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Rehabilitation of Mass Housing as a Contribution to Social Equality: Insights from the East-West European Academic Dialogue

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Abstract: Mass housing neighbourhoods (MHN) represent the leading pattern of urban transformation and expansion in the second half of the 20th century, and accordingly evaluation, regeneration and redesign of the MHN represent a necessary and challenging task in the contemporary research context. In the practical scope of MHN rehabilitation, various holistic approaches and design strategies are identified that affirm both ecological transition and social transformation of these urban settings. However, the level of application of such approaches across Europe varies greatly, and requires research initiatives of a comparative nature that open a cross-geographical debate at the European level. Although there is a series of evidence-based studies that define the conceptual framework of MHN, i.e., large-scale housing settlements, through historical-interpretative and chronological analyses, the academic debate on practical and feasible MHN rehabilitation and their sustainable integration into the urban development of cities at European level is underdeveloped. The specific objective of this paper is to establish preliminary insights into the current level of MHN rehabilitation and to identify challenges for further actions through (1) a comparative analysis of MHN role models from the second half of 20th century, and through (2) insights from an implemented expert questionnaire. The research engages a comparative case study analysis as the primary method and analyses MHN in Germany (as a representative of Western Europe) and in the two ex-Yugoslav countries, North Macedonia and Serbia (as representatives of Eastern Europe). This research has highlighted the main obstacles and challenges for MHN rehabilitation and demonstrated the importance of a multiscale approach to MHN analysis, having in mind that through the distribution of design values at the analysed spatial levels (neighbourhood level, building level, and apartment level) the application of affirmative indicators within different design values group is recognised.

Keywords: mass housing neighbourhoods; rehabilitation; housing design values; comparative case study; questionnaire; multiscale approach; Germany; North Macedonia; Serbia

1. Introduction

Mass housing neighbourhoods (MHN) represent the largest share of urbanity and morphological image of the large-scale cities in Europe, and the leading pattern of urban transformation and expansion in the second half of the 20th century. Moreover, they have a significant share of total housing stock across Europe and have a huge significance in

ensuring access to affordable and appropriate housing, reducing socio-spatial polarisation in cities, and finally contributing to social equality. MHNs were built on a cross-section of multifaceted influential factors that equally include feedback between social structure, i.e., demographic, social and economic characteristics of the housing community reflected in the lifestyle of residents, on the one hand, and the physical structure, on the other. These neighbourhoods embody multiple levels of material and immaterial values and are an inseparable part of the local collective memory and urban identity. Identifying the growing trend of market-oriented development in the neoliberal framework of the Western Balkan countries [1], and the significant decay and devaluation of the existing MHN, the paper tends to open a critical dialogue on the prospects of MHN rehabilitation recognizing their capacity to generate an interactive framework for the exchange and production of social capital on a daily level towards inclusive, safe, resilient and sustainable cities and human settlements, as phrased in the Sustainable Development Goal 11 (SDG 11) [2].

1.1. General Background

Housing development faces multiple challenges resulting mainly from globalisation, demographic changes, climate change, degraded urban environment and the economic crisis. In this framework, The Housing Partnership Action Plan [3] recognises that the cities are affected by the housing crisis in a specific way. Moreover, the current Renovation Wave for Europe [4] indicates that, in addition to the unprecedented growth in the global building sector, 85–95% of the buildings that exist today will still be standing in 2050. That is why the continuous re-examination of current research approaches concerning evaluation, regeneration and redesign of the MHN represents a necessary and challenging task for researchers, educators, policymakers and practitioners in the field of architectural and urban design. This is confirmed by a series of affirmative and research-stimulating declarations, policy positions and strategies aimed at the practical arena of housing development towards realising the Right to Adequate Housing [5]. According to Housing 2030 Initiative ‘large-scale housing renovation programmes are essential to meeting the goals of the Paris Agreement and related SDGs’ [6] (p. 129), and in this framework rehabilitation of MHN requires an understanding of the drivers of (un)equality, which can be found in the interaction of social and spatial patterns followed by the impact of politics and economy. In this sense, drivers of MHN rehabilitation differ between countries, cities and even neighbourhoods.

According to Housing Europe members [7], despite raising awareness of the importance of social and affordable housing, there is a need to EU housing policy framework further turn to long-term, inclusive strategies aimed at (1) fostering both social and economic recovery, and (2) renovating existing housing stock more than deals with new construction resources. Highlighting that housing markets and housing policy are in an interdependent relationship to each other and recognising general challenges and specific problems of housing provision on EU level, Krapp et al. [8] listed following drivers of the current housing policy: energy efficiency requirements and urbanisation, immigration and refugee crisis, and ageing society and decreasing household sizes. These drivers indicate the changing nature of housing policy based on [9] (1) subscribing key principles of ‘adequate housing’, (2) developing smart regulation in housing, (3) enhancing integration of housing provision into social well-being and economic policy and (4) aligning housing policies with the resilient city agenda. In this framework, European Parliament Resolution on Access to Decent and Affordable Housing for All highlighted an integrated approach to social, public and affordable housing at EU level. The European Parliament calls for a ‘sustainable approach to urban land use, for instance giving priority to the rehabilitation of abandoned houses over the building of new ones’ [10] (p. 21) thus demonstrating the need to consider ‘RE’ design and planning strategies to improve the standards of the existing housing stock.

According to the Global Housing Agenda, we are in the era of the repositioning of housing at the centre of national and local urban agendas, and accordingly in a paradigm shift in the thinking and practice of housing development [11]. The ‘Housing at the

Centre' approach [11] is developed on the basis of series of UN-Habitat initiatives since the Vancouver Declaration for Human Settlements (1976) [12], the Global Shelter Strategy for the Year 2000 (1992) [13], the Istanbul Declaration and the Habitat Agenda (1996) [14] and more recently in the framework of the 'Global Housing Strategy' (GHS) [15], as a collaborative movement towards adequate housing for all.

1.2. MHN Rehabilitation Challenges

The urban regeneration of MHN, in the broadest sense, represents a process of spatial and cultural renewal and rehabilitation of urban housing at the multiscale level—from the regional scale of the city to a single housing unit and activity space of the user. This research starts from the notion that architecture is a materialised culture, and if the changes in the socio-cultural sphere of urban life are reflected in the functional and physical sphere of its structure, then the spatial framework of MHN is one of the most vital and expressive indicators of complexity and contradictions of urban transformation (both in sense of physical structures transformation and transformation of urban lifestyles). In this notion, the process of regeneration increasingly requires awareness of the importance of the social component of sustainability—which means to focus on meeting the needs of the most valuable human resource: the diverse structures of population in a wide range of urban lifestyles.

The regeneration of MHN is a process that involves spatial and cultural transformation of inherited mass housing landscape in which all vital functions of the housing community are maintained without compromising the foundations on which they are based, both in the domain of community institutions, means of production, infrastructure, natural and human resources, as well as in the domain of character and identity of the inherited large scale urban settlements. It implies the ability of the urban environment to provide a modern, healthy and quality life while preserving the character and identity of the inherited urban structure.

In the practical scope of MHN rehabilitation, various holistic approaches and design strategies are identified that affirm both ecological transition and social transformation of these urban settings: (1) the application of technological innovations aiming to reduce CO₂ emissions with different learning mechanisms [3], (2) the soft urban renewal as decentralised and interdisciplinary approach, that prioritise affordability and social inclusion objectives [6], and (3) refurbishment strategy for vital neighbourhoods where architecture is positioned as a socially responsive process [16]. However, the level of application of such approaches across Europe varies greatly, and requires research initiatives of a comparative nature that open a cross-geographical debate at the European level. Although there is a series of evidence-based studies that define the conceptual framework of MHN, i.e., large-scale housing settlements [17–21], through historical-interpretative and chronological analyses, the academic debate on practical and feasible MHN rehabilitation and their sustainable integration into the urban development of cities at European level is underdeveloped.

The Geneva UN Charter on Sustainable Housing recognises that 'positive impact of housing can be increased through the application of principles of environmental protection, economic effectiveness, social inclusion and participation, and cultural adequacy' [22] (p. 5). Having an insight into the current paradigm shift of housing development and its position in overall urban development agendas on local and global scale, the identified principles could also be perceived as challenges for MHN rehabilitation. First, environmental protection advocates to achieve a highly energy-efficient and decarbonised housing stock supported by the Green Deal and climate-neutral approach. The creation of climate-responsive housing through implementation of green building materials and construction technologies, and by implementing risk-mitigating design is at the core of this challenge. Second, economic effectiveness is identified in line with the increased investment in sustainable housing promoted through private and public investments including public–private partnerships, and is especially challenged by the rehabilitation of the existing housing stock

in order to combat climate change by improving energy efficiency. Third, social inclusion and participation is a challenge with regard to the sociological dimension of MHN and the modernist idea of co-creation. At this point, it is important to open a critical dialogue on transformation strategies for adaptation to current needs towards liveability of urban space and well-being of its residents [23]. Fourth, cultural adequacy derives from the expression of cultural identity in MHN. This notion specifically refers to the perception of MHN as ‘heritage’ highlighting the role that these play in ‘rehabilitating and revitalising urban areas and in strengthening social participation and the exercise of citizenship’ as phrased in the New Urban Agenda [24] (p. 13).

Rethinking how the MHN, from the regional level to the user activity level, can be shaped to have a positive impact on all social dimensions is at the core of a growing approach—designing for social equality. By considering MHN rehabilitation challenges, it is recognised that the application of architectural design to advance social equality can be a link for balancing and further strengthening all components of sustainable urban development. In the research of these aspects, the dominant engagement of multi-methodological approaches is recognised: (1) For exploring the social sustainability related to urban regeneration processes [25]; (2) for addressing spatial inequality through neighbourhood-based regeneration and community participation [26]; and (3) for developing the concept of socially integrative city aligned with the regeneration policies [27]. Through defining social equity in the context of urban resilience, Meerow et al. [28] identified a tripartite framework of social equity that includes distributional, recognitional and procedural equity dimensions: (1) equitable distribution of resources, (2) acknowledgement of different social groups, and (3) equitable involvement in participatory processes. This framework opens perspectives for strengthening the social dimension of sustainability in the process of MHN rehabilitation, and indicates the need to understand the MHN value framework. Accordingly, our study opens a multi-methodological research direction: to establish the state-of-the-art of MHN rehabilitation, to understand the design values that influenced the formal and functional determination of MHN, and to understand perspectives for further action.

1.3. Paper Outline and Objectives

Based on the identified challenges of the MHN rehabilitation derived from the perspectives on declarations and policies, and current academic thoughts, several research gaps were identified: (1) Lack of enhancement of social equality as a key aspect in achieving sustainability of MHN; (2) the need for creating innovative approaches that connect participatory practices and design; and (3) disconnection of substantial and procedural aspects of MHN rehabilitation. In addition to that, a gap is also perceived in the insufficient connection between rehabilitation design strategies and real conditions of existing MHN, mainly in (1) design-based issues—resulting from inconsistent development of design strategies for rehabilitation which support equal enhancement of all dimensions of sustainability, and (2) context-based issues—insufficient knowledge derived from comparative studies from different geographical contexts. In order to overcome these issues, the paper engages cross-geographical research dialogue for gaining wider insight into current MHN rehabilitation practices and aims to develop a multi-scale comparative overview of MHN rehabilitation (potentials and obstacles) in Germany, North Macedonia and Serbia.

The specific objective of this paper is to establish preliminary insights into the current level of MHN rehabilitation challenges for further actions through (1) a comparative analysis of MHN role models from the second half of 20th century, and through (2) insights from an implemented expert questionnaire. Following these objectives, two research questions arise: (1) what are the differences in design values and current conditions of MHN in line with the differences of cultural and political background of the studied countries, and (2) what are the main obstacles and potentials, as well as appropriate design strategies for MHN rehabilitation?

