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Design proposal development for a more liveable open public space

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Abstract. As a vital element of successful cities, public spaces play an important role in achieving sustainable development goals. The New urban agenda considers public spaces as a need in sustaining the productivity of cities, eco-social cohesion and inclusion, civic identity, and quality of urban life. This is also in line with the New European Bauhaus, as a part of European Green Deal, need to create beautiful places, practices and experiences that are enriching, sustainable and inclusive. In accordance with that there is undoubted importance of the public spaces, while its quality is generated in the symbiosis of various elements. On the basis of normative theories in urban design, *SCORELINE* framework for public space quality evaluation was developed and tested at the research group for planning and design in landscape architecture at the University of Belgrade - Faculty of Forestry. The framework covers six criteria which illuminate key aspects of public spaces such as safety and security, convenience, legibility, comfort, inspiration and sensitivity and liveability. For the purpose of this research, special attention is given to the criteria of liveability. It will be presented through its quantitative and qualitative indicators and its application in practice that cover the investigation carried out on Cara Urosa Street within the Lower Dorćol quarter in Belgrade, Serbia. The results of this analysis defined the inputs for street renewal design proposal, that was additionally tested using Space Syntax method, precisely Depthmap X simulation software to map potential issues and potentials that will be developed through design in order to achieve the defined goals concerning the liveability of open public space.

Keywords: Design proposal, Open public space, Scoreline framework, Space syntax, Belgrade

1. Introduction

Sustainable development is a core principle of the Treaty on European Union and a priority objective for the Union's internal and external policies. The EU was instrumental in shaping the global 2030 Agenda that has become the world's blueprint for global sustainable development. The 2030 Agenda includes 17 Sustainable Development Goals (SDGs) intended to apply universally to all countries. It is a commitment to eradicate poverty and achieve a sustainable world by 2030 and beyond, with human well-being and a healthy planet at its core.

Figure 1: The President's political guidelines and the Commission's annual work programmes constitute this Commission's strategy to implement the SDGs [1]

The European Commission remains committed to the 2030 Agenda. Under the leadership of President von der Leyen, the Commission has presented an ambitious policy programme to deliver on sustainability in the EU and beyond. The SDGs are an essential part of the President's political programme [2] and lie at the heart of the policymaking on internal and external action across all sectors. The President's political programme integrates the SDGs into all Commission proposals, policies, and strategies. All of the 17 SDGs feature in one or more of the six headline ambitions (see Figure 1) announced in President von der Leyen's Political Guidelines [1]. The six headline ambitions cover [2]:

- A European Green Deal within which Europe aims to be the first climate-neutral continent by becoming a modern, resource-efficient economy.
- A Europe fit for the digital age in which the EU's digital strategy will empower people with a new generation of technologies.
- An economy that works for people where the EU must create a more attractive investment environment, and growth that creates quality jobs, especially for young people and small businesses.
- A stronger Europe in the world where the EU will strengthen its voice in the world by championing multilateralism and a rules-based global order.
- Promoting our European way of life within which Europe must protect the rule of law if it is to stand up for justice and the EU's core values, and
- A new push for European democracy which need to give Europeans a bigger say and protect our democracy from external interference such as disinformation and online hate messages

The European Green Deal is defined as a new growth strategy that aims to transform the EU into a fair and prosperous society, with a modern, resource-efficient, and competitive economy where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use [3]. The strategy also aims to protect, conserve, and enhance the EU's natural capital, and protect the health and well-being of citizens from environment-related risks and impacts. At the same time, this transition must be just and inclusive. It must put people first, and pay attention to the regions, industries and workers who will face the greatest challenges. Since it will bring substantial change, active public participation and confidence in the transition is paramount if policies are to work and be accepted. A new pact is needed to bring together citizens in all their diversity, with national, regional,

local authorities, civil society and industry working closely with the EU's institutions and consultative bodies [3].

The Strategy can be conceptualised as a roadmap of key policies for the EU's climate agenda, based on which the Commission has started and will continue to develop legislative proposals and strategies from 2020 onwards [4]. Among other things, strategy look at the change in behaviour and social norms that leads to improved living conditions, such as cities with less pollution and noise [5].

The New European Bauhaus is an initiative that combines design, ecology, social, and price accessibility aspects as well as investments in order to support the implementation of the European Green Deal [3, 6]. It expresses the EU's ambition of creating beautiful, sustainable, and inclusive places, products, and ways of living. It promotes a new lifestyle where sustainability matches style, thus accelerating the green transition in various sectors of EU economy such as construction, furniture, fashion and in our societies as well as other areas of daily life [7]. The initiative generally focused on retooling Europe's design capabilities for a mission-oriented Green Deal, requires a coherent design process, starting with a clean canvas. and retrofitting them for our age and its challenges.

European leaders look at the NEB as a co-creation space where architects, artists, students, engineers, designers work together to make the world Europeans want to live in [2]. In line with this, the three ways [8] of make it happened is seen in the imaginative capacity of design, art, and architecture, that could actively create possible futures. making tangible and motivating the numerous diverse and complex scenarios implicit in the Green Deal. The second is that the New Bauhaus that can help develop a widespread literacy and **toolkit for design**, architecture, technology, and culture at all levels, creating better clients and collaborators as well as better designers. At the end, the third contribution is seen in re-working of the cultures that shape public life, such that public and civic institutions are capable of equitably delivering resilient, healthy, **vibrant,** and culturally rich technologies, infrastructures, cultures, and places. On the other side, one of the most urgent concerns of Europe identities is in the way people use **public space to understand public purpose**.

The SCORELINE framework for the quality of open public spaces has been developed since 2006 at the academic courses of the University of Belgrade - Faculty of Architecture and Forestry, i.e., on courses dealing with the topic of Designing open public urban spaces. The name SCORELINE is an acronym that includes the following terms, i.e., attributes Safety, Convenience, Comfort, Legibility, InspiriNg and Liveability. Among the mentioned terms there is a dependency, or more precisely, an established hierarchy, which implies that the fulfilment of criteria of a higher rank is a prerequisite for the achievement of criteria of a lower rank [9]. Accordingly, safety is considered a prerequisite for the fulfilment of all other quality criteria of open public spaces.

