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SPATIAL CONFIGURATION OF DWELLING UNITS IN MULTI-STOREY RESIDENTIAL BUILDINGS: THE CASE OF APARTMENTS BUILT IN SARAJEVO 2008 - 2018

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This paper is based on the premise that it is not the building as a structure that truly matters, but the spaces within the structure. Consequently, this paper takes into consideration usable space as its main substance and, by analysis and description of dwelling unit concepts in Sarajevo, it evaluates 116 apartments in 16 multi-storey residential buildings built between 2008 and 2018. All the data related to the apartments in Sarajevo is primary data, collected by means of observations and measurements, evaluated through qualitative and quantitative analysis, and set in the frame of an explanatory and comparative multiple case study. The results indicate that, in terms of their functional configuration, the apartments are mostly configured as atypical and unstandardized. The areas of use within the apartments were planned to be interrelated without any clear intentions, which has resulted in static plan types with no or only minor potential for variation in the spatial adaptability or flexibility.

***Key words*: dwelling, spatial logic, configuration, areas of use, plan type.**

INTRODUCTION

When it comes to living spaces and the interests of their users, Vasilski (2016) claims that without experiencing architectural space, architecture cannot be understood. It can be stated that finished architectural spaces are positioned in between two sides of interest (influenced by two parties (Suvanajata, 2001)): architects on one side and users on the other. In addition to the aforementioned parties, a third party of interest is the building and financial sectors, which serve as the dominant force in the contemporary world. The setup of the building sector and its financial interest is an influential power in the form of so-called "market-machineries" which consistently influence the quality and quantity of production of the built living environment (Deilmann *et al*., 1979) and are, in the cases of Western countries, directed and governed by urbanistic, constructional and architectural technical norms and guidelines. Towards the end of the global transition processes of social and economic transformations in Europe (in the 1990s), the former Socialist Republic of Bosnia and Herzegovina (which existed as part of the former Socialist Federal Republic of Yugoslavia (SFRY)) faced a war, which ended with the Dayton Agreement, signed on November 1995 by all conflicting parties, according to which the constitution and the governmental system of post-war Bosnia and Herzegovina was formed. The post-war period was marked by corruption, the black market, political privatizations and misappropriation, which were encouraged by the very newly established complex internal state structure and state organization (Gavrić *et al*., 2009). The state structure consisted of numerous levels which, in practice, meant a lack of both centralized coordination and mutual harmony. These coordination inconsistencies rapidly increased the inequalities among the regions and the people on a scale not even similar to the inequalities that already existed in the period of former SFR Yugoslavia (Ernst *et al*., 2003). During the initial period after the war, the newly formed entities and districts faced massive emigration, devastation, and large-scale displacement. Sarajevo, as the capital city of the post-war country, administratively belongs to the Sarajevo Canton within the Federation of Bosnia and Herzegovina, and it consists of six municipalities: Stari Grad, Centar, Novi Grad, Novo Sarajevo, Ilidža and Vogošća. Within these conditions, in a complex administrative structure, post-war Sarajevo was challenged to deal with tripartite transitional processes (Englund, 2015): (a) *from war to peace,* (b) *from a one-party system to a multi-party system*, (c) *the transition to a new economic system*.

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With the rising housing challenges, pre-war Sarajevo managed to provide and develop the relevant strategies, keeping the integrity of planning during the 1980s (until the war), and in 1985 the City of Sarajevo introduced the "Long-term Social Plan for the City of Sarajevo for the period 1986-2000". Collective residential housing constructed before 1991 could be considered as relatively 'new' since the most intensive construction was evident during the period 1965-1991, and in its time this part of housing stock represented some sort of high standard of living. Implementation of the aforementioned plan for the City of Sarajevo was affected by the post-war conditions – the legacy of the war (damage and destruction of dwelling units in all parts of the city that resulted in 57.5% of residential buildings being damaged), which forced the City to start developing strategies of reconstruction and recovery (The City of Sarajevo – City Planning Institute, 1995). The application of any standard related to housing stock was left as the responsibility of each municipality, and in the post-war period, no new conditions or norms for housing design were created as unified strategies on the city level, due to which, municipalities were expected to develop regulatory plans throughout their planning services which did not offer, in the sense of guidelines, anything more than zones for construction, construction lines, and floor height regulations. All other formal regulations that govern general construction processes were, indeed still are, regulated by the Entity law (Law on Construction, 2001), and the potential standards and guidelines that were supposed to regulate the qualities of the spatial configuration of apartments are not covered either by the mentioned city units or by the law. The existing gap in legislative and relevant guidelines means that besides the floor heights and construction line marking, everything related to the functional content of dwelling units and their configurations (apartment size, use areas, plan types, ratio of usable space per user, etc.) has been left to the private sector and to the investors' own conceptions of living values, which might not be best for the contemporary spatial dwelling needs of the inhabitants (users) of dwelling units in Sarajevo.

