

Article

Introducing Matrix for the Reprogramming of Mass Housing Neighbourhoods (MHN) Based on EU Design Taxonomy: The Observatory Case of Serbia

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Abstract: This article addresses the contemporary framework of housing at the EU level in the era of the ‘Housing at the Centre’ approach. More specifically, the research focuses on mass housing neighbourhoods (MHN) as the leading pattern of urban transformation in European cities in the second half of the 20th century, with the intention being to decode the possibilities for its rehabilitation in line with integrated approaches. The article combines (1) a review-based and systematically-oriented approach, in order to provide a state of the art of EU design taxonomy related to the housing issue, and, more specifically, related to MHN, with (2) a comparative study between EU and national design taxonomies, in order to address their conditionality and possible mismatches. The research considers design taxonomy to gain a more comprehensive insight into the content and coherence between programme values and the relevant EU documents (declarations, statements, policy positions, resolutions, reports, communications, charters, action plans, opinions) related to the housing issue, or broader urban issues that include housing as the scope of observation. The taxonomy enables a conceptual methodological framework for a systematic, consistent, and complete description of key research relations. Accordingly, the specific objective of this article is to establish an evaluation framework for reprogramming of MHN based on the EU design taxonomy through (1) the development of the programming matrix for evaluation, which corresponds to the value-based architectural programming model; and (2) introducing Serbian national design taxonomy, in order to demonstrate the anticipation of design values based on the EU taxonomy within the local context. The results indicate the need to examine and test regulatory experimental settings through middle-out approaches, whose central research perspective will be built parallel and coherently through bottom-up inputs, created as the result of collaborative approaches at the community level, and top-down inputs which are the result of the strategic framework established in relation to priorities at the European level.

Keywords: architectural programming; housing design; housing assessment; multiscale approach; design value matrix; urban rehabilitation



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1. Introduction

1.1. Motivation

We are experiencing the era of climate change, environmental damage, and energy crisis, including the effects of the economic crisis, the fourth industrial revolution, urbanisation and shrinking urban settings, social change, and inequality, which, in a comprehensive sense, have a profound impact on the living environment and raise questions about the possibility of an environmentally sustainable future [1]. In order to tackle this pool of urban challenges, the European Commission set three prominent umbrella frameworks on the European level, which are conceptualised and established as an integral part of the implementation strategy of the United Nation’s 2030 Agenda [2] and the sustainable

development goals (SDGs), including: (1) the European Green Deal, which promotes a commitment to tackling climate and environmental-related challenges [3]; (2) the Renovation Wave for Europe, which is an essential instrument for Europe to become climate neutral by 2050 [4]; and (3) the New European Bauhaus, which expresses the EU's ambition of creating 'beautiful, sustainable, and inclusive places, products and ways of living' [5]. In a unified way, these frameworks represent a unique paradigm of urban development, which becomes a priority in the thematic and methodological sense for all architectural and urban activity domains. Moreover, it indicates the need for an integral viewpoint on the built environment, which confronts different dichotomies such as resource consumption and energy efficiency, ecologically and socially sensitive approaches, protection and enhancement of the ecosystem, human impact and natural environment, quality of everyday life, and economic wellbeing [6]. On the one hand, quantitative indicators related to the relationship between demographic growth and accelerated urbanisation indicate that 6 out of 10 people of world population are expected to reside in urban areas by 2030 [7], while today, more than 70% of Europe's citizens lives in urban areas with the trend to reach 80% by 2050 [8]. On the other hand, there are indications that 40% of housing construction funds in the EU date from before 1960, and 75% of existing housing stock is deemed to be energy inefficient [9], which confirms that the housing sector is undergoing significant transformation across Europe [10].

The contemporary context of housing at the European level could be understood through several milestones that led to the decade in which the 'Housing at the Centre' approach was affirmed in order to restore the social dimension of housing [7]: (1) since the Vancouver Declaration for Human Settlements (1976) [11], with the notion of adequate housing as a basic human right; (2) the Global Shelter Strategy for the Year 2000 (1988) [12], with the acknowledgement and upgrading of informal settlements; (3) the Istanbul Declaration and the Habitat Agenda (1996) [13], with the radical change in housing provision and the promotion of the 'enabling approach'; and (4) more recently, the Global Housing Strategy as a collaborative movement based on the principle of inclusiveness [7]. Following this line of reasoning, 'access for all to adequate, safe and affordable housing and basic services and upgrade slums by 2030' is listed as a constituent part of SDG 11 [2], while sustainable housing is marked as a litmus test of sustainable cities [14]. In order to generate new milestones for the EU housing agenda, there is a need for transfer from short-term approaches to long-term impact strategies and flexible approaches [15], i.e., towards a more sustainable path of development and the achievement of a holistic viewpoint on the built environment through the application of principles listed within the Geneva UN Charter on Sustainable Housing [14]: (1) environmental protection—minimisation of environmental impact, and the promotion of environmental sustainability and resilience through different urban and architectural practices; (2) economic effectiveness—bridging the gap between a vibrant economy and people's needs; (3) social participation—the promotion of social inclusiveness, public health, and transparency; and (4) cultural adequacy—the promotion of cultural identity, heritage values, and emotional wellbeing.

1.2. Mass Housing Neighbourhoods (MHN): Definition and Challenges

Mass housing neighbourhoods (MHN) represent the leading pattern of urban transformation and expansion in European cities in the second half of the 20th century, especially immediately after WWII in the 1960s and 1970s [16]. MHN could be defined as groups of at least 2000 housing units that are spatially organised as distinct and geographical areas, planned by the state or with state support [17]. In this period, the mass construction of buildings was affirmed as the most economical and rational way to achieve a higher standard of living, and the formation of a new culture of multi-family housing within the regime of collective housing and the system of prefabricated construction [18]. Accordingly, MHN from this period could be defined through four dimensions: (1) the morphological dimension: 'a form and landscape characterised by clusters of blocks and towers in a space subjected to the zoning rules' [19]; (2) the scale dimension: 'systematic implementation

of the principles of the Congrès International d'Architecture Moderne (CIAM) on a large urban scale' [20]; (3) the sociological dimension: 'modernist urban and social utopias that would solve a variety of urban problems' [21]; and (4) the design principles dimension: modernist layout and ideals associated with the functionalism and pragmatism of the Modern Movement and the Athens Charter [22]. Although, through the mentioned dimensions, MHN are designated as 'common practice for both East and West European countries, namely during the period of rapid urban growth in the 1960s and 1970s' [23–28], Musterd et al. [29] listed differentiation as the key concept for addressing issues related to post-WWII MHN in terms of different characteristics, inhabitants, positions in the housing markets, urban policies, and location, as well as contextual features and histories. Considering the four dimensions that characterise MHN, the importance of their reprogramming—and establishing a new order of design values that would contribute to overcoming the mono-functional modernist pattern and creating a social and functional mix—is recognised. This notion represents the main motivation for the study.

The European Committee of the Regions [15] pointed out the structural nature of the housing crisis and the mismatch between the availability of affordable land and the level of housing demand in many EU countries. As one of the ways to overcome this mismatch, the Architects' Council of Europe [30] highlighted the importance of improving the existing building stock to make it more sustainable and resource-efficient. On these grounds, Vision for the Regeneration of the EU Building Stock [31] was developed as a policy position within the area of responsible architecture. The current studies on MHN are predominantly focused on the aspiration to discover and explain their urban personalities through historical interpretative analysis and morphological studies [22,23,32–34]. On the other hand, research initiatives that problematise and examine the potential for the regeneration and rehabilitation of MHN and their inclusion in contemporary urban flows are still insufficiently developed in the academic community. Bearing in mind the differentiation of MHN and their contextual conditioning at the local level, the idea behind this research is to introduce an evaluation framework that would be (1) applicable across the range of scales and adaptable to distinct local contexts, and that would (2) stimulate a paradigm shift in the thinking and practice of MHN rehabilitation, in line with current EU design taxonomy. This idea corresponds with the actions identified within the Pact of Amsterdam [8] to introduce impact assessments and explore appropriate methods, as well as specific tools, that could be applied to issues relevant to urban areas, in order to reduce conflicting impacts of EU legislation on these areas. In order to take this action, a holistic approach to the analysis of MHN is necessary. Such an approach should enable a substantial and critical understanding of differentiation through (1) a multiscale approach [6] that addresses both the city and the individual building as complex interactive systems, and (2) a value-based approach [35] that could provide a framework for overcoming standardised approaches and "one-size-fits-all" solutions.

