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Article

The comparative analysis of SPACE SYNTAX and PPS approaches in measuring quality of urban space: The case of Beyazit district, Istanbul

İmran GÜMÜŞ^{1*}, Buse AÇIK ETİKE², İstem Seçkin PARLAKYILDIZ KÖSE³

¹Department of Architecture, Bursa Technical University, Bursa, Türkiye

²Department of Architecture, Adana Science and Technology University, Adana, Türkiye

³Department of Interior Architecture, Beykent University Faculty of Engineering and Architecture, Istanbul, Türkiye

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ABSTRACT

Spatial quality research is conducted using quantitative and qualitative research methods and techniques such as observation or surveys. The aim of the study is to make a comparative analysis of two research methods; the space syntax method, which focuses on a spatial configuration, and the Project for Public Spaces (PPS) approach, which focuses on the quality of urban spaces through principles defined as sociability, linkages and access, uses and activities, comfort and image, which enable understanding the socio-cultural characteristics of the area. This study uses these two methods to examine the concept of quality in urban space in order to measure the spatial quality of Beyazit Square and its surroundings in the historical peninsula of Istanbul. As a result, space syntax numerical values of integration, connectivity and intelligibility can be used as data for measuring the quality of urban space. However, there are differences between the PPS results and the spatial configuration data. This difference enables the identification of quality parameters that are dependent on and independent of the spatial configuration. Through this combined approach, the impact of spatial configuration on spatial quality is investigated. It is concluded that the combination of these two methods can provide a new alternative approach for comprehensive and reliable results in the quality measurement of urban spaces.

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INTRODUCTION

Urban space is a concept with physical, historical, cultural and morphological, perceptual, social, functional and temporal layers (Carmona et al., 2003), with physical/technical and social/relational dimensions. Urban design practice seeks solutions to design and development problems

by focusing on improving the form and characteristics of public space, which involves thinking about, theorizing at various scales, and practicing specific qualities of the built form (Biddulph, 2012). Urban spaces are therefore analysed according to various principles related to their function and morphological structure.

*Corresponding author

*E-mail adres: imran.gumus@btu.edu.tr



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Urban design principles consist of many parameters and can be interpreted in different ways depending on the place-time relationship. Many studies explain these parameters as the quality of public space, continuity and enclosure, character, ease of movement, legibility, diversity and adaptability (Llewelyn, 2000; DETR, 2000; Punter, 2007; Akça, 2008). According to the Urban Design Guide published by Coventry City Council (2004), urban design principles include “character, continuity, quality, connections, legibility, adaptability, diversity and sustainability” principles. In Turkey, urban design principles are defined by the Ministry of Environment, Urbanization and Climate Change as local identity and character, historical and cultural sustainability, quality of space, people-oriented transportation, legibility, perceptibility, adaptability, mixed-use and sustainability.

In recent years, urban spaces have been analysed in a multidimensional manner in line with these principles and studies on the quality of space have been conducted (İnceoğlu et al., 2009). Well-defined urban spaces are those with high user diversity (Zamanifard, 2018), high levels of accessibility (Talen, 2002), perceptibility and legibility (Lynch, 1960). Therefore, measuring the quality of urban spaces is directly linked to the well-being of individuals (El Din et al., 2013).

Space syntax is an analytical method that emerged in 1980 and was developed by Hillier and Hanson to systematically interpret the relationship between pedestrian movements and spatial configuration (Hillier et al., 1993; Sharmin et al., 2018; D’acci, 2019). The space syntax explains the causality of urban spaces defined as successful and high quality with numerical data. It focuses on the potential created by urban morphology and how people experience space. The space syntax reveals the quality of spaces and successful public spaces through morphological analysis. The main categories of syntactic analysis of urban spaces are axial, segmental and visual graphic analysis (Topçu et al., 2021). In this context, axial analysis is used to produce integration, connectivity, intelligibility and synergy values due to its effectiveness in evaluating the quality of public spaces. In the literature, spatial integration and connectivity values (Önder & Gigi, 2010; Li et al., 2015; Monokrousou & Giannopoulou, 2016; Tepe & Sönmez, 2018; Garaou et al., 2020; Geng, 2021; Yamu et al., 2021;) and synergy/comprehensibility parameters (Li et al., 2015; Topçu et al., 2021) are frequently used.