The first part of the paper presents the research context. It provides an insight into the project *Rehabilitation of Mass Housing as Contribution to Social Equality* implemented within the DAAD programme *East-West Dialogue: Higher Education Dialogue with Western Balkan Countries*, explaining the position of the analysis within the comprehensive project framework. The second part of the paper presents the materials and methods applied in this research including a general research conceptualisation, an explanation of the comparative case study analysis and the case study selection, as well as an explanation of the questionnaire structure and content. The third part of the paper presents the results and discussion divided into two parts: (1) insights from comparative analysis of the identified case studies in Germany, North Macedonia and Serbia, and (2) insights from the expert questionnaire through in-parallel discussion of findings on the level of geographical coverage of study and on the level of individual countries. The conclusion summarises the findings and highlights the essential aspects for MHN rehabilitation towards social equality.

2. Research Context: RE-MHN Project-DAAD Higher Education Dialogue

The research context of the paper is positioned within the project *Rehabilitation of Mass Housing as a Contribution to Social Equality* implemented within the DAAD programme *East-West Dialogue: Higher Education Dialogue with Western Balkan Countries*. The project was initiated by Technische Hochschule-Ostwestfalen-Lippe (TH OWL)-Institute for Design Strategies (IDS), Germany in collaboration with the University of Belgrade-Faculty of Architecture (UB-FA), Serbia and the University Ss. Cyril and Methodius (UKIM)-Faculty of Architecture, North Macedonia. One of the main purposes of this project is to discuss the potentials that MHN have for their region and community, the possibilities they provide spatially, and to evaluate and further develop inspiring ways to maintain, re-use and revitalise them, based on selected case studies. Furthermore, it proposes enhancing and testing innovative research practices for rehabilitation of MHN, through the involvement of students, academics and professionals from the field, introducing them into local communities' processes. It strives to enhance the competences and motivation of both academics and civil society to become real actors of environmental and social change. The target groups (local citizens, students and professionals in the field of architecture and urban design) need a specific training and enhancement within the framework of rehabilitation of the MHN: (1) a new profile of a MHN citizen, a community member that is trained in the broad social domain, who owns participatory and collaborative skills and, therefore is equipped to contribute to social equality, and (2) a new profile of architectural educator and professional capable of assuming the responsibility for the improvement of education and training of the future architects to enable them to meeting the expectations of the 21st-century societies worldwide for sustainable human settlements in every cultural milieu. The project strives to establish a unique, socially oriented strategy that would enable a creation of new professional and citizen profiles through encouraging their on-site interaction by implementing a series of on-site community-oriented events (workshops), active participation in relevant thematic events (seminars) and knowledge-based exchange (institutional mobility/study trips) targeting both local and regional support towards East-West Dialogue (Figure 1). It is expected that the project will provide a deeper understanding of the MHN, their potential and influential role in ensuring a just, inclusive and sustainable socio-spatial transformation of the region and beyond. The multi-national, multi-institutional and multi-sectoral collaboration will stimulate and facilitate dialogue as an inclusive medium where different approaches and priorities are discussed and compared, with the aim to encourage the development of new methods and solutions. The final outcome of the project would exhibit the image of the current situation and possible solutions for MHN in the target countries, informing and further enhancing the profession as well as the policymakers.

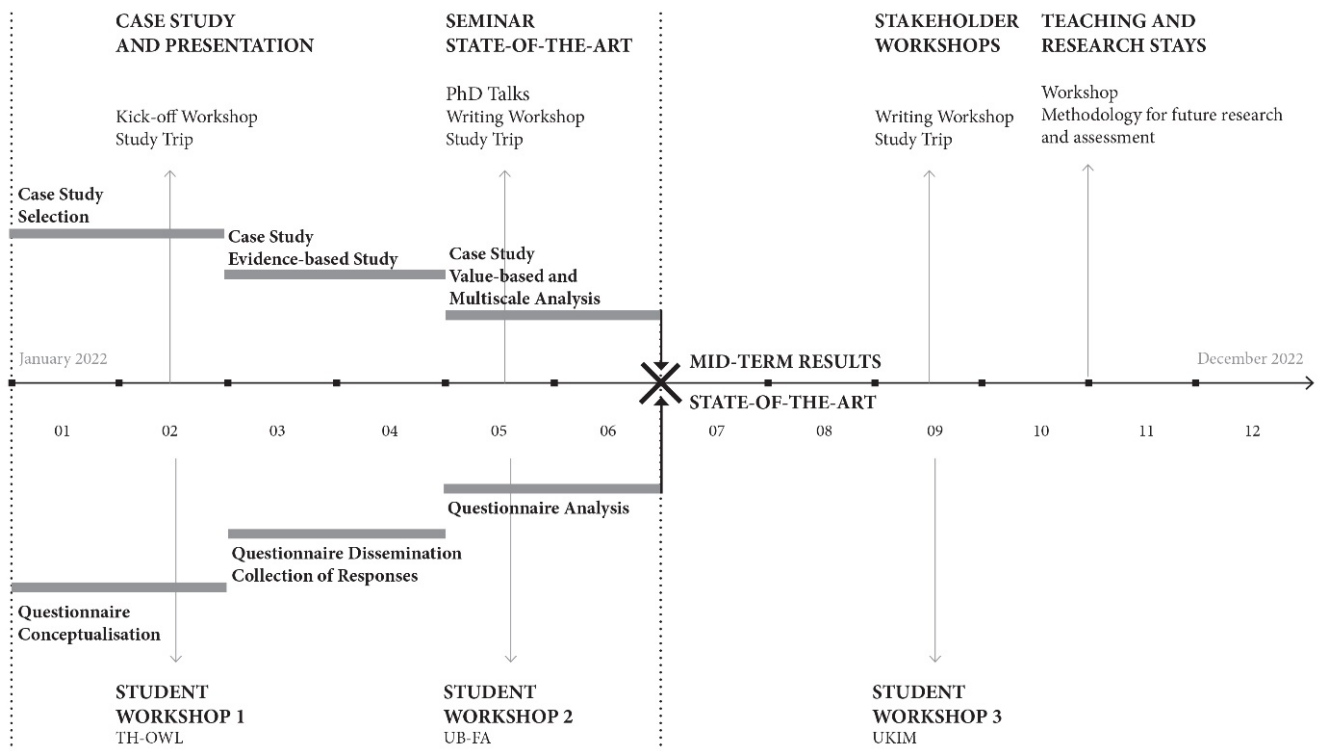


Figure 1. Activities timeline RE-MHN project-DAAD Higher Education Dialogue.

3. Methods and Materials

3.1. Research Conceptualisation

The construction of MHN was a common practice for East and West European countries, namely during the period of rapid urban growth in 1960s and 1970s [17]. Both ‘East’ and ‘West’ in Europe were in agreement that housing was a matter of all-embracing community concern [29]. The conceptual framework of MHN could be defined through a three-fold dimension including: (1) a morphological dimension: ‘a form and landscape characterised by clusters of blocks and towers in a space subjected to the zoning rules’ [30], (2) a scale dimension: ‘constructed as a planned, single development on a large scale for a local context’ [31], and (3) a sociological dimension: ‘modernist urban and social utopias that would solve a variety of urban problems’ [32]. Broadly, European MHN practices differ in Northern/Western and Southern/Eastern European countries [32]. According to [20] these differences can be primarily identified in relation to the urban policies, the impact of industrialisation on building construction, as well as the ‘capitalist’/‘socialist’ dichotomy. In this framework, our research perceives MHN as a common phenomenon in Europe with the intention to challenge and decode the differences between East-West European countries not only on an evidence-based level but also through a twin-track approach—preventive and curative—opening perspectives for MHN rehabilitation.

The research engages a comparative case study analysis as the primary method and analyses MHN in Germany (as a representative of Western Europe) and in the two ex-Yugoslav countries, North Macedonia and Serbia (as representatives of Eastern Europe). The research was conducted in two synchronised phases: (1) the comparative MHN case study analysis, and (2) the expert questionnaire. The following sections explain in more detail the process and approach of both research phases.

3.2. Comparative Case Study Approach

This study engages a comparative case study approach, identifying representative examples for each country in order to reveal leading features of MHN and contribute to decoding differences between East and West European experiences in MHN rehabil-

itation. The first phase of the comparative case study approach is selection-based and focuses on identifying relevant examples for each of the countries based on the following criteria: (1) construction period—mid-1960s and mid-1970s, (2) typo-morphological aspects—modernist MHN integrating high-rise, slabs and other typical post-war modernist mass housing typologies, (3) scale and dimensions—large-scale MHN with a possibility for multiscale approach, (4) geographical-administrative aspect—capital city MHN. After the selection of the cases, an evidence-based study was conducted through collecting and systematising primary data on the development of the three MHN: (1) Märkisches Viertel in Berlin, Germany, (2) Aerodrom Settlement in Skopje, North Macedonia, and (3) Block 23 in New Belgrade, Serbia.

In order to conduct a comprehensive analysis of the MHN cases from the involved countries, two main cross-cutting tracks were established: (1) analysis in line with architectural programming/design values (Value Analysis Track) and (2) analysis in line with spatial levels/scales (Multiscale Analysis Track).

The Value Analysis Track is based on the value matrix established within the context of architectural programming methodology (Table 1). The value-based architectural programming approach starts from the statement that the primary responsibility in the design process is the articulation of values which are perceived as ‘those beliefs, philosophies, ideologies, understandings, purposes or other deeply rooted ideas’ [33,34], which are the reason for creating a design solution and which influence the designed architectural framework (in this particular case designed MHN). This analysis track was performed through identifying the values’ relevance/irrelevance for the development or identifying a particular value as a concept generator for the MHN design process.

Table 1. Architectural programming value matrix according to Hershberger [33].

Values	Environmental	Human	Social	Systemic	Temporal	Economic	Aesthetic
Indicators	location climate urban context regional context	physical physiological psychological functional	cultural legal common	materials technologies processes	growth change constancy	building costs operationalisation maintenance	form space style tradition

The Multiscale Analysis Track is based on the relevant spatial levels for MHN and the specific typo-morphological framework of the engaged case study: (1) urban/neighbourhood scale (an assembly of city blocks or a neighbourhood/district/block), (2) building scale (an assembly of spatial units or rooms), and (3) apartment scale (an assembly of activity/behaviour settings). These cross-cutting tracks are the starting point for value-based and multiscale analysis conducted through the following steps: (1) critical analysis of programming/design values—for each of the spatial levels (scales) the importance of design values/indicators in the design process of MHN was identified through marking the following indexes: focus (primary/generator) indicator (●); affirmative indicator (+); and not considered indicator (X), and (2) multiscale cross-cutting analysis—numerical values are defined for each of the indexes: focus (primary/generator) indicator (1); affirmative indicator (0.5); and not considered indicator (0) and accordingly three spider charts were created, which are the basis for the comparative analysis of design values on different spatial levels.

3.3. Case Studies—Germany, North Macedonia and Serbia

3.3.1. Serbia—Block 23: New Belgrade

Block 23 is located in the Central Zone of New Belgrade, a modernist city on the left bank of the Sava within the administrative territory of the city of Belgrade. Extensive construction of New Belgrade began in 1950 with a basic vision of the development of the new city as the geometric and functional focus of the future millionaire city of Belgrade [35]. Already in the first post-war deliberations of city planners, the central zone of New Belgrade

was intended for the construction of residential and large-scale public buildings with the building of the Federal Executive Council of Yugoslavia (today's Palace of Serbia) as the main axis. The comprehensive structure of the central zone of New Belgrade is based on a strictly defined orthogonal network of urban traffic longitudinals and transversals, as well as as monumental and symmetrical compositional relationships of buildings.

