

SUSTAINABILITY OF POST-SOCIALIST URBAN DESIGN TREATMENT OF PUBLIC OPEN SPACES IN MULTI-FAMILY HOUSING AREAS: CASE STUDY OF NIŠ, SERBIA

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Abstract. *This research focuses on the treatment of public open spaces (POS) in multi-family housing areas in post-socialist Central and Eastern European (CEE) countries. The aim is to evaluate their quality and sustainability and to identify all important impact factors influencing their properties. A case study was conducted on a representative sample of four multi-family housing sites in Niš, Serbia. Determining the interconnection between urban planning parameters and the realized quality of POS is one of the primary objectives that could lead to forming recommendations for future multi-family housing development, including more usable and sustainable POS in the current social and economic context. The models for improvement of POS quality and sustainability are defined as a research result.*

Key words: *sustainability, multi-family housing, public open spaces, urban planning, post-socialist*

1. INTRODUCTION

Many Central and Eastern European (CEE) countries undergone more or less difficult transition in recent decades, from communist to capitalist political system, and from centrally planned to market based economy. Changes in political and economic system largely conditioned social changes. Stratification of population and impoverishment are the results of these changes. In this, newly formed social and economic context, urban planning and architectural design framework inevitably changed.

Transition to democracy (systemic political change), markets (systemic economical change) and decentralized system of local governance were identified as a major drivers of

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urban change (Tsenkova, 2006), and government and markets are the two key determinants of social and spatial processes in this new environment (Nedovic-Budic, 2001).

While many other countries successfully finished transition process, some south-eastern European countries are still trying to make considerable progress in this complex process. Political instability and conflicts are the main reason why this region is behind other CEE countries.

It appears that in Serbia, these reforms have been driven by a number of post-socialist ideological and political dogmas (e.g., privatization, marketization, liberalization), rather than a society-wide, rational, consensus-building process. As a result, Serbian society has found itself in a severe social, economic, and political crisis, which has been further deepened by the global recession (Nedovic-Budic et al., 2012).

These processes had considerable spatial implications. Urban planning framework in Serbia became investor and market-driven, with disregard to any public interest. General financial crisis in the country reflected on the lack of big investments. Low financial potency of the investors caused the fragmentation of housing development. Multi-storey extensions (MSE) of existing multi-family buildings were dominant housing development model at the nineties (Kuzmanov 2009; Vranic et al., 2015) as they required small-scale investments. Further development of housing market in Serbia in the first decade of 21st century focused mainly on small private plots. Small multi-family housing buildings were built on sites where property and legal issues could be resolved, and agreement with plot owners could be reached. Large-scale investments in housing neighbourhoods were very rare.

Unlike previous socialist planned housing development system, this new market oriented system in Serbia completely disregarded public interest and housing quality. The profit of the investors was primary driving force in this process. That was possible because of severe political, social and financial crisis. Corruption and the absence of clear legislative, combined with urban planning documents that often were unclear and of poor quality were the factors that created this investor-oriented housing market environment. Impoverished, uneducated and non-selective user population, whose primary concern was to satisfy basic biophysiological needs, was another factor that facilitated the development of such low competition housing market.

Despite the fact that the quality of public open spaces (POS) is very important factor in overall housing environment quality (Vasilevska, 2012), they were often neglected in this new investor-driven urban housing development context. The aim of this research is to evaluate their quality and sustainability and to identify all important impact factors influencing their properties, as well as to form recommendations for overcoming identified problems and improving overall POS quality. POS environmental and social sustainability is of great importance because of the great influence on housing quality and urban planning sustainability in general.

2. METHODOLOGY

A case study was conducted on a representative sample of four multifamily housing sites in Nis, Serbia. Determining the interconnection between urban planning parameters and the realized quality of POS is one of the primary objectives of the analysis, as well as the evaluation of POS in terms of their social and environmental sustainability. The developed evaluation method is based on previous research of several authors (Vasilevska

et al., 2014; Mitkovic, Bogdanovic, 2004; Dinić, 2006). Mitkovic and Bogdanovic focus on the contents and activities at different urban levels, urban equipment, arrangement level and hygienic conditions. Vasilevska et al. developed complex evaluation method of the quality of POS in multi-family housing areas, analysing large set of parameters to determine the quality of POS from different time periods.

