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ARTICLE

# Neighborhood satisfaction in large housing estates of Central and East European cities: insights from Novi Sad, Serbia

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**Abstract**
There is an extensive body of literature exploring the changes that large housing estates (LHE) in Central and East European (CEE) cities have undergone since the beginning of the post-socialist transition. Although some studies discussed residents' satisfaction with the transformed neighborhood environment within these estates, analyzing differences at the national, CEE and pan-European levels, they have primarily focused on cities in fast-track reforming countries, leaving the non-EU context unexplored. In addition, more recent analyses are generally scarce, while little is known about how LHEs, particularly unrefurbished ones, compare to newer housing types of similar densities in these terms. The paper aims to contribute to filling these research gaps by investigating neighborhood satisfaction in two unrefurbished LHEs and one recently built residential district in Novi Sad, the second largest city in Serbia. The research data was collected from 162 structured 'traditional' (in-person) face-to-face interviews involving a Likert-type questionnaire supplemented with open-ended questions. It was processed in the SPSS 23.0 software package. ANOVA and Scheffe post-hoc tests were used to determine differences and Chronbach's Alpha to measure internal consistency. Through a series of descriptive comparative analyses, the paper examines the variations in evaluations of specific neighborhood features and the correlation between residents' satisfaction, their potential mobility and the housing market position of the studied areas. The research results indicate that the majority of LHE residents are satisfied with their neighborhood environment, live in the neighborhood of preference and do not feel 'trapped', while the situation in the newly built residential district is somewhat different, revealing the shortcomings of post-socialist urbanism. The concluding section discusses the research results against the backdrop of previous studies, questions the stability of neighborhood satisfaction in unrefurbished CEE LHEs, highlights the importance of regeneration, and proposes directions for future investigations.

**Keywords** Large housing estates · Neighborhood satisfaction · Neighborhood environment · Serbia · Novi Sad

Extended author information available on the last page of the article

## 1 Introduction

The physical quality of the housing stock holds great significance in the assessment of a neighborhood's condition; however, neighborhood is about more than just buildings. It is about the residents and what they truly feel about their dwelling environment. In spite of current trends of alienation and decreased place attachment, a neighborhood still matters to its residents and remains an integral facet of their everyday life (Filipovič Hrast & Dolničar, 2012), representing a spatial and social unit that they relate to (Talen, 2019). In the effort to 'make neighborhoods livable', Western researches began focusing long ago on understanding how residents' demands for neighborhood quality can be met (Lee & Guest, 1983). Neighborhood satisfaction, explained as the degree of "congruence between one's neighborhood aspirations and one's actual residential circumstances" (Campbell et al., quoted in Lee & Guest, 1983, p. 288), emerged as a valuable tool. It is a complex multidimensional concept, commonly employed in empirical studies to assess neighborhood livability and determine how residents evaluate their dwelling environment (Al-Ali et al., 2020; Boschman, 2018; Ciorici & Dantzler, 2019; Grogan-Kaylor et al., 2006; Hipp, 2009; Lee et al., 2017; McCulloch, 2012; Mouratidis, 2018, 2020; Mouratidis & Yiannakou, 2022; Parkes et al., 2002; Permentier et al., 2011), serving as an important predictor of residential satisfaction (Abass & Tucker, 2018; Buys & Miller, 2012; Canakcioglu, 2022; Terzano, 2014). It was also found to affect one's happiness, wellbeing and life satisfaction (Gür et al., 2020; Ma et al., 2018; Mouratidis & Yiannakou, 2022; Mouratidis, 2021a; Oshio & Urakawa, 2012). Understanding the factors that influence neighborhood satisfaction may assist in the making of successful housing policy (Lu, 1999), while identifying the sources of residents' discontent can provide decision-makers with important information on which neighborhood improvements are needed (Parkes et al., 2002).

Residents' satisfaction with their neighborhood in Central and East European (CEE) cities has garnered some academic attention after the fall of the Berlin Wall. Investigations have centered on large housing estates (LHE), the spatial legacies of socialism defined as residential districts with recognizable spatial boundaries, unified planning expression, repetitive high-rise prefab buildings,[1] and vast open public and green spaces, which were planned and financed by the state (Murie et al., 2003; Zarecor, 2018). Formerly considered the 'dwelling ideal' (Herfert et al., 2013), they have been undergoing multifaceted transformations since the advent of the transition. However, in contrast to a large body of literature discussing the post-socialist development of these estates, particularly in reference to the trajectory of their West European counterparts that had experienced a severe physical and social decline, there are relatively few studies assessing residents' satisfaction with the transformed neighborhood environment. Initial investigations emerged from the EU-funded RESTATE[2] project dating back to 2002–2005 and focusing on estates in Hungary, Poland and Slovenia (Černič Mali & Sendi, 2005; Dekker & van Kempen, 2009; Dekker et al., 2011; Musterd & van Kempen, 2005, 2007; Tosics et al., 2005; Węcławowicz et al., 2005), followed by independent intra- or inter-urban comparisons that have expanded the research to Romania, Lithuania and Czech Republic (Brade et al., 2009; Herfert et al., 2013; Kovács & Herfert, 2012; Temelová et al., 2011) or investigated solely the perception of elderly residents

[1] "High enough that an elevator is required" (Wassenberg, 2018: 38).

[2] *Restructuring Large Housing Estates in European Cities: Good Practices and New Visions for Sustainable Neighbourhoods and Cities*, funded under Key Action 4 "City of Tomorrow and Cultural Heritage".

(Gorczyca & Grabiński, 2018 in Polish cities; Temelová & Slezáková, 2014 in Prague). These studies mainly originate from cities in fast-track reforming countries, whereas neighborhood satisfaction in LHEs located in non-EU countries that have taken a different transitional path remains largely unexplored. Moreover, these studies primarily refer to the period of the 2000s and early 2010s, while present-day analyses remain scarce. In addition, little is known how post-socialist housing developments have influenced the expectations of LHEs' residents concerning their dwelling environment (Sendi & Kerbler, 2021), as well as how LHEs compare to newer multifamily housing types with similar population densities in terms of neighborhood satisfaction. The study aims to contribute to filling these research voids. The significance of such examinations stems from the fact that LHEs still constitute a considerable share of the housing stock in CEE cities (Gorczyca et al., 2020), representing a key segment of urban housing provision in the region, which will continue to play an important role in local housing markets as one of the chief housing typologies (Sendi & Kerbler, 2021). Another equally important aspect of such comparative studies is that neighborhood satisfaction can disclose the strenghts and limitations of different planning approaches, offering valuable insights that the planning practice may draw on and build upon (Mouratidis & Yiannakou, 2022).

The paper comparatively analyzes neighborhood satisfaction in two unrefurbished LHEs that have not yet experienced middle class out-migration and one post-socialist housing district, as representatives of the two main multifamily housing types in Novi Sad, the second largest city in Serbia. Since subjective assessment of neighborhood characteristics has been found to be a much more relevant determinant of neighborhood satisfaction than their objective assessment (Grogan-Kaylor et al., 2006; Lee et al., 2017; Lu, 1999; Permentier et al., 2011), the focus is put on residents' evaluation. The districts selected for the empirical study were built in the course of two dinstict periods, characterized by contrasting political and socio-economic systems with fundamentally different approaches to urban planning, land allocation, and housing construction, thus the level of residents' satisfaction with certain neighborhood features is expected to vary between the housing types. Variations are also anticipated between the two LHEs due to differences in the local context (Dekker et al., 2011; Musterd & van Kempen, 2007), as well as in the scale of post-socialist changes in their built environment. The paper addresses the following main research questions: (1) How do the residents evaluate specific features of their neighborhoods in the LHEs surveyed? (2) Are they generally satisfied with their neighborhood environment, would they consider moving out, and how stable is their satisfaction? (3) How do the LHEs surveyed compare to a new housing district with a similar population density vis-à-vis residents' satisfaction with specific neighborhood features and their overall satisfaction with the neighborhood environment?

The paper first explores the socialist and post-socialist development of LHEs in CEE cities, identifying commonalities, provides an insight into previous studies on residential satisfaction of their inhabitants, and places LHEs within the Serbian transitional context. After introducing the case study areas, objectively assessing their main characteristics, and explaining the survey methodology and data collection process, the empirical section analyzes the research results and elucidates the differences among the studied neighborhoods. The final section discusses the research findings against the backdrop of previous studies, revisits the main research questions, highlights the importance of regeneration, and offers suggestions for future investigations.

## 2 Reflections on LHEs in CEE cities

### 2.1 Genesis and socialist development

During socialism, the housing policy in all CEE countries, including Yugoslavia, was subordinated to the centrally planned economies and their governments regarded financing, production, and allocation of urban housing as a political and economic matter (Hirt & Petrović, 2011; Tosics et al., 2005). Since urban land had no market value and there was no need to prioritize its efficient use (Bertaud & Renaud, 1995), the construction of LHEs on peripheral greenfield sites proved to be an effective means of retaining industrialization as a development priority and facilitating rapid urbanization, representing a key component of socialist modernization (Dimitrovska Andrews & Sendi, 2001; Svirčić Gotovac, 2021). Socialist ideology considered mass housing as a progressive force that promoted collective identity and advocated for egalitarian dwelling conditions (Smith, 1996); hence, LHEs quickly became the dominant urban housing type in the CEE region (Murie et al., 2003).

Flats in LHEs were in state or social (in Yugoslavia) ownership, allocated at symbolic costs of tenure to young families of the middle-class members, communist party delegates and industrial workers. Therefore, the population of these estates was demographically homogenous but socially heterogenous (Ouředníček & Temelová, 2009; Szafrańska, 2017), and characterized by a solid social cohesion (Svirčić Gotovac, 2021). In spite of ambitious plans and strict regulations aimed at ensuring a dwelling standard, budget constraints often meant a limited supply of social and service infrastructure, low construction quality, and insufficient maintenance (Stanilov, 2007; Zarecor, 2018). These estates thus functioned as monotonous and uniform dormitories, facing various issues related to premature physical deterioration of prefab buildings, neglected and poorly equipped open public spaces, and unfavorable transport accessibility. Even with these shortcomings, LHEs remained the most desired dwelling locations in all CEE cities throughout the socialist period (Herfert et al., 2013; Musterd & van Kempen, 2005).

### 2.2 Post-socialist development

The collapse of socialism reverberated through CEE economies, emptying state coffers and drastically reducing housing provision (Stanilov, 2007). With the early 1990s housing policy reform, CEE countries shifted to market-based restructuring of their housing sectors, entailing deregulation, devolution, and state withdrawal from all housing production and distribution matters. Mass privatization of housing was implemented as the first measure, which swiftly liberalized housing markets and increased residential mobility (Chapman & Murie, 1996; Hegedös & Tosics, 1996; Tsenkova, 2009). While discussing the prospects of LHEs during the 1990s in light of these new conditions, many researchers based the predictions on the West European experience. They foresaw long-term socio-spatial consequences of further physical deterioration, such as extensive middle-class out-migration, residualization and segregation (Enyedi, 1998; Hegedös & Tosics, 1997; Ladányi, 1993), warning that these estates were "likely to become the slums of the early twenty-first century" (Szelényi, 1996, p. 315). The following decades proved them wrong.