The criteria of the PPS, which have been used as a basis for urban studies in many studies after 1980, aim to compare public spaces and increase their livability levels by revealing the qualities of successful urban spaces (PPS, 2019).

The PPS describes successful urban spaces in terms of access and linkages, comfort and image, usage and activities and sociability concepts, while the quality of urban spaces

is based on human movement and the socio-cultural environment and its consequences.

The study seeks to answer the following questions:

- (1) Is there a relationship between PPS analyses and space syntax results?
- (2) What are the reasons for the differences in the analysis results?
- (3) How can the numerical data obtained from Space Syntax be evaluated according to PPS criteria?

By overlapping these two methods, it is expected to obtain information to determine the quality of space by revealing the morphological, perceptual, social, visual, functional and temporal qualities of urban space in a comprehensive manner.

QUALITY OF URBAN SPACE

Quality of Urban Spaces: PPS and Space Syntax

Urban space, which is considered as streets, squares and parks, is classified as public, semi-public and private outdoor spaces and plays an important role in urban memory (French, 1978; Krier, 1979; Newman, 1972; Rossi, 1982). Lynch (1960) draws attention to the importance of roads and streets in urban perception and defines streets as potential channels of movement for people watching cities. Streets, which are the entry points and mirrors of urban memory, directly affect public life as the movement routes of people. According to Whyte (1980), the level of use of urban spaces in daily life is a concept that should be examined in determining urban spaces. In this context, easy accessibility, functional diversity and appeal to different users keep these spaces alive and strengthen the sense of place.

According to Baycan and Nijkamp (2006), urban quality of life is a sub-definition of the concept of quality and is used to express the performance levels of urban spaces to meet the needs of people. This concept, which includes many social, economic and physical parameters, includes many different topics such as urban ecology and resources, urban environment, transportation and social quality of life, sustainable cities (Erkök, 2009).

The concept of quality of life examines people’s well-being, community characteristics and the relationship between people and the everyday urban environment (Pacione, 1982). Szalai (1980) defines the quality of life as the satisfying quality of life. Quality of life is a multifaceted concept that includes health, physical environment, natural resources, personal development and safety parameters, culture, art, people, personal experience, spiritual values, relationships with others, work and other parameters (Mitchell et al., 2001; Doratlı et al., 2003, Azami & Razavian, 2013).

According to the Project for Public Spaces (PPS), the quality of space is assessed according to the concepts of access and linkage, use and activities, comfort and image, and sociability. PPS lists the qualities that successful urban spaces should have as image and identity, attractions and destinations, amenities, flexible design, seasonal strategy, access, inner square & outer square, reaching out like an octopus, central role of management, diverse sources of financing.

Quality of life studies are conducted in two ways: an objective approach based on observable and measurable indicators and a quantitative approach that measures residents' perceptions of their own lives (Pissourious, 2013). In this respect, PPS parameters, which are examined with the support of on-site observation and survey studies, enable the evaluation of the quality of space at the micro-scale, while the space syntax method enables a preliminary evaluation of urban open space analysis on accessibility, mobility and walkability at the macro scale.

Instead of presenting the space with lines by considering spaces as a part of the sequence, the space syntax method examines the elements that direct human movements while bearing the traces of social structure and revealing clues from the spatial order (Hillier, 1996). According to Haq (2001), environmental behaviour research can be studied on two concepts: topological and metric relations. The space syntax method reveals the topological relations of spatial information and explains spatial relations in terms of the number of steps and spaces rather than numerical distance. Considering spaces as empty places, Hillier expressed the passages he reduced to traces with graphs. Thus, he showed the connection between social relations and space. These connections were analysed using the Depthmap X program after axial maps were created. The concepts that are important for the measurement of quality in urban spaces in space syntax analysis are listed below:

Connectivity: This value refers to the measurement of the visible spaces. Environmental perception and sense of place

and movement accessibility unity increase with increasing connectivity.