This research is primarily focused on the environmental and the parameters initiating social interaction between tenants, thus indicating potential for socially and environmentally sustainable POS design. Following indicators of POS quality are identified and analysed as relevant:

- Occupancy level (site coverage, the percentage of the plot covered by physical structure)
- Housing density (plot ratio, ratio between total gross area of the building and area of the plot, also implies higher number of apartments and users, greater housing density)
- Percentage of green area (ratio between greenery and total plot area)
- Parking solution (ratio between number of parking spaces in open parking lots and garages, lower ratio leaves more POS area for other purposes)
- The amount of urban equipment (the amount of urban equipment implies the amount of spaces for social interaction, including children's playgrounds)
- Social interaction and usage level (the data on social interaction level are gathered by field research, and include the number of users and the amount of time they spend in the open spaces).

First four parameters are usually defined by the GRP or DRP. The hypothesis is that all these parameters are mutually interconnected and influence one another and thus overall POS quality and sustainability. They were systemized in Table 1. that was used for analysis.

Table 1 Parameter evaluation table

Parameter	Value			GRP or DRP value
	Low	Medium	High	
Occupancy level (site coverage)				
Density (plot ratio)				
Percentage of green area				
Parking solution (open parking lot/garage ratio)				
The amount of urban equipment				
Social interaction and usage level				

3. CONDUCTED RESEARCH

Nis is the third largest city in Serbia, and is selected as a typical framework to represent these spatial processes. In socialist period it was one of the main industrial centres in Serbia, characterized by large increase of population. The result of this process was great need for new apartments and mass housing development in certain city areas. In post-socialist period, despite crisis the increase of population continued. Refugees and economical migrations from rural areas were the main reason for this process. The need for new apartments still exists, but the local and state authorities were not interested in

solving problems of providing dwelling for this population because of transition to market oriented economy and cutting of public expenses. This is where private investors saw the opportunity to enter unregulated market and maximize their profit. In this process POS were neglected and treated by the investors as unnecessary expense. Four multi-family housing areas were selected, as a representative sample for research of POS treatment (Fig. 1).

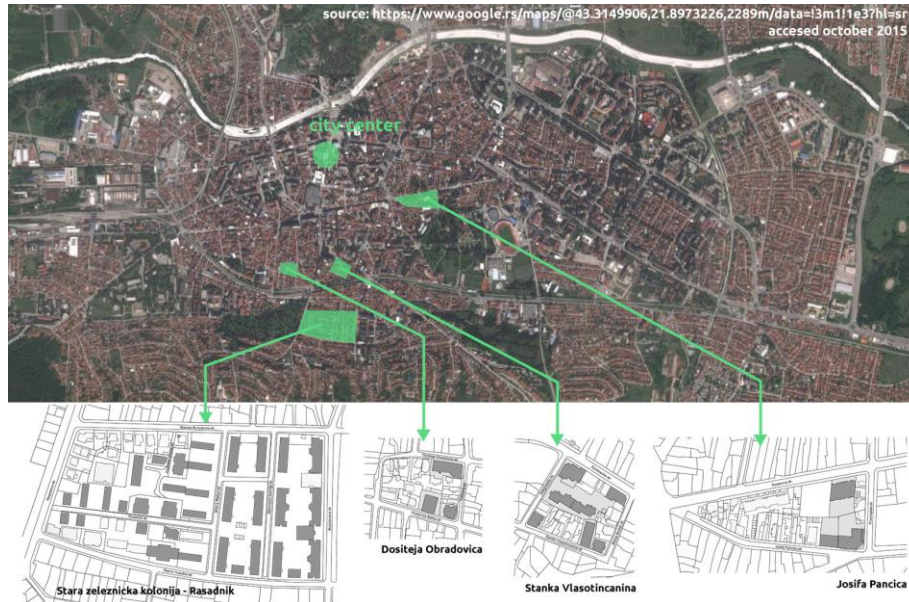


Fig. 1 Central city area of Nis with studied housing development sites (authors drawings)