1.3. Paper Outline and Objectives

Based on the identified research challenges on MHN derived from the perspectives of umbrella frameworks on the European level and current academic discourse, the following research gaps were identified: (1) a lack of reprogramming design strategies (rehabilitation, regeneration, reuse, etc.) for achieving MHN urban sustainability, as well as social and functional mix; (2) the need to establish the state of the art of design ideas, approaches, and concepts related to housing issues defined at the EU level as a unique EU design taxonomy in this field; and (3) the need for value-based evaluation approaches for the anticipation of design values, in order to perceive the potential of and problems for MHN reprogramming. In order to overcome these issues, this paper combines (1) a review-based and systematically-oriented approach in order to provide a state of the art of EU design taxonomy related to the housing issue, and, more specifically, related to MHN, with (2) a comparative study between EU and national design taxonomies in order to address their conditionality and possible mismatches.

In order to approach the abovementioned issues and objectives, the paper uses taxonomy to gain a more comprehensive insight into the content and coherence between programme values and relevant EU documents (declarations, statements, policy positions, resolutions, reports, communications, charters, action plans, opinions) related to the housing issue, or broader urban issues, which include housing as the scope of observation. The taxonomy enables a conceptual methodological framework for a systematic, consistent and complete description of key research relations. It is based on domain theory, which was initiated in the 1970s by Bax [36]. The European Commission defines EU taxonomy as a classification system establishing a list of environmentally sustainable economic activities. It could be crucial in helping the EU scale up sustainable investment and implement the European Green Deal [3]. However, considering the complexity and wideness of the housing issue, in order to create a systematic analytical framework for the evaluation of MHN, this paper considers EU design taxonomy more broadly, not just in the context of economic activities, but also in the context of all relevant housing issues and aspects (environmental, human, social, systemic, temporal, and aesthetic).

The specific objective of this paper is to establish an evaluation framework for re-programming MHN based on EU design taxonomy through (1) the development of the programming matrix for evaluation, which corresponds to the value-based architectural programming model; and (2) introducing a Serbian national MHN taxonomy, in order to demonstrate anticipation of design values based on the EU taxonomy within the national context. These aims correspond to the importance of EU taxonomy implementation on a local level with the 'Housing at the Centre' approach. Based on local experiences and practices, UN Habitat [7] highlights the importance of re-establishing housing problems and opportunities in the international development agenda in an increasingly strategic manner. Following these objectives, two research questions arise: (1) what are the key design values related to MHN rehabilitation introduced on the EU level, and (2) to what extent are these values applied and anticipated in the local context of Serbia?

The paper is structured as follows. The first part of the paper (Section 2) includes the theoretical background of architectural programming methodology and frames it as an evaluation method for MHN. It provides an insight into the contextual framework and the role of architectural programming (Section 2.1), followed by an explanation of the linkage between the conceptualisation of the architectural programme and MHN development (Section 2.2), and value-based architectural programming as a systematic analytical framework for the evaluation of MHN (Section 2.3). The second part of the paper (Section 3) presents the materials and methods applied in this research, including a general research conceptualisation (Section 3.1), an explanation of the development of the EU taxonomy-based programming matrix for evaluation (Section 3.2), an introduction to the observatory field of mass housing in Serbia (Section 3.3), as well as the way in which comparative analysis between EU and national taxonomies is performed (multiscale value-based analysis) (Section 3.4). The third part of the paper (Section 4) presents the results and discussion divided into two parts: (1) elaboration on the developed matrix in line with the different groups of values and associated indicators (Section 4.1), and (2) insights from the value-track and scale-track comparative analysis (Section 4.2). The conclusion summarises the findings and highlights the essential aspects of MHN reprogramming based on the EU design taxonomy.

2. Architectural Programming as Evaluation Method for MHN

2.1. Contextual Framework and the Role of Architectural Programming

The contemporary sociopolitical, technological, and economic context of housing is reflected in the growing requirement for a methodological framework that is: (1) reflective regarding individual and social requirements, and (2) achieves a high level of operational efficiency aimed at the identification and critical assessment of design problems, thematic frameworks, key relationships, and key aspects for the effective implementation of recog-

nised goals. In line with that, this study's complex and multidisciplinary framework needs specific analytical research strategies to evaluate key values for MHN.

In order to (1) synthetically review, classify, and evaluate all relevant values and challenges within the MHN typology and (2) illuminate the processual and multiscale nature of MHN, the paper starts with the methodology of architectural programming as an analytical framework for the evaluation of MHN. Architectural programming is recognised [37] as an analytical and problem-based approach in the design process, raised in specific contextual circumstances of exponential urban development and urbanity growth, including changing patterns of everyday life, industrialisation, mass construction, and standardisation.

The problem in the design process is often reflected in simplified analysis and synthesis based on standardised norms and regulations, which essentially do not contribute to the improvement of environmental conditions and qualitative values of the built environment, even though the regulations and form are satisfied. A significant contribution to the demystification of the described situation in the design process is the revival of the architectural programming methodology, which necessarily has a set of specific criteria, selected relevant aspects for design, and recognised problems and goals. Based on scientific methodology, the architectural programming approach leads designers to focus on the relevant facts and user needs by breaking down the design problem into its elements, in order to understand its essential origin and critical meaning for future design solutions. Observing the city's environmental, morphological, and social framework as primary indicators of the general and individual image of the population, it is evident that the programming process must continuously review the factors that have the most significant influence on this image on different spatial scales.

This paper starts from the premise that architectural programming represents a comprehensive analytical framework that includes different dwelling and behavioural patterns, various values and perspectives concerning the dwelling functions and content. It considers the generation and evaluation of different spatial manifestations, configurations, and relationships, with the ultimate goal of effectively operationalising the overall environmental and social functionality of residential units, individual buildings, and entire settlements within MHN.

This study also highlights the role and significance of architectural programming in the "re-programming" process of architectural heritage. MHN represent an important architectural and cultural heritage; not only an architectural artefact but a living organism that should respond to the needs of modern society and lifestyles. Previously published studies by the authors [16,38,39] have shown the potential of architectural programming, not only in establishing completely new patterns of living and working, but also in re-programming and critically examining inherited patterns, in order to ensure sustainable spatial configurations, activities, and relationships. These studies have demonstrated the capacity of architectural programming methodology to initiate a range of broader critical themes that include regulations, urban narratives, identity, and place-making, as well as economic, ethical, social, and spatial values of different urban cultural practices.

2.2. Architectural Programme and Design Principles of the MHN

The origin of the architectural programming methodology is closely related to the period of the planning and development of MHN, i.e., to the period after the Second World War, and it was stimulated by numerous contextual factors. The most important factors can be seen and grouped into arenas that shape the contextual background of the development of architectural programming [37]:

- Technological arena: the development of computer technologies and system analyses as a response to the need for rapid information processing and thought articulation, but also the development of technical–technological solutions and prefabrication processes that enable mass and intensive construction.