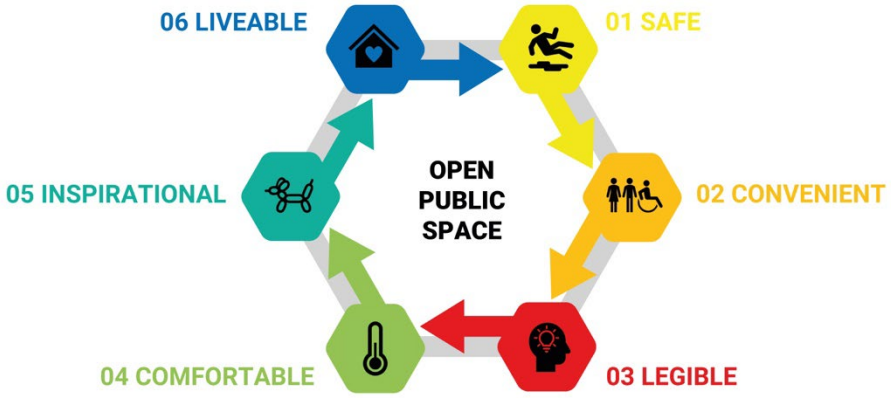

Figure 2: SCORELINE framework for analysing the quality of open public spaces

The framework has a two-way character of communication because each of the criteria is presented in such a way that it is understandable to the wider community and users. Based on the user statements, it can be clearly determined in which domains to act in order to improve the observed quality. In

addition, the method can be applied by experts as well for a detailed analysis of the quality of open public spaces in order to define the design strategy, concept, and program of future urban transformation.

"Liveability" is a term used to refer to issues related to the quality of life and long-term well-being of a community [10]. The concept originated in the 1980s and indicates to the quality of life of citizens determined by the assessment and ranking of potentially influential characteristics [11]. After its emergence, “liveability” evolved as urban planners and theorists sought to describe and quantify the ways in which social, political, economic, and environmental factors contributed to the quality of life of citizens in urban environments [12]. Understanding liveability and the benefits that a city and its residents have when the liveability criterion is highly ranked is key to achieving high-quality open public urban spaces.

The liveability of open public spaces is directly related to the concentration of users and their activities, the density and arrangement of contents, as well as the attractiveness of ambience [13]. Vujadinović [14] states that liveability includes various activities of space users: purposeful walking from place to place, strolling, short stops, longer stays in one place, window shopping, conversations and meetings, recreation, street sales, children's play, social games of the elderly, street entertainers. The association Partners for Liveable Communities (2002) defines liveability as "a set of factors that contribute to the quality of life in a community, including the built and natural environment, economic prosperity, social stability and equality, educational and cultural opportunities, entertainment and recreation”. The degree of aliveness can be perceived and experienced on a personal level and appears as a product of two main aspects: the extent to which the space corresponds to the person's needs, as well as the degree of absence of stress [10].

Cities with a high quality of life are in demand and can provide wider social and economic benefits that can include various investments, local and international economic stimulation, increased local community participation and a sense of identity [15]. Currently, Economic Intelligence Unit (EIU) and Mercer city rankings are published annually based on the concept of liveability. The Economic Intelligence Unit defines liveability as one of the aspects that could contribute to a high quality of life, whereas Mercer focuses on quality of life.

Gehl [5] states that what a city really needs to be viable is a combination of attractive urban space and a critical mass of people who want to use it. Đukić [13], referring to city squares and streets, states that the character of the square and street, the way of use and the density of users are directly conditioned by the function of the buildings along the street front. And she adds what it takes to make a square or a street lively. "In order for the square to be lively, it is necessary to come up with ways to attract users", that is, "for the street to be lively, it is necessary to ensure the density of flow and concentration of users, as well as the density of diversity of content in ground-floor buildings" [13].

Bearing in mind the mentioned, this paper will present the part of the research done at the University of Belgrade – Faculty of Forestry, Chair of Planning and Design in Landscape Architecture. It considers the results of the study done using the SCORELINE and Space Syntax methods, perceived as part of the public space design process in order to develop an urban place that will be in line with the needs and desires of its actual and future users.

2. Methodology and material

The research was conducted through a direct stay in open public spaces, during the fall semester of 2019-2020. year, when several research walks were carried out.

The analysis of the quality of the open space of Cara Uroša Street was done using the SCORELINE method, which includes the following criteria for the quality of open city spaces, namely: safety, convenience, legibility, comfort, inspiration, and liveability [16].

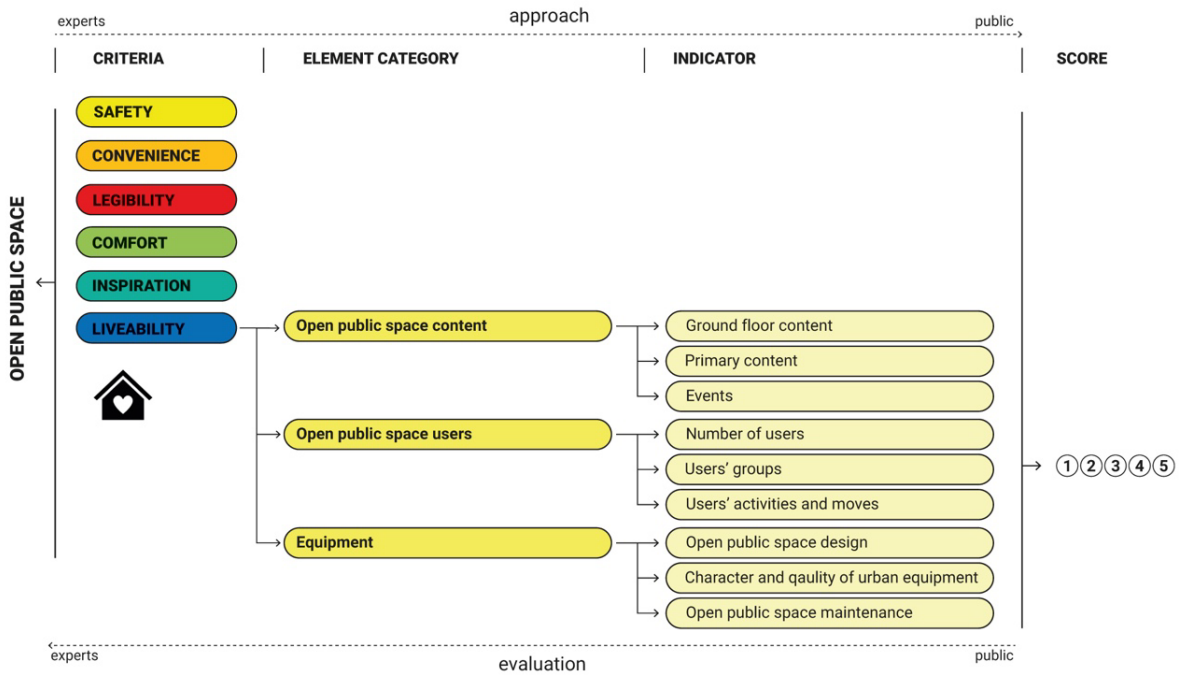

Figure 3: SCORELINE framework for the liveability criteria

The basic idea of the framework is in determining the categories of elements and indicators of the quality of open public city spaces in relation to the observed attribute, i.e., criterion. Each criterion includes categories of elements, of which each category of elements contains indicators that aim to represent a certain qualitative and quantitative value. In addition to the indicators, there is also the possibility of subjective evaluation of the attribute, with a rating from 1 to 5, which also represents a kind of summarized impression related to the observed attribute. This subjective evaluation can be used when examining citizens and users of the space, as a kind of supplementary research during surveys.