While there is evidence that some LHEs have turned into ghettos (see Temelová et al., 2011 for Czech cities; Teodorescu, 2018 for Romanian cities), the vast majority still feature

social mix (Hess et al., 2018; Kalm et al., 2023), regardless of various issues deriving from the physical quality of buildings and open spaces. Hence, these estates cannot be labeled as places of decay, as is often the case with their West-European counterparts (Bolt, 2018; Kovács et al., 2018). They are not yet prone to a progressive socio-economic deterioration, primarily owing to a combined impact of certain post-socialist circumstances. First, LHEs account for the lion's share of the CEE urban housing stock, thus playing a significant role in the local housing markets. Second, as the income-to-housing price ratio in CEE cities is much less favorable than in the West, their residents generally have more modest housing expectations (Szafrańska, 2015), which makes LHEs an appealing dwelling location even today. Third, housing privatization converted long-time tenants to homeowners, strengthening their attachment to both the flat and the estate (Kährik & Tammaru, 2010; Szafrańska, 2017). Furthermore, there are urban population groups (singles, young couples, one-child households, etc.), for whom smaller flats in LHEs meet the dwelling requirements (Benkő, 2015; Hess et al., 2018). Finally, these estates do not present cut-off dormitories anymore (Temelová & Slezáková, 2014). They have been equipped with social and service infrastructure, as well as numerous daily venues, and now have favorable transport accessibility, while still featuring certain residential qualities, such as a profusion of open public spaces and greenery, which are mostly missing in densely built inner-city neighborhoods and post-socialist market-led residential developments.

The post-socialist development pathways of LHEs varied between the countries, being shaped by their different transitional trajectories (Tsenkova, 2014). Nonetheless, two general development modes can be identified based on government's initiative, involvement, and stance (Hess et al., 2018; Vasilevska et al., 2020). The first mode entails planned, coordinated, and policy-driven regeneration or the 'almost ideal development scenario' (Temelová et al., 2011). Examples of this approach primarily derive from cities in the fast-track reforming countries that pioneered the post-socialist transition (Baltic and Central European region). The second one is 'doing nothing' approach, i.e., not intervening and allowing the market forces to shape the changes, typical of cities in Eastern European and Balkan countries. It frequently results in market-based infill developments and/or spontaneous and piecemeal refurbishments reliant on residents' activities, but does not impede the downgrading process significantly, creating LHEs at a 'crossroads between regeneration and degradation' (Temelová et al., 2011). Some authors noted that this laisser-faire attitude of the local authorities may convert into a long-lasting governance vacuum and have harsh consequences—the longer the neglect persists, the more dire the physical condition of buildings and open public spaces becomes and the more difficult the regeneration gets (Pirrus & Leetmaa, 2021)—eventually producing ghettos. A more radical demolition-oriented or 'Pruitt–Igoe' approach is less common in the CEE region. It has been applied to make space for higher quality housing in Moscow and St. Petersburg (Inizan & Coudroy de Lille, 2019).

With these divergent development trajectories, LHEs in CEE cities no longer form a homogeneous group: "some of them are at real risk of social exclusion and physical degradation, while others are on the way of becoming a stable part of residential mosaic of post-socialist cities" (Temelová et al., 2011, p. 1830). Although the 'spiral of decline' may not be the most likely scenario for estates at a crossroads, various factors and processes may trigger middle-class out-migration (e.g., demographic aging, further diversification of housing option, changes in housing preferences, etc.), inducing the transformation of their socio-spatial structure, homogenizing it, and accelerating degradation. The future development of unrefurbished CEE LHEs thus primarily depends on whether their regeneration is conducted or not (Gorczyca et al., 2020; Milovanović et al., 2023).

### 2.3 Residents' satisfaction

In regard to residents' satisfaction with their dwelling environment, studies have disclosed that LHEs in CEE cities are generally viewed as more attractive dwelling locations than in West European cities (Dekker & van Kempen, 2009; Dekker et al., 2011; Herfert et al., 2013; Kovács & Herfert, 2012; Musterd & van Kempen, 2007). According to researchers, it is non-residents who often perceive them much more negatively (Kovács & Herfert, 2012; Musterd & van Kempen, 2005; Wassenberg, 2018).

Studies have also shown that the image and attractiveness, but also the social composition of CEE LHEs can vary significantly between those partially or fully renovated and those at a crossroads between regeneration and degradation. In Budapest, for example, unrefurbished estates are experiencing a loss of middle-class population, displaying initial signs of social degradation, while the refurbished ones remain sought after in the local housing market (Kovács et al., 2018). In Tallinn, unrenovated LHEs are grappling with issues such as demographic aging and an increased share of residents with low socioeconomic status, while those regenerated have managed to retain the inherited social mix and positive image (Leetmaa et al., 2018). Similar trends are observable in Riga's LHEs (Treija & Bratuškins, 2019). Prague stands out as a quite unique example in these terms, as the majority of its LHEs have undergone partial or complete refurbishment. They hold a stable position in the housing market, exhibit a heterogeneous social structure, feature a low level of socio-spatial disparities, and cannot be associated with social stigmatization (Garcia-Ayllon, 2018; Ouředníček et al., 2018), underscoring the importance of regeneration. All these differences are encapsulated in the findings of Temelová et al. (2011), who documented significant variations in residents' evaluation of their dwelling environment between one regenerated LHE, one at a crossroads and one 'reinforcing ghetto' in the Czech Republic. In the refurbished and socially heterogeneous estate, the quality of physical environment was evaluated as 'good' and the quality of services as 'sufficient', in the one at a crossroads as 'fairly good' and 'sufficient', and in the ghetto as 'devastated' and 'poor', respectively. Although the estate at a crossroads maintained a social mix, a notably high share of its residents expressed a desire to move out.

Despite the enduring popularity of refurbished estates, Kovács and Herfert (2012) concluded that LHEs in CEE cities are no longer perceived as the most desirable housing option. Their comparative study reported a quite high level of residents' dissatisfaction (approx. one-third of inhabitants), but also revealed variations between CEE cities: LHEs in Budapest, for instance, have more unsatisfied residents than in Sofia and Vilnius.. As previously noted, these variations may be attributed to differing transitional contexts of the countries in which the cities are located. Yet, they also hinge upon local factors, such as the physical condition of the estate's housing stock, the social structure of its population, urban development policy, housing policy, and most importantly—the type of the local housing market. According to Kovács and Herfer (2012), LHEs are generally less popular, offer cheaper housing, and have less satisfied residents in CEE cities with relaxed markets, characterized by a diversified housing stock and a variety of housing options (*e.g.*, Budapest). Conversely, they maintain their attractiveness and housing prices, and have more satisfied residents in cities with tight markets, where housing supply is dominated by prefab buildings and housing choice is limited (e.g., Sofia). As Hess et al. note (2018, p. 7), "the more prominent the share of large housing estates in an urban housing stock, the more appreciated housing estates are by the population". Herfert et al. (2013) also highlight that, although LHEs no longer represent the 'dwelling ideal', , the level of residents' satisfaction

will likely remain unchanged, particularly in cities with tight housing markets. Another significant factor is refurbishment, as improving the quality of the dwelling environment positively affects how residents perceive their neighborhood (Gao et al., 2022; Nzimande, 2022; van Gent, 2009). In general, partially or fully refurbished that also provide job opportunities, boast well-developed service infrastructure, and offer leisure-time activities are considered as relatively attractive dwelling locations in the CEE region (Hess & Tammaru, 2019; Hess et al., 2018).

## 3 LHEs in post-socialist Serbia: setting the context

Housing policies in the Eastern Bloc were all based on the so-called East European housing model (Hegedös & Tosics, 1992). However, the Yugoslav version had slightly differences, as the responsibility for housing provision was first decentralized and then transferred to self-managing housing enterprises (Mandič, 1992). Despite the large volume of housing production, the housing system was unable to meet the demand, causing a housing shortage in all Yugoslav cities, same as in the rest of the region.

After the disintegration of Yugoslavia in 1991, Serbia entered a decade-long 'blocked' transition (Lazić & Cvejić, 2007), known for the greatest political and socio-economic crisis in its modern history. Economic collapse, mass unemployment, impoverishment, a sharp reduction in housing provision, an escalation of urban housing crisis, and a drastic increase in illegal housing construction were just some manifestations of Serbia's distinctive transitional path. Although the chaotic situation of the early 1990s hindered housing policy reform, mass privatization of socially owned dwellings was instantly implemented as its most powerful systemic measure. In order to maintain social peace during these turbulent times, privatization allowed sitting tenants to purchase dwellings at prices far below their market value. By the end of the 1990s, nearly 98% of the total housing stock in Serbia was in private hands (2002 census), including all dwellings in LHEs.

As the socialist housing stock had already been exposed to deterioration due to inadequate management and insufficient investments, and was in need of technical improvement (Jovanović-Popović et al., 2013; Vranić et al., 2016), the additional objective of housing privatization was to improve residents' attitudes towards maintenance. It was intended to be a step towards the implementation of condominium ownership (Struyk, 1996). However, the outcomes in this regard were largely disappointing due to two main reasons. Firstly, the 'giveaway' privatization transformed low-income households into homeowners (Tsenkova, 2005), while the blocked transition further impoverished them, thus they struggled to cover housing expenses, let alone participate in maintenance or renovation costs. Secondly, even when new homeowners were willing to participate financially, they faced various legal constraints, such as unclear delineations of their rights and responsibilities (Cirman et al., 2013). This brought about a "new housing culture" in which no one assumed responsibility for taking care of the collective areas within apartment buildings or their surrounding open spaces (Damjanović & Gligorijević, 2009, p. 23), leading to the continued deterioration of LHEs. The only types of physical 'interventions' within these estates during the 1990s concerned privately financed and market-led construction of

rooftop dwelling extensions permitted by the new law[3] in exchange for roof repair, façade renovation, and some minor technical upgrading works.

The delayed transition that began in 2000 brought economic recovery, but also a neoliberal transformation without social responsibility (Mitrović, 2018), with private investors emerging as the most powerful actors in the housing sector and urban development in general (Vujošević et al., 2012). They primarily focused on constructing new apartment buildings to cater to homebuyers who were dissatisfied with the existing supply and sought higher quality dwellings (Bolt, 2018; Sendi & Kerbler, 2021), thereby solving the housing crisis, diversifying the urban housing stock, and relaxing local housing markets. LHEs have caught their attention, yet only in terms of 'vacant' land, *i.e.*, vast public and green spaces suitable for infill development (Vasilevska et al., 2020). Meanwhile, supermarket chains and various other services have moved into these estates, erasing their epithet of dormitories. However, due to the dysfunctional system of maintenance and management of LHEs, as well as their protracted neglect stemming from the 'doing nothing' approach (Nedučin et al., 2019), the deterioration persisted. The legal framework that brought some efficiency to the concept of condominium ownership was adopted as late as 2016,[4] finally delineating the responsibilities of homeowners. Its impacts in terms of physical improvements are still lacking, as there are no national or local policies, strategies or programmes for the regeneration of LHEs. According to the last census (2011), they account for 53.4% of the total housing stock, still representing the most prevalent housing type in the country.