ASPIRATIONS IN THE PLANNING AND CONFIGURATION OF DWELLING UNITS IN SFR YUGOSLAVIA AND ABROAD DURING THE PERIOD 1948 TO 1979

From the aspect of architecture, in the second decade after the end of World War II, within the whole territory of SFR Yugoslavia (including Sarajevo), there was a dominant tendency of maximum "packing" of dwelling units up to the limits of acceptable living minimums for the users, as well as the tendency to create a more humane living environment (Čanak, 2014; Mecanov, 2015). Aligned with economic growth, based on the research of architectural solutions and values, the residential architecture in SFR Yugoslavia developed during the period 1948 to 1970 could be referred as "experimental architecture". The dominant design approaches used in dwelling units were based on a tendency to minimize the surface areas of apartments, which resulted in overcrowded apartments with numerous inconveniences from the aspect of the users (Dobrivojević, 2012). Despite progressive tendencies and numerous changes in residential politics by the government, in the middle of the 1960s SFR Yugoslavia was still bottom of the list according to the number of dwelling units constructed per 1000 residents in Europe (Vujović, 1990; Ginić, 1967). Even then, the solution was "found" in the illegal and uncontrolled construction of housing – mainly by the working population. According to Alfirević and Simonović Alfirević (2018), as a result of housing research aims in the 1960s and 1970s, which was the period of the most significant expansion of residential architecture in SFR Yugoslavia, the main concepts for the configuration of apartments could be classified in to four different groups (apartments with: a – extended circulation areas, b – central sanitary units, c – a circular connection, and d – enfilades/extended vistas) that differed according to the approach applied to the configuration of the access areas, circulation areas, sanitary areas, etc. This, in essence, contributed to the variation in the spatial flexibility from numerous aspects. Finci (1962) stated that, during the period of SFR Yugoslavia, Sarajevo noted significant progress in the building of dwellings from the aspect of disposition, internal architecture, structure and equipment, and the internal dispositions/floor plans of dwellings were designed as "inside towards the outside". In other words, apartments were the reflection of their internal disposition and the life within the dwelling units.

More dwelling units were built in England during the decades of "experimental architecture" in SFR Yugoslavia than at any other time in its history (the 1960s and 1970s were the decades of prefabrication, productivity and planning) (NHBC Foundation Expert Panel, 2015). These decades were also marked in the USA and in other European countries (including France and Sweden (Colquhoun, 2002)) by the most significant expansion of the promotion, planning, and construction of high-rise living facilities, like skyscrapers and other multi-storey residential blocks. According to Deilman *et al*. (1979), possible innovatory changes in residential architecture depend mainly on social, economic and technological factors, in accordance with which, as the consequences of economic development in some industrialized countries, a slight increase in the size of dwelling units was detected. In a study conducted by Harold Deilmann, Jorg C. Kirschenmann and Herbert Pfeiffer (1979) documenting modern architecture called "Wohnungsbau / The Dwelling / L'habitat", 65 different dwelling units in multi-storey residential buildings (constructed during the period 1962-1972) located in 15 different countries were evaluated in order to systematically obtain information regarding the effects of different features of the arrangement, rooms access, and the possible use of rooms, and to detect the possible consequences of the design decisions used, from the aspects of variability (adaptability of the plans) and flexibility (use – neutrality of the plans) (Table 1).

In the study by Deilmann *et al*., an analysis of the apartment plans was accomplished by representing different types of dwelling units in the form of diagrams in order to present the diversity of their multifarious characteristics while focusing on two particular characteristics: space coordination (the arrangement and access of rooms) and the use of space (the proposed "possible" uses of rooms). Their study was mainly based on the configurational theory of space, according to which, by understanding the spatial logic of a setting, it is

Table 1. Examples of dwelling unit types in multi-storey residential housing solutions worldwide