The aim of the analysis is to get a clearer picture of all the quality indicators of the particular open public space in order to perceive its weaknesses and potentials of the space. The information obtained is considered as substantial for making design proposals and determine the course of the design strategy. All analyses were done on the basis of direct research in the field and are illustrated in this paper.

The analysis of the liveability was carried out as part of the analysis of the quality of open spaces. It was singled out as a key criterion for improving the space and was looked at separately like all other criteria but considering all the previous indicators. In this paper, the impact of spatial organization on liveability is investigated, and that is why special importance, and a more extensive analysis is devoted exclusively to liveability, without neglecting other criteria.

A comparative analysis of the current state and the proposed design was done in order to see the advantages and disadvantages in relation to the observed open public space. The current situation on the ground is something that can certainly be influenced. That is why the existing situation was analysed, which showed the current mutual relationship between pedestrians and the spatial configuration. Then, the polygon related to the proposed solution was subjected to the same analysis as the empty base, only with fixed elements. The goal is to compare the analysed polygons, depending on the situation, in order to see how space affects pedestrians in different situations, that is, spatial organizations and how pedestrians interpret, read, use and how they move.

Particular analyses of the current and proposed state of the open public space were done on the basis of the Space Syntax theory by using the beta version of the Depthmap X software develop at the UCL Bartlett School of Architecture. These analyses covered the visibility and axial analyses. Visibility analysis included diagrams of Connectivity, Point First Moment, Point Second Moment, Isovist, Visual integration HH, Through Vision and Gate Count. On the other hand, for the purposes of axial analysis,

the analysed diagrams: Connectivity, Line Length, Choice, Entropy, Integration HH R3 at the local level (R3, for the purposes of pedestrian movement), and in relation to the findings established by Hillier and Hanson [HH]), Intensity, Harmonic Mean Depth, Mean Depth, Relativized Entropy and Total Connectivity R3 (R3 related to pedestrian movement, as described by Vukmirović [17]).

2.1. Research territory

The research area covers the area of Cara Uroša Street with a slightly wider coverage in order to obtain more extensive data. Cara Uroš Street is positioned in the central part of lower Dorćol and connects Danube Quay with the city centre via Uzun-Mirkova Street. The street is a one-way, collecting street, it stretches from Dunavska to Uzun-Mirkova lice and intersects with the streets: Mika Alasa, Solunska, Visoko Stevan, Cara Dusan, Strahinjić Bana, Gospodar Jevremov and Zmaja od Noćaj streets. The analysis and reconstruction proposal includes the stretch from Danube Quay to Cara Dušana Street. It is on this stretch that the importance of the street itself is highlighted, primarily because of the footbridge that connects the Danube Quay and Dorćol, i.e., it provides a connection with the city centre.

Figure 4: The research area along the Cara Urosa Street. Source: Aleksa Jovanovic

3. Results

3.1. Cara Urosa public space quality

The safety analysis revealed a significant presence of different content along the street, with an obvious potential for improvement in terms of active ground floors. The level and character of the equipment are minimal, except when it comes to lighting. Along the street, the lighting can be rated as very good, while on the other hand, the lighting of block surfaces is almost non-existent, which certainly affects safety and the occurrence of vandalism. The level and nature of traffic is most affected by the zone of slow traffic (zone 30km/h) and stationary traffic/parking spaces that occupy a significant part of the sidewalk surface and thus directly threaten the safety of pedestrians.

Convenience is characterized by a favourable orientation of space in relation to landmarks and content characterized by good connectivity. Pedestrian traffic appears as the most suitable solution for reaching the desired destinations, while public transport remains unnoticeable due to the high traffic density. Also, traffic density has a bad effect on the use of private vehicles when it comes to staying at the location.

Legibility is characterized by clear and distinct views, especially in the direction of Dunavska Street, with frequent openings in the form of free areas and block passages. Rappers are recorded in every

segment of the street as frequent landmarks. Poor equipment and uneven rhythm occur due to the number of floors and incongruity of the architecture.

In terms of comfort criteria, poorly maintained rows of trees were recorded, with distinctly deformed crowns, while block green areas were not properly maintained. The shading of the street is adequate throughout the day, so that the materials do not emit a large amount of heat due to heating.

In terms of inspiration, there is great potential for improvement as well as inspiration, which is at the lowest level. Analyses show that Cara Uroša Street lacks artistic value. Sounds are common, smells are almost non-existent, and asphalt dominates the entire surface of sidewalks and roadways.