## 4 Case study areas

With a population of 409,038 in the metropolitan area and 290,853 in the proper area,[5] Novi Sad is the second largest city in Serbia, serving as both a business and trade hub of regional importance and an industrial, educational, and IT center of national significance. During the socialist era, it experienced extensive industrialization, urbanization, modernization, and a complete alteration of its pre-war spatial structure. In 1991, over 80% of the dwellings in the city proper area derived from the socialist period, while a 2% housing surplus was a mere consequence of the slowdown in population growth during the 1980s (1991 census). By 2002, nearly 98% of the housing stock was privately owned (2002 census). Up until the early 2000s, the local housing market was extremely tight—the housing stock was undifferentiated characterized by an immense share of dwellings located in LHEs and a minimal surplus, housing options were limited, and residential mobility was extremely low (Nedučin et al., 2021). The delayed transition created an exceptionally neoliberal investment climate that led to a housing boom in the mid-2000s (Polić & Stupar, 2015). The hyperproduction of apartment buildings in Novi Sad, achieved through the demolition-based transformation of low-density residential districts, became the most lucrative economic activity in the country. The housing production quickly outpaced the city's population growth, generating a 20% housing surplus by the end of the decade (2011

[3] *Zakon o nadziđivanju zgrada i pretvaranju zajedničkih prostorija u stanove* (Law on Superstructures and Conversion of Common Areas into Dwellings). Sl. glasnik RS, No. 46/94.

[4] *Zakon stanovanju i održavanju zgrada* (Law on Housing and Building Maintenance). Sl. glasnik RS, No. 104/2016 i 9/2020-dr. zakon.

[5] PE Informatika: *Broj stanovnika po naseljima* (Population by Settlements). Retrieved from https://www.nsinfo.co.rs/cyr/broj-stanovnika-po-naseljima (accessed 26 March 2023).


**Fig. 1** Location of residential districts and analyzed micro-units. Source: GeoSrbija (https://a3.geosrbija.rs/). Liman II and Liman III

census). The global economic crisis caused a significant reduction in housing output, preventing a crash in the local housing market, but the housing construction industry fully recovered by the late 2010s. Overall, the post-socialist expansion of Novi Sad's housing stock reduced the socialist share to 46% (Nedučin et al., 2021).

The empirical study on residents' satisfaction with their neighborhood environment was carried out in three residential districts in Novi Sad—*Liman II* and *Liman III,* as two LHEs, and the recently transformed *Grbavica* (Fig. 1). They represent typical local examples of two conflicting planning and design approaches—integrated top-down (socialist) and piecemeal bottom-up (post-socialist). These districts were selected due to their shared characteristics: they are in the proximity to each other and conveniently located relative to the city center, the Danube River, and the university campus; all three feature social mix, host a variety of daily venues, and have similar population densities and housing market positions. In addition, the two Limans were chosen to highlight differences in the scale of infill developments introduced during the post-socialist period.

The survey was conducted within three micro-units (Fig. 1), selected during the preliminary analysis on the following basis: (1) each micro-unit corresponds to a geographical area that residents largely consider and refer to as their neighborhood (Hipp, 2010); (2) each one meets the criteria proposed by Vasilevska et al. (2020), serving as a typical representative of the chosen residential district in terms of functional organization, morphology, and design features, and (3) each micro-unit borders the main street within the district.

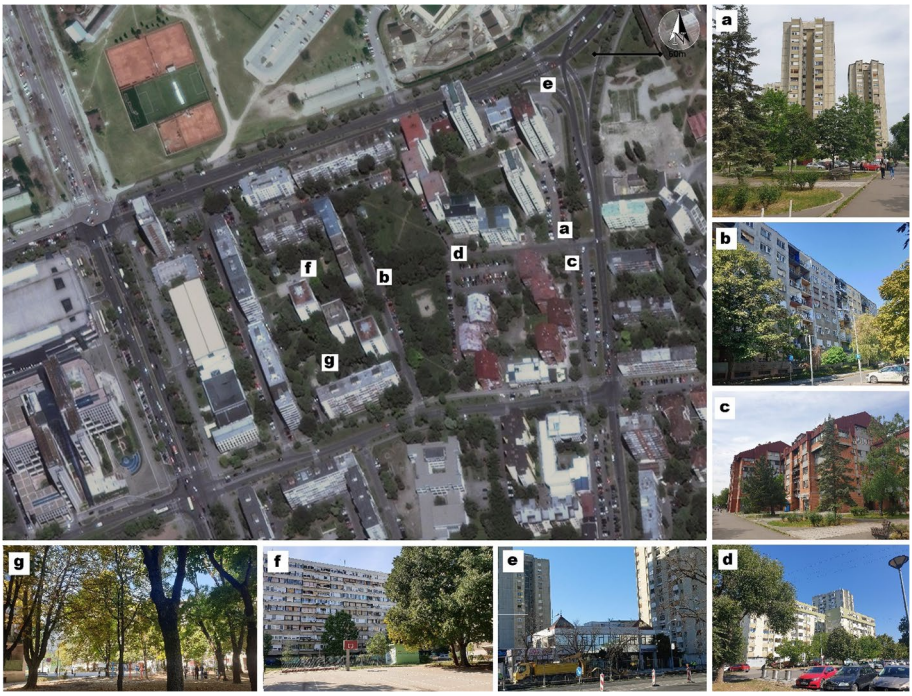


**Fig. 2** Micro-unit in Liman II: population—approx. 3500, area—10.3 ha (housing—8.5 ha), population density—approx. 400 inh/ha (calculation based on GeoSrbija spatial data); **a** and **b** first housing towers and slabs; **c** 'anti-modernism' design of the early 1980s; **d** panel buildings with rooftop extensions; **e** office building as a low-rise infill development; **f** inner-block sports fields; **g** inner-block greenery. Source: aerial view—GeoSrbija (https://a3.geosrbija.rs/); photos—authors

The following paragraphs briefly describe the development of the two Limans and Grbavica and explain their differences in terms of morphology and certain physical features, closing with an objective comparative assessment of their distinctive characteristics.

### 4.1 Liman II and Liman III

Liman II (Fig. 2) and Liman III (Fig. 3) are parts of Limans, one of the largest residential areas in Novi Sad. It consists of four successive LHEs—Liman I to IV—developed during the socialist period along the Danube River. These estates vary in size and their distance from the city center increases, with Liman I being the closest and Liman IV the farthest.

The construction of repetitive and uniform high-rise panel housing in Liman II (Fig. 2a and b) and Liman III (Fig. 3a and b) began in the early 1960s and continued until the late 1970s, when Yugoslav architects took down "the portrait of Le Corbusier off the wall" and made a clean break with orthodox modernism (Hirt, 2008, p. 801). The housing blocks built afterwards, particularly in Liman II, exhibit a shift to an 'anti-modernist' design, characterized by smaller building scales, pitched roofs, and brick façades (Fig. 2c); hence, Liman II represents a slightly less conventional and grey LHE than Liman III (Fig. 3c). All four Limans featured social heterogeneity and were voted


**Fig. 3** Micro-unit in Liman III: population—approx. 4000, area—11.6 ha (housing—9 ha), population density—approx. 450 inh/ha (calculation based on GeoSrbija spatial data); **a** and **b** first housing towers and slabs; **c** dominance of 'gray modernism'; **d** rooftop expansions; **e** music and ballet school built in place of sports fields and greenery (opened in 2021); **f** tucked up inner-block pedestrian paths; **g** inner-block greenery. Source: aerial view—GeoSrbija (https://a3.geosrbija.rs/); photos—authors

the city's most desirable residential districts in a public survey conducted in the late 1980s (Pajović, 1996).

By the early-1990s, all dwelling in Limans were privatized. Due to deferred maintenance during the socialist period, older apartment buildings began experiencing technical problems associated withprefabricated technologies. Meanwhile, private investors focused on constructing rooftop dwelling annexes (Fig. 2d and 3d). After 2000, the infill developments introduced lacking and new services. Only a few low-rise office and commercial buildings were erected in Liman II (Fig. 2e), resulting in insignificant changes in its spatial structure, morphology, and building density (PE Urbanizam, 2009b). In Liman III, on the other hand, the construction of a large mixed-use complex in lieu of open public spaces, greenery, and parking lots substantially affected all mentioned aspects. It provided Liman III with a greater variety of venues and services compared to Liman II, but had a negative impact on the residential quality (PE Urbanizam, 2009b). This did not deter the local government from constructing a large music and ballet school with a concert hall, replacing three sports fields, a playground, and green areas (Fig. 3e). Even with these additions, both estates still boast an abundance of open public spaces (Figs. 3f and 4f) and greenery (Figs. 3g and 4g).

Despite showing some signs of physical decay due to the absence of formal renovation attempts, these estates have not experienced middle-class out-migration. However, they now find themselves at a crossroads between regeneration and deterioration. Whereas

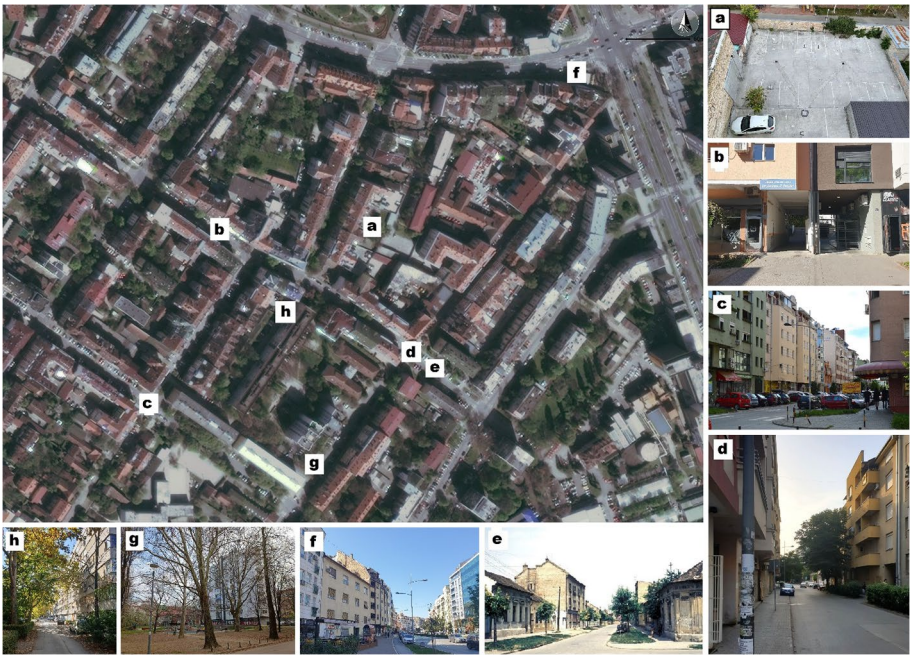


**Fig. 4** Micro-unit in Grbavica: population—approx. 5000, area—12.2 ha (all housing), population density—approx. 400 inh/ha (ocalculation based on GeoSrbija spatial data); **a** inner-block courtyards subordinated to parking provision; **b** gated car entrances to courtyards; **c** post-modernist architecture of Grbavica; **d** narrow streets with minimal sidewalks; **e** street widths inherited from low-density housing **c** the only bicycle path within Grbavica; **g** and **h** larger public and green spaces around infill housing from the 1960s;. Source: aerial view—GeoSrbija (https://a3.geosrbija.rs/); photos—PE Urbanizam (**e**) and authors

there is no official data on their social composition, it is known that almost 80% of the city's housing stock is owner-occupied (2011 census). Since inheritance has become the most common mode of housing transition in CEE LHEs (Rodik et al., 2019), it may be assumed that this share in Liman II and III is even higher. Their population thus consists of original, now elderly residents, households with a member who has inherited the flat, but also young couples with children and students as tenants. Although LHEs in CEE cities often offer more affordable dwellings, acting as housing market springboards (Ouředníček, 2016), the asking prices for flats in these two districts are higher than the average for Novi Sad proper.

## 4.2 Grbavica

Grbavica is a local example of a pre-war low-density city district that has undergone almost a complete transformation during the post-socialist period (Fig. 4). It nowadays features new medium- to high-rise housing blocks, scattered ensembles of infill apartment buildings dating back to the 1950s and 1960s, and a preserved stretch of detached single-family housing on the west side.