3.1. Josifa Pancica Area

Urban city block between Dusanova and Josifa Pancica streets is located in central city area. The physical structure of the block was a mixture of architectural structures of different type and from different time periods. Dominant building type were low-storey family housing units from different time periods (pre-WWII to socialist period). Two larger multi-family buildings from socialist period were integrated into block physical structure. Both of these buildings undergone multi-storey extension process in the nineties, and their number of storeys was increased from four to six. Due to the position of this urban block within the central city area most of the ground floors were converted to commercial use. New housing development within this block was initiated according to Detailed Regulatory Plan of "Cair- Center" complex from 2006. DRP classified this block as a mixed used area with possible multi-family housing development. Three new high-storey multi-family housing buildings (9 storeys high) with about 20% of commercial space were constructed in last few years (Fig. 2).

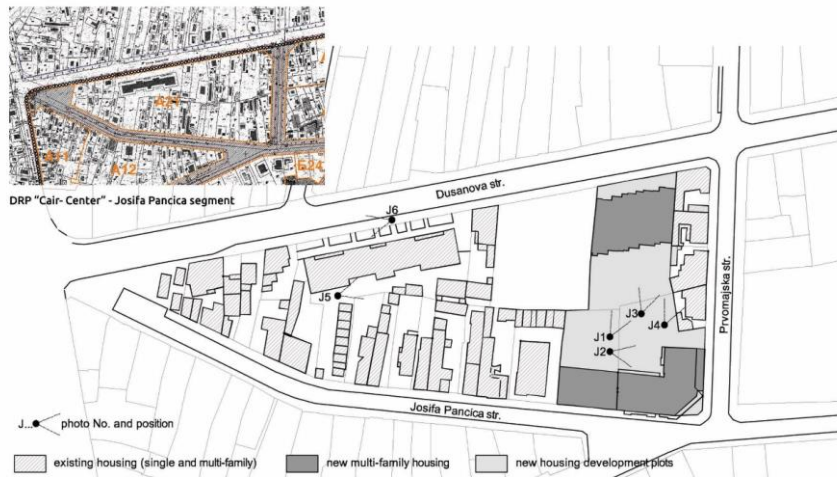


Fig. 2 Josifa Pancica area (authors drawings)

POS use in these complexes is rudimentary. They are used as a parking lots, without any urban equipment, developed green areas or places for social interaction between tenants (Fig. 3, J1-2). Only a small amount of greenery is present on these plots (Fig.3, J3-4).

Table 2 Dusanova-Josifa Pancica evaluation table

Parameter	Value			GRP or DRP value
	Low	Medium	High	
Occupancy level (site coverage)		√		80%
Density (plot ratio)			√	3.6
Percentage of green area	√			-
Parking solution (open parking lot/garage ratio)		√		min. 70/30%
The amount of urban equipment	√			-
Social interaction and usage level	√			-



Fig. 3 Josifa Pancica area – photo-documentation (photos by S. Kondic)

3.2. Dositeja Obradovica Area

Dositeja Obradovica block is within old single-family housing area. In recent years it is being transformed to multi-family housing development, in accordance with DRP „Obilicev venac“ of 2003. Three multi-family residential buildings were constructed so far on three plots (Fig. 4). In two cases POS are used only as open parking lots, without any green areas or spaces for socialization of tenants (building No. 1 and 2, Fig. 5, D3-4). Despite that fact parking space remains a great problem in this area. In case of building No. 2 parking space is small and insufficient (Fig. 5, D3). The original design of building No. 1 had almost 50% of parking places in garages on the ground floor, so it formally complied with DRP requirements. But in practice, most of these garages were transformed to illegal commercial spaces, so parking place problem remained unsolved (Fig. 5, D5). Unlike previous two cases, building No. 3 has an underground garage and few parking places on the plot. But in this case POS had been usurped by the investor and sold to the users of the ground floor apartment as private courtyard. Even some additional illegal physical structure – extension of the apartment, was constructed subsequently. Although in this case there is enough green area on the plot, it is not used as POS but as a private garden (fig. 5, D2).