Due to the importance of the central blocks for achieving the highest quality construction of New Belgrade, a general Yugoslav competition was organised in 1968 for the architectural solutions of all buildings. The urbanistic conception of Block 23 was developed within the Urban Institute of the City of Belgrade, while the authors of the architectural conception are Yugoslav architects Aleksandar Stjepanović, Božidar Janković and Branislav Karadžić, whose solution was the first prize in the competition. The construction of the block began in 1969, while the completion of construction was in 1976.

The Block 23 is rectangular in shape, measuring 600×400 m, with an area of about 19 ha. About 2100 apartments were built in the block (1929 according to the project program), for the planned 7560 inhabitants, the population density is 395 inhabitants/ha. The block was designed and built as an investment of the Yugoslav People's Army, and until the privatisation of the fund in the 1990s, it was in the fund of the Military Construction Directorate. The project achieved optimal capacities of residential buildings, complementary facilities, traffic areas and greenery for the modern organisation of the life of the inhabitants [36]. The block is organisationally conceived as a local community. The spatial composition of Block 23 is also based on the general features of the conceptual design of the central zone of New Belgrade, including the following principles: groups of residential towers at the corners of the block, rows of multi-storey buildings that follow the main boulevards, low-rise construction inside the block such as residential buildings up to four floors, primary school, preschools and the centre of the local community (Figure 2). In this sense, Block 23 contains a variant of the same typology of the towers, slabs and meanders, mirrored from Block 21 in relation to the imaginary central axis of the whole New Belgrade Central Zone in the east–west direction.



Figure 2. Block 23: New Belgrade—(a) Planning Framework (left) [37], (b) Contemporary photo (right), source: Anica Dragutinovic (photograph taken by Zorana Jovic for the student workshop 'Reuse of Common Spaces of New Belgrade Blocks: Co-designing the Urban Commons', Belgrade, September 2020).

Block 23 has become globally known as an icon of brutalist architecture, and due to the specific solution of facade elements that form a kind of concrete lattice on the facade, it was also called 'concrete baroque' [38] (Figure 3). Today, buildings and public areas are in a very bad condition, due to poor maintenance and dilapidated elements. Numerous partial changes on the facades and roofs, extensions, changes in carpentry and glazing of terraces are visible. The biggest problems are damage to concrete elements, delamination and corrosion of reinforcement, dilapidated flat roofs and terraces, but also arbitrary

interventions on structural elements. The block has an active local community, which have initiative on managing common public spaces within the block.

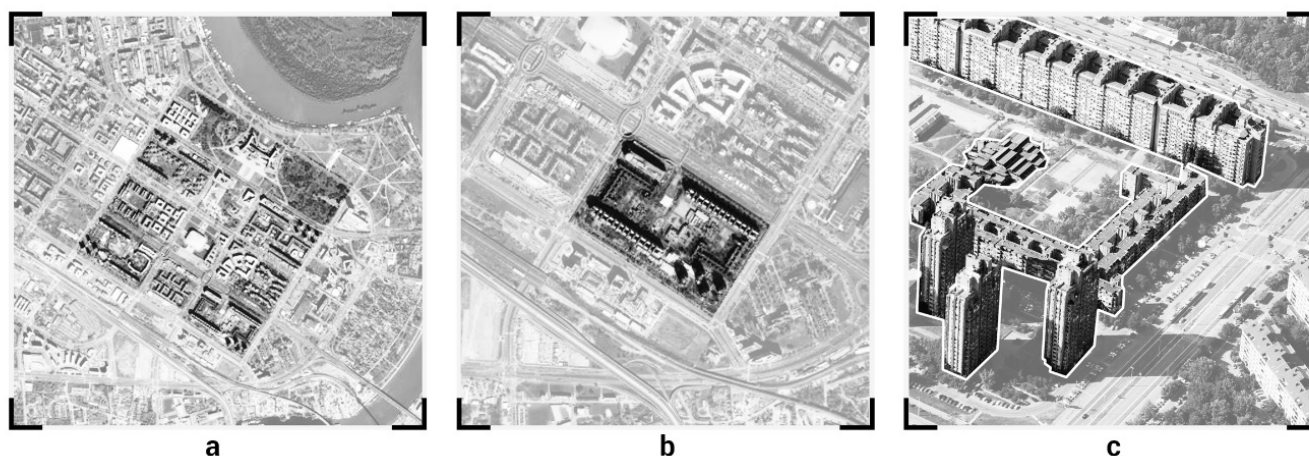


Figure 3. Central zone of New Belgrade, Block 23 (Serbia): (a) Urban morphology of MHN, (b) Urban pattern of MHN and (c) MHN building typologies. Source: Authors, adapted from Bing Maps.

3.3.2. North Macedonia–Aerodrom: Skopje

The Aerodrom settlement is a mass housing neighbourhood situated in the eastern part of Skopje. The first residential units on the territory date back to the post-war period, representing a logical extension of the city towards east. However, what today could be recognised as the most distinguishable built structure within Aerodrom was constructed during the late 1970s and 1980s in order to meet the housing needs and much of the predicted/expected growth and development of the city after the earthquake in 1963.

For Skopje, the earthquake in 1963 was a key milestone for urban and architectural transformation. With 70–80% of the total built fund completely destroyed or damaged beyond repair (81% of the total housing fund), the scope and the seriousness of the problem required development of a thorough strategy for the city reconstruction and expansion. At the same time, it presented an opportunity to raise the standard of living. With the growing number of residents and the policy of an ‘open city’, the demographic analysis predicted 154.000 new inhabitants whose housing needs were to be met by the early 1980s [39]. The new Aerodrom mass housing neighbourhood, designed for 81.000 inhabitants, was supposed to meet more than half of the projected needs.

The choice of the location for this massive endeavour was subject of a thorough ‘threshold analysis’ [40], in order to identify the topographic limitations, seismological and hydrological suitability of the ground (one of the primary concerns after the earthquake), as well as the positions of the existing industries as a main source of employment. In 1974 (from May until October), seven relevant architectural and urbanistic institutions from former Yugoslavia participated in the invited competition for conceptual urban design, and the first prize was awarded to the Yugoslav Institute of Urbanism and Housing.

The winning proposal, later constructed with minimal changes and adjustments was a late-modern, post-functionalist MHN, organised in double horseshoe shape units that form a porous perimeter block. Each ‘horseshoe’ consists of free-standing buildings of various typology—residential towers and higher elongated blocks oriented towards the main boulevards and inner, lower housing units oriented towards the common greenery (Figure 4). The diversity of structures on the one hand tended to evade (or decrease) uniformity and repetitiveness of identical elements, and on the other, to introduce a variety of scales and housing typologies—from high-rise lofts to family apartments with small individual gardens.



Figure 4. Aerodrom: Skopje—(a) Planning Framework (left) [41], (b) Contemporary photo (right), source: Mihajlo Stojanovski.

In addition to the diversity of buildings, a successful gradation of space was envisaged (and later to certain extent implemented) in attempt to bring the whole complex closer to human scale and provide symbiosis between the built and unbuilt space: inner pedestrian streets, small gardens, organised greenery, all the way to vast open green spaces. In the final realisation, the housing units were consistently built, while the neighbourhood centres and the public spaces lacked some of the public content envisioned in the development plan (e.g., the educational infrastructure was halved in number, the neighbourhood centre was built much later, while the vast open spaces were never articulated as planned). Despite the fact that soon after the construction (mainly due to the size, the number of flats/inhabitants and the general absence of public facilities) the settlement was often called the ‘city bedroom’, during the long years of post-socialist transition, when the city abruptly and highly uncritically began to densify under the pressure of the private investment, this neighbourhood showed remarkable resilience. The stability of the urban form (Figure 5), the quality of the built structure as well as the high ratio/percentage of open space make it still one of the most desirable neighbourhoods.

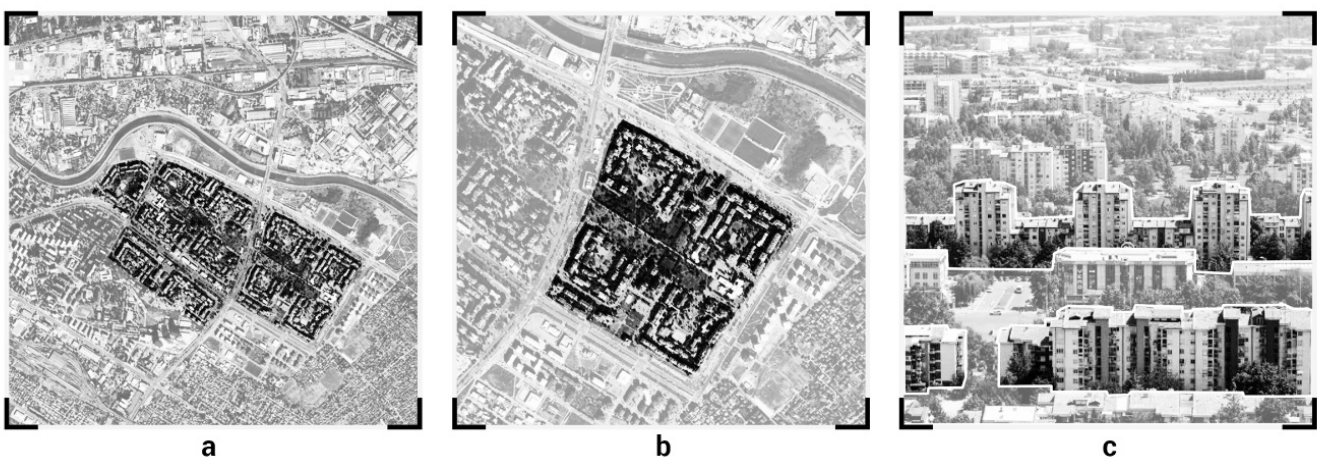


Figure 5. Aerodrom Settlement (North Macedonia): (a) Urban morphology of MHN, (b) Urban pattern of MHN and (c) MHN building typologies. Source: Authors, adapted from Bing Maps.

3.3.3. Germany–Märkisches Viertel: Berlin

The Märkisches Viertel is the largest MHN in West Berlin, planned and built in the period 1963–1975. In the planning area of 370 ha (see Figure 3) architects Werner Düttmann, Georg Heinrichs and Hans C. Müller planned around 16.000 flats and 500 single-family

houses for around 60,000 inhabitants [42]. As indicated in the midterm report from 1967, a detailed sociological studies of the town planning office Reinickendorf completed in 1959 had shown that ‘a comprehensive reorganisation of the area’ is needed. As in the case of the other West Berlin mass housing neighbourhoods—Falkenhagener Feld in the north-west of the Spandau district (1962–1975) and Gropiusstadt in the south-east of the Neukölln district (1962–1975)—the Märkisches Viertel was built according to the urban planning paradigm of *Urbanität durch Dichte* (urbanity through density) [21,43] (Figure 6). The West Berlin MHN aimed at urbanity in this sense, following the principles of Athens Charter such as functional separation and predominance of light and air. The neighbourhoods had communal facilities such as schools, kindergartens, shops and sport centres [21].