- Sociopolitical arena: the new role of the individual and the new position of the family in society, changing patterns of everyday life, industrialisation and mass construction, standardisation and norming.
- Academic arena: the development of research methodologies in design, as well as design methodologies in general, through the positioning of design science and the theory of design methods on the one hand, and the development of participation within the design process on the other.
- Practical arena: the rapid development of cities and the need for intensive expansion of the construction fund, especially in the form of the construction of MHN, additionally encouraging and accelerating the search for an answer on how to systematically and operationally evaluate the planning and design of public services and housing, but also to systematise and select relevant information in this complex process.
- As previously pointed out, MHN are predominantly designed following the principles of modernist design doctrines. Under these principles, architectural programming in this period was predominantly focused on the functional and anthropometric aspects of housing and based on the theory of user needs. In aiming to achieve a higher standard of living, and with the formation of a new culture of multi-family housing in the collective, such material and organisational circumstances prompted numerous studies of the organisation of residential units and prefabricated construction systems. The focus of professional activity was on developing concepts for the design of residential units. The programming process was based on the housing design that can satisfy a number of assumed family situations [17]. Their ideal schemes and conceptual designs were powerful, if crude, models of human existence and needs. However, the model of human experience was implicit in the design. It was a biological and social model, but much richer from the biological than from the sociological and psychological aspects [40]. Very little attention has been paid to the behavioural forms (e.g., manifestations) of these needs in different cultural contexts. The role of social and cultural aspects of the environment was largely neglected as a factor in design. This model is a very simplified and naïve model of observing the environmental–behavioural interface. However, it is still often present in architectural thought today. The reasons are recognised in the mechanical nature of the design process, and the concern that the developed methods are insufficiently focused on human values and creativity [41]. At the end of the 1970s and the beginning of the 1980s, programming was considered an isolated problem of functionalism, without understanding that it can include many other types of problems, such as aesthetic, psychological, and environmental–behavioural. The main goal was to establish a functional maximum in relation to the economic minimum.
- The limitations of this approach were also recognised in the practice and perception of MHN by users as early as the 1970s. Facilities, neighbourhoods, and settlements simply did not function in real life as intended [42,43]. The architecture required greater diversity and richness of approach in responding to the truly great diversity and richness of human needs and personalities. In this context, significant criticism was directed at the positivist theoretical base of the modern movement in architecture. In the context of the need to rehabilitate these settlements, bearing in mind significant changes in the sociopolitical, environmental, economic, and cultural conditions in which the settlements function today, these limitations are even more pronounced [17]. In this context, this work starts from understanding the architectural programme’s changing nature: from unified, functionalist, and deterministic to flexible, hybrid, and variable. Bearing in mind the complex development of the design process in relation to improved research methods and techniques in the field of architecture, the traditional definition of a programme as a record of specific requirements, conditions, or a set of criteria is not acceptable in the contemporary moment. This means that it is necessary to redefine the concept of the programme from the modernist doctrine—which is characterised by predominantly functional and anthropometric aspects, and is based

on a deterministic approach—towards a more complex approach and a more flexible concept [41], in order to adequately respond to current needs in the context of the rehabilitation of MHN.

2.3. Value-Based Architectural Programming as a Systematic Analytical Framework for the Evaluation of MHN

The complexity of the architectural programme is the result of a whole series of influential factors and aspects, as well as the complex nature and contextual framework of housing, which indicates the necessity of developing a comprehensive matrix of values that, in addition to content, will also have a procedural character. In this sense, one of the architectural programming research tasks was to establish a matrix of values for the generation of architectural programmes, in line with the contemporary moment.

Value-based architectural programming is intended to enable an integral identification and review of all relevant factors and participants in the programme development process. The identification of values related to the design problem in the early phase of the programming process leaves the possibility for identifying key elements in the design process for which more systematic research procedures should be applied. Unlike other approaches to programming (design-based architectural programming, knowledge-based architectural programming, agreement-based architectural programming), the values-based approach is not exclusively needs-oriented, but at the same time, tends to identify and consider limitations caused by time and economic aspects. Architectural programming based on values enables an examination of the fundamental nature of the design problem, establishing a comprehensive balance of programming activities and, thus, simultaneously, a comprehensive methodological framework for evaluating the existing built environment.

Value-based architectural programming is based on the belief that the primary responsibility in the architectural programming process is articulating the values to which the architect should respond in the design process. Values, in this context, mean those beliefs, philosophies, ideologies, understandings, purposes, or other deep-rooted ideas that are the reason for creating a design solution and influence the design framework [44]. According to Robert Herschberger, there is no definitive set of values applicable to all architectural problems, but there may be sets of values that apply to certain types of architectural problems. In this sense, only specific and contextually-based values can serve as a framework for generating an architectural programme (Table 1).

Table 1. Programming value matrix according to Herschberger [44,45].

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

Architectural programming as an analytical tool has a predominant role in the analytical phase of the design process. In the context of critical interpretation of the EU taxonomy relevant to MHN, this phase is crucial for creating an argumentative framework to identify gaps and limitations, improve the thematic framework, and foster operationalisation in design practice and the maintenance and rehabilitation of MHN. The particular value of such an analytical approach is reflected in its potential to enable a comparative overview of housing patterns and associated problems at all spatial levels (from the apartment unit to the city level).

The values-based architectural programming model finds its roots in strengthening the multi-criteria approach. In this sense, programming becomes focused on creating an argumentative framework in the analytical phase as a key support for discussing the overall cultural, socioeconomic, and ecological conditions and relationships that affect the quality of the living environment. Consequently, it is also the key support for recognising problems, limitations, developing strategies, and decision-making processes in the creative

and executive phases of MHN rehabilitation. Bearing in mind that the specificity of the model lies in the perception of design limitations, which should not be left to be intuitively recognised but argumentatively based and carefully researched, value-based architectural programming relies on engaging a dialectical research strategy in order to search for an effective response to the identified limitations. In this context, the value matrix represents a multi-criteria framework for the efficient evaluation of relevant values for the rehabilitation of the MHN.

3. Materials and Methods

3.1. Research Context and Conceptualisation

The research context of the paper is positioned within the intersection of two research projects: (1) the international project Rehabilitation of Mass Housing as a Contribution to Social Equality, which was implemented during 2022 within the DAAD programme East-West Dialogue: Higher Education Dialogue with Western Balkan Countries (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); and (2) the national project Research and Systematization of Housing Development in Serbia in the Context of Globalization and European Integrations for the Purpose of Improving Housing Quality and Standards (TR36034), implemented in the period 2011–2020, within the Ministry of Education and Science of the Republic of Serbia research programme of technological development at the UB-FA. The overall aim of the first project was to decode the potential that MHN have for their region and community, the possibilities they provide spatially, and ways for their maintenance, re-use, and revitalisation [16]. The second project was focused on the study of transformations of housing models in Serbia in the context of globalisation and European integration, with the starting premise that the traditionally adopted concept of the housing unit and the morphological characteristics of the housing settlements of the existing housing stock in Serbia no longer meet the needs of contemporary users. Following the insights from both projects, this research is grounded on cross-cutting perspectives of the EU and Serbia's national framework.

The research is positioned at the intersection of two scientific fields of design research [46]—phenomenology and epistemology. The domain of design taxonomies is studied within the phenomenology framework in order to establish the state of the art of concepts, approaches, and ideas in the field of housing on the EU level and within the prominent umbrella frameworks. Parallel to this, the domain of design axiology is studied within an epistemology framework, in order to demonstrate the anticipation of design values derived from EU design taxonomy to the local context of Serbia as a national observatory framework. The research was conducted in two phases: (1) development of the programming matrix for evaluation based on the current EU design taxonomy; and (2) a comparative analysis of the EU taxonomy with the design values established on the local level (national taxonomy) through two analysis tracks: a multiscale analysis track and a value analysis track. The following sections explain in more detail the process and approach of both research phases.

3.2. Development of the Programming Matrix for Evaluation

The primary material for the development of the programming matrix for MHN evaluation refers to formally established EU documents (declarations, statements, policy positions, resolutions, reports, communications, charters, action plans, and opinions) related to the housing issue or broader urban issues which include housing within the scope of observation. The material consists of 32 sources adopted in the period from 2009–2022 by leading political and professional bodies, partnerships, and initiatives at the European level, including: (1) the European Commission [3–5,15,47]; (2) the Architects' Council of Europe (ACE) [6,9,30,31,35,48–52]—the representative organisation for the architectural

profession at European level; (3) the Housing Partnership [53,54]—one of four pilot partnerships launched within the framework of the urban agenda for the European Union; (4) Housing Europe [55–59]—the European Federation for Public, Cooperative and Social Housing; (5) EU Ministers responsible for housing/urban matters and culture [1,8,60,61]; (6) the European Responsible Housing Initiative (ERHIN) [10]—a consortium of the project implemented by DELPHIS, Housing Europe, and the International Union of Tenants; and (7) those UN documents [2,7,14,62,63] acknowledged by EU Ministers responsible for housing within the Nice Declaration [60]. Moreover, six reports on the State of Housing in Europe [64–69], which imply a comprehensive analysis of the current state of housing in Europe starting from 2012, are addressed in order to understand the broader contextual implications of previously listed sources.