These sites are characterized by high site coverage and density. DRP regulated number of storeys was four, but despite that five and even six storey buildings were constructed (Fig.5, D1). Public green area percentage is low, and urban equipment and places for social interaction are non-existing (Table 3).

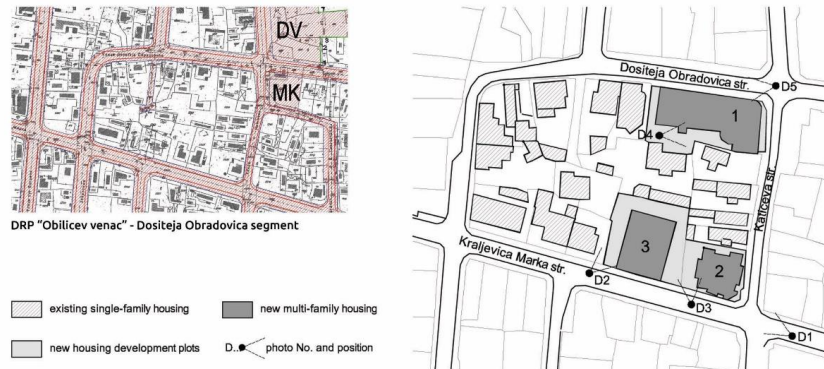


Fig. 4 Dositeja Obradovica area (authors drawings)

Table 3 Dositeja Obradovica evaluation table

Parameter	Value			GRP or DRP value
	Low	Medium	High	
Occupancy level (site coverage)			√	70%
Density (plot ratio)			√	2.4
Percentage of green area	√			-
Parking solution (open parking lot/garage ratio)		√		-
The amount of urban equipment	√			-
Social interaction and usage level	√			-



Fig. 5 Dositeja Obradovica area – photo-documentation (photos by S. Kondic)

3.3. Stanka Vlasotincanina Area

Stanka Vlasotincanina block is within mixed inherited housing area and new development is regulated by DRP “Stanko Vlasotincanin” of 2003 (Fig. 6). Four different housing development types can be identified within this area: existing single or multi-family housing, existing housing with MSE development, first period post-socialist housing development (nineties, buildings No. 1, 2 & 3), and second period post-socialist housing development (post 2000, buildings No. 4, 5 & 6).

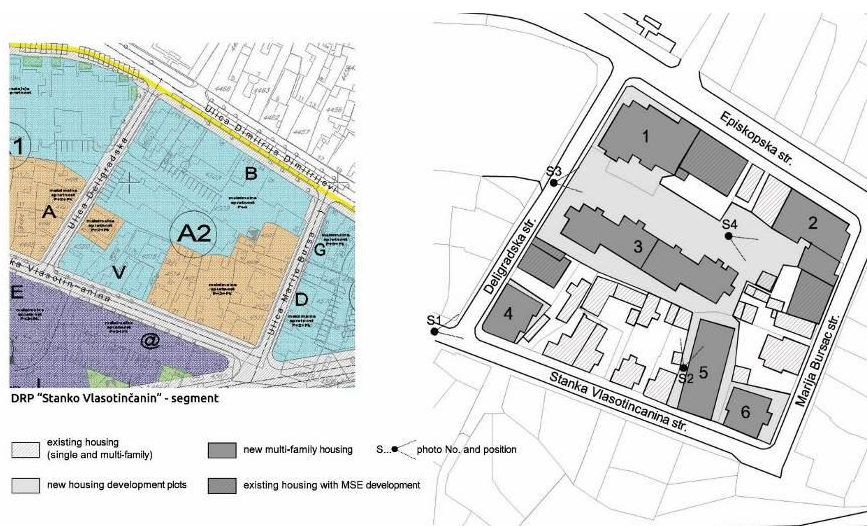


Fig. 6 Stanka Vlasotincanina area (authors drawings)

Table 4 Stanka Vlasotincanina evaluation table

Parameter	Value			GRP or DRP value
	Low	Medium	High	
Occupancy level (site coverage)			√	70%
Density (plot ratio)			√	3.0
Percentage of green area	√			-
Parking solution (open parking lot/garage ratio)	√			-
The amount of urban equipment	√			-
Social interaction and usage level	√			-

Existing socialist period housing was not the subject of the analysis. It is mostly single-family housing that is being replaced by higher density multi-family housing, in accordance of the increase of land value in the central city area.

