: Master Plan of Leskovac 2010-2020, GEOSrbija

Changes during observation period

Reducing the quality and quantity of public open spaces, especially in inner courtyards located in eastern part of the neighborhood

(September 2018 - May 2019)

Figure 4. Leskovac. *Blocks 6 and 7* neighbourhood within Subunit 1a LHE



Figure 5. Bor. Chosen neighbourhood within Spatial unit III LHE

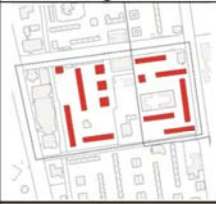


















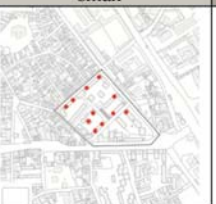

Criteria/ Types of transformation	Population category of the city			
	Capital city Belgrade	Second-tier city Nis	Third-tier city Leskovac	Fourth-tier city Bor
	LHE neighborhood	LHE neighborhood	LHE neighborhood	LHE neighborhood
1. Privatization of existing housing stock	 high	 high	 high	 high
2. New infill housing development	 medium	 medium	 none	 none
3. New infill commercial development	 small	 none	 small	 small
4. Multi-story extensions in the form of additional stories or lofts on top of the existing host buildings	 small	 high	 small	 none
5. Quantitative and qualitative decrease of public open spaces	 medium	 medium	 medium	 medium
6. Origin and development of small scale retailing - 'garage capitalism'	 small	 small	 small	 medium
7. Small scale extensions on the host buildings based on the individual actions	 medium	 small	 small	 small

Figure 6. Evaluation of presence and diversity of TTs within selected LHE neighbourhoods and cities

City	Type of LHEs post-socialist transformation						
	Privatization of existing housing stock	New infill housing development	New infill commercial development	Multi-story extensions on top of the existing host buildings	Quantitative and qualitative decrease of public open spaces	Small scale retailing - 'garage capitalism'	Small scale extensions on the host buildings
Belgrade	High	Medium	Medium	Medium	Medium	Medium	Medium
Nis	Medium	Medium	Medium	High	Medium	Medium	Medium
Leskovac	High	Medium	Medium	Medium	Medium	Medium	Medium
Bor	High	Medium	Medium	Medium	Medium	Medium	Medium
Intensity - Legend:		High	Medium	Low			