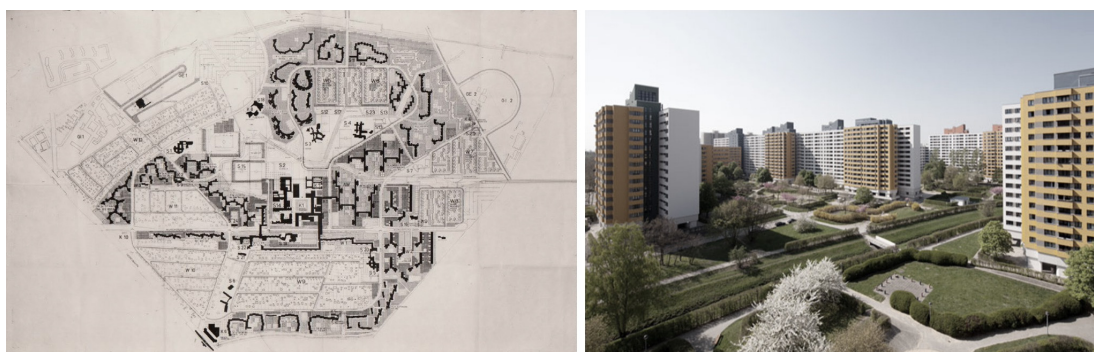


Figure 6. Märkisches Viertel, Berlin, built 1967–1976: original site plan (1967) by Werner Düttmann, Georg Heinrichs and Hans C. Müller (left) and Two images—(1) planning/design framework—original plan, historical plan; (2) contemporary photo after the renovation (right). Sources: Berlinische Galerie, reproduced from Rellensmann and Becker, 2015 (left), Photography © GESOBAU AG, Thomas Bruns, reproduced from <https://www.stadtentwicklung.berlin.de/nachhaltige-erneuerung/maerkisches-viertel>, accessed on 20 May 2022 (right).

The strong tenant culture, or rather ‘tenant-friendly’ housing policies in Germany, influenced the housing market, resulting in the fact that most of the urban dwellers in Germany in the post-war period tended to be tenants, including middle and upper middle class. Even in the beginning of the twenty-first century, 85% of Berlin households still rent their apartments [21]. Nevertheless, as Urban [21] notes, in 1989 only 5% of West Berliners were residents of a large housing estate, compared to about one-third of East Berliners. Thus, the political background and social significance of the MHN was different in West Berlin, compared to East Berlin—as well as compared to the other Eastern European countries under socialism, including Yugoslavia. The MHN in East Berlin ‘evoke memories of the socialist lifestyle connected with bleakness, shoddy workmanship and forced collectivism, but also with modernisation and social equity’ [21]. Different contexts of West Berlin produced different models of large housing estates’ construction and its financing. The so-called *gemeinnützige Wohnungsbaugesellschaften* (non-profit housing associations)—owned by municipalities or other public bodies, and ‘favoured by subsidies and tax breaks’, had a legal remit to provide affordable rental housing [21]. One such state-sponsored institution was GESOBAU, which built, owned and rented the Märkisches Viertel.

Despite the positive public opinion in the first years, already five years after the construction started the reputation rapidly declined. Within an architecture student exhibition titled ‘Diagnosis on the construction in West Berlin’, organised for the fifth Building Fair in 1968, the students ‘tainted the Märkisches Viertel as a textbook example of modernist hubris that entailed both ugly architecture and bad planning, and accused the local government, in alliance with housing associations and architects, of exerting totalitarian rule over the built environment’ [21]. German magazines and papers followed up, contributing to the creation of an infamous image of the neighbourhood (Figure 7). ‘With several decades of historical distance, it is clear that the ‘architectural debate’ over the Märkisches Viertel, and by extension over other large estates, was about anything but architecture’ [21]. However,

at the beginning of the 1980s, once the communal facilities, parks and playgrounds were completed and other technical repairs conducted, the residents' satisfaction was on the rise. Statistics from that period reveal that 69% of residents were 'pleased' or 'very pleased' with their environment (Institut für Markt und Medienforschung as cited in [21]).



Figure 7. Märkisches Viertel, Berlin (Germany): (a) Urban morphology of MHN, (b) Urban pattern of MHN and (c) MHN building typologies. Source: Authors, adapted from Bing Maps.

In late 1980s and early 1990s the housing policies went through a set of changes, due to the changed socio-political context in Germany after reunification. This affected the legislation change related to the housing associations, and therefore the tenants' structure. Nevertheless, in the case of the Märkisches Viertel, the flats are still owned and operated by the GESOBAU housing association. The association invested in renewal of the housing estates, which started in 2006 and ended in 2015, renovating the 15,200 flats (which were owned by the association) and refurbishing the buildings in order to improve energy efficiency. The rents rose, but not significantly compared to the other housing estates in Berlin, and the operating costs decreased due to the improved energy efficiency of the buildings. In parallel with this, the revitalisation of the communal facilities, public buildings, parks and playgrounds, funded by the urban development grants of the district Reinickendorf, took place. In February 2021 an upgrade project for the outdoor spaces started, focusing on greening, upgrading of the playgrounds, renewal of paths and lawns and additional lighting (Figure 8). The tenants' structure, in terms of unemployment rate and share of foreign nationals, was close to Berlin average (around 15%) in 2014 [21]. Therefore, social integration in this mass housing neighbourhood in West Berlin is relatively high, compared to the other cases of social and rental housing in West Europe. In the context of increasing social polarisation and inequality in cities, the mass housing neighbourhoods have a key role in providing affordable housing and maintaining the initial social values. As the Senate Department for Urban Development and the Environment announced in December 2021, the program for the Märkisches Viertel in the upcoming years will primarily focus on the social infrastructure projects, to meet the increasing demand as a result of new housing construction and the influx of refugees [44].



Figure 8. Upgrade project for the outdoor spaces in the Märkisches Viertel, Berlin: program of the outdoor spaces (left) and photo of complete playground in the housing group 906/907 (right), source: GESOBAU AG, reproduced from <https://www.gesobau.de/wohnen/rund-ums-wohnen/wohnquartiere/maerkisches-viertel/neugestaltung-der-aussenanlagen-im-maerkischen-viertel.html>, accessed on 21 May 2022.

3.4. Questionnaire Design

This phase of analysis used a traditional method to obtain qualitative data but was carried out using modern technologies through an e-questionnaire with pre-defined questions. The e-questionnaire was conducted within the academic and professional arena as an expert questionnaire in the three countries Germany, North Macedonia and Serbia in March and April of 2022. In order to obtain sound conclusions about the experts' perspective on the state-of-the-art of MHN rehabilitation, the sampling frame of the questionnaire was defined in line with the following criteria: (1) The equal number of respondents from all three countries; (2) the presence of experts from all domains of professional activity (Research/Academic, Practitioner, Policy and Governance, Public sector and Administration, and Decision Maker in National NGO) in order to consider research questions from different professional domains; and (3) selection of locally active and recognised experts in the subject area. The additional criterion in the selection of respondents was the presence of experts from different scientific fields (Environmental Engineering, Civil Engineering, Architecture, Urban planning, Landscape planning, Rural planning, Social sciences, and Economy) in order to provide a critical perspective from different disciplines and scientific fields. Accordingly, research engages the non-probability Quota sampling method with the goal to (1) select participants with characteristics defined in the previously explained sampling frame, and (2) have an equal number of each category in the final sample.

The identification of relevant experts and their invitation to participate in the questionnaire was conducted in each country separately. At the very beginning, a minimum number of respondents was determined, which included at least three respondents from each domain of professional activity in each country. At the level of each country, a list of potential 25 reference experts for the field of MHN rehabilitation was determined, so that 5 experts in each of the 5 domains of professional activity were listed. A total of 75 invitations for questionnaire were distributed simultaneously in Germany, North Macedonia and Serbia. After recovery and screening, 70 valid questionnaires were collected, with an effective rate of 93.34%, which meets the quantity requirement required for the analysis.

The questionnaire is designed in three sections, with a total of 13 different questions. The questionnaire included different types of questions in order to ensure the framework for both qualitative and quantitative analysis of collected data. The results of the questionnaire and statistical analysis were performed in Excel. In the first part, the respondents answered three introductory questions (Questions 1 to 3) given to distinguish the general background of the experts:

- Question 1 (Q1): Choose the country in which you are currently professionally engaged;
- Question 2 (Q2): Select primarily field of your expertise/professional background (multiple choice possible-up to 3 fields);
- Question 3 (Q3): Select your primary professional activity (multiple choice possible).

The second part consisted of seven questions (Questions 4 to 10) oriented to establish the state-of-the-art of MHN rehabilitation: one rating question, three single choice questions, two multiple choice questions and one rank order scaling question:

- Question 4 (Q4): Please rate the level of MHN rehabilitation/renewal in the context of city planning and development within the country of your current professional engagement. (1—low rate; 5—high rate);
- Question 5 (Q5): Are there relevant policies (laws, directives, regulations) in your country that regulate the MHN rehabilitation/renewal?
- Question 6 (Q6): If the answer to the previous question is ‘Yes’, which field of the MHN rehabilitation/renewal is regulated through the policy framework (laws, directives, regulations)?
- Question 7 (Q7): Are there relevant strategies (guidelines, studies, action plans) in your country that stimulate the MHN rehabilitation/renewal?
- Question 8 (Q8): If the answer to the previous question is ‘Yes’, which field of the MHN rehabilitation/renewal is stimulated through the strategy framework (guidelines, studies, action plans)?
- Question 9 (Q9): Which aspects of urban sustainability do you find the most dominant in the current state of the MHN rehabilitation/renewal? Rank from 1 to 3 (1—the most dominant aspect)
- Question 10 (Q10): On which urban scale (spatial level) is the MHN rehabilitation/renewal dominantly implemented in the country of your current professional engagement?

First, the 5-point Likert scale was used to establish the rate of MHN rehabilitation/renewal in the context of city planning and development (Q4), a type of psychometric response scale in which responders specify their statement on a rate of five points from the lowest rate (grade or point 1) to the highest (grade or point 5). Second, respondents reflected on the existence of policy and strategy framework for MHN rehabilitation/renewal (Q5 and Q7), and identified regulated/stimulated fields of MHN rehabilitation/renewal: Economic Development, Physical Improvement, Environmental Actions, and/or Neighbourhood Strategy. Third, a rank order scaling question was used to rank aspects of urban sustainability in the current state of the MHN rehabilitation/renewal in which responders ranked sustainability aspects (Ecological, Economical and Social) from 1 to 3 (1 is the most dominant aspect). Finally, in this part of the questionnaire, responders identified urban scale (spatial level) on which MHN rehabilitation/renewal is dominantly implemented in the country of their current professional engagement—from regional level to single unit (XL: Regional level; L: City level; M: Municipality/Neighbourhood/Settlement level; S: Building/Site/Plot; XS: Housing unit/Apartment).

The third part consisted of three questions (Questions 11 to 13) oriented to open up the perspectives for potential solutions—three matrix table questions:

- Question 11 (Q11): Please rate (1–5) the extent to which listed aspects/terms are obstacles for MHN rehabilitation/renewal in your country. (1—low obstacle; 5—high obstacle);
- Question 12 (Q12): Please rate (1–5) the extent to which listed aspects/terms are potentials for MHN rehabilitation/renewal in your country. (1—low potential; 5—high potential);
- Question 13 (Q13): Which design approach do you consider most applicable in relation to the relevant scales in the process of MHN rehabilitation/renewal? Mark where you think is the strongest link in-between design approach and scale.

The first two questions of the third part of questionnaire are matrix table questions with two axes: (1) aspects/terms of obstacles and potentials, and (2) 5-point Likert scale in which responders specify their statement on rate in five points from the lowest rate (grade or point 1) to the highest (grade or point 5) for each of the listed aspects/terms. List of the aspects/terms is same for both questions and includes: (1) Community and stakeholders, (2) Interdisciplinary thinking, (3) Knowledge for integration of systems and experience with new technologies, (4) Conventional technology (existing infrastructure and existing technology), (5) Policy framework, (6) Innovation funds (economy and investments), and (7) Need for decentralisation. The final question aims to identify the strongest link between different design approaches for MHN rehabilitation and urban scales (spatial levels).