The first step in the development of the programming matrix involved: (1) the collection of the previously mentioned EU documents, (2) a preliminary insight into their content in order to determine the relevance for the scope of the study, and (3) the chronological systematisation of sources. In the second step, a content analysis of all 33 relevant sources was conducted in order to derive the leading concepts/approaches/ideas related to the housing issue at the EU level at the current moment. In the third step, the identified concepts/approaches/ideas were clustered in accordance with the value-based architectural programming methodology (previously explained within Section 2.3), i.e., the original programming matrix (Table 1), consisting of seven design values groups (environmental, human, social, systemic, temporal, economic, and aesthetic) with associated indicators.

3.3. *Observatory Field: Mass Housing in Serbia*

In order to challenge the EU housing taxonomy on the local level, the context of mass housing in Serbia is introduced as an observatory field to evaluate to what extent identified design values are applied and anticipated in the local context. The development of mass housing in Serbia is closely related to socialist ideology, which made multi-family housing a function of achieving its goals. Accordingly, MHN in Serbia after WWII was characterised by rationality, economy, and the extremely large production of apartments within the closed systems of industrialised construction. In addition to being rational and economical, multi-family housing was seen as an ideologically desirable form of housing. The local concept of MHN resulted from the overall social and economic arrangement and appropriate development goals in housing construction. In such an ideological framework, MHN in Serbia were built within the socially-oriented construction programme as functionally separated units in new locations within the framework of modernist ‘super-blocks’, which were a characteristic of post-war housing construction in Eastern European countries.

In the early 1990s, the Republic of Serbia began the housing transition by enabling the privatisation of the social housing fund, and the withdrawal of the state from financing further housing construction, which, considering the housing issue, represented a transition from a planned system to a market economy system [70]. In this period, this transformation of the overall housing system set conditions of: (1) undefined parameters of comfort and housing standards; (2) housing plans unadopted to contemporary life, European standards and market needs; (3) no diversity in different typologies of housing, which meant that the need for new developmental, morphological, and typological models of housing structure, urban patterns, and individual housing units was evident. Within the current Strategy of Sustainable Urban Development of the Republic of Serbia until 2030 [70], it is recognised that the urban renewal initiatives for improving the quality of housing are not systematically implemented. The previous experiences in this field include some realised urban adaptation projects at the level of individual buildings, urban interpolations, new construction, or reconstruction in areas affected by natural disasters (floods, earthquakes, etc.), social housing integration programmes in existing residential areas, and attempts to improve living conditions in substandard areas. Following the recognised lack of a systematic approach to identified problems, reprogramming the MHN in Serbia is one of the primary tasks in the context of sustainable urban development.

In order to perform a comparative analysis of EU and national housing taxonomies, the primary material on the local level refers to formally established national documents (strategies, action plans, laws, and regulations) related to the housing issue or broader urban issues, which include housing within the scope of observation. The material consists of 7 sources adopted from 2011 to 2022 by the Government of the Republic of Serbia. The context of Serbia is characterised by a still-insufficiently developed housing policy, and, accordingly, the primary sources could be classified into three groups: (1) the strategy of sustainable urban development [70] and the action plan for its implementation [71], (2) the strategic framework for the reconstruction of the existing construction fund [72] and the regulation on the energy efficiency of the buildings [73], and (3) Law on Housing and Building Maintenance [74], followed by the Social Housing Strategy [75], and including the draft of National Housing Strategy [76]. The secondary group of sources is represented by the results of the national project TR36034, which enabled the formation of a research base for establishing programme requirements for design and planning, as well as for the preservation, reconstruction, rehabilitation, and development of MHN, following the needs of the Republic of Serbia: (1) analysis and typological classification of the existing housing stock in Serbia [77–82]; (2) valorisation of ecological and environmental conditions and factors of design, development, and rehabilitation of MHN [19,83–86]; and (3) analysis of existing national and European legislation in the field of housing [87,88].

3.4. Multiscale and Value-Based Analysis

In order to conduct a comparative analysis of the EU design taxonomies with the introduced national framework, 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 value-based architectural programming methodology (within Section 2.3), consisting of seven groups of design values (environmental, human, social, systemic, temporal, economic, and aesthetic) with associated indicators. This analysis track was performed by identifying the relevance/irrelevance of clustered ideas/approaches associated within the particular design values/indicators group. The multiscale analysis track is based on the relevant spatial levels for MHN and the specific typo-morphological framework: (1) city level (comprehensive urban settings); (2) neighbourhood level (an assembly of city blocks or a neighbourhood/district/block); (3) building level (an assembly of spatial units/apartments and semi-public/shared spaces); and (4) apartment scale (an assembly of activity/behaviour settings).

These cross-cutting tracks are the starting point for the 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 presence of design values/indicators derived from EU taxonomy, within the national framework, was identified through marking the following indexes: (a) established within the strategic framework on the national level (+); (b) regulated within urban policy framework on the national level (*); (c) piloted and demonstrated in the relevant environment (o); (d) was not applicable in particular scale (x); and (e) not considered in any of frameworks; and step (2) multiscale cross-cutting analysis—numerical values are defined for each of the indexes: established within the strategic framework (1); regulated within urban policy framework on the national level (2); piloted and demonstrated in the relevant environment (3); not considered indicator and not applicable in a particular scale (0). Based on the collected values, a spider chart was created as the basis for a comparative analysis of design values on different spatial levels.

4. Results and Discussion

The results and discussion section is organised in two parts. The first part explains the matrix development and identified notions (concepts/ideas/approaches) in line with the programme values groups (environmental, human, social, systemic, temporal, economic, and aesthetic). In the second part of the section, a discussion is built on the results of the comparative analysis of EU and local design taxonomies in two directions: (1) through observing the representation of design values of the EU taxonomy in the local context at three levels—in the strategic framework, policy framework, and implementation framework (value analysis track); and (2) through observing the connection of design values with spatial levels of MHN (multiscale analysis track).

4.1. Matrix Development

The complexity of the EU design taxonomy is reflected in the recognition that the identified notions (concepts/ideas/approaches) are linked to all general groups of values and their associated indicators referenced within the value-based architectural programming scope. The developed matrix represents a total systematised qualitative review of the notions associated with the particular indicator concerning their primary focus or direction for the design process (Table 2). In this sense, certain concepts are linked to several indicators and, accordingly, to several groups of values, which will be discussed below.

Table 2. Housing Programming Matrix based on the EU design taxonomy.

Values	General Programme Indicators	Design Notion (Concepts/Approaches/Ideas)
A. environmental	a. climate	<ol style="list-style-type: none"> 1. concept of “zero emissions building” 2. climate policy tools and climate resilience standards for buildings 3. energy performance certificates (EPC)
	b. urban context	<ol style="list-style-type: none"> 1. concept of “city of proximity” 2. functional diversity (fab lab, co-working, renewable energy production units, etc.) 3. compact city model
	c. location	<ol style="list-style-type: none"> 1. green/blue infrastructure and ecosystem-based approaches 2. common spaces for shared functions 3. positive energy districts
B. human	a. physical	<ol style="list-style-type: none"> 1. an idea of flexibility 2. design-for-all approach and idea of inclusiveness
	b. physiological	<ol style="list-style-type: none"> 1. wellbeing standards 2. eco-design for better health indices 3. age- and gender-responsive approaches—user behaviour
	c. psychological	<ol style="list-style-type: none"> 1. volume increasing approach 2. life-centred perspective—getting inspired by nature
	d. functional	<ol style="list-style-type: none"> 1. integrated and mixed-use approach—social and functional mix 2. concept “15 min cities” 3. diversity of use and functions

Table 2. Cont.