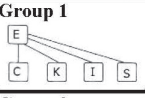
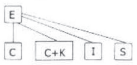
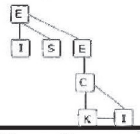
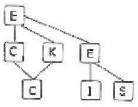
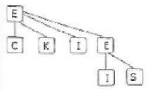
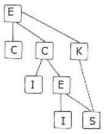
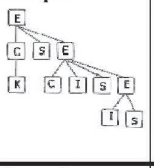
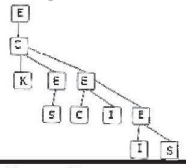
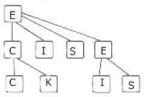
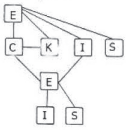
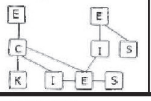
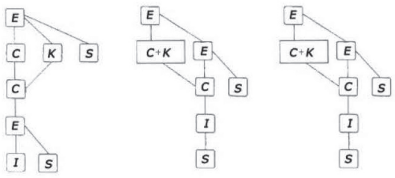
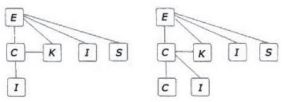
Evaluation and classification of plan types for 65 different dwelling units that belong to projects located in 15 different countries (Germany, France, Finland, Australia, England, Japan, Spain, Canada, Italy, Israel, Switzerland, Kuwait, FAS Puerto Rico, U.S.A., and Austria)	
Group types represented by diagrams as a means of plan-types **E** – Entrance areas | **C** – Communication areas | **K** – Kitchen areas | **S** – Sanitation areas | **I** – Individual areas	Technical description of the diagrams that represent the plan types in accordance with the access areas and the possible inconveniences and advantages of the plans.
Group 1 	Flexible dwelling types, Equal sized rooms and neutral access, Wasteful of area (space) and not very economical. The flexibility of the plan is so restricted that such plan types only seem meaningful for small dwellings.
Group 2  **Group 3** 	The high wastage of the access area in group 1 can be reduced by combining various functions in one room (group 2), and by wider use of the access space (group 3), resulting in less flexibility and a higher degree of inconvenience. Possible inconveniences could be diminished by the provision of two separate communication areas and adroitly relating them to the individual rooms. In addition, unity results from connecting the children's rooms – living (family) room – kitchen, which for families with young children offers many advantages.
Group 4  **Group 5**  **Group 6** 	In these groups (4, 5 and 6), the plan types are shown with almost complete separation of the communication and individual areas. These groups are distinguished by their method of access. In groups 4 and 5 the individual area is reached through a neutral lobby. In general, these types have certain flexibility in the use of the rooms (in the case of group 5). Group 6 - Individual rooms are associated with the communication area, which reveals possible flexible use with some liability to inconvenience. The functions in the plan types in group 6 are more firmly fixed by the method of access. The advantage of these plan types lies in a possible saving in access areas. The possible inconveniences of these plan types can be reduced by subdividing the communication areas, and from case to case, the separable part of the communication area can be used in various ways.
Group 7  **Group 8** 	The plan types in groups 7 and 8 differ from those in groups 4-6 primarily in the relation between the toilet facilities and both areas. In groups 4-6 these are related exclusively to the individual area, while in groups 7 and 8 they are associated with both the individual zone and the communication areas. The two areas can be used separately and possible inconveniences are almost excluded.
Group 9  **Group 10** 	Division of the individual area into two separately usable zones: a self-contained functionally workable individual area and separately usable individual rooms connected with toilet facilities at the entrance to the dwelling. (These individual rooms associated with the dwelling's entrance are more flexible in their uses than rooms in a separate individual area. (Flexibility is enhanced by the possibility of choosing between a room associated with the individual area and the dwelling's entrance). Such solutions are particularly applicable to large dwellings.
Group 11 	The concept of making the dwelling more adaptable by exploiting the use and possibilities of the individual area is carried a stage further. The dwelling offers two points of access and consequently, a large dwelling unit can be divided into smaller units, full and separately usable. The opportunity arises for adjusting the size of the dwelling to the waxing and waning of the family by closing or letting a part of the accommodation.
Group 12 	*Extrinsic variability:* This concept of dwelling offers the capacity for change in the scope of the dwelling, i.e. the size of the home and inherent adaptability to altering needs. This particular concept of dwelling is associated with the potential demand for space and change of floor areas which correspond to the periodic changes in close human relationships. There are several stages of extrinsic variability: - the combination of two adjoining dwelling units into one large dwelling (fusion) - the enlargement of one dwelling at the cost of another (expansion and reduction) - maximum adaptability is achieved by total variability of the dwelling shell, the internal partition walls and supply services (this is the presence of possibilities for intrinsic variability) Intercalary cells (affected by the opening and closing of gaps in partition walls) are the simplest degree of extrinsic variability.
Group 13 	*Intristic variability:* Unlike dwelling flexibility, in which changes of use are possible without changing the system – on the basis of the functional neutrality of the rooms and neutrality of their access – variability presupposes a change of system. Adaptability to changing needs by variable internal walls and installations inside the dwelling units with fixed bounding lines is referred to as 'intrinsic variability'. There are several stages of intrinsic variability: - Changes of character (in spatial availability and spatial structure) that are feasible through subdivision of rooms (disjunction), by combination (fusion), by joining together (conjunction) and by substitution (changes of use). - It assumes the reduction to a minimum number of structural and service-related delimiting factors and possible spatial freedom for changes. - Maximum adaptability to different conceptions of living and functional demands is offered within a fixed service core and a diagonally lighted rectangular plan. It includes the locational changeability of service elements.
Group 14 **Not presented with a diagram** (this concept is related to urban structure)	This concept represents the major urban structures that have no fixed elements, which can be flexibly adapted to social and economic changes and, by means of which, proliferating chaos and mechanical monotony are avoided. (Concentration and interlinking of all urban functions, combinations of private and public, sheltered, individual, adaptable dwellings with terrace gardens, better rationalization of land resources, undisturbed spatial handling of closely related functions, trouble-free intrinsic flexibility and extrinsic variability reflecting the changing needs of individual users or the whole town, and higher quality and cheaper constructions).