Integration: Points and axes with high integration values are places with high visual and mobility accessibility.

Intelligibility: It refers to the combination of fragmented images that people perceive while experiencing the space. When the slope of the correlation in the scattergram is 45 degrees ($R^2=1$), the highest level of intelligibility is obtained.

Regions with high levels of integration are those with dynamic social and public life and dense urbanisation. It is possible to develop various mapping methods and spatial structures rather than spatial syntax to analyse spatial relationships (Pafka, Dovey & Aschwanden, 2018). This is because micro-morphology studies exclude factors that can affect the direction and speed of movements such as street pedestrians, trees, fences and borders. Since cities are three-dimensional living spaces, reducing them to spatial axes may not give an accurate result. Axial maps provide scientific clues on how a city should function. There are many factors such as street life, population, and building quality that make areas with a high level of integration on the axial map attractive.

METHOD

Two different methods were used in the study: survey and field study. The survey results were used to interpret PPS quality parameters supported by observational data. This study, which involved the comparison and evaluation of methods for measuring the quality of urban space, was carried out in two ways and then combined. First, the components of each method were matched so that the same metrics were evaluated and results for similar metrics were obtained in the synthesis step.

The first methodology used in the study is the transformation of the main elements developed by the Project for Public Spaces (PPS) organisation within the framework of many studies into a useful methodology. These key elements are

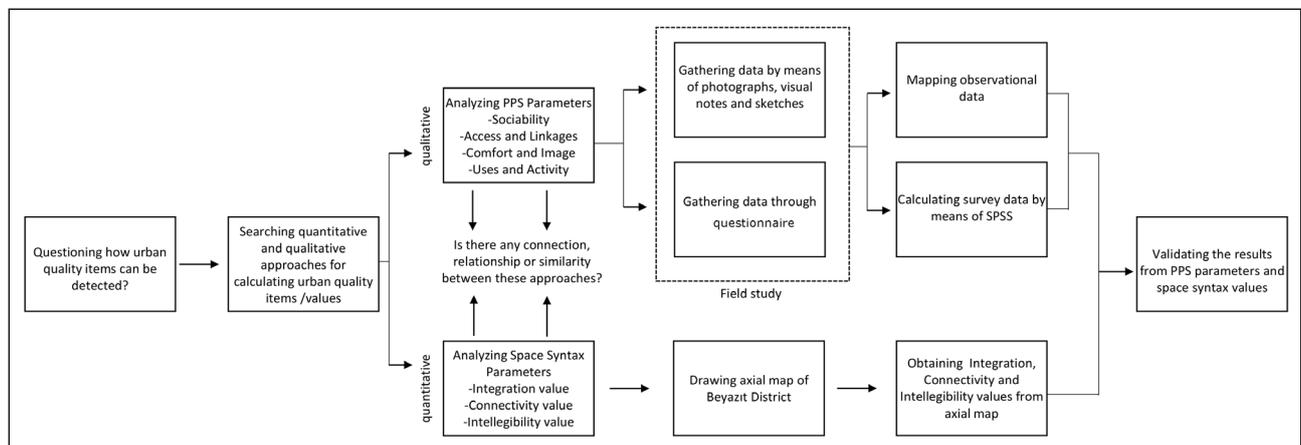


Figure 1. Methodological steps used in the study.

developed as a tool by the pps organisation researchers to interpret key parameters and measure the quality of public space (Idziorek and Chalana, 2019; Vidou and Latinopoulos, 2021), and have been included as part of the methodology or derived from many studies (Schuch and Wang, 2015; Buckman, 2016; Sulaiman, et. al., 2016) or as criteria compatible with the PPS tool (Kickert, 2018; Kurniawati, 2012).