Values	General Programme Indicators	Design Notion (Concepts/Approaches/Ideas)
C. social	a. cultural	<ol style="list-style-type: none"> 1. culture-centred approach 2. needs-driven solutions 3. new sustainable lifestyles 4. small-scale initiatives by individuals, neighbourhoods and local communities
	b. legal	<ol style="list-style-type: none"> 1. volume-based urban parameters rather than surface-based 2. regulatory experimental settings 3. minimum energy performance standards (MEPS)
	c. common	<ol style="list-style-type: none"> 1. district and community-based approaches with the cooperative development methods 2. multigenerational living and multicultural coexistence 3. common spaces—a sense of togetherness/creating a sense of community
D. systemic	a. materials	<ol style="list-style-type: none"> 1. bio and geosourced materials 2. recovered and renewable materials
	b. technologies	<ol style="list-style-type: none"> 1. cost-effective and efficient strategies 2. nature-based solutions 3. smart technologies
	c. processes	<ol style="list-style-type: none"> 1. standardised industrial solutions 2. toolbox of measures to promote advanced heating and cooling
E. temporal	a. growth	<ol style="list-style-type: none"> 1. affordability—combine climate targets with social cohesion goals
	b. change	<ol style="list-style-type: none"> 1. transparent and reliable processes of exchange 2. land-use and development approval processes 3. designing for adaptability over time—accommodating changing needs
	c. constancy	<ol style="list-style-type: none"> 1. temporary uses and meanwhile spaces
F. economic	a. building costs	<ol style="list-style-type: none"> 1. affordable financial regulation and incentives 2. green loan
	b. operationalisation	<ol style="list-style-type: none"> 1. community Land Trust (CLT) 2. participation and co-creation/bottom-up participation
	c. maintenance	<ol style="list-style-type: none"> 1. urban regeneration and adaptive re-use—building conservation and retrofit 2. circular economy principles (such as durability, designing for disassembly, etc.) 3. model of housing cost neutrality (including rent, energy and operating costs, and local taxes)
G. aesthetic	a. form	<ol style="list-style-type: none"> 1. surface areas and volumes reprogramming 2. extensions to existing buildings (where appropriate regarding the quality of life)
	b. space	<ol style="list-style-type: none"> 1. place-based approach 2. baukultur concept—total visual milieu
	c. style	<ol style="list-style-type: none"> 1. quality of experience and style, beyond functionality 2. heritage values of housing
	d. tradition	<ol style="list-style-type: none"> 1. distinctiveness and sense of place—fitting the local context 2. local and regional identity

Environmental approaches within the EU design taxonomy are built on the intersection of three general groups of programme indicators—climate, urban context, and location. On a general level, this group of approaches represents the most influential design taxonomy within the analysed sources, in accordance with the thesis of targeting total building performance within the three pillars of building performance [9]: low energy consumption, high indoor environmental quality, and occupant satisfaction. Bearing in mind that climate challenges are at the centre of all three umbrella frameworks, climate indicators are manifested through: (1) the stimulation of the concept of zero emissions building [89], which considers whole-life carbon emissions and their impact on the environment; (2) the development and strengthening of the application of climate policy tools [90] (such as deep renovation passports/roadmaps) and climate resilience standards towards ensuring a socially just transition to a climate-neutral economy [10]; and (3) standardisation through the application of energy performance certificates (EPC) [4,91]. Urban context indicators are manifested as a response to the challenges of accelerated urbanisation, which, in the context of MHN rehabilitation, refers to the aspiration to improve the existing living conditions both functionally and morphologically. In this sense, two conceptual frameworks of the city were identified: (1) the city of proximity [92], based on the idea of improving accessibility to facilities and public transport or other soft modes of transport, which is particularly significant for the phenomenon of MHN of the second half of the 20th century, characterised by a monofunctional structure and modernist conditions at the level of urbanism; and (2) the compact city model [14,93] that affirms planned growth in order to prevent urban sprawl. In the synergy of these two concepts [31], the idea of functional diversity (fab lab, co-working, renewable energy production units, etc.) is found, which is recognised as a sound design strategy for renovating the empty housing stock and reaching well-connected and well-located housing, with particular attention being paid to ‘the proximity factor and the strengthening of the spatial relationship with the rest of the urban fabric and the surrounding functional areas’ [63]. Finally, the location indicator is scaled up to district and community approaches, affirming the following concepts: (1) green/blue infrastructure [94] and ecosystem-based approaches, which encourage green areas extension; (2) the systematic distribution of outdoor spaces and common spaces for shared functions; and (3) positive energy districts [95], which could generate a large potential for renewables and waste-heat recovery [4].

Human approaches are manifested in line with the need to go ‘beyond a human-centred to a life-centred perspective inspired by nature and learning from it’—a overarching perspective within the framework of the New European Bauhaus [5]. The distribution of concepts/approaches/ideas within the human group of values is found in four categories of programme indicators—physical, physiological, psychological, and functional—which are primarily reflected in relation to environmental principles and their associated values, but which are scaled up to the level of individual needs and activity setting of the user. Physical indicators refer to the improvement of conditions that could have a direct effect on the physical and mental health of the population in a long-term perspective, and which could be improved through: (1) the idea of the flexibility of space [52] at the housing unit level; and (2) a design-for-all approach [5], stimulated by the idea of inclusiveness. Bearing in mind that MHN were created as a result of deterministically established design parameters within the industrialised construction system, it is of great importance to introduce housing that is more aligned with contemporary urban lifestyles [39] and adaptable to solving physical barriers in accessing housing for the elderly and people with disabilities. This issue is further mapped to psychological indicators—which became even more significant in the context of the COVID era—and the need to reinforce the basic rules of public sanitation and public health in line with the challenges imposed by the pandemic. The improvement of psychological indicators within the EU design taxonomy given significant consideration with regard to eco-design approaches, which are considered in terms of (1) providing greater opportunities for contact with green public spaces, and (2) translating into better health indices for the population with reduced income-related

health inequalities. Furthermore, this group of indicators stimulate the substantiation of high health and environmental standards through ‘ensuring high air quality, good water management, disaster prevention and protection against climate-related hazards, removal of and protection against harmful substances’ [4]. Based on the insight into the selected sources, it was recognised that the physiological indicators of human values primarily refer to the dimensional and ergonomic aspects of space. However, in this case, they are also considered concerning the volume-increasing approach, which refers to the design principle of increasing building volume (in a physical or visual sense), which favours the quantity of air and thereby provides for greater exposure to natural light and, accordingly, stimulates the link between nature protection and physical and mental health. The function indicators represent the manifestation of the notion of habitability with the overall intention for a particular place to ‘serve the purpose and achieve the functions for which it is designed’ [50], relying on the following three approaches: (1) an integrated and mixed-use approach [35], which could be engaged in order to ensure a mix of uses in daily life and to reinforce access to common functions and basic services (work, shops, leisure, care, etc.); (2) a proximity economy approach [5], correlated to the concept of “15-min cities” [92] which is scaled up from the concept of “city of proximity”; and (3) an approach directed towards diversity of use and functions [56] as a design reflection on the need to adapt to changing social and economic conditions, as well as the social and cultural mix of the inhabitants supported by age- and gender-responsive approaches [14].