Table 2. List of multi-story residential buildings to which the 116 evaluated dwelling units belong

No.	Project / Location	Year	No.	Project	Year
1.	Be – Ha – Stan, Ilidža	2008	9.	Panamera Apartments, Ilidža	2015
2.	Bosmal Apartments / Bosmal City Center, Novo Sarajevo	2008	10.	Izvor Apartments, Stup - Ilidža	2016
3.	Residential Building, Stup - Ilidža	2008	11.	Residential Building, Unipromet d.o.o., Otoka	2016
4.	Residential Building, Lužani - Ilidža	2009	12.	Naselje Miljacka, Otoka – Novi Grad	2016 – 2017
5.	Residential and Commertial Building, H1-H2 Block, Dobrinja	2011	13.	Nova Otoka, Otoka - Novi Grad	2017 – 2018...
6.	Residential Building – Domoinvest do.o.o.	2014	14.	Ilidža River Apartments, Ildiža	2017
7.	Residential – Commertial Building, B.P., Dobrinja	2014	15.	Sarajevo Towers, Ilidža	2017
8.	Residential – Commertial Building, E2, E3, E4, Dobrinja	2014	16.	Sarajevo Waves, Otes - Ilidža	2017 – 2018...

possible to gain insight into how collectives and individuals function or live (Hillier, 2003). Le Corbusier (1923) describes the home as a "*machine for living in*" (Hillier, 2007) in which the term "machine" is a synonym for a system of areas and volumes of use that make living possible inside them. This study aims to establish an insight into the dominant spatial logic related to the *relationship between different areas of use* (plan types) according to which the apartments in Sarajevo were planned and constructed, by comparing them with the architectural standards and practices abroad.

This paper intends to investigate the design aspirations regarding the following:

- Apartment size (in line with contemporary architectural standards); and
- The types of areas of use (in relation to the international examples).

The paper makes a comparison between the case of Sarajevo and the spatial aspirations in dwelling units from the period of SFR Yugoslavia and cases from abroad (Table 1), and it examines the contextual circumstances of the contemporary conditions which the city is dealing with.

As such, this study was undertaken with the purpose of evaluating the contemporary practice of the spatial configuration of dwelling units in Sarajevo in order to detect whether the spatial logic according to which the dwelling units were organized is dominantly the result of:

- Designs in which planners tried to keep the plans as adaptable as possible to the varying situations related to the changing needs of the user; or
- Designs which resulted in plan configurations of dwelling units that lack adaptability and variability (static plans types – incompatible with change (Deilman *et al*., 1979)).

METHODOLOGY OF THE STUDY

In order to achieve the above, the methodology of analysis used in the study by Deilman *et al*. (1979) was adopted as the main method of analysis in this paper, within the framework of which 116 dwelling units/apartments in 16 multi-storey residential buildings were examined (Table 2). Using an explanatory comparative multiple case study, this paper is focused on identifying and discovering the real conditions of spatial logic in the functional organization of dwelling units in Sarajevo in order to provide illustrative insight into the eventual spatial organization patterns and aspirations of the specific design/configuration logic which the users/residents are experiencing.

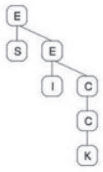
All of the data is primary data that was collected through observations and measurements, and then analyzed using qualitative and quantitative analysis. From the aspect of qualitative analysis, the *areas of use* were detected/recognized and noted for all of the dwelling unit layouts, after which they were measured quantitatively. As the last part of the analysis, within the framework of qualitative analysis methodology, the *plan type* was classified and represented in the form of diagrams that in their essence describe at least two characteristics, namely: the logic of space coordination and use of space. The methodology was performed with the main purpose of understanding the spatial logic in the configuration of living spaces according to which all 116 apartments were constructed (Table 2) during the period 2008-2018.