Elements that are transformed into a method within the scope of the study are uses and activities, sociability, access and linkages, comfort and image which are principles of quality of urban space that were determined through PPS

(Project for Public Spaces, 2020). Firstly, uses and activities are factors that make the space unique and attractive, causing continuous use, diversity of people. Secondly, sociability can be expressed as interacting with familiar and unfamiliar people, feeling comfortable with these people, and having a sense of attachment to the place. Thirdly, access and linkages provide data on the easy accessibility and mobility of the public space. Finally, the comfort and image factor asks whether the public space has a good image for users and evaluates the success of the facilities in the public space in providing comfort.

The transformation of the PPS tools into a method was carried out through a survey and field analysis. Each factor described above was translated into a question and asked the users. Ultimately, a total of 53 people were surveyed according to the PPS components (Table S1 in Supplementary Material) (Table 1). In addition, visual and literary data were used in the study to support the questionnaire and validate the data. The visual mapping is supported by Lynch analysis, introduced by Kevin Lynch (1960) as a tool that enables citizens to perceive spatial legibility within the components of urban space: Paths, edges, districts, nodes, and landmarks. Following this classification, the quality neighbourhoods located within

Table 1. Demographic distribution of survey participants

	Number of participants	%
Female	13	24.52
Male	40	75.47
Age Range		
0-18	4	7.54
19-45	37	69.81
46-59	10	18.86
60-85	2	3.77

Table 2. Meanings of approaches used in the study

Scientific Approach	Approach To Spatial Quality Analysis	Parameters	Elements Studied in Urban Space	Method
Qualitative	PPS	Comfort and image	Security, attractiveness, legibility, cleanliness, building conditions, human density, urban furniture	Photography, questionnaire, observation, mapping
		Uses and activity	Analysis of activity, function, functional sustainability	Analyzing of public space, archive research, questionnaire, observation
		Access and linkages	Accessibility, street density	Transportation mapping, questionnaire
		Sociability	Space sense, social activity diversity (street experiences), quality of area	Questionnaire and observation
Quantitative	Space Syntax	Connectivity	Visibility, security/ perceptibility/ sense of direction/environmental perception	Depthmap X Software
		Integration	Accessibility, depth, functional analysis and urban morphology, foresight related to social context/ tendency	
		Intelligibility	Spatial legibility, perceptibility	

the edges of the site, which are composed of pathways, define different urban textures. The roads on the periphery of the area form physical and social edges, while at the same time providing a connection with the rest of the urban area. In addition, the Nolli mapping technique described by Giambattista in 1748 (Verstegen & Ceen, 2013) to examine the figure-ground relationship of the city of Rome was used for visual mapping. In addition to visual mapping, observation, photography and archival research were also conducted (Figure 1). The difficulty of this method was in combining the data obtained with other techniques with subjective data.

The space syntax method forms the second stage of the study. The main categories of syntactic analysis of urban spaces are axial, segment and visual graph analyses (Topçu et al., 2021). In the literature, spatial integration and connectivity values (Önder & Gigi, 2010; Li et al., 2015; Monokrousou & Giannopoulou, 2016; Tepe & Sönmez, 2018; Garaou et al., 2020; Geng, 2021; Yamu et al., 2021) and intelligibility parameters (Li et al., 2015; Topçu et al., 2021) are carried out frequently. Due to its efficiency in evaluating public spaces' quality, axial analysis is used for producing integration, connectivity and intelligibility values. These values emerged from the relationship between human movements and urban morphology giving an idea about morphology, net depth, and intelligibility of urban space when explaining environment perception, sense of direction, and social foresight of individuals (Table 2). Therefore, the axial map that expresses the morphological structure of the city was drawn and analysed on Depthmap X software. Integration and connectivity values are obtained through the longest visible line of each street with the fewest connections, and the intelligibility value was acquired from the correlation of these values. Integration and connectivity values are obtained based on the shortest visible axis connections of the streets, while the intelligibility value is obtained based on the integration and connectivity values.