Social Approaches are recognised as an instrument through which architecture manifests itself as a social innovation in the triad of three types of programme indicators—culture, legal, and common. This group of approaches is predominantly based on the spatial level of the district/urban block concerning the sociological level of the community, with the unique goal of achieving local social sustainability through intergenerational cohabitation [59] and social integration [10]. The thesis within the EU design taxonomy is that the provision of social values could be effectively achieved through bottom-up approaches, such as small-scale initiatives by individuals, neighbourhoods, and local communities that guarantee valorising diversity and equality for all within the housing community. At the core of this group of indicators, the study recognised a synergistic relationship between existing cultural and heritage values (culture-centred approach) and the needs of the end-users (needs-driven solutions), which contribute to the optimisation of the cultural values of the place. In this framework, the Housing Europe initiative study on the challenge of an ageing population and future affordable housing [59] identified the following role models which demonstrate how housing typologies could be designed or reprogrammed to ensure the strengthening of social values: (1) mixed-used typologies—generation mixes in housing and inter-generational cohousing; (2) community-centred typologies—solidarity between generations through volunteering; (3) service-based typologies—care services and technologies to encourage active ageing and security; and (4) nature-based typologies—ageing and ‘green living’ lifestyle. Legal indicators of the programme are identified as the articulation of environmental and economic values and the way in which those group of values contributes to the improvement of the social standard of housing, primarily based on aspects of regulation and standardisation: (1) favouring volume-based urban parameters rather than surface-based, which corresponds to the volume increasing approach within the human group of values; (2) the establishment of regulatory experimental settings; and (3) introducing a minimum energy performance standards (MEPS) [4] for both existing buildings undergoing major renovations, and for the replacement or retrofit of particular elements (heating and cooling systems, roofs and walls, etc.). Common indicators represent, in this case, a supplement to the culture-centred approach through the encouragement of the active participation of citizens and stimulation of district and community-based approaches with cooperative development methods. From the long-term perspective, these indicators are perceived to address obstacles to the right to housing [47], such as discrimination, speculation, predatory lending, land-grabbing, conflicts, forced evictions, environmental degradation, and vulnerability to disasters. Moreover, the Geneva UN

Charter on Sustainable Housing highlighted the thesis that ‘housing should take into consideration the background and culture of inhabitants’ in order to promote a new lifestyle where ‘sustainability matches style’ [14]. Bearing in mind that MHN represents a complex multiscalar urban construct, improving existing neighbourhoods also implies improving common spaces and places towards regaining a sense of belonging and avoiding spatial segregation of social groups. Considering the conditioning of individual programme indicators within the group of social values, it was recognised that culture has the capacity to enable and be a driver of economic, social, and environmental sustainability [1].

Systemic Approaches correspond to the technical and technological aspects of the design process. It is classified into three notions—materials, technologies, and processes. Material indicators are aimed at encouraging the use of sustainably produced and procured nature-based building materials, which include recovered and renewable materials, as well as bio and geosourced materials. This type of indicator is particularly important for the decarbonisation and integration of renewables [4], particularly at the building and housing unit level. Following the line of ‘smart’ construction and upgrading of housing, the indicator of technologies is recognised through two approaches: (1) the implementation of cost-effective and efficient strategies, such as improvements in the dwellings’ envelope, passive heating and cooling techniques, improvement of the building’s services; and (2) nature-based solutions as a reflection of the need to reconnect with nature [5]. This group of approaches could also be marked as the materialisation of environmental values in response to the recognised need for housing to meet the necessary energy requirements [15]: energy efficiency, energy savings, low CO₂ emissions, and investment in clean and renewable energy, etc. Process indicators are manifested within the synergy of material and technology indicators, the basis of which is the aspiration to achieve resource-efficient and circular material life cycles [52]. In line with that, life cycle tools are recognised as one of the basic mechanisms for realising standardised industrial solutions that will further enable scenarios for improving building lifespan, adaptability and deconstruction.

Temporal Approaches within the EU design taxonomy are represented as an operational framework for the confrontation with and synergistic action of other groups of values. Looking at the basic housing development agenda in the context of action plans and strategies for the development of the housing sector, ‘affordability’ is recognised as a central concept within which a series of value dichotomies collide, including combining climate targets with social cohesion goals, the renovation of existing housing and diversified use and ownership [53], and meeting energy-performing requirements alongside well-balanced minimum energy efficiency requirements [57]. The term ‘affordable housing’ is interpreted in various ways in the housing literature and international policy [4,50,56], primarily as a consequence of the reference design value concerning which the definition of ‘affordability’ is established. Within the European housing landscape, three main clusters could be identified within the housing continuum shaped in line with the temporal and economic perspective [54]: (1) emergency housing with the categories of emergency shelters and transitional housing; (2) affordable housing with the categories of social housing, affordable rental housing, and affordable home ownership; and (3) market housing with the categories of market rental and market home ownership. The proposed classification recognises the conditionality of housing with a variety of housing systems, policies, and traditions and, accordingly, their transitional nature, in which the issue of time and the contextual framework play a key role. In that order, ‘affordability’ is primarily perceived as a temporal indicator, given that the variability of the context affects both the shaping of social, economic, and environmental indicators, and the transition of the affordable housing category to other forms of housing. As the second indicator of the temporal group of values, the issue of change is considered, and it should answer three challenges: (1) transparent and reliable processes of exchange, which are considered as an operational framework for reaching environmental and systemic indicators towards responding to climate challenges; (2) land-use and development approval processes, which are particularly related to the rehabilitation process of MHN on a district level with two approaches—the renovation of

existing housing and community-led urban renewal; and (3) designing for adaptability over time in order to accommodate the changing needs of individual users and community. Finally, the indicator of constancy, in this case, refers to the intention to achieve continuity in the use and maintenance of MHN through temporary uses and meanwhile spaces. The design approach based on temporary use is recognised as one of the leading principles for achieving smart and quality-based processes within the Leeuwarden Declaration on Adaptive Re-use of the Built Heritage [35]. Bearing in mind that MHN throughout Europe are designated as a unique heritage [96] of the second half of the 20th century, the engagement of a temporal-based approach is recognised as significant to make possible future re-uses, or a return to the original condition of the individual building or public space.

Economic Approaches advocate a group of values aimed at supporting an environment conducive to investment in housing and the promotion of secure land and housing tenure [14] through the indicators of building costs, operationalisation, and maintenance. The indicator of building costs is recognised as an instrument for promotion of the quality and affordable housing through: [4] (1) financial regulation and incentives for public and private owners and tenants to undertake renovations and support compliance with mandatory MEPS; or (2) green loan or schemes for energy efficiency loans. The operationalisation indicators are manifested in accordance with the approaches of co-creation and bottom-up participation, in order to encourage participatory housing and self-development of housing through the setting up of residents' cooperatives and crowdfunding. In addition to these approaches that are related to the organisational aspects of the community, another recognised approach refers to economic models that enable the separation of the building from the land, such as the Community Land Trust (CLT), co-housing, and other forms of collective tenure [63]. Accordingly, these cooperative solutions could provide greater autonomy for residential communities for the implementation of district and community-based approaches, as well as the prevention of segregation. The third group of programme indicators is focused on the issue of maintenance and management of the existing housing stock. The first approach is derived from the ACE policy position on urban regeneration, which recognises the need to introduce new strategies that promote the 'deep renovation' [31] or 'smart renovation and transformation' [35] of buildings, where energy and resource efficiency complements the functional, spatial, and material reconfiguration of buildings. Following this line of reasoning, the Statement for Designing for a Circular Economy was established to stimulate architectural solutions which promote circularity in value-oriented hierarchy of actions and integrate four approaches [51]: (1) the cultural approach—maintenance, re-use, and renovation, as well as retrofitting of the existing housing stock in order to combat energy poverty by supporting energy efficiency [14]; (2) the functional approach—designing for adaptability in order to reflect on changing needs, user lifestyles, and behaviour; (3) the technical approach—designing for easy replacement and direct reuse while optimising technological value; and (4) the material approach—recycling and upcycling design principles and utilisation of sustainable building materials.