The selected buildings are mostly located in the Ilidža and Novi Grad municipalities (Table 2), where the city of Sarajevo's highest urban expansion and construction of multi-storey residential buildings have been recorded within the last decade. The layouts were considered and evaluated independently from the multi-storey residential buildings. Only the apartment layout samples of each floor from each of the multi-storey residential buildings were included in the evaluation process. Under the status of the characteristic dwelling unit, the study considered and drafted all apartments that differ in functional organization (from the aspect of the spatial logic of configuration and according to the number of additional rooms, parents' rooms and children's rooms). If two apartment layouts were identical or highly similar, only one of them was included in the research. The method used to detect the *areas of use* was to examine the functional content of each apartment's layout (Table 1), in order to present the planned nature of the room/space.

RESULTS OF THE STUDY AND DISCUSSION

After evaluating 116 dwelling units from 16 different multi-story residential buildings, the results were disaggregated as follows:

Table 3. Illustration of the set of analysis methods applied to 116 dwelling units

Legend / Key for plan types and dwelling plans				Example of analysis applied to an apartment layout		
Code	Area or Zone	No	Nature of room / space	Detected and marked areas of use	Size (m^2) of areas of use	Plan type diagram
E	Entrance areas	1	Hall / landing, porch, lobby, cloakroom / closet		1a 3.05 m² 1b 1.84 m² 2 4.93 m² 3 12.37 m² 5 6.08 m² 7 4.05 m² 8 5.77 m² 9 10.17 m² (A) Area 48.26 m² 3a 10.06 m² E/A 10.13 % C/A 35.85 % K/A 12.60 % S/A 8.39 % I/A 33.03 %	
C	Communication areas	2	Eating space			
		3	Living space			
		4	Play space			
K	Kitchen areas	5	Kitchen			
		6	Household – maintenance space			
S	Sanitation / toilet facilities	7	WC – bath – shower			
I	Individual areas	8	Children's room, work room			
		9	Parents' room			
		10	Storage / store rooms			

- Results related to the classification of dwelling units according to the number of additional rooms (I – Individual areas) (Table 4);
- Results related to the detected *areas of use* (*nature of room/space* (Table 1)); and
- Results of the plan type analysis (Tables 8-10).

Classification of dwelling units according to the number of additional rooms (I – Individual areas)

The results confirmed that 113 apartments were configured as single storey dwelling units, while only 3 cases of two storey apartments were detected (all three were loft apartments). In accordance with the methodology in this paper, the additional individual rooms (parents' rooms and children's rooms) are referred to as Individual areas (I) (Table 4). The results demonstrate that when it comes to the number of existing additional rooms within apartments (parents' room and children's room(s)) there are 5 different types of apartments (Table 5). The number of additional rooms indicates the potential capacity of each dwelling unit, which is of essential importance from the aspects of the users/inhabitants and their changing living needs. Types of apartments without any additional individual areas or additional rooms are referred to as studio apartments. The results related to the classification of dwelling units (apartments) according to the number of additional individual areas or rooms are as follows:

Despite the claim by Rakočević (2003) that studio apartments are the *typical basic unit* of the architectural setting for living space, and that they are supposed to accommodate human individuals and satisfy their needs, the results indicate the presence of only 12.07 % of this type of apartment, which is simply not a satisfactory rate, whether from the aspect of quantity, or the spatial logic according to which these apartments were constructed (Table 7). With atypical plan schemes, the average size of *studio apartments* (33.60 m2) corresponds with the standard studio apartment size, which is between 25 m2 and 33 m2 (Buxton and Littlefield, 2008), but it is still unclear how advantageous the areas of use are to the inhabitants since almost half of the examples are irregular layouts that differ from typical studio apartments (Table 7).

1 room apartments (Table 4) are the second most common dwelling units. Their average size is equal to the minimum standard requirement of 48.50 m2 (Buxton and Littlefield, 2008). 1 room apartments consist of only one additional room as an individual area, and as such, this type of apartment might correspond to the initial needs of young couples without children.

The most common type of apartment is the *2 room apartment*. These apartments in Sarajevo (68.54 m2 on average) are significantly smaller than the examples of the same apartments abroad (97.63 m2), while the average area of 3 room apartments in Sarajevo (99.45 m2) corresponds to the size of those abroad that were evaluated in the study by Deilmann *et al.* (1979).