The typological, morphological, and spatial transformation of Grbavica and other low-density residential areas in the city began in the mid-1990s in line with the regime

of 'permanent reconstruction', first introduced by the 1985 Master Plan[6] that heavily criticized the concept of LHEs, then copied to the following one (2000, amendments from 2006[7]). It implied replacing low-rise housing with medium- to high-rise apartment buildings while maintaining the existing parcellation and street network. The goals of this regime were rational from the perspective of achieving sustainable urban development—to recycle underutilized urban land, increase urban density, and halt urban sprawl caused by LHEs, but also to improve living conditions in targeted neighborhoods. However, the advent of post-socialist capitalism gave rise to a neoliberal planning paradigm known as 'investor urbanism'. It refers to a developer-led planning practice that subordinates urban space to the dictates of capital, allowing private investors to build whatever and wherever they desire (Hirt, 2014, 2015). As a result, Grbavica has transformed into a compact neighborhood, characterized by closed blocks, overbuilt lots (i.e., exceeding optimal floor area and building coverage ratios), gated semi-private inner-block courtyards mainly intended for parking (Fig. 4a and b), a cacophony of colors and architectural styles (Fig. 4c), and narrow streets inherited from low-density housing, which barely leave space for pedestrian paths, let alone cycling infrastructure (Fig. 4d, e and f) (Mrkajić & Anguelovski, 2016; Nedučin et al., 2021; PE Urbanizam, 2009b). These streets are also not 'busable', i.e., traversable by bus, and only one bus line used to pass through this district until it was rerouted several years ago due to congestions. In a city-funded study on green and recreational areas, Grbavica and all other permanent reconstrucion zones were singled out as"the most problematic" city neighborhoods, lacking open public spaces and "every type of greenery" (Faculty of Agriculture, 2009, p. 32). Larger green spaces may only be found around socialist housing developments (Fig. 4g and h). Notwithstanding all its shortcomings, Grbavica has evolved into one of the most expensive residential districts in the local housing market.

Grbavica is currently inhabited by former owners of demolished houses who received compensation in kind and their inheritors, couples with children as first-time homebuyers, as well as families that sold a larger privatized dwelling elsewhere to purchase a smaller one in this residential district, all belonging to different social classes (Nedučin et al., 2021). In contrast to Limans that feature more spacious dwellings, Grbavica has a significant share of studios and one-room apartments, primarily purchased for renting purposes (Nedučin et al., 2009), hence, its population also consists of singles, young professionals, newlyweds, and students as tenants.

### 4.3 Main characteristics of the case study districts: comparative assessment

The main characteristics of Liman II, Liman III and Grbavica are listed in Table 1. The comparative assessment was based on the available official data and authors' own research.

[6] *Generalni urbanistički plan Novog Sada do 2005. godine*; Sl. list Grada Novog Sada, No. 16/1985.

[7] *Generalni plan Grada Novog Sada do 2021. godine;* Sl. list Grada Novog Sada, No. 24/2000; *Odluka o izmenama i dopunama Generalnog plana Grada Novog Sada do 2021. godine*; Sl. List Grada Novog Sada, No. 10/2006.

**Table 1** Objectively assessed characteristics of the case study districts

| | Liman II | Liman III | Grbavica |
|---|---|---|---|
| Location (a) | City center—1.7 km Danube—500 m univ. Campus—700 m | City center—2.2 km Danube—500 m Univ. campus—1.6 km | City center—1.5 km Danube—1.3 km Univ. campus—1.8 km |
| Period of construction/transformation | Socialist | | Post-socialist |
| Total population (b) | 6195 | 10,799 | Approx. 17,300 |
| Population density (c) | Medium- to high-density | Medium- to high-density | Multifamily housing—medium- to high-density |
| Building coverage ratio (d)[1] | 1.61–3.00; several housing blocks < 1.60 | < 1.60; several housing blocks 1.61–3.00 | Multifamily housing 1.61–3.00; several housing blocks < 1.60 |
| Buildings' height | GF + 4 to GF + 17 | GF + 3 to GF + 16 | Multifamily housing GF + 3 to GF + 14 |
| Dominant block structure | Open | | Closed |
| Dominant architectural style | Modernist with some unorthodox modernist buildings | Modernist | Post-modernist |
| Post-socialist changes | Small-scale low-rise infill developments | Large-scale medium-rise infill developments | Overall transformation—from low-density to medium- and high-density housing |
| Character of open spaces | All public | | Enclosed—fragmented and semi-private; outside of blocks—public |
| Presence of public spaces | Satisfactory—inherited from the socialist period, reduced by the post-socialist infill developments (in Liman III more than in Liman III) | | Unsatisfactory—inherited from low-density housing, without any enlargements or additions |
| Presence of green spaces (e) | Sufficient, but relatively poorly maintained; all green spaces are public | | Deficiency of public green spaces, except around socialist developments; inner-block green areas are minimal and semi-private |
| Pedestrian infrastructure | Well-developed—containing an auxiliary network of inner-block pathways | | Underdeveloped—no inner-block pathways |
| Cycling infrastructure | Well-developed—built during the socialist period | | Underdeveloped—bicycle paths run along the district's perimeter and exist solely in its main street |

**Table 1** (continued)

| | Liman II | Liman III | Grbavica |
|---|---|---|---|
| Presence and proximity of daily venues and services (a) | Various amenities along three perimeter streets and the central street<br>Within a 5-min walk | | Various amenities along all four perimeter streets and the majority of inner streets |
| Presence and proximity of public schools and kindergartens (a) | 1 primary school and 1 kindergarten<br>within a 10-min walk | 1 primary school and 2 kindergartens | 2 primary schools and 3 kindergartens |
| Access to public transportation (f) | Favorable—bus lines along the perimeter streets and the district's main street | | Relatively unfavorable—bus lines along the perimeter streets, but none of them pass through the district |
| Ratio of registered cars and parking per housing block (g)[2] | Mostly 1.01–2.00; some blocks under 1.00 | | Mostly under 1.00; some blocks 1.01–2.00 |
| Average asking price of flats in March 2023 (h)[3] | 2,528 €/$m^2$ | 2,318 €/$m^2$ | 2,429 €/$m^2$ |

[1]The official data are from 2009, yet there were many new housing developments in Grbavica since then, which significantly increased the building coverage ratio in the then less dense blocks

[2]This seemingly greater availability of parking in Grbavica stems from the large number of tenants who are not officially registered as its residents

[3]Average asking sales price for Novi Sad proper was 2,171 €/$m^2$. Sources: (a) based on Google Maps; (b) PE Informatika; (c) Master Plan of the City of Novi Sad until 2030 (*Generalni urbanistički plan Grada Novog Sada do 2030. godine*. Sl. list Grada Novog Sada, No. 33/2022); (d) PE Urbanizam (2009b); (e) Faculty of Agriculture (2009) and City of Novi Sad (2015); (f) Public Transportation Company "Novi Sad" (Bus Routes in the City of Novi Sad. Retrieved from http://www.gspns.co.rs/mreza?selected_lang=lat (accessed 30 March 2023)); (g) PE Urbanizam (2009a); (h) 4 zida.rs (Retrieved from https://www.4zida.rs/kretanje-cena-nekretnina/prodaja/stanovi/gradske-lokacije-novi-sad (accessed 30 March 2023)); own research.

## 5 Survey methodology, data collection and data analysis

The quantitative and qualitative data on residents' perception of their neighborhood environment was collected from structured 'traditional' (in-person) face-to-face interviews involving a questionnaire[8] (Appendix 1) designed in reference to the surveys of Abass and Tucker (2018), Filipovič Hrast and Dolničar (2012), Herfert et al. (2013), and Lee et al. (2017). The personal information included data on respondents' age group, gender, tenure, and length of residence. *Satisfaction with the neighborhood physical environment* (NPE) was assessed based on 18 close-ended questions. Using a five-point Likert scale (from 1 "extremely unsatisfied" to 5 "extremely satisfied"), respondents rated their satisfaction with the following: motor traffic, parking availability, cycling and pedestrian infrastructure, pedestrian safety, easy of accessing public transport, access to playgrounds, sports fields, open-air gathering places and greenery, provision of street furniture and street lighting, accessibility of daily venues, public kindergartens and schools, aesthetics, cleanness, safety, and neighborhood suitability for children raising. *Satisfaction with the neighborhood social environment* (NSE) was assessed based on 9 closed-ended questions. On a four-point Likert-type scale (from 1 "never" to 4 "often"), respondents rated the frequency of social interactions with their neighbors (6 items: greeting, visiting, borrowing things, talking about neighborhood issues and personal life, and organizing joint actions). Using a five-point Likert scale (from 1 "not at all" to 5 "completely"), they further rated their satisfaction with intra-neighborhood social relations, their trust in neighbors, and neighborhood attachment (3 items). In addition, respondents were asked to state the *advantages* and *disadvantages of dwelling in their neighborhood* (two open-ended questions), with the aim of gaining a deeper insight into what they particularly appreciate or find problematic. To determine their *relocation intentions* and reasons behind them, respondents were asked the following questions: why they chose their neighborhood as a place of residence (open-ended), whether or not they would move out if given the chance (closed-ended), and if yes, to which neighborhood and for what reasons (two open-ended sub-questions).

The survey sample was preliminary selected to target 70 residents aged 18+ from each micro-unit,[9] with an age and gender distribution aligned with the population composition of Novi Sad proper, which corresponds to a stratified sampling method (Cohen, 2011; Tipton, 2013). Within these quotas, the selection of respondents was random, based on their willingness to participate, ensuring the minimization of sampling bias (Glasgow, 2005; Onwuegbuzie & Collins, 2015). The interviewing began in late February 2020, yet ended on March 15, when the national government declared the state of emergency due to the COVID-19, followed by a lockdown. Up until that point, a total of 162 residents had completed the survey (53 from Liman II and Liman III, respectively, and 56 from Grbavica[10]), slightly deviating from the age and gender criteria (Appendix 2). The interviewing was planned to resume in the summer of 2021, after the vaccines became available and the social distancing requirements were eased. However, as more than a year under the pandemic had reconfigured the daily life of urban population (Florida et al., 2021; Martínez & Short, 2021; Mouratidis, 2021b), potentially affecting the residents' perception of their neighborhood environment, the authors decided not to carry on with the survey.

[8] The final version of the questionnaire was developed after pilot testing that included 10 participants.

[9] Confidence level 90%; margin of error 10%.

[10] In relation to the targeted 70 respondents from each case study area, the response rate for Liman II and Liman III was 75.7% and for Grbavica 80% (77.1% in total).

The survey data was processed in the SPSS 23.0 software package. The analysis of variances (ANOVA) was conducted to assess statistical differences in the level of satisfaction with particular features of NPE and NSE among the case study areas. ANOVA was chosen because the dependent variable (satisfaction) was measured on an interval level and treated as continuous, while the independent (grouping) variable had three categories—Liman II, Liman III, and Grbavica (Larson, 2008; Sawyer, 2009; Sthle & Wold, 1989). To further examine the differences between the case study areas, the Scheffe post-hoc test was employed (Ruxton & Beauchamp, 2008). The overall satisfaction with the neighborhood environment for each area was determined based on respondents' satisfaction with NPE and NSE. The internal consistency of the scales was measured using Chronbach's Alpha, yielding values of 0.90 (considered excellent) for the NPE scale (skewness −0.07 and kurtosis −0.84), 0.86 (considered good) for the NSE scale (skewness 0.52 and kurtosis −0.26), and 0.89 (considered good) for overall neighborhood satisfaction (skewness −0.12 and kurtosis −0.76). The reliability of these values was deemed acceptable according to relevant guidelines (Cronbach & Shavelson, 2004; Forero, 2014; Miller, 1995).