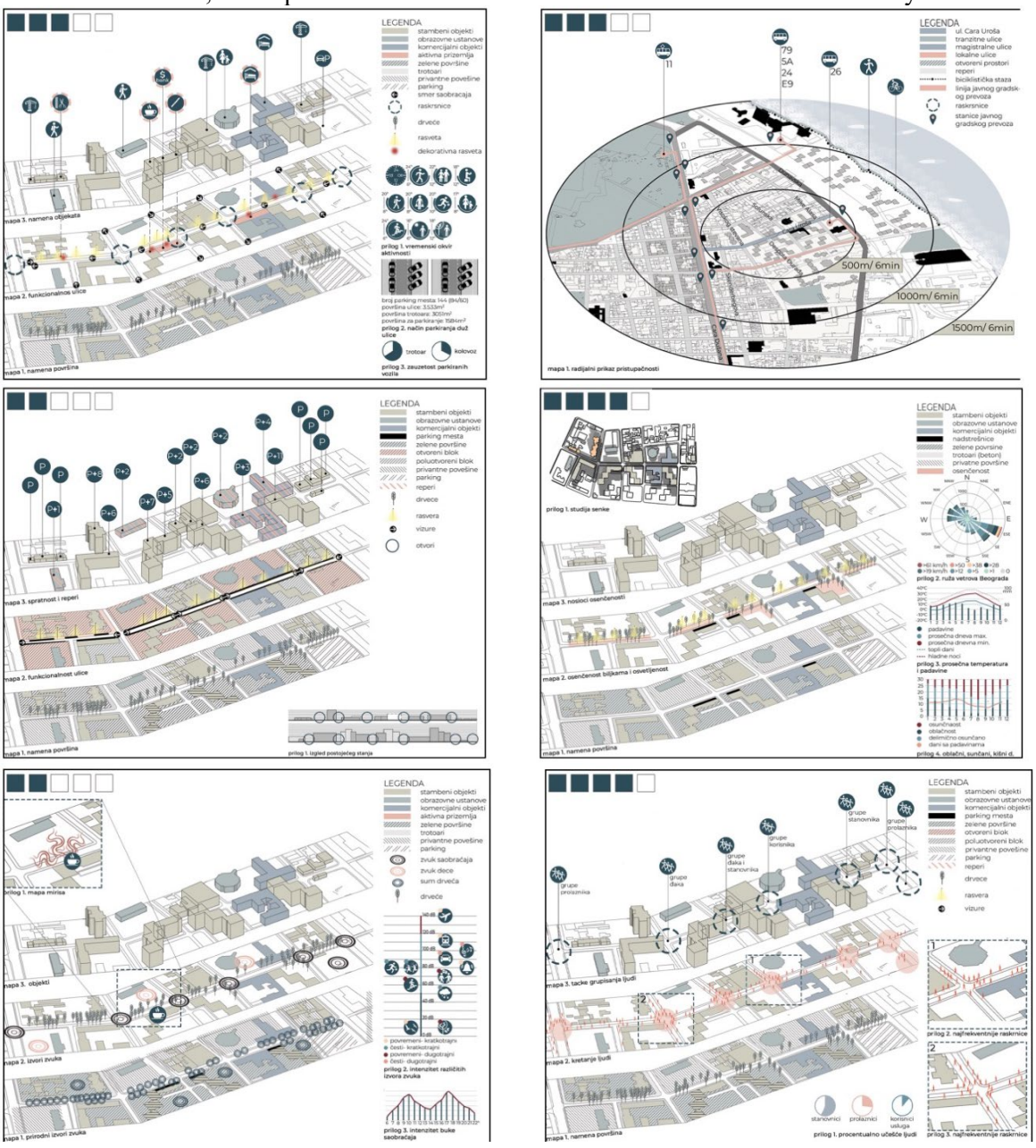

Figure 5: Public space quality based on SCORELINE framework. Case study Cara Urosa Street

3.2. Liveability of Cara Urosa Street

The analysis of liveability appears as a key criterion that includes all the aforementioned quality criteria of open public spaces. Each of the criteria that are analysed has certain indicators, so for the purposes

of liveability, the contents in the open public space, including the places on the ground floor, the users and the equipment of the space should be looked at.

By analysing the content, it was recorded that residential buildings dominate the space. That indicates that mostly residents are the users of this space. Along the street, there are also educational institutions that have a positive effect on the effect of vitality and also add to the importance and contribute to the potential of the street when it comes to new design solutions and space transformation.

In relation to the activity of the ground floor, it was observed that (1) the full capacity of the active ground floor has not been used (2) there are several buildings that are in the construction phase, within which shops will appear and contribute to the activity of the ground floor. The function of buildings along the street front is significant because it determines the character of the street, the way the street is used and the density of users [13]. It should be emphasized that stationary traffic occupies a significant area and dominates the space in relation to pedestrians, which negatively affects vitality, reduces the intensity and flow of users.

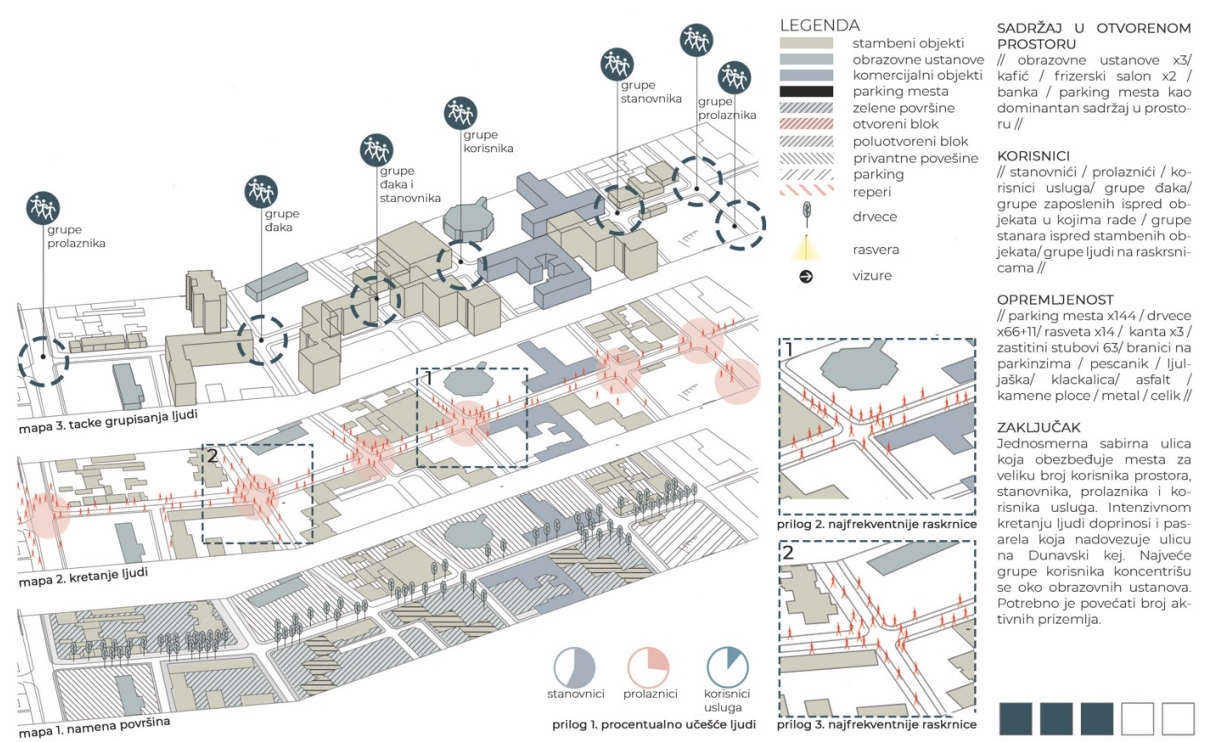

Figure 6: Liveability of Cara Urosa Street. Source: Aleksa Jovanovic

Open public space users were recorded individually and at the level of groups that appear in certain parts of the street and in some specific intervals. Residents are most often present, followed by passers-by and service users who are directly determined by the content along the street and the frontages. Users who are present in groups to the greatest extent are groups of students in front of educational institutions and at intersections as well as users, then residents near residential buildings and block areas and passers-by. The concentration of users at intersections decreases from the direction of Cara Dušana Street towards Dunavska Street.