The first step in the analysis involves insight into the geographical coverage of the study and identification of the background of the experts in line with the professional background (scientific field), as well as primary professional activity of respondents. The second step in the analysis refers to questions oriented to establish the state-of-the-art of MHN rehabilitation by comparing the total sample and specific values for individual countries or groups of respondents in the following order: (1) Identification of rate value on MHN rehabilitation/renewal in the context of city planning and development, (2) Conditionality of policy and strategy frameworks of MHN rehabilitation/renewal, (3) Ranking aspects of urban sustainability in the current state of MHN rehabilitation/renewal research, and (4) Identification of urban scale (spatial level) of MHN rehabilitation/renewal. The second step in the analysis refers to questions oriented to open up the perspectives for potential solutions through establishment of rate-matrix of obstacles and potentials for MHN rehabilitation/renewal in the context of city planning and development.

4. Results and Discussion

4.1. Insights from the Comparative Case Study Analysis

4.1.1. Urban/Neighbourhood Scale

Serbia–Block 23: The urban structure of Block 23 is defined in accordance with the design intention to establish blocks as the organisational urban units so that each block is organised as independent in relation to the wider system, while in a mutually coordinated relationship it forms a unique urban framework. In that order, one of the starting motives for conceiving New Belgrade as a modernist city was reflected in the application of the system of ‘free buildings in greenery’, which are modern spatially composed with protective elements and passages on the ground floor. The basic role of protective elements, as well as passages is reflected in (1) the articulation of the optimal layout and (2) the motivation to establish spatial and functional connections between people and buildings of modern architecture. In the compositional sense, the design solution of the Block 23 is characterised by autonomously placed towers, slabs and meanders in the geometric order, both horizontally and vertically, which in the design result produces a high level of architectural solution and ambient tone, thus achieving plastic urban solution. In functional terms, the thesis is that the contents of the social standard in MHN are also of great importance in the development of social qualities of housing. In this case, it resulted in the designer’s intention to achieve that the differentiated and complex needs of people in the field of education and creative leisure were established by their central and connecting positioning in block. This meant that housing is not only an apartment, but also everything that ensures the satisfaction of basic economic, social and cultural needs, but also creates a space of social interaction for personal and mutual contacts of members of the housing community (neighbourhood units).

North Macedonia–Aerodrom: Apart from the idea to provide high-quality housing for over 80.000 inhabitants, the Aerodrom neighbourhood had ambition to deliver recognisable spatial composition that would go beyond the paradigm of free-standing towers and slabs in vast, open green space. Out of eight horseshoe shaped units, six were eventually constructed, each consisted of individual buildings of different type—towers that face the boulevards, strengthen the angles and serve as spatial markers, long residential blocks that

define the outer border and lower residential units inside each block, oriented towards semi-private greenery. The different heights of the buildings enhance the specific silhouette and the visual identity of the settlement. One of the most valuable features in the neighbourhood, present from the earliest stage of the design competition, until the final realisation is the strong emphasis on the open public spaces with various character—inner pedestrian street, small urban pockets, sidewalks, small private gardens, playgrounds etc. Due to the high percentage of public greenery, the neighbourhood is still very attractive (especially for nuclear families), and the open spaces are probably its strongest potential for spatial and programmatic rehabilitation.

Germany—Märkisches Viertel: The design goals of the Düttmann-Heinrichs-Müller team for the Märkisches Viertel were to achieve ‘urban physiognomy through a clearly recognisable design of the outdoor space and to achieve individuality both in the ways of living and individual buildings through a differentiated application of prefabricated panel construction’ [45]. A total number of 35 architects was engaged in the design of different parts of the Märkisches Viertel, resulting in different typo-morphological characteristics of outdoor spaces and buildings. A newly composed ‘large-scale symphony’ was proclaimed as the new urban landscape [45]. The interlocking of different functions—living, leisure, shopping and sport—was conceived on the level of the large-scale neighbourhood as well. As Tajeri [43] argues, the interweaving of housing and green spaces is ‘a striking feature of the district’. For Düttmann, a lack of courtyards in cities was a consequence of the traditional urban planning (of perimeter blocks) and the dominance of streets as the only space for urban experience. Therefore, the courtyards became ‘a symbol of social injustice’ in cities. In consequence, the counteract to this urban issue was to provide extensive green and open spaces in the Märkisches Viertel, ‘expanding the urban experience and allowing for leisure and recreation in green space’ [43].

The following table (Table 2) represents the distribution of design values for analysed case studies and their importance on neighbourhood scale.

Considering the distribution of design values and indicators on the Urban/neighbourhood scale (Figure 9), it is recognised that the analysed case studies have a completely different distribution of focus and affirmative indicators. The group of environmental values is recognised as the leading one on this spatial level, especially in the case of location indicators, which are considered for all three case studies in accordance with the creation of ‘new environmentalism’, i.e., intensive connection with nature and environment. This concept was not only the result of spatial-aesthetic synthesis, but also of the urban approach that affirms the specifics and conditions of the location, i.e., the existing natural conditions. In that sense, the planning of such a complex housing construction was aimed at improving the overall environment and uninterrupted functional capacity of the city as a whole, which is ultimately reflected in the interconnectedness of work, housing and recreation. In the case of the settlement Aerodrom and the central zone of New Belgrade, the indicator of the urban context is particularly pronounced, having in mind that the planning strategy which was at the core of this cases was aimed at extensive expansion of urban territories and a completely new urban physiognomy of the city. In the case of the central zone of New Belgrade, the regional context is additionally recognised as an affirmative indicator in accordance with the construction of New Belgrade as a new administrative centre of Yugoslavia, which was supported by the construction of strong infrastructure and traffic flows with a regional role. Climate indicators at this spatial level are considered at the general level through the basic ecological and sanitary factors of ventilation and insolation. The human design values are primarily focused on indicator functions, which is a natural result of the paradigm of modernist functionalism that was the leading design paradigm in the period of MHN construction. Within this group of values, the case study of the Aerodrom settlement can be singled out as a specific, which engages all four indicators (physical, physiological, psychological and functional) as focus (primary/generator) indicators in the design process. The reason can be found in the character of the urban pattern of this MHN, i.e., the urban parameters of individual buildings and their compositional relationships,

which contributed to the creation of a special ambience encouraged by urban greenery and open public spaces with various character. This approach has greatly contributed to the realisation of the human dimension of space, which has often been denied when it comes to large-scale modernist settlements. Within the group of social values, the complete absence of consideration of cultural indicators is identified, while legal and common ones are identified as categories of affirmative indicators. The specificity of this group of values is the primary consideration of common indicators in the case of the central zone of New Belgrade. This indicator is the result of Yugoslav self-government which had a strong influence on the domain of architectural and urban design, and which produced a specific concept of local community centres which, through socio-political, economic and spatial aspects, enabled achieving self-governing goals. The role of local communities was in overcoming the hierarchical relationship of territorial-administrative division, and accordingly local communities were equally spatial and social entity of planning. Systemic design values were primarily considered in accordance with the technology indicator, which for all analysed countries was in line with the extensive industrialised housing and the application of prefabricated systems. The analysis indicates that temporal design values did not play a primary role in the process of designing on the urban/neighbourhood scale, which at the present time represents a special challenge in the age of rehabilitation for which indicators of growth and change are especially important. Within the group of economic values, focus indicators related to building costs and operationalisation of construction were identified, which was in line with overcoming the challenges of demographic growth, and rapid and extensive expansion of the housing stock in the capital cities. Finally, in the group of aesthetic values, indicators of form and space are predominantly considered, especially from the aspect of urban composition and morphology of space, while the style indicator is indirectly considered in the service of affirmation of modernism aimed at simplification of form and rejection of 'unnecessary details' through emphasizing material structures and advocating the thesis that forms following the function.

4.1.2. Building Scale

Serbia–Block 23: The building conception within the block-based vision of New Belgrade is defined on the basis of a parallel view of two aspects of the spatial concept—the functional concept and the architectural–design concept. According to the basic urban concept, block 23 consists of three types of buildings divided into several spatial groups. Within the functional concept, the optimal organisational structure was considered, while within the architectural–design concept, the compositional and volumetric setting was considered. The specificity of the assembly is reflected in the designer's thesis that the block does not have to be a set of the same units, but different organisational schemes have been developed through experimentation and various structuring of residential tracts—specifically by creating a double tract. The leading role in establishing complex connections in the functional and architectural form was played by programming the social standard facilities in order to meet the complex needs of the community, where the social standard in the context of the then socialist system is defined as 'meeting the common needs of citizens institution' [46]. It was considered that the contents of the social standard significantly contribute to the level of equipment of the settlement and overcoming the concept of 'city dormitory', within which housing develops the leading role in creating the social standard played by the buildings of the social standard, which are also named as the centre of the local community.

Table 2. Identification of design values importance on neighbourhood scale.

Design Values	Indicators	Case Study 1: Serbia	Case Study 2: North Macedonia	Case Study 3: Germany
environmental	climate	+	+	+
	urban context	●	●	+
	regional context	+	X	X
	location	●	●	●
human	physical	●	●	+
	physiological	+	●	+
	psychological	+	●	+
	functional	●	●	●
social	cultural	X	X	X
	legal	+	+	+
	common	●	+	+
systemic	materials	+	+	+
	technologies	●	●	●
	processes	+	+	+
temporal	growth	X	+	+
	change	X	X	+
	constancy	+	+	X
economic	building costs	●	●	●
	operationalisation	●	●	+
	maintenance	X	+	+
aesthetic	form	●	●	+
	space	●	●	●
	style	+	+	+
	tradition	X	X	X

Index: focus (primary / generator) indicator (●); affirmative indicator (+); and not considered indicator (X).



Figure 9. Spider chart: design values on urban/neighbourhood scale.

North Macedonia–Aerodrom: In order to achieve unique spatial experience and diverse design expression, seven large local construction companies were involved in the design and construction process of the Aerodrom neighbourhood. With their expertise, experience and available technologies they helped in overcoming the uniformity of the buildings and creating different spatial identity. The presence of various building types within each horseshoe unit—from tall towers, through medium height longitudinal blocks, low height housing to hybrid forms with prominent verticals and retracted low segments—contributes to the diversity of the neighbourhood and strengthens the ‘identification’ of the residents to the specific residential unit. Regardless of the variety in the typologies, the proximity of the structures gives them a large extent of spatial coherence. The idea to bring the architecture closer to human scale pervades throughout the entire complex and is inherent for the individual buildings, incorporated in the spatial distribution of the masses. Instead of a single prism, each building is visually de-monumentalised, segmented into smaller volumes in order to bring the multi-family building down to the level of a ‘house’. Important aspect in the design and construction process was the rationality of the housing units and the buildings in general, the use of modern construction techniques and technologies, durable materials and emphasis on thermal and acoustic properties.

Germany–Märkisches Viertel: As Krohn [47] argues, the involvement of a large number of young architects in the design of diverse parts and buildings of the Märkisches Viertel—and the associated different design language—enabled the residents to identify their houses despite the ‘gigantic building volume’. The question of form was considered key: the architects ‘wanted to design sculptural, space-defining structures that, despite their modularity, would create individual urban spaces and identity at the same time through a specially developed colour palette’ [43]. Heinrichs and Müller’s office was not only responsible for the overall concept, but also for the project of the central part of the neighbourhood with several thousand apartments. In contrast to their preliminary planning, the realised design of this central part is organised in a strictly orthogonal manner, with residential blocks oriented north-south. Since the housing association worked with a French precast concrete company, which initially set up a prefab factory on the site, the architecture of the large form was developed from this construction specification [47].