In addition the disruption of the survey due to the state of emergency, there are several other limitations of this research. Firstly, none of LHEs in Novi Sad has undergone any form of regeneration, thus a comparative analysis of neighborhood satisfaction between refurbished and unrefurbished estates could not be conducted. Secondly, there is no official information on the socio-economic composition of the case study districts, as the 2011 census did not provide such data. Although the last census (2022) may have analyzed this 'micro level', its results are not yet available. The social mix thesis was therefore based on the popularity of these three districts in the local housing market and the assumption that social deterioration would reduce the price of dwellings, which was not the case in any of the areas studied. Finally, the research focused on the overall ratings of perceived neighborhood characteristics without delving into differentiating them based on individual or household characteristics (age, gender, household composition, education level, tenure, socioeconomic status, or length of residence), as such analysis was considered beyond the scope of the paper.

## 6 Research results: descriptive comparisons

Table 2 shows the ANOVA results, indicating statistically significant differences among the case study areas in terms of satisfaction with NPE (F = 46.13, $p = 0.001$) and NSE (F = 36.13, $p = 0.001$), as well as in overall neighborhood satisfaction (F = 46.61, $p \leq 0.001$). Table 3

**Table 2** Satisfaction with the neighborhood physical and social environment (ANOVA)

| | Liman II | | Liman III | | Grbavica | | F | df | *p* |
|---|---|---|---|---|---|---|---|---|---|
| | M | SD | M | SD | M | SD | | | |
| Satisfaction with the physical environment | 70.65 | 12.48 | 63.50 | 13.86 | 48.03 | 10,71 | 46.13 | 2 | 0.001** |
| Satisfaction with the social environment | 39.15 | 4.18 | 33.20 | 4.09 | 31.70 | 3.93 | 36.13 | 2 | 0.001** |
| Overall neighborhood satisfaction | 81.27 | 12.77 | 74.17 | 14.45 | 57.48 | 11–80 | 46.61 | 2 | 0.001** |

**$p \leq 0.01$; *$p \leq 0.05$

*F* ANOVA test result, *M* arithmetic mean, *SD* standard deviation, *df* degrees of freedom

shows the results of the Scheffe post-hoc test, revealing statistically significant differences between the two LHEs in the respondents' assessment of NPE (MD = 6.22, $p = 0.027$) and their overall satisfaction with the neighborhood (MD = 9.02, $p = 0.007$), yet not in the evaluation of NSE. Furthermore, statistically significant differences emerged between Liman II and Grbavica across all three aspects—NPE satisfaction (MD = 20.53, $p < 0.001$), NSE satisfaction (MD = 8.71, $p < 0.001$), and overall neighborhood satisfaction (MD = 28.37, $p < 0.001$). Similarly, statistically significant differences were observed between Liman

**Table 3** Differences in satisfaction with the neighborhood physical and social environment and overall neighborhood satisfaction (Scheffe post-hoc test)

| | | Liman III | | Grbavica | |
|---|---|---|---|---|---|
| | | Mean difference | *p* | Mean difference | *p* |
| Satisfaction with the physical environment | Liman II | 6.22 | 0.027* | 20.53 | < 0.001** |
| | Grbavica | − 14.32 | < 0.001** | | |
| Satisfaction with the social environment | Liman II | 1.53 | 0.534 | 8.71 | < 0.001** |
| | Grbavica | − 7.17 | < 0.001** | | |
| Overall neighborhood satisfaction | Liman II | 9.02 | 0.007** | 28.37 | < 0.001** |
| | Grbavica | − 19.35 | < 0.001** | | |

**$p \leq 0.01$; *$p \leq 0.05$

**Table 4** Satisfaction with particular features of the neighborhood physical environment (ANOVA)

| | Liman II | | Liman III | | Grbavica | | F | df | *p* |
|---|---|---|---|---|---|---|---|---|---|
| | M | SD | M | SD | M | SD | | | |
| Functioning of motor traffic | 3.75 | 1.31 | 3.24 | 1.31 | 2.10 | 1.07 | 13.13 | 2 | < 0.001** |
| Parking availability | 2.30 | 2.03 | 2.63 | 2.43 | 1.69 | 1.07 | 5.42 | 2 | 0.005** |
| Cycling infrastructure | 3.85 | 1.11 | 3.74 | 1.33 | 1.94 | 0.94 | 29.18 | 2 | < 0.001** |
| Pedestrian infrastructure | 4.60 | 1.38 | 3.96 | 1.36 | 2.98 | 1.03 | 21.65 | 2 | < 0.001** |
| Pedestrian safety | 4.37 | 1.09 | 3.41 | 1.16 | 2.80 | 1.16 | 19.46 | 2 | < 0.001** |
| Access to public transportation | 4.87 | 1.16 | 4.15 | 1.09 | 3.64 | 1.11 | 6.44 | 2 | 0.002** |
| Access to public schools and kindergartens | 4.85 | 1.50 | 4.25 | 1.38 | 4.07 | 1.41 | 5.22 | 2 | 0.006** |
| Availability of daily venues and services | 4.89 | 1.63 | 4.24 | 1.56 | 4.65 | 1.92 | 1.37 | 2 | 0.256 |
| Access to green spaces | 4.54 | 1.50 | 4.03 | 1.39 | 3.32 | 1.27 | 24.27 | 2 | < 0.001** |
| Access to playgrounds | 4.03 | 1.20 | 3.36 | 1.31 | 2.25 | 1.33 | 28.14 | 2 | < 0.001** |
| Access to of open spaces for gathering | 3.65 | 1.09 | 3.41 | 1.39 | 1.91 | 1.18 | 24.41 | 2 | < 0.001** |
| Access to open-air sports fields | 4.08 | 1.33 | 3.20 | 1.30 | 1.74 | 1.08 | 28.78 | 2 | < 0.001** |
| Provision of street furniture | 3.55 | 1.11 | 2.96 | 1.20 | 2.04 | 1.01 | 20.54 | 2 | < 0.001** |
| Aesthetics of the built environment | 3.50 | 1.19 | 2.96 | 0.95 | 2.35 | 1.06 | 16.74 | 2 | < 0.001** |
| Neighborhood cleanness | 3.78 | 1.11 | 2.93 | 1.03 | 2.89 | 1.01 | 5.57 | 2 | 0.005** |
| Street lighting | 4.23 | 1.12 | 3.59 | 1.09 | 3.34 | 1.21 | 5.26 | 2 | 0.006** |
| Safety | 3.69 | 1.42 | 3.15 | 1.03 | 2.55 | 1.04 | 3.17 | 2 | 0.044* |
| Children raising in the neighborhood | 4.18 | 1.55 | 3.36 | 1.23 | 2.43 | 1.38 | 15.97 | 2 | < 0.001** |

**$p \leq 0.01$; *$p \leq 0.05$

*F* ANOVA test result, *M* arithmetic mean, *SD* standard deviation, *df* degrees of freedom

**Table 5** Satisfaction with particular features of the neighborhood social environment (ANOVA)

| | Liman II | | Liman III | | Grbavica | | F | df | *p* |
|---|---|---|---|---|---|---|---|---|---|
| | M | SD | M | SD | M | SD | | | |
| Satisfaction with intra-neighborhood social relations | 4.15 | 0.85 | 3.87 | 0.95 | 3.16 | 1.01 | 14.04 | 2 | < 0.001** |
| Trust in neighbors | 3.58 | 0.94 | 3.40 | 0.93 | 2.73 | 0.89 | 10.26 | 2 | < 0.001** |
| Neighborhood attachment | 4.07 | 0.77 | 3.91 | 0.93 | 3.16 | 1.08 | 21.60 | 2 | < 0.001** |
| Frequency of social interactions with neighbors | 3.03 | 0.85 | 2.86 | 1.01 | 1.99 | 1.75 | 1.75 | 2 | < 0.001** |
| *Frequency of social interactions with neighbors (individual items)* | | | | | | | | | |
| Greeting each other | 3.53 | 0.70 | 3.54 | 0.59 | 2.98 | 0.82 | 10.39 | 2 | < 0.001** |
| Visiting each other | 2.40 | 1.20 | 2.37 | 1.05 | 1.55 | 0.87 | 10.56 | 2 | < 0.001** |
| Borrowing small things | 2.19 | 1.20 | 2.11 | 1.08 | 1.48 | 0.97 | 6.58 | 2 | 0.003** |
| Talking about neighborhood issues | 3.08 | 0.96 | 2.93 | 1.06 | 2.39 | 1.15 | 5.94 | 2 | 0.002** |
| Talking about personal life | 2.35 | 1.13 | 2.56 | 1.06 | 1.61 | 0.95 | 11.19 | 2 | < 0.001** |
| Organizing joint actions | 2.31 | 1.18 | 2.23 | 1.06 | 1.42 | 0.82 | 11.60 | 2 | < 0.001** |

**$p \leq 0.01$; *$p \leq 0.05$

*F* ANOVA test result, *M* arithmetic mean, *SD* standard deviation *df* degrees of freedom

III and Grbavica in NPE satisfaction (MD = −14.32, $p = < 0.001$), NSE satisfaction (MD = −7.17, $p < 0.001$), as well as in overall neighborhood satisfaction (MD = −19.35, $p = < 0.001$). In all three categories (NPE, NSE, and overall satisfaction), Liman II ranked higher than Liman III, while Grbavica received the lowest ratings.

In general terms, the survey results revealed that a significant majority of respondents from both Liman II and Liman III are contented with their neighborhood environment, live in a neighborhood of preference, and do not feel 'trapped'. While some significant differences were noted in favor of Liman II regarding the subjective evaluations of certain NPE and NSE features (Tables 4 and 5), Limans' dwellers surveyed still appear to be much more satisfied than respondents from Grbavica.

The following paragraphs are organized as a series of comparative analyses aimed at explaining how the case study areas differ in terms of respondents' evaluation of specific neighborhood characteristics, thus clarifying the variations in the results. They further unveil a discernible correlation between respondents' satisfaction with the neighborhood environment, their relocation intentions, and the positioning of these three residential districts within the housing market.

### 6.1 Satisfaction with the neighborhood physical and social environment

The analysis showed that the level of satisfaction with NPE was significantly higher in both Liman II and Liman III than in Grbavica (Table 3), with some variations also noted between the two LHEs. Generally, respondents from all three neighborhoods were highly satisfied with the access to public schools and kindergartens, as well as the availability of daily venues and services, and rather dissatisfied with the access to parking. The evaluation of other features of NPE differed between the case study areas (Table 4; Scheffe post-hoc test in Appendix 3). To explain these discrepancies, certain planning aspects and the local context will be taken into account.