Urban mobiliary and equipment along the street was also recorded. Parking spaces (144) with bumpers on a larger number of parking spaces, trees (66+11) that are not cared for to the right extent and in a proper manner, lighting (14), garbage cans (3) and protective poles (64). Within the block areas, there is a small number of furniture elements that cannot be considered usable and safe (sandbox, swing, and see-saw). In addition to concrete structures, the materials used on the street include asphalt, stone slabs of negligible surface area, steel, and metal constructions.

The conclusion is that Cara Uroša Street, which has elements of one-way and two-way collector streets, has the potential to provide space for many users, residents, and passers-by. It is necessary to increase the number of active ground floors and thus extend the street front to intensify pedestrian traffic. It is necessary to improve the equipment of the street, which is at the lowest level.

3.3. Public space development proposal

Considering that the liveability analysis cannot be seen as a separate criterion, it is necessary to refer to all the previous criteria, from which the potential for improving both the liveability of the space itself and all other criteria is evident. The potential for active ground floors, the creation of a multifunctional street intended for pedestrians, is specifically expressed, since pedestrian traffic appears to be the most favourable form of movement on the site, with obviously good connectivity and shading of the space. The presence of residential, commercial and, above all, educational institutions is directly related to the needs of people and pedestrian traffic.

Figure 7: Public space design proposal for Cara Urosa Street. Source: Aleksa Jovanovic

The design strategy includes several principal steps that are elaborated through the design solution. Primarily traffic in terms of reducing vehicular and stationary traffic in favour of pedestrian and bicycle traffic. The strategy includes the creation of a space that could respond to the various needs of people in terms of outdoor activities, which increases the level of liveability of the space. Additional comfort must be achieved through the integration of the street with elements of urban green infrastructure. It is important that the street is attractive throughout the year.

The design concept of Cara Uroša Street is depicted in a multi-functional street that is primarily intended for pedestrians who can move freely along the entire street, while vehicles appear as a secondary mode of transportation, with certain restrictions that are subordinate to pedestrians.

It is planned to create a form-homogeneous street based on the shared space approach, which creates a connecting surface that unites the distinctly uneven left and right fronts of the street. The homogeneity of the space is expressed through schematically the same type of paving, placed at one level on the entire surface of the street, so that there is no height barrier between the car part and the rest of the street, considering that everything is subordinated to pedestrians. Vehicular traffic is reduced and includes a zone of slow movement of vehicles along the entire street, with physical obstacles that dictate the slow movement of vehicles moving through cross streets.

Various landscape-architectural elements and active ground floors are planned along the street, which should attract users, enliven the space, and encourage them to stay outdoors. The design envisages the

retention of the footbridge, which enables a greater flow of users, creating a connection with the Danube Quay.

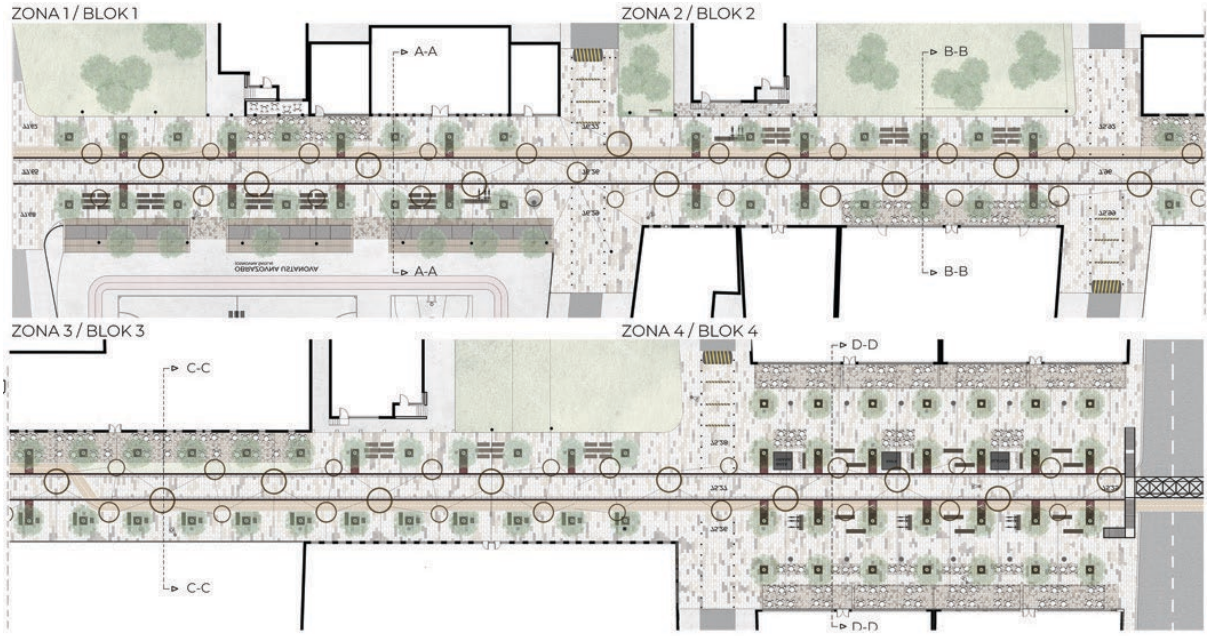

Figure 8: Public space design proposal for Cara Urosa Street _ floor plan. Source: Aleksa Jovanovic

According to the Detailed Regulation Plan for the area between Francaska Street, Cara Uroša, Tadeusa Košćuška and the former railway on Dorćol, it is planned to create a square that aims to accumulate a larger number of users and provide space for various events throughout the year. By maintaining part of the existing one and erecting a new row of trees while tying the space with block greenery, the level of comfort has been raised so that a pleasant stay in the open air is possible.

3.4. Verification of the proposed solution

The measurements obtained using the Depthmap X software within the Space Syntax methodology are axial analysis, visibility analysis and agent analysis, which is part of the visibility analysis. The analyses were applied on two levels: the level of the existing state (the current state of spatial organization, with all fixed elements) and the level of the proposed solution (ground floor arrangement of the street, including shops on the ground floor). Within each of the analyses, different measurements were obtained, which were comparatively analysed and presented

3.4.1. Visibility analysis

The overall analysis of the visibility of the existing situation shows that the connectivity is predominantly low along the streets and that the values increase in open block areas depending on the spatial configuration of the blocks. The mark of the first moment, viewed as moments of the first area of inertia of the Isovist, has high values along long linear streets and these high values are expressed pointwise at intersections or polygons in relation to the proximity and openness of the block.