The following table (Table 3) represents the distribution of design values for analysed case studies and their importance on building scale.

Considering the distribution of design values and indicators on the building scale (Figure 10), it is recognised that the analysed case studies have an almost equivalent distribution of focus and affirmative indicators. In contrast to the urban/neighbourhood scale, this spatial level recognises a negligible consideration of the environmental value group, which is problematised only by affirmative treatment of urban context indicators in accordance with general urban-spatial parameters such as regulation, number of floors and building typologies. When it comes to Märkisches Viertel MHN, a specific urban pattern was identified, which was treated in a news-design way when creating the composition of the settlement in synchronisation with the topography. On the other hand, urban patterns recognised within the MHN in the capitals of ex-Yugoslav countries imply a more deterministic approach to the design of buildings subject to strictly orthogonal parameters and the urban matrix. The human design values group still has the primary focus on the function indicator, which is in direct correlation with the systemic design values group, which is the result of design in an industrialised system. In the building conception of case studies, the thesis is that residential buildings, as parts of MHN and cities, include all the features of the set design goals at the general level, two-way: (1) through environmental influences on the building and (2) through spatial possibilities and affirmative impact of the building on the environment to which it belongs. This thesis further encouraged the reflection on the spatial characteristics of the architectural structure and the examination of the subordination of space to the content of life and the activities that will take place in it. Considering that the design based on the needs of specific users (predominantly middle class) significantly contributed to the standardisation of housing construction of individual

buildings in relation to these influential factors and characteristics of industrialised construction, typological classification of housing patterns was predominantly established in relation to the primary relationship of physical structure and natural conditions which is established at a higher spatial level of urban/neighbourhood scale. Within the group of social values, the focus indicators were not identified by the analysis, but only the affirmative presence of legal and common indicators was recognised which is mostly the result of normative aspects and standardisation of construction. Insight into the distribution of the indexes of indicators indicates that the group of temporal values was not considered in the process of designing MHN on the building level, which currently results in frequent ad hoc architectural interventions such as extensions and changes to the facade, initiated by the users themselves without the support of urban policies and local government in the case of Aerodrom Settlement and central zone of Belgrade. On the other hand, in the case of Märkisches Viertel MHN, owing to the ‘tenant-friendly’ housing policies in Germany and the fact that the settlement remained in the ownership of a non-profit housing association, conditions were created for comprehensive rehabilitation of the settlement. In this sense, the issue of ownership is recognised as one of the key aspects to the implementation of MHN rehabilitation in a comprehensive and systematic way. This thesis can be confirmed through the indicator of maintenance within economic values, which in the case of the German example has an affirmative influence in the design process, while in the case of the ex-Yugoslav countries it was not even considered. Finally, the group of aesthetic values was focused on indicators of form and space, which for example gave a special architectural expression in the case of the central zone of New Belgrade in the form of ‘concrete utopia’ and brutalist architectural gesture.

Table 3. Identification of design values importance on building scale.

Design Values	Indicators	Case Study 1: Serbia	Case Study 2: North Macedonia	Case Study 3: Germany
environmental	climate	X	X	X
	urban context	+	+	+
	regional context	X	X	X
	location	X	X	X
human	physical	+	+	+
	physiological	+	+	+
	psychological	X	+	X
	functional	●	●	●
social	cultural	X	X	X
	legal	+	+	+
	common	+	+	+
systemic	materials	●	●	+
	technologies	●	●	●
	processes	+	+	+
temporal	growth	X	X	X
	change	X	X	X
	constancy	+	X	X
economic	building costs	●	●	●
	operationalisation	+	+	+
	maintenance	X	X	+
aesthetic	form	●	●	●
	space	●	●	+
	style	+	+	+
	tradition	X	X	X

Index: focus (primary/generator) indicator (●); affirmative indicator (+); and not considered indicator (X).

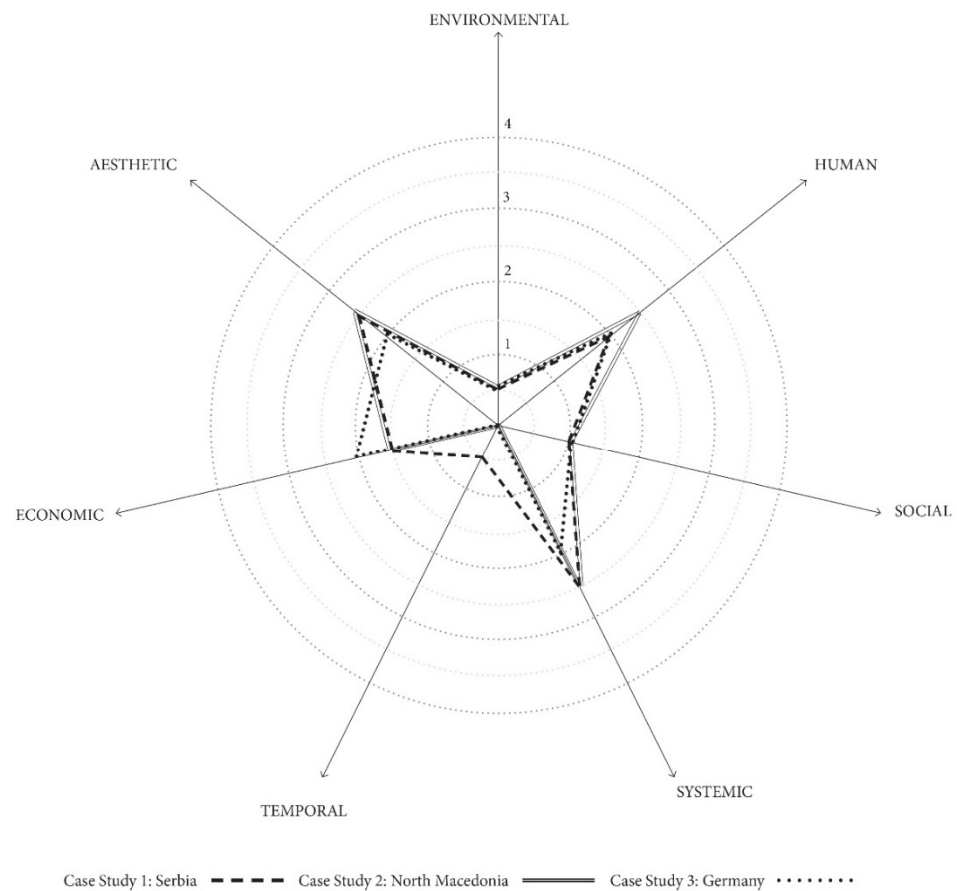


Figure 10. Spider chart: Design Values on Building scale.

4.1.3. Apartment Scale

Serbia–Block 23: In the spatial solution of the local community of Block 23, a special aspect was the definition of standards in terms of size and structure of apartments, which resulted in the predominant construction of two-and-a-half-room, three-room and larger family apartments. When defining the structure of housing units at the level of the block, the designers were guided by the belief that in time there will be a functional transformation and redistribution of functional zones at the level of the apartment. In that sense, more flexible regulations have been defined, i.e., more favourable determination of dimensional parameters. The apartments in Block 23 are considered to be representative examples of the ‘Belgrade housing school’ and are characterised by flexible foundations, zoning, circular connection between the rooms provided by movable partitions. A circulating connection has been established around the installed core, which contains all the necessary communication flows in the apartment. By using movable partitions between the dining room and the living room, or other units, it is possible for this space to operate independently or to be an integral part of other units. In this way, it is possible to connect and unite several rooms into one larger unit according to the particular needs of users.

North Macedonia–Aerodrom: One of the leading premises within the process of conception, design and construction of the Aerodrom mass housing neighbourhood was the principle of rationalisation in all possible domains, in order to reach the optimal number of apartments within the planned funds and in the shortest possible time frame. This was based on extensive previous research activities and some of the set goals were to provide better quality housing, to increase the number of housing units, to increase the living area per capita (from less than 9 m² per capita before the earthquake in 1963 to nearly 20 m² by the early 1980s), to provide certain flexibility in the use of the living space, to optimise the process of construction by using highly productive systems and methods,

to apply the newly acquired knowledge in terms of seismicity, energy efficiency, noise reduction etc. [33]. Due to the various heights, various typologies of buildings and mainly due to the presence of seven different construction companies involved in the process of design and construction, the apartment units provide wide variety of solutions and spatial layouts: from small studios to four-bedroom apartments, the most dominant being two and three-bedroom apartments.

Germany–Märkisches Viertel: The intention of the architects of the Märkisches Viertel, as in the case of all mass housing neighbourhoods, was to create as many residential units as possible. Initial plans from 1961 to realise 14.000 units were later increased to 17.000, which was realised by adding additional storeys to the buildings [35]. The diversity of the apartment structure in the Märkisches Viertel is relatively high compared to the other mass housing neighbourhoods from that period. The residential complex designed by Düttmann reveals 865 bright apartments with spacious layouts. As Tajeri [35] argues, Düttmann wanted to avoid a ‘ghettoisation’ of ‘only childless couples’ or ‘only couples with children’ or ‘only single people’ and grouped eight flats ranging from large studios to three-bedroom apartments on each standard floor of the two high-rises in residential area W 2b.

The following table (Table 4) represents the distribution of design values for analysed case studies and their importance on apartment scale.

Table 4. Identification of design values importance on apartment scale.

Design Values	Indicators	Case Study 1: Serbia	Case Study 2: North Macedonia	Case Study 3: Germany
environmental	climate	X	X	X
	urban context	X	X	X
	regional context	X	X	X
	location	+	+	+
human	physical	+	+	+
	physiological	+	+	+
	psychological	+	+	+
	functional	●	●	●
social	cultural	+	+	+
	legal	●	+	+
	common	X	X	X
systemic	materials	+	●	+
	technologies	●	+	+
	processes	+	+	X
temporal	growth	+	X	X
	change	●	X	+
	constancy	+	+	X
economic	building costs	●	●	+
	operationalisation	●	+	+
	maintenance	X	X	+
aesthetic	form	X	+	+
	space	+	+	+
	style	X	X	X
	tradition	X	X	X

Index: focus (primary/generator) indicator (●); affirmative indicator (+); and not considered indicator (X).

The conducted analysis and distribution of values (Figure 11) indicates that the design issues of the organisation of the apartment space were especially considered in the context of the case study from Serbia, which is a representative example of ‘Belgrade apartment’ and ‘Belgrade school of housing’. This influence was indirectly transferred to the practice of designing the Aerodrom settlement, since the work of Belgrade architects had a strong influence on the comprehensive Yugoslav cultural space. In the cause-and-effect order in

relation to the urban level and the level of the building, in the case of the apartment level, a negligible consideration of environmental values is recognised, which are considered through general indicators of apartment orientation in accordance with insolation and ventilation factors. Moreover, the position of the apartments was related to the distribution of functional zones of the apartment, where the 'day zone' is mainly oriented towards the public space (inside the block), while the 'night zone' is oriented towards the peripheral edges of the block. The group of human values possesses, as a primary indicator, the question of function in all analysed case studies, but the functional design motive differs in each of the cases from the perspective of the apartment structure: (1) Block 23 has dominantly larger family apartments (two-and-half and three-bedroom apartments), (2) Aerodrom settlement has diversity of apartments from single to family structure but dominantly larger family apartments (two- and three-bedroom apartments), while (3) Märkisches Viertel has diversity of the apartment structure (from large studios to three-bedroom apartments). The group of social values recognises cultural and legal indicators as affirmative, with specific notions related to the context of the New Belgrade case study, for which the legal indicator is recognised as the primary indicator in the design process. In this case, the legal indicator is the result of the research infrastructure built within the Housing Center which was focused on studies of the use value of housing and functional concepts, as well as on the normative framework and developed housing standards within the self-governing system. In the context of systemic values, an affirmative consideration of materials and technologies indicators has been identified, which is in correlation with specific construction systems based on dimensional aspects of the apartment. It is the modular coordination that has developed in correlation with the functional aspects of the apartment that has contributed to the definition of a specific construction model that can provide an answer to the challenge of mass and effective construction. Within the group of temporal values, the indicator of change in the case of Block 23 is recognised as a specificity, which is the result of habitological studies focused on the issue of flexibility and long-term use of the apartment in accordance with contemporary needs. The reason that the issue of flexibility is problematised in this case can be found in correlation with the aspect of apartment structure, which, unlike Aerodrom settlement and Märkisches Viertel, predominantly includes larger family apartments that allowed experimentation with flexible modalities of space use. The group of economic values is a direct result of systemic values and attempts to make construction operational and to reduce construction and maintenance costs. Finally, as all previous indicators were the result of rationalisation and simplification, the aesthetic aspects are neglected and imply the emphasis on previously highlighted values of economy and systematicity.