Areas of use detected in dwelling units in Sarajevo

Since dwelling units are used for many different human activities within the planned areas, making an inventory of every single activity is something that would be time-consuming and in some sense even impossible (Leupen and Mooij, 2011). This paper therefore focuses on detecting *areas of use* that were readable from the layouts as the main purpose of specific areas/spaces in the dwelling units. The *areas of use* within the dwelling units in Sarajevo (Table 5) are identical to the examples abroad in terms of their type (Table 3), but the presence of all types of areas of use varies among the domestic apartments. Numerous dwelling units lacked some areas of use (Table 5), mainly *play areas* and *storage spaces* in kitchen areas. Play areas/spaces were detected in only 19 smaller apartments (apartments with 1 or 2 additional rooms), while in the apartments with 3 additional rooms (larger apartments) no play areas were detected. The existence of storage areas/spaces were detected only in 8 cases out of the 116 apartments evaluated, which proves the aspiration of keeping the size of apartments stable in the range of the minimum number of areas of use,

but at the cost of access and circulation areas (possible play areas) and storage in kitchen areas, which affects mainly the inhabitants and their differing needs. Consequently, it is possible to state that the residents of most of the apartments in the examples in Sarajevo do not have adequate facilities to store their groceries, non-seasonal clothes or maintenance equipment (vacuum cleaner, cleaning equipment, etc.) due to the lack of adequate storage areas within almost three-quarters of the apartments evaluated.

The quantity and distribution range of use areas within different types of dwelling units is presented in Table 6. The results suggest that an increase in the number of additional rooms (**I**) in the case of 3 room apartments was done by reducing the Communication (**C**) and Kitchen (**K**) areas.

Regarding the plan types of dwelling unites in Sarajevo, the space in the city and the spatial structure of the area with its own contextual meaning influences the spatial structures of any dwelling unit (Kuntscher *et al.*, 2009). Since the evaluation of the sub-systems (dwelling units/ apartments) of the built environment offers a set of opportunities for understanding the aspects and features of dwelling and its meanings (Coolen, 2008), Rapoport's (1990) emphasis on the importance of the meaning of the built environment from the users' perspective is the main focus of this paper. Different plan types, detected in a plan-type analysis, are represented in the form of diagrams that mainly describe the space coordination and use of space in the apartment layouts evaluated. The different types of layout configurations among all that were evaluated are represented with at least three examples of diagrams which illustrate the specific logic of the configuration and use of space (Table 7, Table 8, Table 9 and Table 10).

In comparison with the plan types of apartments abroad (Table 1) the results show a lack of variety despite their size according to the number of additional rooms. In the case of the examples abroad (Table 1), the results show much wider spatial aspirations in the dwelling units that would be more suitable for the changing cycles and changing needs of users (14 different types of plan-type logic were detected). In the cases evaluated in Sarajevo, the dwelling units showed a lack of spatial potential for significant variations in spatial

Table 4. Classification of dwelling units according to the number of additional rooms (I – Individual areas)

Type of apartment according to the number of additional rooms (**I**)	Classification of dwelling units according to the number of additional rooms (I – individual areas)		
	Number of detected dwelling units	% among 116 evaluated	Average size (m^2)
Studio apartments	14	12.07 %	33.60 m^2
1 Room apartments	33	28.45 %	47.79 m^2
2 Room apartments	44	37.93 %	68.54 m^2
3 Room apartments	24	20.69 %	99.45 m^2
4 Room apartments	*1*	*0.86 %*	*129.85 m^2*

Table 5. Types of areas of use in the case of the apartments in Sarajevo

Area / zone	Types of *areas of use* within the dwelling units (*among 116 dwelling units*) in Sarajevo	
E – Entrance areas	Entrance halls	
	Corridors	
C – Communication areas	Eating spaces	
	Living spaces	
	Play spaces	19 cases detected in 1 room and 2 room apartments
K – Kitchen areas	Kitchens	
	Households	8 cases detected in 1 room, 2 room and 3 room apartments
S – Sanitary areas	Toilets	
	Bathrooms	
I – Individual areas	Children's room	
	Parents' room	
	Storage room	4 cases detected in 1 room apartments | 6 cases detected in 2 room apartments | 15 cases detected in 3 room apartments)

Table 6. The average correspondence of areas of use within all apartments

Type of apartment according to the number of additional rooms (individual areas)	Areas of use						
	E/A (%)	**C**/A (%)	**K**/A (%)	**S**/A (%)	**I**/A (%)	**C**/A+**I**/A (%)	(**C**+**K**+**I**)/A (%)
	Entrance areas – Average size in %	**C**ommunication areas – Average size in %	**K**itchen areas – Average size in %	**S**anitation / toilet facilities – Average size in %	**I**ndividual areas – Average size in %	**C**ommunication areas + **I**ndividual areas – Average size in %	All together as a single space; **C**ommunication areas + **K**itchen areas + **I**ndividual areas – Average size in %
Studio apartments	14.81	Separated communication area(s) not detected	15.33	13.31	19.32	49.87	77.03
1 Room apartments	13.02	39.57	12.76	10.15	24.50	not detected	not detected
2 Room apartments	13.27	33.41	10.31	9.83	33.18	not detected	not detected
3 Room apartments	13.37	29.09	8.25	11.07	38.22	not detected	not detected