The mark of the second moment is also expressed along long linear spaces, i.e., streets, and is predominantly within low values on the entire investigated area, except for a large open block (see Figure 9a). Visual integration appears as a graph with the highest values, viewed in relation to the entire investigated area. Integration is highest at intersections, then along streets where it increases and decreases depending on the proximity and spatial shape of block surfaces. In the view analysis, it was

recorded that the locations most often crossed by people are long linear directions or hubs. The number of gates, i.e., the flow of people, is expressed in open spaces that allow access from as many directions as possible.

The overall analysis of the visibility of the proposed solution shows that connectivity is predominantly low along narrow streets, while the value is significantly increased in wide streets and increases in open block areas depending on the spatial configuration of the blocks (see Figure 9b). The mark of the first moment, viewed as moments of the first area of inertia of the Isovist, has high values along long linear streets and is especially pronounced in wide streets. Values are expressed at intersections or polygons in relation to the proximity and openness of the block.

The mark of the second moment is also expressed along long linear spaces and increases in relation to the width of those spaces with expressed initial positions. Visual integration appears as a graph with the highest values, viewed in relation to the entire investigated area. Wide intersections provide the maximum level of integration, then smaller intersections and streets are expressed, where they increase and decrease depending on the proximity and spatial shape of the block surfaces.

In the view analysis, it was recorded that the locations that people most often cross are long linear directions or shorter connections, and the values are highly expressed in wide, long linear spaces, ie the street in this case. The number of gates, i.e., the flow of people, is expressed in the case of open gates that allow access from as many directions as possible. Overall connectivity shows that the network formed by long streets is the carrier of connectivity in space.

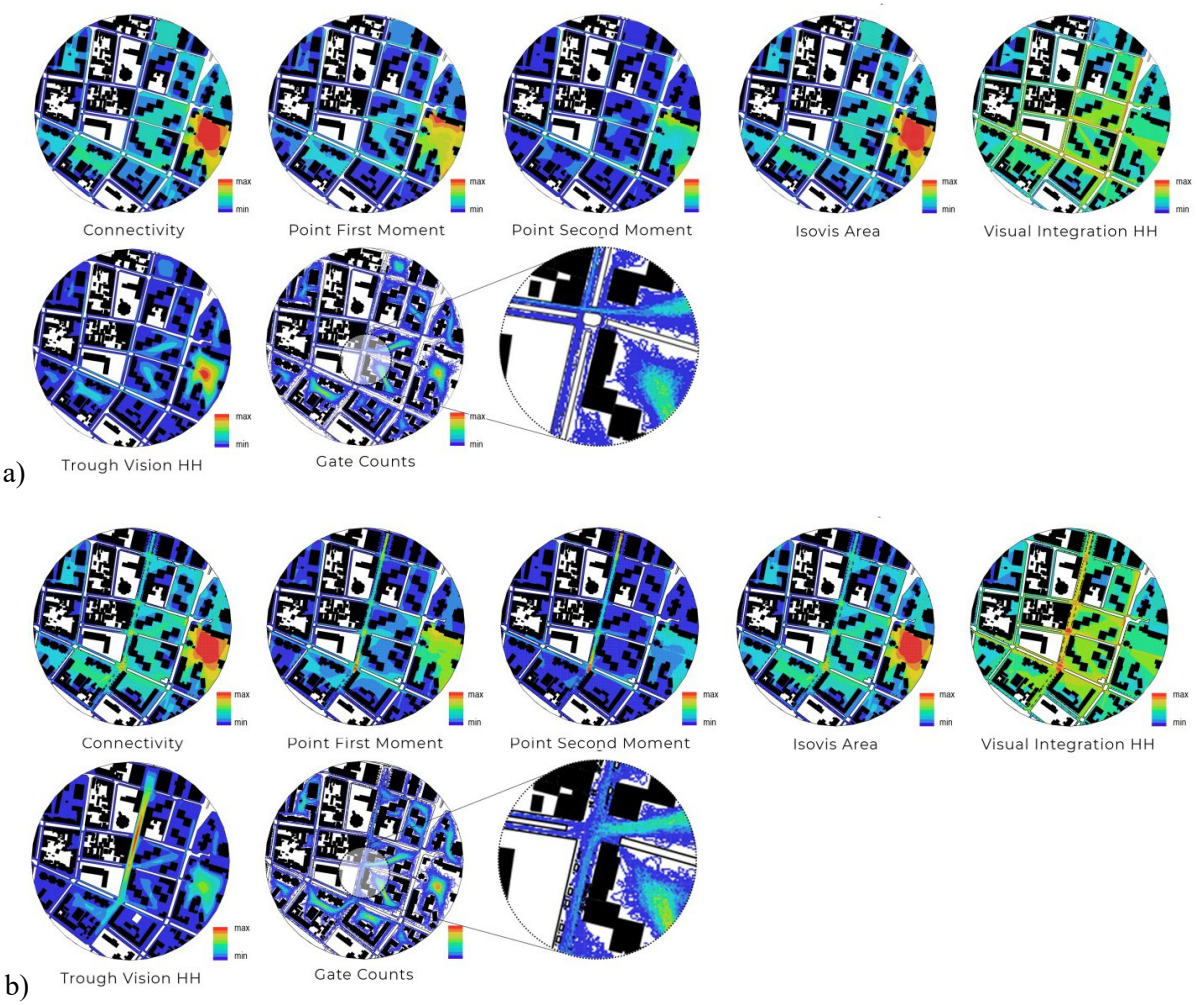

Figure 9: Visibility analysis of the a) actual state and b) proposed development

Table 1: Comparative parameters of all visibility measurements

Measures	Actual average	Proposal average	Actual minimum	Proposal minimum	Actual maximum	Proposal maximum
Connectivity	2880.99	**3099.14**	**7**	5	11001	11026
Point First Moment	129761	**151468**	**18**	13.2558	700209	907745
Point Second Moment	**8810230**	1179750	**60**	46	86488200	150536000
Isovist Area	2880.4	**3097.58**	**8.01695**	7.0456	11006.2	11028
Visual Integration [HH]	4.93315	**5.58851**	2.5056	2.29218	8.47552	9.63207
Through vision	116271	**136432**	0	0	1158350	1162230
Gate Counts	**7.54824**	7.01967	1	1	**92**	70

3.5. Axial analysis

The overall axial analysis of the existing condition shows that the greatest connection is along one of the largest streets that achieves connection with the surrounding area (see Figure 10a). For the length of the path (line), the highest values are characteristic for the streets with the longest path. The choice is expressed along all linear street directions that contact open areas and thus increase the possibility of choice. The entropy in the entire analysed area is high, which means that the depth is mostly uniform. Entropy is highly expressed in open block surfaces, open to the street in several directions. Integration, i.e., the number of changes in direction of movement that must be made in order to access other spaces to use the shortest path when moving, is expressed along all streets depending on their length.