Matching is done to reach the analysis of similar criteria in the combination of these two different studies. Therefore, when determining the uses and activities according to the PPS method, the integration value is used to evaluate the same criteria. In the evaluation of sociability, integration and intelligibility values, access and linkages from connectivity, integration and intelligibility are evaluated together. Finally, in terms of comfort and image criteria, connectivity and intelligibility values are utilised in Space Syntax.

The quality of urban space specified with PPS and Space Syntax analysis data is determined with multifaceted hybrid research (Figure S1 and Figure S2 in the Supplementary Material). This study aims to identify the compatibility and incompatibility of human perception and mathematical models and to test the mathematical relevance of environmental factors directly related to human perception.

CASE STUDY: BEYAZIT DISTRICT

Spatial Characteristics of the Site

This study was conducted in and around Beyazit Square, located in the historical peninsula of Istanbul. Social characteristics, diversity of activities and users, multifunctional use and transportation networks are the main reasons for site selection.

Using Nolli mapping technique and Lynch analysis, the morphological characteristics of Beyazit Neighbourhood were determined. In this context, important buildings such as Beyazit Mosque, Sabuncu Han, Beyazit Bath and Beyazit Madrasah can be shown as public spaces with their interiors represented by the colour white, while the colour black indicates private spaces. Metro-tramway stations and the intersection of roads create nodes that allow people to meet. Highly perceptible places such as Beyazit Mosque, Laleli Mosque and Istanbul Metropolitan Municipality Building are the major triangulation points, while madrasahs, libraries, museums and stations are the minor triangulation points (Table S2 in the Supplementary Material). Beyazit Square has been analysed in three periods: Byzantine Period, Ottoman Period and its current state. The area was used as a cemetery in the early Byzantine period. Emperor Theodosius built a forum in the centre of the necropolis between 375 and 395, making Beyazit Square the focal point of the city (İşözen, 1987).

Findings of the Study

Of the four different PPS criteria, the use and activities criterion will be associated with integration value, the sociality criterion with the integration and intelligibility value, the linkages and access criterion with the connectivity, integration and intelligibility values, the comfort and image criterion with the connectivity and intelligibility values of the space syntax data.

PPS Analysis of Beyazit District

Access and Linkages

This territory is surrounded by tram and bus stations, which constitute opportunities in terms of public transportation. Despite the intensity of transportation, pedestrian movements are also disrupted. The hierarchy of roads decreases from the periphery to the centre.

Within the dense residential texture, the streets forming the edges of the buildings constitute the most active connections. The level of visual sustainability and spatial perception continues in the neighbourhood of the square and the main axes and is horizontally interrupted by narrow street sections and open spaces. According to the survey, 58.4% of access to the area is provided by public transportation. However, only 9.4% of pedestrian access is available. Despite this situation, intensive pedestrian

circulation was observed on the streets and alleys in the study area. While 85% of the people who actively use public transportation do not have problems in transportation, 47% think that public transportation is insufficient. In addition, 52.9% of individuals using private vehicles have transportation problems.

Use and Activities

According to PPS standards, use and activities are considered as a variety of activities and use of the space for different purposes.

Beyazıt Square as representative of old Istanbul and its surrounding small-sized commercial elements present in urban memory continue their existence by modernising themselves. Second-hand Book Bazaar reshaped its functional sustainability as an area where stationers were located in the past in parallel with modern requirements. The former municipality buildings were converted to university buildings with functional transformation, but their public use continues. Atatürk Boulevard is now a commercial axe shaped in line with current commercial trends, is used frequently by foreign citizens. Ordu Street and Vezneciler Street include transfer points where transit activities are carried out since they are the main transportation axes.

The space is mainly composed of semi-private and semi-public spaces. It is observed that the public use hierarchy is disconnected within itself with sharp edges and public spaces are mostly consisting of open spaces. For example, municipality buildings, university buildings and mosques are spaces that are open to the public and semi-public which are indoor spaces with controlled entrances. Semi-private spaces consist of commercial units with private property. These privately owned spaces undertake the commercial function of the region and boost public life on the axes in which it is located.