4.2. Insights from the Questionnaire

4.2.1. Respondents Background

As was mentioned in the research methodology section, the first part of the questionnaire was the introductory one, consisting of three selection/multiple-choice questions intended to clarify the professional position and scientific background of respondents, as well as the country of their professional engagement.

Regarding the expertise/professional background of respondents, results indicated the involvement of respondents from seven scientific fields which provide research on the possibility for an IMT framework (inter-, multi-, and trans-disciplinarity). The expertise/professional background pointed to most respondents (57) are from the Architecture field (81.43%). A high level of respondents (39) is recognised in the field of Urban planning (55.71%); while a medium level (8) is recognised in the field of Landscape planning (11.43%). Other areas were identified as having a low level of respondents (3–4) in the total share of 20%: Environmental Engineering, Civil Engineering, Landscape Planning, Rural Planning and Social Sciences. The additional value and perspective on the critical framework of the questionnaire is achieved by the involvement of 35.71% of respondents

who positioned them in more than one field, which refers to and confirms the IMT profile of the respondents.

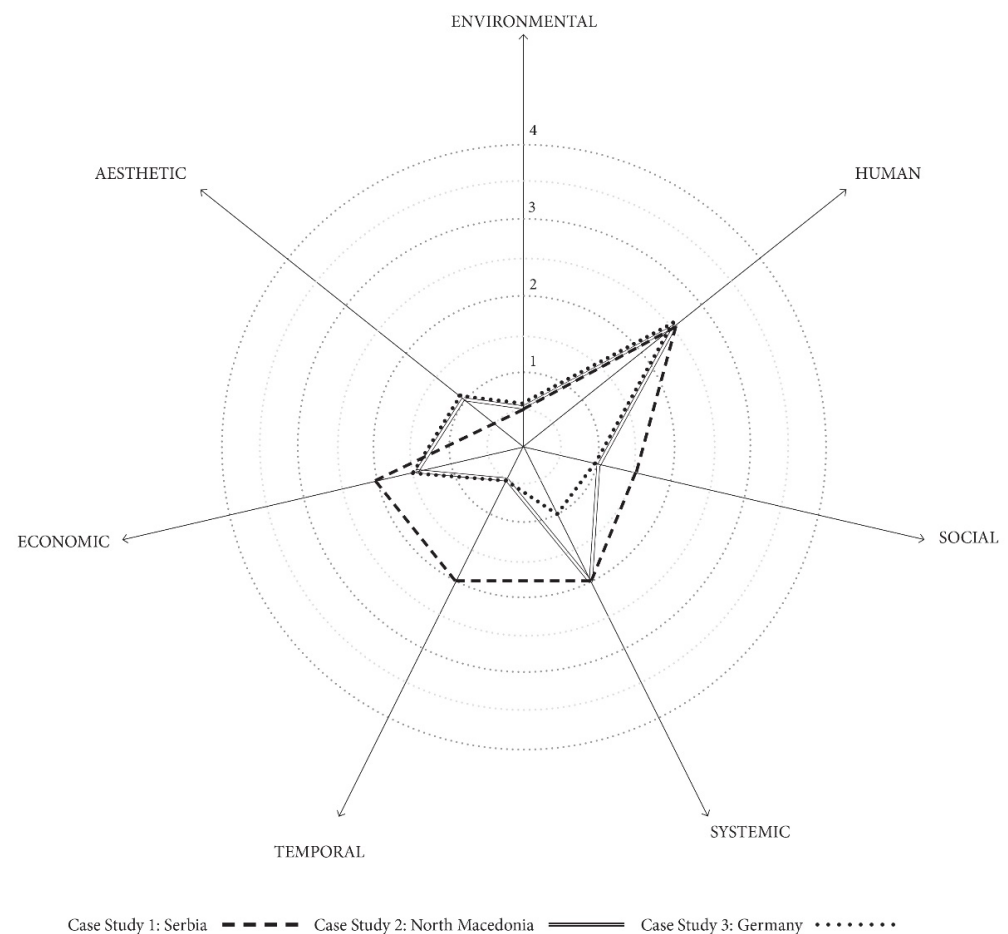


Figure 11. Spider chart: Design Values on Apartment scale.

Regarding the primarily professional activity of respondents, results indicated the dominant involvement of respondents from the field of Research/Academic (30%) and Public Sector and Administration (25.71%). Other activities have a smaller share of respondents: Practitioners (21.43%), Policy and Governance (15.72%), and Decision Maker in NGO (5.72%). As in the case of the expertise/professional background of respondents, there is involvement of 30% of respondents who positioned them in more than one professional activity framework.

4.2.2. The State-of-the-Art of MHN Rehabilitation

The questions within the second section of questionnaire were oriented towards establishing the state-of-the-art of mass housing rehabilitation/renewal in the context of city planning and development. The findings of the analysis will be explained in detail below.

Rate value on MHN rehabilitation/renewal

Question 4 is defined in a rating form (1–5) in order to establish a quantitative insight into the state-of-the-art of the application level of mass housing rehabilitation/renewal in the context of city planning and development within the country of current professional engagement of respondents. In that order, state-of-the-art was established from a multi-geographical perspective from three countries. The average value on application from questionnaire insights is 2.46 on a level of geographical coverage of the study. This value is not in line with the values for individual countries—the results indicate that the current

level of MHN rehabilitation in Germany (3.44) is at a higher level than in the ex-Yugoslav countries (Serbia 1.97; North Macedonia 1.96). These data represent a strong indication of the need for a broader geographical and cross-sectional study in the subject area, as well as the need to open up the critical East–West dialogue on the thematic issue of MHN.

Conditionality of policy and strategy frameworks of mass housing rehabilitation/renewal

The questions 5–8 are defined in multiple-choice form in order to (a) provide insight into the policy and strategy framework of mass housing rehabilitation/renewal and (b) understand the potential conditionality of these two frameworks. Comparative analysis of these results points to different levels of development of relevant policies (laws, directives, regulations) and strategies (guidelines, studies, action plans) for regulating and stimulating mass housing rehabilitation/renewal. On the one hand, in Germany, the conditionality and connection between the policy and strategy framework have been recognised in all listed fields, which include Economic Development, Physical Improvement, Environmental Actions, and Neighbourhood Strategy. On the other hand, results from the Balkan countries (Serbia and North Macedonia) indicate the presence of a policy framework predominantly in the field of Physical Improvement and Environmental Actions, while the Neighbourhood Strategy field is mainly developed through pilot studies in the strategy framework.

Ranking aspects of urban sustainability in the current state-of-the-mass housing rehabilitation/renewal research

Question 9 is defined in the ranking order form (Rank from 1 to 3 (1—the most dominant aspect)) in order to decode the dominance of sustainability aspects (ecological, economical, and social) in the current state-of-the-mass housing rehabilitation/renewal research. In line with the first-last choice of aspects, results indicate that (1) in Serbia and North Macedonia, economical aspect of urban sustainability is the most dominant, followed by ecological and social, while (2) in Germany, the social aspect of urban sustainability is the most dominant, followed by ecological and economical.

Scale (spatial level) of mass housing rehabilitation/renewal

Question 10 is defined in single choice form with five identified spatial levels of rehabilitation/renewal: XL—Regional level, L—City level, M—Municipality/Neighbour/Settlement level, S—Building/Site/Plot/level, and XS—Housing unit/Apartment in order to provide insight in 'scalarity' (dominant scale of implementation) of mass housing rehabilitation/renewal. The results indicate that in Germany, the implementation of the mass housing rehabilitation/renewal is most dominantly realised at the medium scale of Municipality/Neighbourhood/Settlement level. Responses from Serbia decode the Building/Site/Plot/level as the dominant scale of implementation followed by Housing unit/Apartment (the scales of higher urbanity are not recognised). Responses from North Macedonia decode the Housing unit/Apartment level as the dominant scale of implementation followed by the Municipality/Neighbourhood/Settlement level.

4.2.3. Perspectives for Potential Solutions

Obstacles for mass housing rehabilitation/renewal

Question 11 is defined as a matrix table question with seven obstacles for mass housing rehabilitation/renewal and rating values 1–5 for each (1—low obstacle; 5—high obstacle). The primary intention of this question is to decode and understand the extent to which listed aspects/terms are obstacles for mass housing rehabilitation/renewal on geographical coverage of analysis. Through insight into the rate value of obstacles for mass housing rehabilitation/renewal, the results indicate that all listed aspects/terms are recognised as obstacles for rehabilitation/renewal. Given that a higher rate indicates a higher level of obstacle for rehabilitation/renewal, following results are recognised: (1) Germany-Need for decentralisation was identified as the smallest degree of obstacle (rate 1) compared to the other listed aspects, while A gap between science and practice (lack of knowledge for integration of systems and low experience with new technologies) was identified as the most dominant obstacle (rate 3.88), followed by issues of Interdisciplinary

thinking and Conventional technology (existing infrastructure and existing technology) (rate 2.55), Innovation funds (economy) (rate 2.44) and Policy framework (rate 2.33); (2) North Macedonia—Need for decentralisation was identified as the smallest degree of obstacle (rate 3.05) compared to the other listed aspects, while Innovation funds (economy) was identified as the most dominant obstacle (rate 4.48), followed by issues of Policy framework (rate 3.78). A gap was seen between science and practice (lack of knowledge for integration of systems and low experience with new technologies) (rate 3.57), Community and stakeholders (rate 3.42), Conventional technology (existing infrastructure and existing technology) (rate 3.38), and Interdisciplinary thinking (rate 2.23), and (3) Serbia—Need for decentralisation was identified as the smallest degree of obstacle (rate 2.30) compared to the other listed aspects, while Innovation funds (economy) was identified as the most dominant obstacle (rate 3.89), followed by issues of Policy framework (rate 3.76). A gap was seen between science and practice (lack of knowledge for integration of systems and low experience with new technologies) (rate 3.63), Community and stakeholders (rate 3.19), Interdisciplinary thinking (rate 3.09), and Conventional technology (existing infrastructure and existing technology) (rate 2.92).