The Scheffe post-hoc test (Appendix 3) revealed that the level of satisfaction with the following features of NPE is significantly lower in Grbavica compared to Liman II and Liman III: functioning of motor traffic, pedestrian and cycling infrastructure, pedestrian safety, access to open public spaces (playgrounds, sports fields, places for gathering and sports fields), as well as green spaces, aesthetics of the built environment, provision of street furniture, and suitability of the neighborhood for children raising. This highlights the issues that arise from the post-socialist approach to the planning of new residential districts—or investor urbanism, which prioritizes the production of dwellings at the expense of the quality of the dwelling environment.When asked about the disadvantages of dwelling in their neighborhood (open-ended question), respondents from Grbavica primarily complained about frequent congestions (52%), street noise (48%), overcrowding (40%), and the lack of open public and green spaces (32%). The following quotes illustrate low ratings of some of the mentioned features: "No squares, no greenery, no playgrounds […], only asphalt, cars, buildings, too many people and too much noise" (male, 55–64); "There are no bike lanes and the streets are so crowded with cars that I'm afraid to ride my bike around here" (female, 25–34); "[…] there are only a few places with benches where I can sit with my friends when we go out for a walk […] and it's a long walk to get to them" (female, 65+). These findings correspond to the conclusion of Vasilevska et al. (2014), drawn for open public and green spaces within new medium- to high-rise housing developments in Niš, Serbia—their quantity is insufficient and the lack of playgrounds, sports fileds and green areas is evident, especially when compared to LHEs. They also confirm

the arguments that traffic related issues, such as congestions and noise (Botteldooren et al., 2011; Dawkins et al., 2015; Leslie & Cerin, 2008; Youssoufi et al., 2020), high residential density (Bramley et al., 2009; McCulloch, 2012), underdeveloped pedestrian infrastructure (Lee, 2022; Leslie et al., 2005), as well as the deficiency of cycling infrastructure (Al-Ali et al., 2020) and open public and green spaces (Basolo & Strong, 2002; Zhao et al., 2022) negatively affect neighborhood satisfaction.

In contrast, the wide street sections in Limans were originally designed to accommodate spacious bicycle and pedestrian paths, prioritizing safety and distancing buildings from motor traffic. Such street network quickly adapted to meet contemporary traffic demands and public transportation needs. Meanwhile, the open block structure facilitated the development of an auxiliary pedestrian network. Limans also retained their prominent 'socialist trait'—undefined plots that treat the area between buildings as a common good, forming a rich networks of playgrounds, sports fields, gathering places equipped with benches, and greenery, which are accessible to everyone. Respondents from Limans acknowledged the efforts of socialist planners, supporting the argument that residents of LHEs highly appreciate the quantity and accessibility of open public and green spaces (Dekker & van Kempen, 2009; Dekker et al., 2011): "This is a peaceful neighborhood with a lot of greenery, […] and traffic that is distanced from buildings. Somebody truly cared about the life of residents when planning it" (male, 65 + , Liman III); "[Liman II] was built in the times when the open space requirements were respected" (male, 35–44, Liman II). The significantly lower level of satisfaction with pedestrian infrastructure, pedestrian safety, access to playgrounds, and provision of street furniture in Liman III compared to Liman II can be attributed to the influence of the post-socialist planning practice. It may also partially explain the statistically significant differences between all three case study areas in the mentioned aspects, with Liman II being ranked the highest and Grbavica—as a true product of investor urbanism—the lowest. In contrast to Liman II, where there were only a few low-rise infill developments, in Liman III they were much larger in scale and number. The new buildings disrupted the auxiliary pedestrian pathways, eliminated several playgrounds, sports fields, open-airgathering places equipped with benches, parking lots, as well as greenery, while increasing building density and traffic volume. Respondents from Liman III referred to these issues in their comments: "[…] local government and investors have not yet managed to ruin [Liman III] completely, although they have definitely started with these new buildings" (male, 45–54); "[…] now instead of three sports fields, we have a music school, as if they couldn't have built it where there's nothing" (male, 18–24). Despite these concerns, the majority still described their neighborhood as peaceful, green, and well equipped with open public spaces when stating the advantages of dwelling in Liman III.

Although there were no highly significant differences between the case study areas in terms of safety evaluation, respondents from Grbavica were the least satisfied in this regard, verifying the association of safety issues with lower neighborhood satisfaction (Ciorici & Dantzler, 2019; Grogan-Kaylor et al., 2006; Leslie & Cerin, 2008; Mouratidis, 2021a). They complained about insufficient street lighting, narrow streets crowded with parked cars, 'nowhere to run' because of densely built buildings, and occasional after-dark vandalism as aspects that negatively influence their safety. Respondents from Limans generally felt safer, although not completely 'safe', mentioning the presence of stray dogs as a concern. Some elderly criticized the behavior of "youngsters who gather in small parks between the buildings in the evenings, make noise and draw graffiti" (male, 65+, Liman III), confirming that the safety issues may also stem from a generational conflict regarding the use of public space, as Temelová and Slezáková (2014) highlighted. Even though these findings to some extent align with the argument that the

spatial structure and organization of LHEs can negatively affect the feeling of security, primarily due to the size of housing blocks and 'nobody's area' in between (Wassenberg, 2018), they also reveal that the same problem may also arise from fundamentally different planning and design approaches. A statistically significant difference was observed between Liman II and Grbavica in the respondents' assessment of street lighting, with the latter ranking lower, which could be correlated with the perception of safety.

The mentioned variations in the levels of satisfaction between the studied areas might explan the statistically significant differences in the ratings regarding the suitability of the neighborhood for children raising in favor of the two LHEs. Liman II ranked the highest, while Grbavica received the lowest score.

As the perceived aesthetics of the built environment has been identified as an important determinant of neighborhood satisfaction (Florida et al., 2011), respondents were asked to evaluate the appearance of their neighborhood, disclosing another significant difference in favor of Limans. Although LHEs are generally regarded as 'ugly' and 'bland', researchers argue that the perception of their inhabitants is often much more positive (Kovács & Herfert, 2012; Musterd & van Kempen, 2005; Wassenberg, 2018), and this was confirmed by the study. As expected, Liman II received a higher ranking than Liman III, since it is characterized by fewer housing slabs and towers 'painted in gray' and more buildings of 'anti-socialist' design, as described in one comment. Criticism of socialist architecture was expressed by only a few respondents: "Buildings here are so hideous that my eyes hurt when looking at them" (male, 18–24, Liman III). The aesthetics of Grbavica ranked significantly lower—"It seems like someone made [Grbavica] from Lego bricks, but used different sets and colors" (male, 35–44)—which raises concerns about the lack of design regulations at the city level.

A significant difference in the level of satisfaction with neighborhood cleanness was observed between the two LHEs, as well as between Grbavica and Liman II (which achieved the highest score). While the frequency of communal cleaning and maintenance is the same in all three areas, Liman III and Grbavica experience a considerably higher number of daily visits than Liman II due to a higher concentration of non-residential uses, which presumably affects the neighborhood cleanness and its evaluation.

On the other hand, high levels of satisfaction with the accessibility of daily venues and services were noted in all three areas. Respondents identified this feature as one of the main advantages of their neighborhoods, confirming its positive impact on neighborhood satisfaction (Basolo & Strong, 2002; Mouratidis, 2020; Mouratidis & Yiannakou, 2022). The ground floors of the new buildings along Grbavica's main streets were mandated to host non-residential uses. Similarly, the original plans for Limans envisioned the development of service infrastructure, yet its provision was limited due to budgetary constraints. During the post-socialist period, the supply of daily venues and services drastically improved. This was particularly appreciated by elderly respondents who had been residing in Limans since the socialist times: "Everything is close: grocery store, butcher shop, pharmacy, hairdresser, post office, I can reach everything on foot" (female, 65+, Liman II). These results align with the findings for the 65+ population of LHEs in Prague (Temelová & Slezáková, 2014), as well as in Novi Sad (Dragičević et al., 2022).

An additional feature that received relatively high ratings in all three areas was the ease of access to public schools and kindergartens. The two LHEs were initially well-equipped with these public services, while Grbavica preserved the inherited and developed new capacities during the transformation. A significant difference was observed only between Liman II and Grbavica, which can be attributed to the proximity of these services to housing, i.e., shorter distance for residents of Liman II.

In contrast, parking availability received the lowest score (although a statistically significant difference was noted between Grbavica and Liman II), being recognized as the main issue in all three areas, particularly in Grbavica, where off-street parking capacity is insufficient. While Liman III was planned in accordance with the calculation of the required number of parking spots, the transformation of neighboring Grbavica and the introduction of infill developments in lieu of large parking lots have caused the problem of parking availability. The increased demand for parking in Liman II can be linked to the proximity of the university campus and the shopping mall.

In general, the previously discussed variations in the respondents' evaluation of the neighborhood physical characteristics between the case study areas correspond to the objective assessment presented in Table 1. Objective characteristics that have been associated with neighborhood satisfaction are the presence of daily venues and open public and green spaces, residential density, and the location of the neighborhood within the city (Lovejoy et al., 2010; McCulloch, 2012; Mouratidis, 2018, 2020). Although subjective perception and objective assessment frequently do not match (Gruber & Shelton, 1987), respondents highly appreciated the location of their neighborhood and seemed to be well aware of the current state and (un)availability of other features. This suggests that the psychological phenomenon known as the 'sunk cost fallacy', defined as a greater tendency to pursue a choice once an investment has been made (Arkes & Blumer, 1985), did not influence the perception of respondents from Grbavica, i.e., the money they invested in buying their dwellings did not make them biased towards the neighborhood. With reference to residential density, some researchers argue that higher densities have a negative impact on neighborhood satisfaction (Bramley et al., 2009; McCulloch, 2012); yet, for Howley et al. (2009), the source of lower satisfaction is not necessarily density *per se*, but rather other associated factors, such as street noise and congestions. The case of Grbavica confirms both of these viewpoints, as respondents identified overcrowding and traffic issues as disadvantages of their neighborhood. However, the following findings for the social environment in the two Limans may also be interpreted to fit the argument that higher density in some cases has a positive effect on neighborhood satisfaction, since it can strengthen social ties (Mouratidis, 2018).

The comparative analysis revealed that satisfaction with NSE was significantly higher in Liman II and Liman III compared to Grbavica (Table 3). Respondents from the two LHEs were fairly positive about intra-neighborhood social relations and frequency of social interactions with their neighbors, then again, much more so than respondents from Grbavica (Table 5; Scheffe test in Appendix 4). The surveyed Limans' dwellers also demonstrated a significantly higher degree of neighborhood attachment, trust in neighbors, and contentment with intra-neighborhood social relations (with only insignificant differences noted between Limans II and III), thus confirming the association of these social features with greater neighborhood satisfaction (Al-Ali et al., 2020; Ma et al., 2018; Mouratidis & Yiannakou, 2022; Permentier et al., 2011; Weijs-Perrée et al., 2017).

These findings do not necessarily imply that Grbavica's social environment requires major improvement. Strengthening place attachment and social relations in a neighborhood takes time (Keene et al., 2013; Pajvančić-Cizelj & Knežević, 2017; Toruńczyk-Ruiz & Martinović, 2020; Weijs-Perrée et al., 2017), thus it was anticipated that this recently transformed neighborhood, with a much lesser share of long-term residents, would score lower in these aspects than the two LHEs. As nearly 30% of the respondents from Grbavica have resided in their neighborhood for more than 15 years, compared to 70% from Limans, it may be concluded that the length of residence had an impact on the level of satisfaction with NSE in all three areas. However, the findings from Liman II and III regarding the evaluation of neighborhood physical features also confirmed that long-term residents are more familiar with local problems (Lu, 1999), which negatively affects their satisfaction.