About 49% of the users who participated in the survey use the area daily, and 87% use the space for working purposes. Although these users are in the working space every day, the level of feeling safe found out 84.6% of the users with this profile use the area for touristic purposes.

Comfort and Image

According to PPS, comfort and image evaluation is carried out with security, attractiveness, intelligibility, maintenance and cleaning, and structure quality concepts. As a result of the interviews, the most expressed concepts as the most liked elements are the Grand Bazaar and historical buildings, Istanbul University, touristic spaces, historical texture phrases. These keywords are also clues in describing the spatial identity of the site. In the answers given to the question “What are the elements that are not liked? The words “parking problem, traffic, crowd, neglect, noise, lack of green space” words stand out. This situation contributes

to identifying the elements that damage the spatial quality.

The sense of belonging was reported as 3.38 on average, which is above the general average of 3.05. Users who rarely use the space reported a positive sense of belonging with 2.92 out of 5. It was determined that 43% of the people did not use the space for any social activity. About 69% of these people described the space as uncomfortable or crowded. However, only 21% of the people in this category stated that they felt lonely or unfamiliar with the space.

The pedestrian intensity in the area increases on Ordu Street, Atatürk Boulevard, Grand Bazaar and Büyük Reşit Paşa Streets. These axes are the urban spaces where the number of commercial and educational spaces increases and transportation/transfer points are located, and these spaces are frequently used in the daily life of the citizens.

In the street perspective and section studies, streets are evaluated in accordance with the human scale (Figure S3 in the Supplementary Material). The sense of closeness created by wide streets forms a linear transition line. This situation strengthens the linear highlight that determines pedestrian movements. It is found that different street typologies like wide, medium and narrow streets are detected and it is observed that human-street relations differ according to these topologies. The sense of closeness created by the streets is decreasing thanks to the commercial function of the ground floors. This situation, at the same time, affects the vividness of the area positively by increasing the interaction of private space with public space. Pavements, roads, recreation spaces and building façades were studied in terms of maintenance and cleaning issues. It was seen that the streets and pavements were clean. Waste containers and other cleaning elements are adequately positioned according to needs. Except for a few abandoned buildings, it was observed that the buildings and facades were well maintained. However, it is found that there was visual pollution due to a lack of urban planning and heterogeneity of the facades. This visual pollution is also supported by inconsistency and confusion in commercial signs.

The high density of buildings, one of the characteristic features of the region, also affects the quality of green space. The green spaces in small-scale urban areas are unrelated to each other and do not provide the diversity and opportunities that the majority of the population needs. Therefore, the use of public spaces in this context remains limited and is found insufficient in the surveys and observations. On the other hand, many urban furniture in the study area direct and influence urban life. Urban furniture affecting the city image is given in Table S3 in the Supplementary Material.

Sociability

Sociability data results were obtained from the surveys and observations listed below. The number of male and female