First post-socialist period was characterized by the absence of strict legislative and regulations. Despite that fact development in this period provided certain amount of usable POS, used as open parking plots (Fig. 7, S3) or greenery with socialization areas (Fig. 7, S4). The reason for that could be found in closeness to socialist period planned development characterized by higher degree of public awareness.

**Fig. 7** Stanka Vlasotincanina area – photo-documentation (photos by S. Kondić)

Second period is the period of unregulated and investor profit-driven development. Even basic urban parameters were often exceeded. This is the case of building No. 4 (Fig. 7, S1), with site coverage of 83% (DPR defined max. 70%) and plot ratio of 4.0 (DRP defined max. 3.0). This development is characterized by the absence of any useable POS, and even any parking spaces. Open spaces are small and unarranged, without adequate green areas, urban equipment or social interaction sites (Fig. 7, S2).

This housing area is a great example of chaotic post-socialist urban development in Serbia without any regard for public interest.

3.4. Stara zeleznicka kolonija – Rasadnik Area

Stara zeleznicka kolonija – Rasadnik area is a specific city area where MSE of existing multi-family buildings was dominant type of housing development in post-socialist period. The existing socialist period physical structure was already developed to the extent that made demolition and construction of new buildings economically unjustified. That is why MSE was the most viable development model for this area. It would increase economical sustainability and housing density, without the increase of site occupancy level. This model was adopted and defined by DRP “Stara zeleznicka kolonija-Rasadnik” from 2007 (Fig. 8).



Fig. 8 Stara zeleznicka kolonija - Rasadnik area (authors drawings)

Table 5 Stara zeleznicka kolonija – Rasadnik evaluation table

Parameter	Value			GRP or DRP value
	Low	Medium	High	
Occupancy level (site coverage)	√			50%
Density (plot ratio)		√		3.2
Percentage of green area			√	-
Parking solution (open parking lot/garage ratio)	√			-
The amount of urban equipment		√		-
Social interaction and usage level		√		-

The existing structures are dominantly single and multi-family buildings, with a small amount of public and commercial facilities (kindergarten, health care centre...). Before the extensions most of the multi-family structures in this area were low-storey (two or three storey) buildings. Through the MSE process another two or three storey were added, so that current physical structure consists mainly of four and five storey buildings (Fig. 9, R1, R2). This model increased housing density without diminishing POS area, so that higher plot ratio was achieved with low occupancy level. This fact was very favourable for the POS quality. Only in this area within the scope of this research large percentage of arranged and unarranged green areas and children playgrounds were identified (Fig. 9, R3-R4). This had been achieved although DRP does not define minimal green area percentage.

**Fig. 9** Stara zel. kolonija - Rasadnik area – photo-documentation (photos by S. Kondic)

Larger POS and green area is followed by the presence of urban equipment and higher social interaction level than in other observed areas (Fig.10, R5-R6). Even some aspects of multi-family housing individualization were observed, like individual ground floor apartment entrances, independent from the main building entrance (Fig. 10, R7). This improves apartment and housing concept quality (Stoiljkovic, Jovanovic, 2010; Stoiljkovic, Petkovic, 2012).

Parking space, a great problem in the other analysed areas, does not represent a significant problem in Stara zeleznicka kolonija - Rasadnik. Most of the parking spaces are on the open parking lots, and there are a few garages in the central part of SZK area. Although there is a large POS area, considering the amount of increase of housing density greater problem with providing sufficient parking space was expected than observed. But even now there is not a clear differentiation of greenery and parking spaces, and some of the green areas are being destroyed by vehicles (Fig. 10, R8).

This is the only area with medium social interaction level observed. It clearly is stimulated by the existence of adequate social interaction spaces with urban equipment and green areas. Parking solution parameter was not of great influence in this area because there is no deficit of green areas, and maximum DPS defined plot ratio was not exploited.