Potentials for mass housing rehabilitation/renewal

Question 12 is defined as a matrix table question with seven potentials for MHN rehabilitation/renewal and rating values 1–5 for each (1—low potential; 5—high potential). The primary intention for this question is to decode and understand the extent to which listed aspects/terms are potential for MHN rehabilitation/renewal on geographical coverage of analysis. Through insight into the rate value of potentials for MHN rehabilitation/renewal, the results indicate that, as in the case of obstacles analysis, all listed aspects/terms are recognised as potentials for rehabilitation/renewal. Given that a higher rate indicates a higher level of potential for rehabilitation/renewal, following results are recognised: (1) Germany—Need for decentralisation was identified as the smallest degree of potential (rate 1.2) compared to the other listed aspects, while Interdisciplinary thinking was identified as the most dominant potential (rate 4.44), followed by issues of Knowledge for integration of systems and experience with new technologies (rate 4.22), Policy framework (rate 3.55), Innovation funds (economy) (rate 3.78), Community and stakeholders (rate 3.33), and Conventional technology (existing infrastructure and existing technology) (rate 2.89), (2) North Macedonia—Policy framework was identified as the smallest degree of potential (rate 2.76) compared to the other listed aspects, while Community and stakeholders was identified as the most dominant potential (rate 4.05), followed by issues of Innovation funds (economy) (rate 3.90), Knowledge for integration of systems and experience with new technologies (rate 3.86), Interdisciplinary thinking (rate 3.33), Need for decentralisation (rate 2.82), and Conventional technology (existing infrastructure and existing technology) (rate 2.78), and (3) Serbia—Need for decentralisation was identified as the smallest degree of potential (rate 2.37) compared to the other listed aspects, while Community and stakeholders was identified as the most dominant potential (rate 3.95), followed by issues of Innovation funds (economy) (rate 3.71), Policy framework (rate 3.65), Policy framework (rate 3.64) Knowledge for integration of systems and experience with new technologies (rate 3.60), Interdisciplinary thinking (rate 3.51), and Conventional technology (existing infrastructure and existing technology) (rate 2.97).

Design approaches in relation to Spatial scales for implementation

Question 13 aims to identify the strongest link between different design approaches for MHN rehabilitation and urban scales (spatial levels). The question was defined in a matrix form with two axes (1) a list of design approaches and (2) relevant spatial levels. Following the identified MHN rehabilitation challenges derived from the affirmative and research-stimulating declarations, policy positions and strategies aimed at the practical arena of housing development, three groups of design approaches have been identified [48]: (1) Environmentally based, which advocates a climate-neutral approach, and ecological aspect of sustainability: Environmentally Sensitive Design, Climate Sensitive Design, Carbon Neutral Design, Green Blue Infrastructure; (2) economy-based which advocates

improving efficiency and cost reduction: Construction-Centred Design, Energy Conscious Design, Passive/Active Sustainable Design, Thermal Comfort Design, Acoustic Comfort Design; and (3) socially based which advocates social inclusion, equality, and participation: Community Building Design, Design for All. Specifically, Whole-Lifecycle Design is identified as an integral approach to gathering specific sustainable values of the previous groups of design approaches.

The analysis was conducted by insight at quantitative indicators for each of the spatial levels and design approaches so that the focus scales for the implementation of MHN rehabilitation are those that contain more than 20% of responses for the given scale. Certainly, it is important to note that the listed design approaches are applicable at all spatial levels and that in this case the capacity for their applicability in the case of MHN rehabilitation is considered. The attached graph (Figure 12) recognises that design approach groups are directly related to spatial levels as follows: (1) Environmentally based approaches have a focus on regional, city, and neighbourhood scales; (2) economy-based approaches have a focus on the level of the neighbourhood, building and apartment, while (3) socially based approaches are identified predominantly at the neighbourhood level with reflection on the city level. Concerning this distribution of spatial levels, it is recognised that the neighbourhood level is crucial for MHN rehabilitation and that accordingly, the social aspects of rehabilitation have a stimulating role in the sustainable transformation of MHN. This is confirmed by the framework of the whole-lifecycle design, which establishes a comprehensive coverage of spatial levels, with a focus on the neighbourhood as a link between the city and the building.

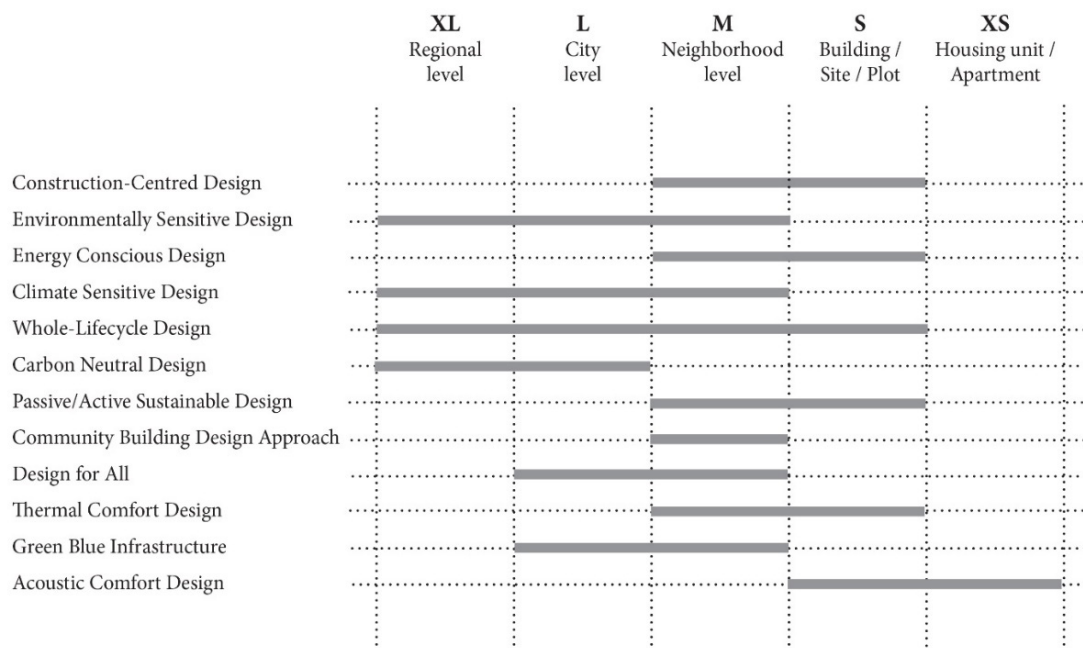


Figure 12. Design approaches vs. scales graph.

5. Conclusions

The concluding remarks were developed according to the initial research questions outlined at the beginning of this paper: (1) what are the differences in design values and current conditions of MHN in line with the differences in the cultural and political background of the studied countries, and (2) what are the main obstacles and potentials, as well as appropriate design strategies for MHN rehabilitation?

The answer to the first question was found in the application of cross-track analysis (multiscale and value-based) that allowed the identification of the conditionality between spatial scales, and design values and indicators. The conducted research provides

cross-geographical insight (East-West Europe) into the development of MHN and opens perspectives for their sustainable rehabilitation. The following concluding indications are recognised in the synthetic review of the engagement of design value groups at the analysed spatial levels: (a) The group of environmental values is predominantly represented and considered at the neighbourhood level in the context of intensifying the relationship between architecture and nature and strengthening environmental-behavioural approaches in design process; (b) within the group of human values, the indicator of function is predominantly represented at all spatial levels as a result of the rhetoric of modernist functionalism; (c) within the group of social values, the denial of cultural indicators is identified, while the common indicator is affirmatively positioned at the neighbourhood level, and the legal indicator at the levels of building and apartment as a result of standardisation and normative aspects of housing; (d) the group of systemic values is equivalently positioned at all spatial levels in response to the issue of mass construction, extensive growth of housing stock and technological progress, which has led to the application of industrialised construction systems; (e) the group of temporal values is almost neutral in the design process at all analysed spatial levels, which has negative repercussions on the contemporary perspective of rehabilitation, having in mind that indicators of change and growth are crucial in the rehabilitation process; (f) like a group of systemic values, a group of economic values is equivalently positioned at all spatial levels through indicators of operationalisation and reduction of construction costs; and finally (g) within the group of aesthetic values, indicators of style and tradition are not considered, which is the result of the modernist approach and the triad functionalism-minimalism-rejection of ornament, while indicators of form and space are considered in accordance with the general thesis that form follows function.

The second question was answered through the questionnaire analysis and this question perspectives for future research and directions of action in MHN studies are challenged. The questionnaire primarily pointed to the low level of implementation of MHN rehabilitation strategies in Eastern European countries, which, unlike Germany, have not yet opened the vision of rehabilitation in the era of housing repositioning at the centre of urban strategies and policies. One of the leading issues problematizing MHN rehabilitation includes the nature of urban policies and ownership. In the case of Germany, 'tenant-friendly' housing policies are recognised, followed by the ownership of a non-profit housing association, which has created the conditions for comprehensive rehabilitation of the MHN. Confirmation is also found in the conditionality of policy and strategy frameworks of MHN whereas in the case of Germany the conditionality and connection of policies and strategies in the fields of Economic Development, Physical Improvement, Environmental Actions, and Neighbourhood Strategy are recognised, while the case of Serbia and North Macedonia indicates the presence of a policy framework predominantly in the field of Physical Improvement and Environmental Actions. Insight into the reflections on obstacles for MHN rehabilitation indicated that the need for decentralisation is the lowest level of an obstacle for all analysed countries, while the leading obstacle in the case of Germany is the lack of knowledge for integration of systems and low experience with new technologies, while in the case of Serbia and Northern Macedonia, insufficient access to innovation funds is recognised as the leading obstacle. On the other hand, insight into the potential for MHN indicated that, in the case of Germany, Interdisciplinary thinking is recognised as the leading potential, which can also contribute to bridging the gap between science and practice, while in the case of Serbia and Northern Macedonia, the leading potential is community and stakeholder engagement. Building on the knowledge of obstacles and potentials for MHN rehabilitation, a special contribution of the questionnaire refers to the issue of scale (spatial level) for MHN rehabilitation. This question primarily refers to the identification of relevant spatial levels that are the generator for the implementation of rehabilitation strategies. Observing the state-of-the-art of MHN rehabilitation, it was recognised that all three countries currently have different focal scales of MHN rehabilitation-neighbourhood level in Germany, building level in Serbia and, apartment level in North Macedonia. Having in mind that the findings related to the identification of the strongest link between different

design approaches for MHN rehabilitation and urban scales (spatial levels) indicated that the neighbourhood level is crucial for MHN rehabilitation and that accordingly, the social aspects of rehabilitation have a stimulating role in the sustainable transformation of MHN, the fact that in Germany the neighbourhood level is a generator for the MHN rehabilitation indicates another reason for the higher level of implementation of rehabilitation strategies.

In methodological terms, the research demonstrated the importance of a multiscale approach to MHN analysis, having in mind that through the distribution of design values at the analysed spatial levels (neighbourhood level, building level, and apartment level) the application of affirmative indicators within different design values groups are recognised. This distribution of design values is a strong indicator that the MHN design process has just emerged through a multiscale approach and that accordingly, their critical analysis through a multiscale approach is necessary, as well as multiscale treatment in the rehabilitation process.

In the context of future research direction, this study set the research implications in two perspectives—design-based issues and context-based issues. Regarding design-based issues, the following directions are recognised: (1) The need for definition and clarification of different design strategies which could be engaged within the framework of large-scale housing renovation programmes in line with the Renovation Wave for Europe; (2) formulating and testing collaborative practices towards adequate housing for all in line with the repositioning of housing at the centre of urban policies and strategies; and (3) challenging the social component of sustainability in the process of urban regeneration, i.e., enhancing of social equality as the key aspect in achieving sustainability of MHN. Regarding context-based issues, the following directions are recognised: (1) Widening the scope of geographical coverage of the study in order to decode additional specifics of certain regions and their associated cultural patterns that have had an impact on the development of MHN; (2) designing and conducting thematically based analyses of MHN that synchronously perceive the morphological dimension, scale dimension and sociological dimension; (3) examining conditionality of the policy framework of MHN development in different EU regions, and its implication on the urban form of MHN; and (4) formulating a common vocabulary related to MHN on EU level.

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