**Table 6** Potential mobility and the neighborhood of preference for potential movers

| | Stayers (%) | Potential mobility (%) | Neighborhood of preference for potential movers (%) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Downtown area | Limans | Grbavica | Other multifamily housing | Single-family housing | Not specified |
| Liman II | 89 | 11 | 33.3 | 16.7 | – | – | 50 | – |
| Liman III | 89 | 11 | – | 66.7 | 16.7 | – | 33.3 | – |
| Grbavica | 43 | 57 | 15.7 | 56.2 | – | 9.4 | 15.6 | 3.1 |

### 6.2 Neighborhood satisfaction and potential mobility

The study revealed the relocation intentions, what lies behind them and how they relate to neighborhood satisfaction of the surveyed dwellers (Table 6). Only 11% of respondents from Limans were willing to relocate, primarily due to a preferernce for living in a single-family house. Since the vast majority of them evaluated the neighborhood environment positively, it appears that the surveyed LHEs mainly feature satisfied residents who are living in their preferred neighborhood and have no desire to move out – referred to as 'satisfied stayers' by Herfert et al. (2013).

In contrast, 57% of respondents from Grbavica were willing to relocate, with most of them also being relatively unsatisfied with their neighborhood. More than half chose Limans, considering them as equally well located, yet greener, more spacious, less noisy, more peaceful, and better equipped with public spaces, which indicates the presence of various 'pushing factors' associated with lower residential quality (Wang et al., 2019). Therefore, it seems that despite the diversity of housing options, the outside image of Limans from the late 1980s has endured throughout the post–socialist period, but also that Grbavica has a significant share of dissatisfied residents who feel 'trapped' in their current neighborhood. These findings support the notion that satisfied residents are less likely to move out (Terzano, 2014; Walden, 1998), i.e., neighborhood satisfaction increases the length of residence. They also align with the thesis that neighborhood satisfaction can predict residential mobility and help explain its patterns (Aigbavboa & Thwala, 2018; Boschman, 2018; Permentier et al., 2011; Wang et al., 2019).

### 6.3 Neighborhood satisfaction and housing market position

The research results presented in Tables 2 and 3 and described above might serve as an explanation for the positioning of Liman II and III in the local housing market, yet not for the ranking of Grbavica (Table 1). Assessing solely based on the popular real estate mantra 'location, location, location', one could argue that the average asking prices of flats in all three districts are justified. Location was generally perceived among respondents as the prime advantage of their neighborhoods (open-ended survey question)—it scored higher in Liman II and Grbavica (90% and 85% of respondents, respectively), presumably because Liman III (68%) is more distanced from the city center. However, the similarities end there. The relatively high neighborhood satisfaction and low relocation intentions of respondents from Liman II and III, but also the fact that the majority of respondents from Grbavica willing to relocate would choose Limans, may explain the demand for flats in the surveyed LHEs and justify their pricing.

The research results revealed a discrepancy between the market position of Grbavica and the level of neighborhood satisfaction, hence, one might argue that it is a somewhat overrated residential district. In addition, Grbavica was the preferred neighborhood for less than half of

its surveyed residents, while location and access to daily venues in most cases were seen as the only advantages of dwelling in this area. The explanation for its market position lies within the local context. Firstly, Grbavica was the first residential district in the city to undergo transformation and offer a greater variety of housing options after the fall of socialism. Secondly, flats in newly constructed buildings are more expensive than older housing, being perceived as of higher quality, while also requiring less renovation investments. Furthermore, the location stands out as Grbavica's prime attribute. Finally, it has a large supply of small flats that are higher priced than spacious, but easier to rent, which makes them attractive for investment purposes. However, these findings do now allow general conclusions regarding the relationship between neighborhood satisfaction and neighborhood market position. They only confirm their positive correlation (Jansen, 2014) and partially support the argument that neighborhood satisfaction can be capitalized into housing prices (Blair & Larsen, 2010).

## 7 Discussion and concluding remarks

In a broader sense, this empirical study confirmed well-known findings that residents' positive evaluations of the neighborhood physical characteristics (*e.g*., presence of open public and green spaces, pedestrian-friendly environment, proximity of daily venues, public services, and public transpiration, aesthetics, etc), and features associated with the neighborhood's social dimension (*e.g.,* friendliness, trust among neighbors, neighborhood attachment, etc.) represent predictors of greater neighborhood satisfaction (Abass & Tucker, 2018; Al-Ali et al., 2020; Basolo & Strong, 2002; Ciorici & Dantzler, 2019; Grogan-Kaylor et al., 2006; Lee, 2022; Lee et al., 2017; Leslie & Cerin, 2008; Mouratidis, 2020; Mouratidis & Yiannakou, 2022; Parkes et al., 2002; Permentier et al., 2011; Zhao et al., 2022). In relation to LHEs in CEE cities, the research results correspond to the general conclusions of relevant investigations (Dekker & van Kempen, 2009; Dekker et al., 2011; Herfert et al., 2013; Temelová et al., 2011), showing that residents, even of unrefurbished estates, can be relatively content with their neighborhood environment. Although the level of satisfaction with certain neighborhood features varied between the surveyed LHEs, the research also verifies some more specific findings—the quantity and accessibility of open public, greenery, and daily venues are highly appreciated (Dekker & van Kempen, 2009; Dekker et al., 2011). The small difference in the ratings of neighborhood aesthetics between the two LHEs solely reveals the impact of the shift to 'unorthodox' modernism, still being consistent with the finding that residents evaluate this feature favorably (Kovács & Herfert, 2012; Musterd & van Kempen, 2005; Wassenberg, 2018).

However, the research results diverge from the findings that unrefurbished LHEs in CEE cities have a rather high share of unsatisfied dwellers wanting to relocate (Kovács & Herfert, 2012; Musterd & van Kempen, 2007; Temelová et al., 2011). In contrast, they show that the majority of residents are satisfied stayers, indicating that these estates have a relatively attached population and feature residential stability. The research thus supports the findings of Herfert et al. (2013), who reported only a fairly small share of unsatisfied 'trapped' and 'springboard' dwellers. Given that the vast majority of dwellings in Limans are owner-occupied and that their market prices are up to 20% higher than the average for Novi Sad proper, the residents could afford to move out, but choose not to. Furthermore, the results deviate from the thesis that once the housing shortage is eliminated, unrefurbished LHEs hit the bottom of the housing market and begin to attract households with the lowest incomes (Muliuolytė, 2013). The housing stock in Novi Sad already had a 20% surplus in 2011 and this did not affect the market position of Limans in any way. Finally, when coupled with the local housing market report, the research results can neither confirm nor deny the correlation between the market type—the 'relaxed' and 'tight' dichotomy—and the

popularity of LHEs, their market position, and residents' satisfaction (Kovács & Herfert, 2012). Novi Sad's market can be classified as relaxed due to the hyperproduction of housing during the delayed transition, which substantially diversified the housing options. Yet, it can also be categorized as tight, since LHEs still make up a considerable share of the total housing stock. This duality is a consequence of the different transitional path that Serbia has taken. The study therefore suggests that there are CEE cites with an in-between or 'mixed' housing market type, characterized by diversified housing choices and comparable ratios of socialist and post-socialist housing developments, where LHEs at a crossroads between regeneration and degradation have relatively satisfied residents and maintain their popularity and market position. As housing markets in CEE cities are expected to continue expanding and differentiating despite the type, housing choices will further diversify and residents' expectations in terms of dwelling quality and standards will increase (Herfert et al., 2013; Sendi & Kerbler, 2021), eventually affecting even the satisfied stayers within LHEs. Nevertheless, this process may take time. It thus appears that the short-term development prospects of LHEs in CEE cities with mixed housing markets are not yet threatened and that their market position will likely remain unchanged. On the other hand, various issues might arise in the medium and long run, especially if regeneration is omitted. Hence, how stable is neighborhood satisfaction in LHEs at a crossroads?

During the post-socialist period, CEE LHEs have experienced certain changes. In addition to transforming from monotonous dormitories to more functionally diverse neighborhoods, some have undergone partial of complete regeneration, while some have been excluded from urban regeneration agenda and continued degrading. Yet, their vast public and green spaces have become attractive for infill development and the dwelling quality issues arising from this trend in Serbian, Slovakian, Polish and Romanian cities have recently been discussed (Bogdanović Protić et al., 2020; Kristiánová, 2016; Marin et al., 2021; Szczerek, 2021; Vasilevska et al., 2020). In order to comprehend residents' perception of the changes in the built environment of LHEs at a crossroads between regeneration and degradation and their impact on neighborhood satisfaction, Diamond's concept of 'creeping normalcy' (2005) might be applied. When changes are systemic, comprehensive, and swift, such as in the case of Grbavica's transformation or LHEs' extensive regeneration, they are instantly noticeable and visible, and perceived as essential, thus considerably affecting the daily lives of residents and their satisfaction with the neighborhood environment. In contrast, the experience is significantly different when numerous minor changes are introduced at a slow pace and incrementally, such as in the case of the gradual physical degradation and scattered infill development of the LHEs surveyed. They then go essentially undetected due to slow pace and limited scope, being perceived as 'creeping normalcy'. The adverse effects of small-scale changes on the residential quality in Liman III have already been noted by the planning profession. The research results show that its residents are becoming aware of this impact, which could explain a slightly lower level of satisfaction with NPE compared to Liman II, where spatial constraints impeded large-scale infill developments. To prevent further decline in the residential quality and foster community spirit, a civil initiative named "Let's Save Limans from Concrete" has recently formed in Liman III, underscoring the argument that satisfied residents are more likely to engage in civic activities and advocate for their neighborhood (Grillo et al., 2010; Walden, 1998), as well as participate in community actions and DIY activities (Cirman et al., 2013; Milstead & Miles, 2011). The research therefore suggests that residents' satisfaction in LHEs at a crossroads would not be significantly affected by the laisser-faire approach of local authorities or piecemeal changes in the neighborhood environment, unless the number and/or scale of 'creeping normalcies' reach a critical point, as it could soon be the case with Liman III if the current trend persists. To some extent, this stance supports the argument that the main development trajectory of most CEE LHEs has been and will likely continue to be stability, as noted by Kalm et al. (2023). However, this perspective does not undermine the importance of regeneration strategies and programmes. Rather, it

implies that the experience of 'creeping normalcy' could delay residents' recognition, sustain their levels of satisfaction, and lead local policy- and decision-makers into false assumptions, thereby prolonging or even discouraging the implementation of regeneration programmes. As Permentier et al., (2011, p. 994) noted, a higher level of residents' satisfaction may sometimes paint "too rosy a picture of the neighborhood", while regeneration is not just about the current dwellers, but also about making a neighborhood appealing to non-residents.