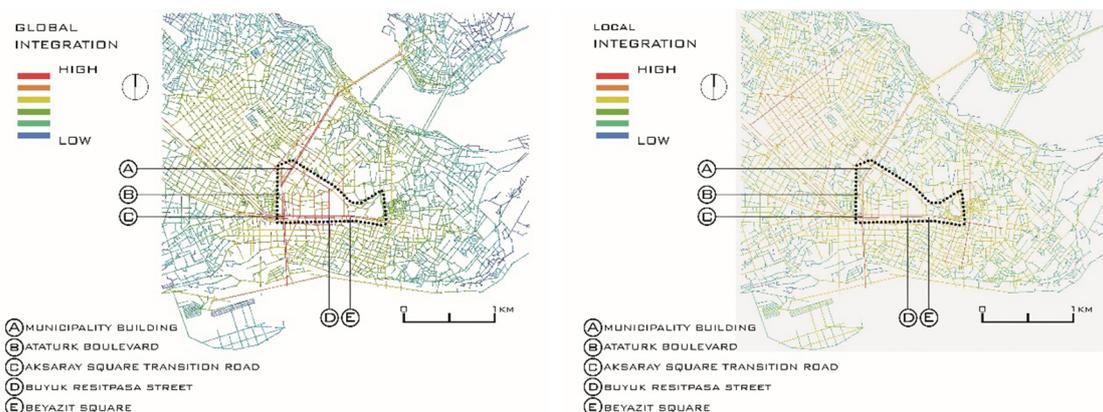


Figure 2. Global and local integration map of Beyazit district.

users is not balanced due to the high number of male users. The predominance of meeting and food and beverage functions, commercial and educational buildings (Figure S4 in the Supplementary Material) leads to intensive use of the area both in groups and individually. While routine users of the area feel comfortable, short-term users feel like strangers. This shows that the area has a conservative atmosphere.

The reason why a large number of people do not prefer the area for social activities can be explained by its central location and acting as a transfer centre. The reasons for the users to use the area actively are eating, drinking and meeting activities. The area is mostly crowded, with a high number of people describing it as friendly and warm. However, a low percentage of people find the area uncomfortable, which can be explained by its structure with a sense of closure.

It is thought that those who experience problems have transportation problems due to crowding. Area users use the subway the most and pedestrians the least. When there is no daylight in the areas where commercial functions are located, desolation occurs. While this situation harms the sociability of the area, it also results in a negative impact on the quality of the space. While 53% of the individuals who used the space for any social activity at any time stated that they felt lonely and alien, the remaining 47% used positive adjectives and stated that they used the space for meeting, eating and drinking activities.

Space Syntax Analysis of Beyazit District

The space syntax analyses were conducted in the urban environment including Beyazit Square in the historical peninsula of Istanbul. The streets and landmarks surrounding and feeding the square are marked on the map. The streets and landmarks are shown on the local and global integration and connectivity analysis maps. In the maps, blue and green colours indicate low values, yellow colours indicate medium values, and red and orange colours indicate high values.

The global integration values (R-n) of the district obtained from the Depthmap X program were higher on Ordu Caddesi, Atatürk Bulvarı and Şehzadebaşı Caddesi, which are the main axes of the region (Figure 1). The global integration values of the study area are between 0.47 and 1.65. The average value was calculated as 0.96.

Ordu Street has high local integration values (R-3), while other streets around the study area, Atatürk Boulevard and Şehzadebaşı Street, have average values. It was calculated that the global integration values of Yeşil Tulumba Street, Gençtürk Street, Fethibey Street and Harikzedeler Street, which cut Ordu Street perpendicularly, were orange, while these values turned yellow in local integration values. The local integration value of the study area varies between 0.33 and 3.97. In Figure 2, the colours of the lines change from blue to red, which means that integration

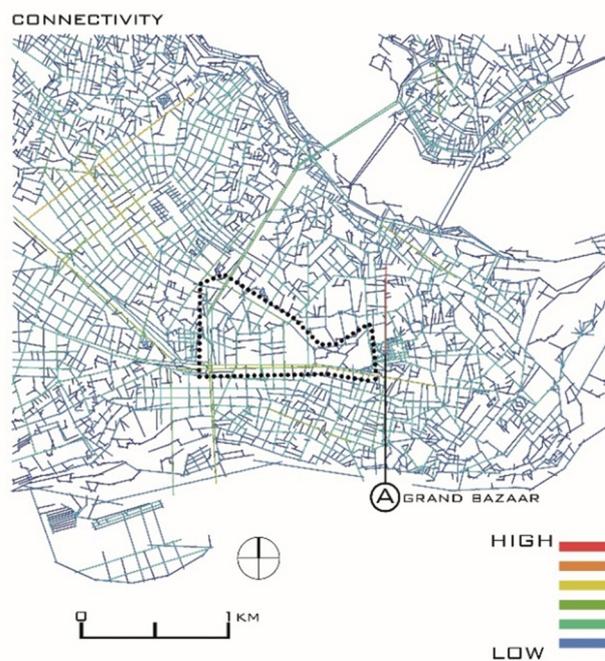


Figure 3. Connectivity map of the study area.