Fig. 10 Stara zel. kolonija - Rasadnik area – photo-documentation (photos by S. Kondic)

4. RESULTS & DISCUSSION

Analysis results confirm the hypothesis that all of the considered parameters are interconnected. This is clearly visible through the evaluation tables. Higher occupancy level and density imply lower percentage of green area and the amount of urban equipment. Smaller available POS area is conditioned by higher site coverage. On the other hand, higher housing density requires more parking space. For economic reasons the tendency of the investors is always to maximize the use of open spaces for parking lots, leaving less space for greenery and places for social interaction. If the GRP or DRP does not define minimal percentage of green area and minimal percentage of garage parking spaces it can be expected that the POS will dominantly be used as open parking lots, without greenery and spaces for social interaction.

Economic interest of the investors was obviously primary driving force in housing development. In some cases even urban parameters are not in accordance with DRP defined values. These cases are identified in Stanka Vlasotincanina area. Larger number

of storeys and housing density than DRP permitted are identified both in Stanka Vlasotincanina and Dositeja Obradovica areas.

Also, there often is a problem of providing adequate number of parking spaces in almost all of the considered areas. Nominal garages and parking areas are often illegally converted to commercial spaces or private gardens. Even illegal subsequent construction of additional physical structure and the extension of original ground floor area, thus the reduction of available POS area, is sometimes present (Dositeja Obradovica area). This implies corruption or the lack of local authorities control over the construction process. On the other hand, Stara zeleznicka kolonija – Rasadnik area, as dominantly MSE model of housing development, does not have the problem of the increase of the site coverage. Thus total POS area from original socialist period development remained undiminished. This is the only studied area where children's playgrounds are present, and places for social contacts and greenery percentage are adequate. But even in this area the problem of providing adequate number of parking spaces is expected. Since the increase of housing density was not compensated by adequate increase of parking spaces capacity green areas are partially used as illegal parking space and therefore destroyed. The age structure of the population in this area is very specific. Most of the original structures are inhabited by older population that in most cases does not use cars. Increase of younger population in housing extensions initiated parking space problem, and it can be expected to intensify over time, following the change of tenant age structure.

Based on the analysis of evaluation tables following conclusions on parameters interconnection can be drawn:

- Occupancy level (site coverage) is always inverse parameter to the percentage of green area, the amount of urban equipment and social interaction and usage level. In all of the observed areas this connection was determined. Larger site coverage has very negative effect on POS quality.
- Plot ratio and housing density are also inverse to percentage of green area, amount of urban equipment and social interaction and usage level. This connection is not as rigid as in the case of site coverage. Larger density negative effects can be minimized by adequate urban planning and architectural design. It can be achieved by larger number of floors that could allow smaller site coverage. From the aspect of POS quality this is favourable model of achieving greater housing density, as the analysis of Stara zeleznicka kolonija – Rasadnik area proved.
- Percentage of green area is rarely defined in DRP-s. This parameter is very important from the aspect of sustainability, and larger required green area percentage would stimulate smaller site coverage level, and therefore higher degree of social interaction, based on the previous discussion.
- Parking solution (open parking lot/garage ratio) is not always a parameter of great importance, but in some cases it can be crucial for POS quality. High housing density requires large numbers of parking spaces on confined plot. If DRP requirement is to provide larger percentage of parking spaces in the garages more of the POS area is left to the greenery and social interaction sites.

These conclusions could provide guidelines for the recommendations how to improve POS quality and sustainability in post-socialist multi-family housing areas.

5. CONCLUSION

To determine overall sustainability of POS it is necessary to evaluate all of its aspects: environmental, social and economic. Although environmental and ecological aspect of sustainability are usually most exploited, social aspect is also very important because it determines use value and therefore durability of POS in multi-family housing, and also housing in general. On the other hand, housing development must be economically sustainable, so that the investors would not lose interest in further development. That is why all of the models for improving sustainability of POS must consider all of these sustainability aspects.

Public authorities in Serbia were not very interested in the investments and maintenance in POS, especially within new multi-family housing blocks, and as a private property they were left to the investors to arrange them. Due to the corruption and lack of control by local authorities POS are often left uncompleted and in poor condition by the investors.