Table 7. Plan type data related to studio apartments

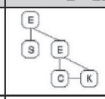
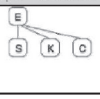
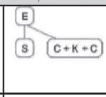
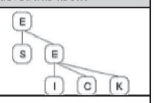
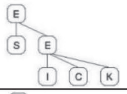
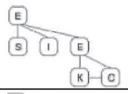
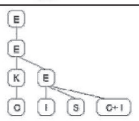
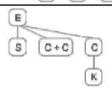
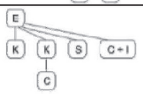
Studio Apartments							
Configuration of the layout		Number of samples	Plan type diagrams E – Entrance areas | C – communication areas | K – Kitchen areas | S – Sanitary areas | I – Individual areas				
a	Regular studio apartments	8					
b	Studio apartments with additional functional areas	3					
c	Transitional studio apartments	3					
	Total	14 apartments					

Table 8. Plan type data related to 1 room apartments

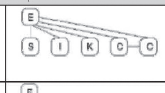
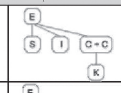
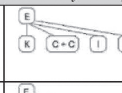
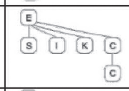
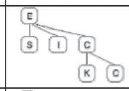
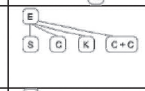
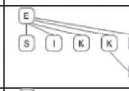
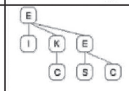
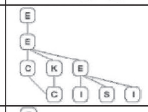
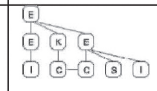
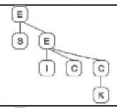
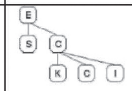
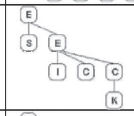
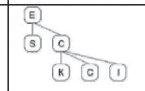
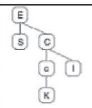
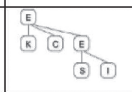
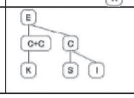
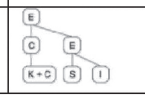
1 Room Apartments							
Configuration of the layout		Number of samples	Plan type diagrams E – Entrance areas | C – communication areas | K – Kitchen areas | S – Sanitary areas | I – Individual areas				
a	Semi-open access areas	5					
b	Enclosed access areas	10					
c	Ramified access areas	8					
d	Regular access areas, individual areas connected with communication areas	7					
e	Semi- zoning and complete zoning: Separation of Individual areas	3					
	Total	33 apartments					

Table 9. Plan type data related to 2 room apartments

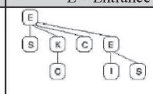
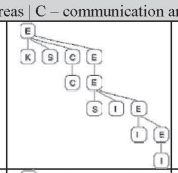
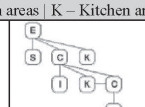
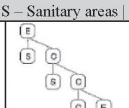
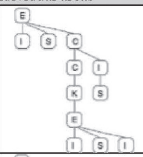
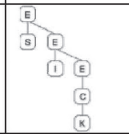
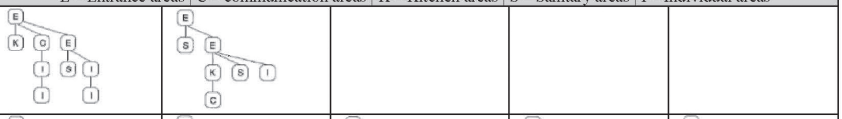
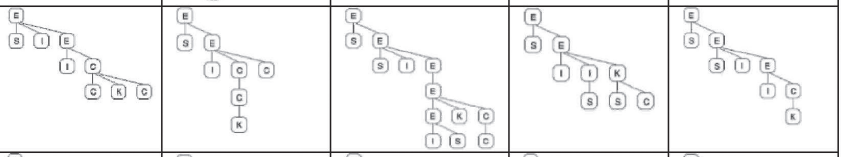
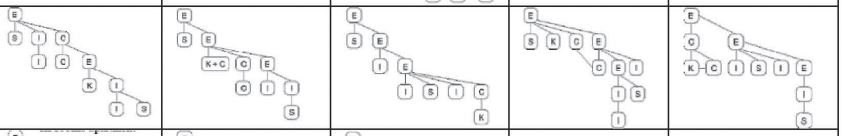
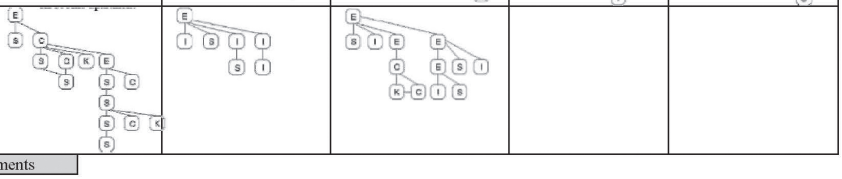
2 Room Apartments							
Configuration of the layout		Number of samples	Plan type diagrams E – Entrance areas | C – communication areas | K – Kitchen areas | S – Sanitary areas | I – Individual areas				
a	Access Areas connected with communication areas	7					
b	Enclosed access areas	12					
c	Ramfied access areas	20					
d	Complete separation of individual areas	5					
	Total	44 apartments					