Aesthetic Approaches within the current EU design paradigm are predominantly guided by cultural indicators based on the thesis that 'cultural aspects create a sense of place and are a major determinant of local and regional identity' [35]. This group of programme values is structured through four indicators that include form, space, style, and tradition. The form indicator relies on human values and their associated physical and psychological indicators that relate to encouraging adaptive conversion, building conservation and retrofit through: (1) reprogramming surface areas and volumes in terms of reaching idea of flexibility and improvement of wellbeing standards; and (2) where appropriate, regarding the quality of life development of the extensions to existing buildings in line with the volume increasing approach and life-centred perspective. The space indicator represents the impetus of aesthetic values by introducing the concept of Baukultur [1]. This concept directs the design focus on the perception of the whole built environment and total visual milieu of space by considering the factors of spatial coherence, scale, and materiality [1]. Furthermore, the indicator of space is related to place-based approach as an essential

instrument to take into account the specificities of a place, including the overall context and history, and as reference points for an integrated horizontal and vertical approach [31,61]. In that order, it is recognised that the quality of space requires a holistic approach that considers all impact—societal, environmental, cultural, and economic, and, accordingly, that the aesthetic values overcome a purely artistic dimension [50]. In the same scope of consideration, the indicators of style address: (1) quality of experience and style beyond functionality by taking advantage of local resources and locally proven technical solutions; and (2) heritage values of housing by taking into account local priorities, needs, and culture [9,31]. Finally, the indicator of tradition is rooted in the idea of reaching distinctiveness and a sense of place by fitting the local context, and raising awareness of the local and regional identity. Following this line of reasoning, the Geneva UN Charter on Sustainable Housing [14] stated that the ‘national housing policies should that take into account social and territorial peculiarities and support the protection and enhancement of historical and cultural heritage’ through a multiscale perspective from landscapes to single housing units.

4.2. Comparative Analysis of EU and Local Design Taxonomies

A comparative analysis of the identified EU design taxonomy within the context of Serbia as an observatory field of local design taxonomy showed that there is still a significant disparity between housing strategies and policies established at the EU level and those implemented at the national level. In this case, the context of Serbia is additionally specific because it is a country that currently has the status of candidate for accession to the European Union. Accordingly, in the coming period, there is a necessity to develop numerous strategies that would respond to the challenges listed in Chapter 27 related to environmental and climate changes. Keeping in mind that the challenges of climate change are recognised as an umbrella within the overall EU urban paradigm, these challenges are directly reflected in housing policies and the implementation of housing rehabilitation strategies. Qualitative analysis—through which the connection of identified design notions (concepts/approaches/ideas) with the level of their consideration or application was mapped—showed (Table 3) that only 12 indicators (21.42%) out of a total of 56 programme indicators distributed in seven groups of values are piloted/demonstrated in the intended environment on the national level, while 17 indicators (30.36%) are established within the strategic framework, and seven indicators (12.50%) are regulated within the policy framework. Moreover, 20 indicators (35.72%) were not considered within any of the frameworks mentioned above.

Table 3. Mapping the application of the EU design taxonomy within a national framework.

Values	Concepts/ Approaches/ Ideas *	City Level	Neighborhood Level	Building/ Site/ Plot	Housing Unit/ Apartment
A. environmental	A.a.1.	x	*	*	*
	A.a.2.	+	*	*	*
	A.a.3.	+	*	*	*
	A.b.1.	o	+	+	x
	A.b.2.	o	+	+	x
	A.b.3.	+	+	x	x
	A.c.1.	+	+	+	x
	A.c.2.	o	o	o	-
	A.c.3.	+	+	*	*

Table 3. Cont.

Values	Concepts/ Approaches/ Ideas *	City Level	Neighborhood Level	Building/ Site/ Plot	Housing Unit/ Apartment
B. human	B.a.1.	x	x	-	-
	B.a.2.	+	+	+	+
	B.b.1.	-	-	-	-
	B.b.2.	+	+	-	-
	B.b.3.	-	-	-	-
	B.c.1.	x	+	+	-
	B.c.2.	-	-	-	-
	B.d.1.	+	+	-	-
	B.d.2.	o	+	+	x
B.d.3.	+	+	+	x	
C. social	C.a.1.	+	+	-	-
	C.a.2.	-	-	-	-
	C.a.3.	-	-	-	-
	C.a.4.	+	o	+	-
	C.b.1.	x	-	+	-
	C.b.2.	-	-	-	-
	C.b.3.	x	*	*	*
	C.c.1.	+	o	+	-
	C.c.2.	+	+	-	-
C.c.3.	+	o	+	-	
D. systemic	D.a.1.	-	-	-	-
	D.a.2.	-	-	-	-
	D.b.1.	x	*	*	*
	D.b.2.	+	+	-	-
	D.b.3.	-	-	-	-
	D.c.1.	x	x	o	o
D.c.2.	x	*	*	*	
E. temporal	E.a.1.	+	+	-	-
	E.b.1.	-	-	-	-
	E.b.2.	*	*	-	x
	E.b.3.	-	-	-	-
	E.c.1.	-	-	-	-
F. economic	F.a.1.	-	-	-	-
	F.a.2.	x	x	o	o
	F.b.1.	-	-	-	x
	F.b.2.	+	o	+	-
	F.c.1.	+	+	o	o
	F.c.2.	-	-	-	-
	F.c.3.	x	x	-	-
G. aesthetic	G.a.1.	x	-	-	-
	G.a.2.	x	-	-	-
	G.b.1.	+	+	-	-
	G.b.2.	+	+	-	-
	G.c.1.	-	-	-	-
	G.c.2.	o	o	o	-
	G.d.1.	+	+	+	-
	G.d.2.	+	+	-	x

Indexes: established within a strategical framework on the national level (+); regulated within urban policy framework on the national level (*); piloted/demonstrated in the intended environment (o); N/A in particular scale (x); or not considered (-); Note*: The indexes for concepts/approaches/ideas are defined in line with the marks in Table 2.

The results of the value-based analysis track indicated that environmental values are the most developed group indicators within the national design taxonomy. Climate indicators are regulated within urban policies, urban context indicators through the concept of the city of proximity, and indicators to encourage functional diversity are piloted at the broadest spatial level of the city, while the compact city model is strategically established within the agenda of sustainable urban development. Following functional diversification, the location indicator is manifested through piloting common spaces for shared functions. The group of human values is predominantly strategically determined while piloting the '15-min cities' concept, which largely builds on the environmental concept of the city of proximity and is the only one recognised. Within the group of social values, the piloting of three conceptual frameworks/approaches has been recognised, which include: (1) small-scale initiatives by individuals, neighbourhoods, and local communities [86]; (2) district and community-based approaches with cooperative development methods [97]; and, based on the previous two, (3) the stimulation of common spaces and a sense of togetherness. These are predominantly designed as bottom-up initiatives initiated by the local community with the indirect support of the academy [16]—which is still an experimental practice—and the testing of possible formats of MHN rehabilitation by the community. The regulation of minimum energy performance standards (MEPS) is also recognised in this group of values, which is a direct repercussion of policy-regulated environmental indicators. The temporal values are at the lowest level of consideration at the national level in relation to other groups of programme values, so the aspects of the affordability of housing and the issue of land-use and development approval processes are considered at a very general level within the strategy of sustainable urban development. The study further recognised that economic values are predominantly an indirect result of other groups of values, and that individual indicators were not considered at any of the analysed levels of application or implementation. In this sense, the stimulation of operationalisation indicators through the encouragement of participation and co-creation (in line with the scope of social approaches), as well as building conservation and retrofit (in line with the scope of systemic approaches), is highlighted. The aesthetic approaches, similar to the group of social values, strategically consider space indicators in the broadest sense, particularly the place-based approach, through general consideration for introducing holistic approaches to urban planning. The same level of consideration is recognised for indicators of tradition. Finally, the only piloting in this group of values refers to the appreciation of the heritage values of MHN and the style indicators that are recognised in individual examples of MHN [98].

The results of the multiscale analysis track confirmed that there is a far-reaching gap not only between the analysed spatial levels relevant to the subject of MHN (city level, neighbourhood level, building/site/plot level, or housing unit/apartment level), but also between the observed groups of programme values (Figure 1).

As demonstrated by the value-based analysis track, the group of environmental values implies the highest level of consideration within the national design taxonomy related to MHN. However, through the multiscale analysis track, it is recognised that this consideration is predominantly focused on spatial levels of a higher order, while the housing unit/apartment level was considered to a minor extent in this context, especially when it comes to indicators related to the urban context and location. Accordingly, such relationships between scales and values show that there is no operational link between urban planning parameters and housing standards that apply to the single housing unit level. Additionally, the group of human values is considered disproportionately highly at the city level, while the level of applicability of the identified concepts, approaches, and ideas related to the housing unit as the immediate level of the user's living space is given almost negligible consideration. The applicability of design notions related to the social group of values and indicators is predominantly manifested at the neighbourhood level, which is a direct result of the application of the bottom-up approach with the cooperative development methods. The multiscale analysis track indicates the mutuality of the group of systemic and economic values that are predominantly implemented at the level of

individual buildings, while the complete absence of this spatial level could be observed within the group of temporal values. An extreme indication is also recognised in the case of an aesthetic group of values, within which there is a complete absence of consideration of programme indicators at the housing unit level.