Following models for improvement of POS quality and sustainability in post-socialist multi-family housing areas can be determined:

- Better control of the development process by local authorities and reduction of corruption level. This is not within the scope of this research nor architectural profession, and represents a much wider society problem. Beside other benefits, further progress in this area would have positive effect on housing development process.
- User's education to form a more competitive housing market. Uneducated and non-selective users easily adopt low quality housing. Increase of the awareness of the users through education would increase the need for competition in the housing market, and therefore overall quality of housing development.
- Correction of urban planning documentation (GRPs and DRPs). It is necessary to define certain urban parameters more precisely in urbanistic plans that condition construction and housing development. As opposed to recent years tendency of urban planning regulations in Nis to limit number of storeys and increase housing density by the increase of site coverage, from the aspect of POS quality and sustainability increase of buildings height and reduction of site coverage percentage is more viable solution. Increase of the minimal green area percentage is also very important parameter. Larger greenery percentage that would include all of the permanent green areas on the plot and on building open spaces (terraces, roofs...) would make a great contribution to housing quality and sustainability. Development of economic models of stimulation of the investors to use these principles (subsidies, exemption from payment of municipal expenses...) is of key importance in this process. Parking solution, defining ratio between number of parking spaces in open parking lots and garages is very important in large density housing areas. Lower ratio (larger percentage of parking spaces in the garages) leaves more POS area for greenery and socialization of tenants, improving overall housing quality and sustainability.
- Land Readjustment (LR). This is one of potentially best methods of resolving the problem of POS deficiencies. One of the primary problems of high quality and sustainable urban development of the city is the absence of efficient land management instruments. (Obradovic, 2012). Irregular plots form and undisputed private property rights prevent urban planners and architects from finding the most economical and efficient design. LR proved to be a viable solution for more efficient and economic

land management and urban development, increasing overall housing development quality and sustainability (Yilmaz, Demir, 2015). The general idea of LR is the exchange of the plots in the project area. All of the plots are added together to a so-called land readjustment-mass. Out of this total land readjustment mass all areas designated in the urban development plans for public spaces can be excluded and allocated to the municipality. The remaining mass is the so-called redistribution mass that has to be redistributed to the original landowners (Müller-Jökel, 2004). That way POS area is excluded from the original investors plot and they are conditioned to provide POS area. For this solution to be viable it is necessary to respect investor's economic interest, to condition them to finance POS arrangement, but at the same time to increase plot ratio parameter in order to compensate their plot area loss and provide much better and economic plot shape.

Implementation of these models could increase quality and sustainability of POS, as well as overall urban development quality. Further research should provide more detailed guidelines for their implementation and simulation of potential positive results.

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ODRŽIVOST POSTSOCIJALISTIČKOG URBANISTIČKOG TRETMAŃA SLOBODNIH PROSTORA U ZONAMA VIŠEPORODIČNOG STANOVANJA: STUDIJA SLUČAJA – NIŠ, SRBIJA

Ovo istraživanje je fokusirano na tretman slobodnih prostora (SP) u zonama višeporodičnog stanovanja u postsocijalističkim centralno i istočnoevropskim zemljama. Cilj istraživanja je da oceni njihov kvalitet i održivost, kao i da identifikuje sve bitne uticajne faktore značajne za njihova svojstva. Sprovedena je studija slučaja na reprezentativnom uzorku od četiri područja namenjenih višeporodičnom stanovanju u Nišu, u Srbiji. Jedan od osnovnih ciljeva istraživanja je utvrđivanje međuzavisnosti između urbanističkih parametara i realizovanog kvaliteta slobodnih prostora. Ovo bi moglo da vodi do formiranja preporuka za buduću višeporodičnu stambenu izgradnju, uključujući i upotrebljivije i održivije otvorene površine u savremenom socijalnom i ekonomskom kontekstu. Kao rezultat istraživanja definisani su i modeli za unapređenje kvaliteta i održivosti slobodnih prostora.

Ključne reči: održivost, višeporodično stanovanje, otvorene površine, urbanističko planiranje, postsocijalističko