Table 10. Plan type data related to 3 room apartments

3 Room Apartments			
Configuration of the layout		Number of samples	Plan type diagrams E – Entrance areas | C – communication areas | K – Kitchen areas | S – Sanitary areas | I – Individual areas
a	Semi-opened and enclosed access areas	2	
b	Ramified access areas	8	
c	Semi zoning: Separation of individual areas	9	
d	Complete separation of individual areas	5	
	Total	24 apartments	

adaptabilities and flexibilities compared with examples evaluated abroad (Table 1). The results related to the plan types (in the cases evaluated in Sarajevo) can be summed up into the following characteristic aspects:

- Semi-open and enclosed access areas/access areas connected with communication areas;
- Ramified access areas (zigzag corridors);
- Semi-zoning: Separation of individual areas; and
- Complete separation of individual areas (Grouping of individual areas – zoning).

On the other hand, in the cases of dwelling units/apartments that were constructed during the SFR Yugoslavia the following characteristic design tendencies were detected (Alfirević and Simonović-Alfirević, 2018): turning the entrance areas into spaces where guests could be received, forming of everyday areas where children could play and learn; separation of children's activities from their parents' or guests' activities (a spatial dimension that is required for larger families (Hall, 1990)); design experimentations regarding the circulation areas within the apartments with the purpose of creating the feeling of a wider space for inhabitants.

In comparison with the aspirations in planning dwelling units in SFR Yugoslavia, for the cases evaluated in Sarajevo (built in the period of 2008-2018) it is possible to state that the results did not show any deliberate design tendency/ approach regarding the treatment of entrance areas and play areas (lack of play areas – Table 5). Aspects related to the tendencies to separate children's activities from their parents' or guests' activities were not detected, despite the fact that the results did reveal the existence of semi-zoning (separation of individual areas) together with cases of the complete separation of individual areas. It was not possible to correlate any zoning tendencies among the apartments in Sarajevo with the intentional separation of different activities (characteristic for apartments built in the period of SFR Yugoslavia) due to the fact that the differences detected among the examples could not be linked (they were too case-specific). Even without these tendencies, it is expected that circulation areas should be as clear, unobstructed, and direct as possible (Neufert, 2012), but the results of the cases in contemporary Sarajevo, with their detected ramified access areas (zigzag corridors), show a range of mistreatment of circulation areas (access areas). This finding points out the post-war reality of Sarajevo, in which architectural tendencies related to the configuration of dwelling units seem to be disconnected from the positive aspects of the pre-war tendencies, which suggests that they might be leading towards superficial architectural actions that satisfy investor interest more than the users' living requirements

CONCLUSION

The paper concludes by arguing that contemporary Sarajevo is still facing ongoing complex post-war transitional circumstances (Zagora and Šamić, 2014) in which there is a lack of institutionally organized aspirations towards innovation and research that would result in proper architectural guidelines. These conditions have resulted in uniform dwelling units that are the products of design configurations without the significant potential for spatial adaptability and variability. From the aspect of the spatial logic according to which the examples were designed and constructed, it is possible to conclude that the dwelling units evaluated was configured as inflexible spatial systems – static plans that might be useful for the residents for some uncertain amount of time within their changing life stages. This logic and practice in the configuration of apartments in Sarajevo is stimulating an increase in the construction of more apartments than actually needed due to the fact that the static plan types described do not show any adaptability to the changing needs of their users. Since dwelling units,

as subsystems, describe tangible spatial meanings, in accordance with Norberg-Shultz's statement (1985), human individuals feel at "home" only when their environment is meaningful – useful. How often the apartments in Sarajevo are considered "home" for their users, and how often they are simply shelters, are some of the questions that arise, the answers to which are suggested in the results of this research.

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