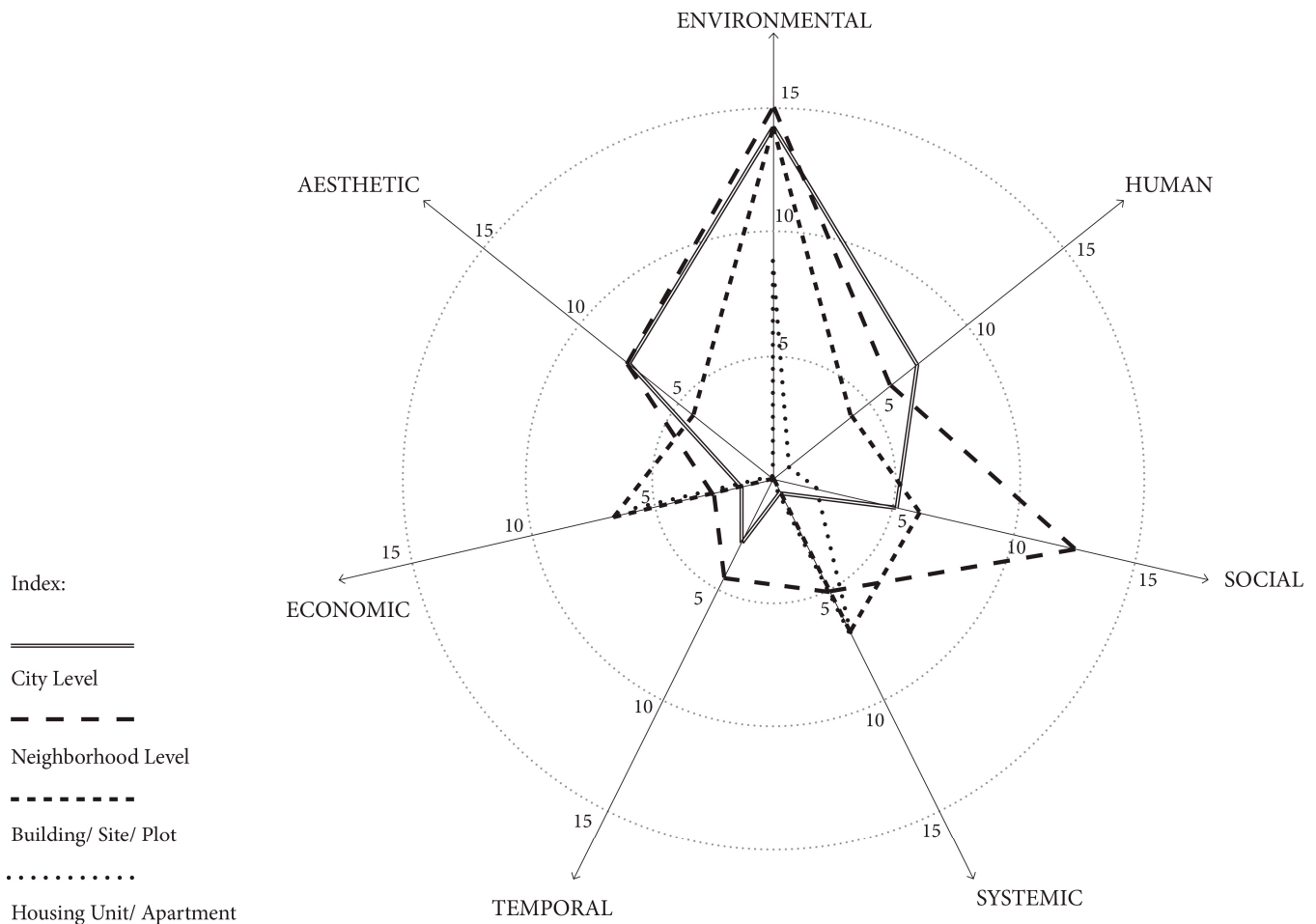


Figure 1. Multiscale distribution of recognised design values within national taxonomy.

5. Concluding Remarks

Although design notions (ideas, approaches, and concepts) could be found within the identified relevant sources at the EU level within all groups of programme values and indicators, it is recognised that they are still disproportionately represented, and that they are predominantly based on environmental approaches, specifically on climate indicators. This has the result that the overall design taxonomy is focused on the technical and technological aspects and monitoring of quantitative indicators through pragmatic norms and performance measurement systems. However, the initiation of strengthening the social and human dimensions (life-centred perspective) of housing in the sense of standards related to well-being and human behaviour is also recognised. However, these aspects are still not defined in an operational way or with an instrumental role in the design process. In the methodological sense, it was recognised that the developed matrix has the capacity to be an assessment framework for gaining insight into the state of the art at the local level in relation to the tendencies of the design taxonomy at the EU level, but that it could also serve as a design framework for identification of priority ideas, concepts, and approaches in housing rehabilitation. In this sense, a special reference is reflected in the ability to identify the dependence of design values with spatial levels through the developed matrix and multiscale analysis track, and to establish an orderly hierarchy of design priorities,

which is the basis for designing for a circular economy and the implementation of life cycle assessment.

The research intention to examine the EU design taxonomy and to compare it with the local context through the introduction of the national observatory framework of Serbia showed that, in addition, to the distribution and representation of individual programme values, recognised mismatches represent the issue of housing policies and action plans for their implementation. In this sense, additional efforts are necessary to examine and test regulatory experimental settings through middle-out approaches, whose central research perspective will be built in parallel with and coherently through bottom-up inputs created as a result of collaborative approaches on community level, and top-down inputs which are the result of the strategic framework established in relation to priorities at the European level. In order to be in line with the 'Housing at the Centre' approach and to restore social dimension of housing, it is necessary to create and implement design-based research that will have the community at the centre and that will advocate social participation and cultural adequacy. Additionally, bearing in mind the multiscale character of MHN, one of the research priorities in the upcoming period should be focused on examining the possibility that certain design notions could be scaled to higher or lower spatial levels in order to provide the framework for a holistic viewpoint on the built environment.

Considering the methodological nature of the research and the intention to develop a design-based evaluation tool in a form of matrix, the research resulted in the presentation and elaboration of a completely new programming matrix based on the design notions relevant for the MHN rehabilitation. The matrix application could be recognised in different phases of the design process—from the analytical phase, in order to identify design problem that could be addressed within the design process, towards the executive phase and post-occupancy evaluation, in order to evaluate the existing condition of MHN. Moreover, the developed matrix could contribute to the process of local and regional urban policies development (in the domain of housing and specifically mass housing), providing a framework for understanding the level of implementation of recognised design notions at the EU level in the local practice of urban development.

The advantage of this methodological framework is recognised in its instrumental role within partial and specific local contexts through the recognition of gaps and mismatches in specific case studies. Research in the wider European context is certainly necessary, but it requires more complex research that would be conducted at the international level, while this manuscript introduced an observatory framework. Current comparative studies on housing policies in Europe indicated that there are differences [99] in: (1) responsibility regarding the horizontal and vertical distribution units and levels (national, regional, local); (2) construction periods; (3) regional appearance; and (4) features for further development. These comparative studies also indicated that housing policies are affected by different drivers (including immigration, refugee crisis, emigration, urbanisation, ageing society, decreasing household size, and energy efficiency requirements) and guiding principles (goals and functions); therefore, the current research agenda in the academic community should, as a priority in the upcoming period, include a comparative consideration of design values for the improvement of the existing construction housing fund.

This study demonstrated that the developed programming matrix has an instrumental capacity to establish design-based relations between EU design taxonomies and local features and, thus, contribute to evaluating the level of compliance of certain policy notions over responsibility levels.

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