The longest street directions achieve high values, while values decrease along shorter streets and within blocks. Intensity as a measurement parallel to intensity shows almost identical results of analysis as with intensity analysis. The depth is shown low with long streets that create a network with the surrounding spaces, which actually marks it as the most accessible directions. The harmonic mean depth is the reciprocal of the mean depth and on the diagram, it shows the results opposite to the mean depth, where the maximum value is considered as the most accessible. In relativized entropy, a low value indicates uneven distributions, which occur at intersections with wide access spaces. Overall connectivity shows that the network formed by long streets is the carrier of connectivity in space.

A comprehensive axial analysis of the proposed solution shows that the existing connection is maximal along the street with the longest direction and the widest street at the same time, which achieves connection with the surrounding area (see Figure 10b). The length of the path (line) shows the highest values along the streets that have the longest path, which is expressed in the case of wide streets. The choice is expressed along all linear directions, with an emphasis on wide stretches of streets that connect with open spaces and thus increase the possibility of choice. The entropy is shown as extremely high and this shows that the depth is low, which is also contributed by the elements in the street that affect the movement. Entropy is also high with open, walkable block surfaces.

Integration is expressed along one dominant linear direction and decreases as the space opens up to other open areas and also decreases in value with shorter streets. Intensity as a measurement parallel to integration shows almost identical results of the analysis as with the intensity analysis in this case as well. The depth is shown low by one dominant long street which is the core of the network with the surrounding areas, which actually indicates the most accessible directions.

The harmonic mean depth as the reciprocal of the mean depth shows the highest values in the central part of the dominant street. In relativized entropy, low values are in the central part of the dominant street and decrease as it expands. The overall connectivity shows that the network formed by the long streets, with wide openings towards other directions, is crucial for spatial connectivity.

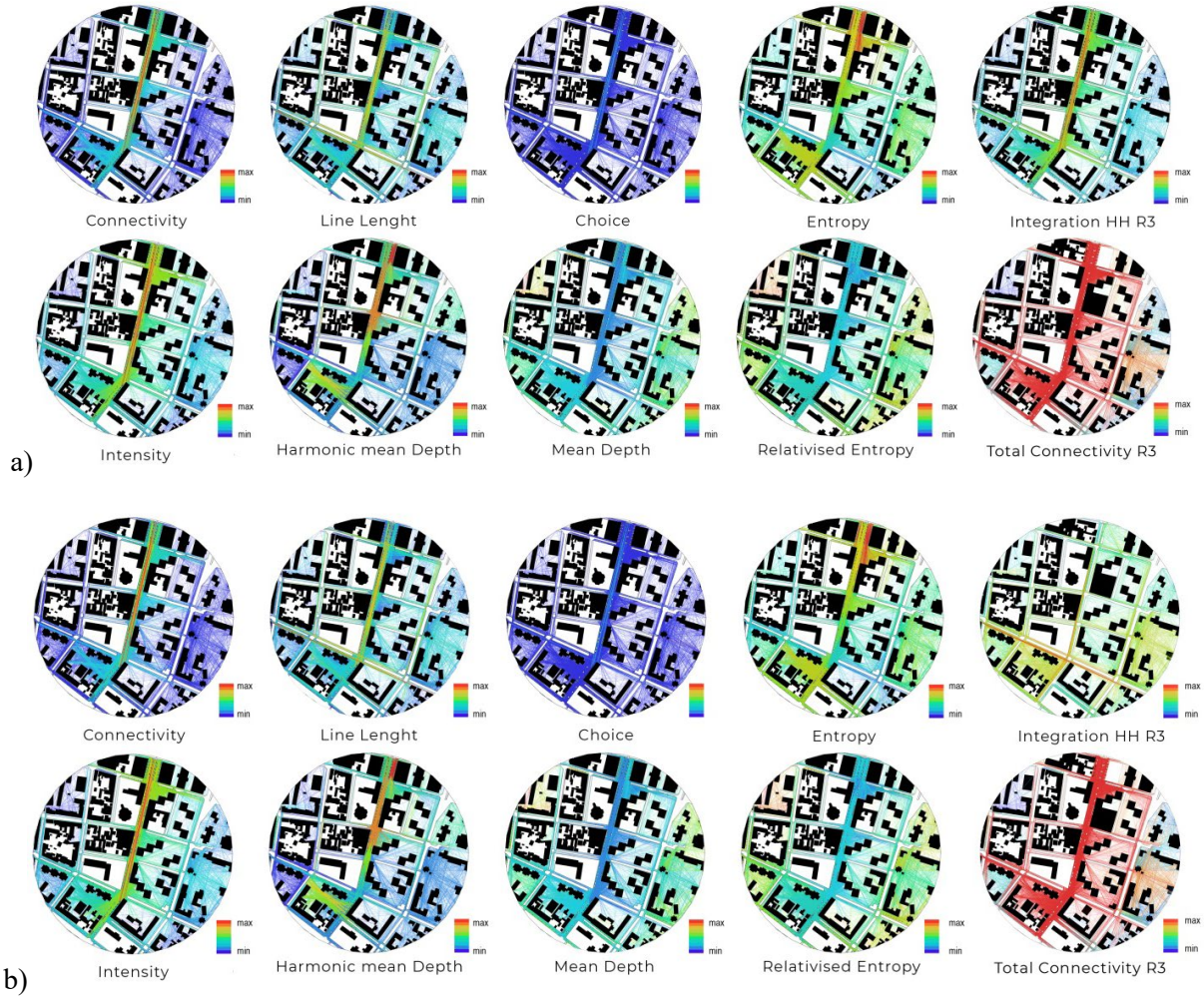

Figure 10: Axial analysis of the a) actual state and b) proposed development of the Cara Urosa Street. Source: Aleksa Jovanovic

Table 2: Comparative parameters of all axial measurements

Measures	Actual average	Proposal average	Actual minimum	Proposal minimum	Actual maximum	Proposal maximum
Connectivity	**257.634**	1687.7	2	2	1325	**9688**
Line Length	**75.8392**	70.7041	1.06099	1.06099	445.143	445.143
Choice	19.5918	**74703.1**	0	0	1047430	**7981570**
Entropy	**2.08578**	1.67972	**1.55491**	1.08337	2.52854	**2.26682**
Integration HH R3	5.82858	**8.59593**	2.23963	**2.27448**	9.32502	**19.931**
Intensity	0.831572	**1.06275**	**0.345505**	0.286167	1.44352	**2.24253**
Harmonic mean Depth	132.24	**172.33**	**16.2197**	15.0527	425.269	**483.258**
Mean depth	**3.62801**	2.71577	**2.29416**	1.64432	**7.03327**	6.1861
Relativised Entropy	**2.24019**	1.96855	**1.52033**	1.18695	3.61681	**3.83581**
Total Connectivity R3	11099670	**30082700**	1403	**2218**	1895790	3394390

4. Discussion

The purpose of the comparative analysis was to present how spatial organization and content affect users, i.e., pedestrians through the theory of Space Syntax and models of axial analysis and analysis of visibility in relation to the configuration of space.