Figure 7. Intensity of observed neighbourhoods TTs in relation to city size

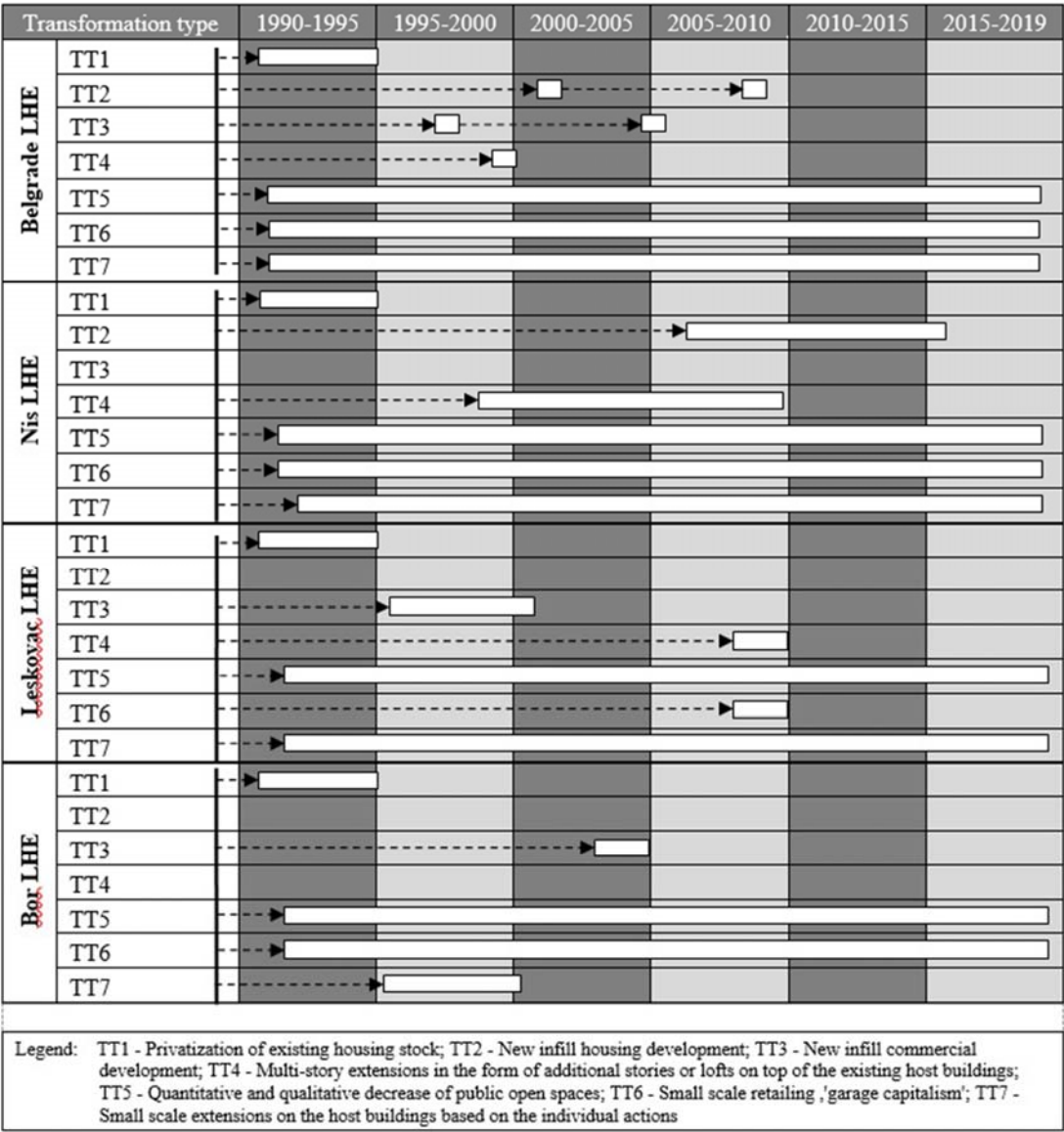


Figure 8. Pace of observed neighbourhoods TTs in relation to city size

	Criteria/Type of LHE transformation	Criteria value			
		none	low	medium	high
1.	Privatization of existing housing stock	/	0 - 40% of existing housing stock	40 -80% of existing housing stock	>80% of existing housing stock
2.	New infill housing development	/	< 5 % of neighborhood surface area	5-10 % of neighborhood surface area	>10% of neighborhood surface area
3.	New infill commercial development	/	< 5 % of neighborhood surface area	5-10 % of neighborhood surface area	> 10% of neighborhood surface area
4.	Multi-story extensions in the form of additional stories or lofts on top of the existing host buildings	/	< 30% of the total number of existing housing buildings	30 - 80% of the total number existing housing buildings	>80% of the total number existing housing buildings
5.	Quantitative and qualitative decrease of public open spaces	/	<20% occupation of public open spaces compared to 1991	20-50 % occupation of public open spaces compared to 1991	>50% occupation of public open spaces compared to 1991
6.	Origin and development of small scale retailing - 'garage capitalism'	/	<5 (number/ha)	5-10 (number/ha)	>10 (number/ha)
7.	Small scale extensions on the host buildings based on the individual actions	/	<5 (number/ha)	5-10 (number/ha)	>10 (number/ha)

Table 1. Criteria for evaluation of post-socialist LHEs transformation at the neighbourhood level.