A final question addressed in the study was how LHEs at a crossroads rank in terms of residents' satisfaction with their neighborhood environment compared to newer residential districts of similar densities. Urban land is nowadays regarded as a scarce and valuable resource that should be efficiently utilized. From this perspective, the socialist approach to planning of residential districts would be categorized as rather irrational and even unsustainable. Yet, when assessing its outcomes concerning neighborhood satisfaction and comparing them with those of the post-socialist approach, a different perspective emerges. The bottom-up investor urbanism has been chasing square meters that could be sold and showed almost no regard for residents' daily life outside their flats, shaping all post-socialist residential developments in Novi Sad. As the study revealed, residents of Grbavica evaluate the resulting physical characteristics of their dwelling environment less favorably, with a majority expressing their willingness to move out and primarily choosing Limans as their preferred alternative. This indicates where the post-socialist districts stand in comparison to LHEs, at least in this city. It is precisely the neighborhood physical features associated with the socialist approach, particularly the profusion of open public spaces and greenery, wide streets, large distance between buildings, and well-developed pedestrian and cycling infrastructure, which respondents from Grbavica yearned for the most. The research results thus challenge the argument that non-residents evaluate LHEs more negatively than residents (Kovács & Herfert, 2012; Musterd & van Kempen, 2005; Wassenberg, 2018). Based on the insights gathered from this study, however, it is not possible to reach a straightforward conclusion in favor of LHEs. Tight housing markets would likely affirm it, while relaxed ones would deny it. Therefore, further comparative investigations within CEE cities with mixed markets are essential to clarify the position of these estates in terms of their image, reputation, and residents' satisfaction vis-à-vis newer neighborhoods with corresponding residential densities. Still, the study does suggest that people residing in densely built city districts would regard LHEs as appealing dwelling locations. Despite occasional neglect in maintenance, the abundance of open public and green spaces remains their well-preserved, widely recognized, and probably the most appreciated feature. These spaces represent a competitive advantage, especially now after the COVID-19 pandemic rediscovered their significance and value (Mouratidis & Yiannakou, 2022), heightening public awareness of their lack. Hence, it would be topical to investigate how LHEs' dwellers experienced their neighborhood environment during mobility restrictions in comparison to residents of other city districts. Future studies could also measure neighborhood satisfaction in reference to individual or household variables, such as gender, age, socio-economic status, tenure, education level, household composition, and length of residence, providing a valuable resource of information for planning neighborhood interventions. Alternatively, they could focus solely on refurbished estates, yielding insights into aspects that have not been taken into account by local policy- and decision-makers while creating regeneration strategies and programmes. What may also be of interest is to compare neighborhood satisfaction in LHEs between EU and non-EU CEE countries. Such an analysis would likely reveal other layers of influence stemming from diverse transitional trajectories.

# Appendix

## Appendix 1 Questionnaire

**Neighborhood of residence:**

_____

**1. Age group:**
a) 18-24 b) 25-34 c) 35-44 d) 45-54 e) 55-64 f) >65

**2. Gender:**
a) male b) female

**3. Is the flat in which you live in your ownership (or in the ownership of a household member)?**
a) yes b) no

**4. How long do you live in this neighborhood?**
a) < 5 years b) 5 to 15 years
c) 15 to 25 years d) >25 years

**5. For what reasons did you choose this neighborhood as your place of residence?**

_____
_____
_____

| **6. How satisfied are you with the following aspects of your neighborhood (from 1 - *extremely unsatisfied* to 5 - *extremely satisfied*)?** | | | | | |
|---|---|---|---|---|---|
| Functioning of motor traffic (congestions, traffic noise, amount of traffic, etc.) | 1 | 2 | 3 | 4 | 5 |
| Parking availability | 1 | 2 | 3 | 4 | 5 |
| Cycling infrastructure | 1 | 2 | 3 | 4 | 5 |
| Pedestrian infrastructure | 1 | 2 | 3 | 4 | 5 |
| Pedestrian safety | 1 | 2 | 3 | 4 | 5 |
| Access to public transportation | 1 | 2 | 3 | 4 | 5 |
| Access to public schools kindergartens | 1 | 2 | 3 | 4 | 5 |
| Availability of daily venues and services | 1 | 2 | 3 | 4 | 5 |
| Access to green spaces | 1 | 2 | 3 | 4 | 5 |
| Access to playgrounds | 1 | 2 | 3 | 4 | 5 |
| Access to of open spaces for gathering | 1 | 2 | 3 | 4 | 5 |
| Access to open-air sports fields | 1 | 2 | 3 | 4 | 5 |
| Provision of street furniture | 1 | 2 | 3 | 4 | 5 |
| Aesthetics of the built environment | 1 | 2 | 3 | 4 | 5 |
| Neighborhood cleanness | 1 | 2 | 3 | 4 | 5 |
| Street lighting | 1 | 2 | 3 | 4 | 5 |
| Safety | 1 | 2 | 3 | 4 | 5 |
| Suitability for children raising | 1 | 2 | 3 | 4 | 5 |

**7. What do you see as the advantages of dwelling in your neighborhood?**

_____
_____
_____

**8. What do you see as the disadvantages of dwelling in your neighborhood?**

_____
_____
_____

| **9. How often do you have the following contacts with your neighbors? N – *never*, R – *rarely*, S – *sometimes*, O - *often*** | **N** | **R** | **S** | **O** |
|---|---|---|---|---|
| Greeting each other when we meet | | | | |
| Visiting each other | | | | |
| Borrowing small things from each other | | | | |
| Talking about neighborhood issues | | | | |
| Talking about personal things | | | | |
| Organizing joint actions (planting flowers, painting hallways, cleaning yards, etc) | | | | |

**10. How satisfied are you with neighbor relations (from 1 – *not at* all to 5 – *extremely satisfied*)?**
1 2 3 4 5
not at all extremely

**11. How much do you trust your neighbors (from 1 – *not at all* to 5 – *completely*)?**
1 2 3 4 5
not at all completely

**12. Do you feel attached to your neighborhood? (from 1 – *not at all* to 5 – *extremely attached*)?**
1 2 3 4 5
not at all extremely

**13. Would you move out of your neighborhood if you had the chance?**
a) yes b) no

**If *yes*, to which neighborhood?**

_____
_____
_____

**If *yes*, for which reasons?**

_____
_____
_____

## Appendix 2

See Table 7.

**Table 7** Age and gender structure of the sample and population of Novi Sad proper (%)

| Age group | Liman II N = 53 | Liman III N = 53 | Grbavica N = 56 | Novi Sad* |
|---|---|---|---|---|
| 18–24 | 9.43 | 7.54 | 10.71 | 7.83 |
| 25–34 | 16.98 | 18.87 | 19.64 | 16.79 |
| 35–44 | 22.65 | 24.54 | 21.43 | 21.66 |
| 45–54 | 15.09 | 13.20 | 16.07 | 16.90 |
| 55–64 | 15.09 | 16.98 | 12.50 | 15.03 |
| > 65 | 20.76 | 18.87 | 19.65 | 21.79 |
| Gender | Liman II N = 53 | Liman III N = 53 | Grbavica N = 56 | Novi Sad* |
| Male | 47.17 | 43.39 | 48.21 | 46.40 |
| Female | 52.83 | 56.61 | 51.79 | 53.60 |

*PE Informatika: Starosna i polna struktura stanovništa Novog Sada (Age and gender structure of the population of Novi Sad). Retrieved from https://www.nsinfo.co.rs/en/starosna-polna-struktura-stanovnistva

## Appendix 3

See Table 8.

**Table 8** Differences in the satisfaction with particular features of the neighborhood physical environment (Scheffe post-hoc test)

| | | Liman III Grbavica | | | |
|---|---|---|---|---|---|
| | | Mean difference | *p* | Mean difference | *p* |
| Functioning of motor traffic | Liman II | −0.18 | 0.761 | 1.14 | < 0.001** |
| | Grbavica | 0.96 | < 0.001** | | |
| Parking availability | Liman II | −0.39 | 0.223 | 0.33 | < 0.001** |
| | Grbavica | −0.72 | 0.005** | | |
| Cycling infrastructure | Liman II | 0.00 | 1.00 | 1.61 | < 0.001** |
| | Grbavica | −1.61 | < 0.001** | | |
| Pedestrian infrastructure | Liman II | 0.57 | 0.039* | 1.45 | < 0.001** |
| | Grbavica | −0.87 | 0.001** | | |
| Pedestrian safety | Liman II | 0.69 | 0.008** | 1.36 | < 0.001** |
| | Grbavica | −0.67 | 0.010* | | |
| Access to public transportation | Liman II | 0.54 | 0.161 | 0.98 | 0.002** |
| | Grbavica | −0.46 | 0.246 | | |
| Access to public schools and kindergartens | Liman II | 0.44 | 0.423 | 1.06 | 0.007** |
| | Grbavica | −0.62 | 0.164 | | |
| Availability of daily venues and services | Liman II | 0.46 | 0.282 | 0.33 | 0.504 |
| | Grbavica | −0.13 | 0.287 | | |
| Access to green spaces | Liman II | 0.19 | 0.733 | 1.35 | < 0.001** |
| | Grbavica | −1.35 | < 0.001** | | |
| Access to playgrounds | Liman II | 0.79 | 0.008** | 1.86 | < 0.001** |
| | Grbavica | −1.07 | 0.000** | | |
| Access to of open spaces for gathering | Liman II | 0.26 | 0.566 | 1.55 | < 0.001** |
| | Grbavica | −1.29 | < 0.001** | | |
| Access to open-air sports fields | Liman II | 0.52 | 0.105 | 1.77 | < 0.001** |
| | Grbavica | −1.26 | < 0.001** | | |
| Provision of street furniture | Liman II | 0.68 | 0.008** | 1.39 | < 0.001** |
| | Grbavica | −0.71 | 0.005** | | |
| Aesthetics of the built environment | Liman II | 0.50 | 0.061 | 1.20 | < 0.001** |
| | Grbavica | −0.70 | 0.004** | | |
| Neighborhood cleanness | Liman II | 0.52 | 0.040* | 0.65 | 0.008** |
| | Grbavica | −0.13 | 0.820 | | |
| Street lighting | Liman II | 0.33 | 334 | 0.72 | 0.006** |
| | Grbavica | −0.39 | 213 | | |
| Safety | Liman II | −0.11 | 888 | 0.43 | 0.174 |
| | Grbavica | 0.54 | 0.034* | | |
| Children raising in the neighborhood | Liman II | 0.07 | 0.965 | 1.35 | < 0.001** |
| | Grbavica | −1.27 | < 0.001** | | |

**$p \leq 0.01$; *$p \leq 0.05$

## Appendix 4

See Table 9.

**Table 9** Differences in the satisfaction with particular features of the neighborhood social environment (Scheffe post-hoc test)

| | | Liman III | | Grbavica | |
|---|---|---|---|---|---|
| | | Mean difference | *p* | Mean difference | *p* |
| Satisfaction with intra-neighborhood social relations | Liman II | 0.32 | 0.218 | 0.95 | < 0.001** |
| | Grbavica | −0.63 | 0.003** | | |
| Trust in neighbors | Liman II | 0.20 | 0.522 | 0.78 | < 0.001** |
| | Grbavica | −0.57 | 0.006** | | |
| Neighborhood attachment | Liman II | 0.45 | 0.054 | 1.18 | < 0.001** |
| | Grbavica | −0.64 | 0.039* | | |
| Frequency of social interactions with neighbors | Liman II | 0.49 | 0.895 | 5.1 | < 0.001** |
| | Grbavica | −4.62 | < 0.001** | | |
| *Frequency of social interactions with neighbors (individual items)* | | | | | |
| Greeting each other | Liman II | 0.07 | 0.946 | 0.83 | < 0.001** |
| | Grbavica | −0.76 | 0.001** | | |
| Visiting each other | Liman II | 0.04 | 0.988 | 0.93 | 0.001** |
| | Grbavica | −0.89 | 0.001** | | |
| Borrowing small things | Liman II | 0.13 | 0.866 | 0.78 | 0.006** |
| | Grbavica | −0.65 | 0.023* | | |
| Talking about neighborhood issues | Liman II | 0.14 | 0.852 | 0.79 | 0.009** |
| | Grbavica | −0.64 | 0.039* | | |
| Talking about personal things | Liman II | −0.18 | 0.741 | 0.79 | 0.003** |
| | Grbavica | −0.97 | < 0.001** | | |
| Organizing joint actions | Liman II | 0.19 | 0.696 | 1.00 | < 0.001** |
| | Grbavica | −0.81 | 0.001** | | |

**$p \leq 0.01$; *$p \leq 0.05$

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**Conflict of interest** The authors have no conflicts of interest to declare.

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