In this paper, all obtained measurements are presented as a product of axial and visual analysis, which were viewed and analysed in relation to the set topic of the work, which is predominantly spatial-

physical. In this way, conclusions were drawn in relation to the different results obtained at different polygons, which are described below.

Looking at the results, it was concluded that the visibility analysis shows low connectivity along narrow streets, i.e., surfaces (sidewalks) intended for pedestrian movement. Wide spaces for movement have better connectivity, especially in parts that are open to other free areas, which is also influenced by the configuration of the surrounding space. Wide linear streets have a positive effect on the interaction of space, especially if they form a network with other streets of the same type. Visual integration is expressed at intersections, the larger the intersections spatially, the smaller the visual integration. Also, visual integration is better in streets that have certain openings towards block free surfaces, which is also affected by the configuration of the block.

The results show that the width of the space for pedestrian movement has a positive effect on the directions that people cross most often. This is primarily recorded with wide, long linear directions or shorter links. People's movement flows change with the change of spatial configuration. Linear spaces direct movement while openings depending on the width dictate the density of pedestrian flow. Overall connectivity shows that the network formed by long streets is the carrier of connectivity in space.

The results of the axial analysis showed that connectivity is influenced by the network formed by the streets, as well as the width and length of the street itself, determining the dominant line (street) of movement within the network. While the lengths of pedestrian paths are determined solely by the greatest distance that can be achieved in one direction, the openings along the streets increase the possibility of choice, which is additionally influenced by the content in the space. In the case of entropy, it was shown that the spatial arrangement of elements has a great influence on the entropy itself, that is, the depth of space. It has been shown that one street direction assumes a dominant role when it comes to integration, which is largely influenced by the configuration of the elements in the space. Integration is also closely related to the length of streets that form a network of pedestrian spaces, and the same results were obtained for intensity, which confirms the parallel of these two measurements. The length of the streets and the openness of the blocks determine the depth, which is influenced by the shaping of the space through the placement of various elements within the space itself. The distribution of the flow of people depends on the entry points, i.e., spatial nodes, and can be regulated by proper shaping of the space. And finally, the length of the street as well as the width of the space for people's movement greatly influence the overall connection, which is further increased by the compactness of the network of pedestrian spaces.

In the paper of Desyllas and Duxbury [18], on the comparison of axial analysis and analysis of visibility on pedestrian movements, it was shown that analyses performed on the basis of visibility analysis give a better correlation with pedestrian movement than axial maps of space representation. The authors also point out that a similar result was obtained after two previous studies. On the example of Cara Uroša street, axial lines proved to be significant in the interpretation of pedestrian movement, which is evident when applying axial analyses on different polygons, that is, the same polygon with a changed spatial configuration.

For the analysis of small neighbourhoods and squares, Bill Hillier recommends using Isovist map, Visual graph analysis, Agent-based modelling, Through-vision, and All-lines analysis. The above measurements were applied to the squares De Doelen and Schouwburgplein in Rotterdam. Among other things, these measurements were used to show the spatial organization in this paper, using the case study of Cara Uroša Street.

In a study that examines the application of advanced methods and tools for spatial-visual analysis in the practice of landscape design, the authors of the study pointed out that quantitative measurements and spatial-visual analyses are not sufficiently represented, but that there is a tendency to increase the application of such methods [19]. Space Syntax is certainly one of the methods that allows obtaining a significant amount of information about space, and that is why its application in landscape architecture is as important as in architecture.

Dursun [20] explores the syntax of space and measurements that can be applied in architecture without favouring any possible analysis and points out that the syntax of space is only one way of

thinking about space, with a focus on the organization of space, patterns of movement and their social significance.

Dettlaff [21] as the conclusion of his work in which he investigates spatial syntax as a methodology for understanding space states that with the help of spatial syntax it is easy to prove why a certain problem arose and how it relates to planned changes in space. He also adds that the spatial syntax allows us to know the relationships between the creation of different structures and urban fabrics. These are actually the main reasons for applying the Space Syntax in this work. On the same principle, the investigated polygons were compared.

By comparing the overall characteristics of the proposed solution with the existing state, the spatial configuration of the proposed solution is very favourable, even when compared to an empty polygon, which contains only fixed objects. A good flow of people, as well as the intensity of movement, is ensured to a significant extent. The physical elements in the space enable the unhindered movement of pedestrians and direct the flow of movement, due to the very linear form of the space and the elements that follow the form of the street. The longest line of the path was achieved, which passers-by could use to shorten without hindrance, and a physical connection with the surrounding open spaces was also achieved, which significantly affected the increase in the influx of people, flow and connection and choice.

It has been shown that the proposed solution for the reconstruction and improvement of the Liveability of Cara Uroša Street in Belgrade, by turning it into a multifunctional integrated street, is a good solution in favour of pedestrians, pedestrian movement, which was previously recorded as the most suitable form of movement in the researched location, which improves the vitality of the street itself and raises the quality of people's lives.

5. Conclusion

Open public spaces have a great impact on people's quality of life. They reflect its inhabitants and should provide certain opportunities to the residents and users of the space, which should attract and respond to all their needs, regardless of their age, in order to keep them and enable a pleasant outdoor stay. In order for one space to accomplish all that, it must be of good quality, organized, highly functional and fulfil certain qualities.

There is a relationship between functional and liveable space. It cannot be said that a space is functional if it is not alive and vice versa. Durability is a very important factor because it is constantly related to users, content, and spatial organization. Users are the core of an open space, and the density of users as well as the intensity of movement of users through a space reflect its liveliness and give importance to that space. Density and intensity can be ensured through attractive content, which is spatially well organized when it comes to the various elements of the outdoor content, and which is well and tidily positioned when we talk about the content on the ground floor.

By analysing the spatial syntax, it was determined how a space functions depending on its spatial organization. From the comparative analysis of the two spatial forms, it can be concluded that the spatial organization and content largely shape the user's life. Well-planned spaces ensure high-quality intensity of user flow, and well-organized content affects the density of users and their retention and stay in the open space.

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