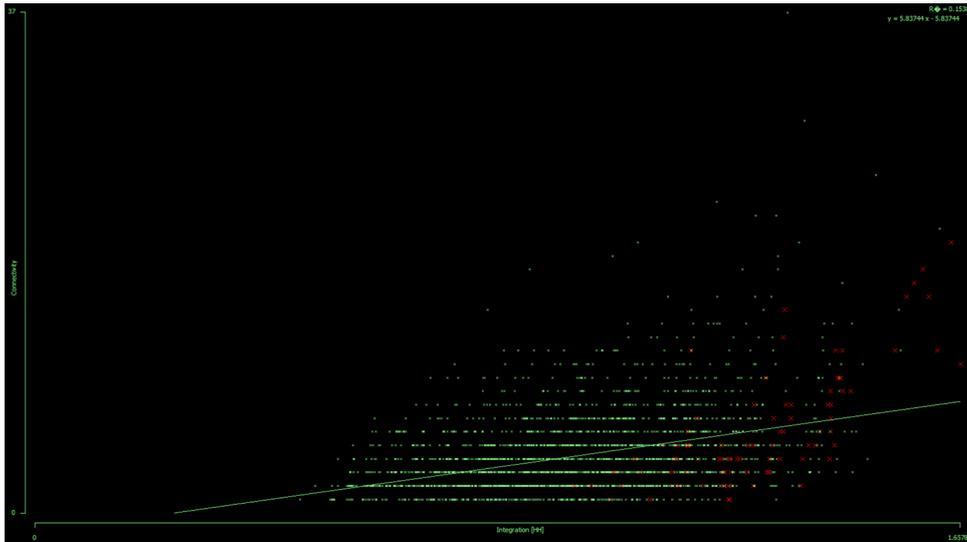


Figure 4. Scattergram of existing pattern.

is increasing. The average local integration value was calculated as 1.94.

It has been determined that the connectivity values of the district are quite low compared to the integration values. The connectivity value of the district varies between 0 and 37. The average connectivity value was calculated as 4.18. This shows that the connectivity of the study area is low and users have limited opportunities to find directions and create a certain perception of the environment (Figure 3).

The intelligibility value of the study area was obtained by correlating global integration and local integration. According to the scattergram, it was seen that the space could not be understood. According to Hillier (1996: 94), the system can be fully comprehensible if the points move linearly from right to left. According to the scattergram, the intelligibility of the space is very low, as the R2 value is 0.42. In this case, there is a poor correlation between local and global integration values (Figure 4).

DISCUSSION OF THE RESULTS

The following inferences were obtained within the scope of the study:

- The spaces within a 2 km radius of Beyazit District were studied with space syntax and PPS methods, and the results were obtained from certain areas such as Atatürk Boulevard, Şehzadebaşı Street, Büyük Reşitpaşa, Beyazit Square, Ordu Street, Yeşil Tulumba, Bakırcılar Street, Vezneciler are listed below.
- Atatürk Boulevard is frequently used by foreign citizens and the street scale of this space is vehicle oriented. Architectural quality of this boulevard is low. It is concluded that, despite the high intelligibility and integration values and high local and connectivity values, the district is not an urban attraction point and does not enable the sociability in the district.
- Questionnaire and space syntax data of Şehzadebaşı Street mostly verify each other. Because of mixed land use and open urban spaces, many tourists, employers and students are observed.
- The connectivity value is low, however, the existence of landmarks and the presence of units with commercial use creates a unique perception in the field.
- Büyük Reşitpaşa Street connects the metro and tram axles and educational and commercial buildings are located on this street. The intelligibility value in the area is low but the integration value is high. The rate of gathering together who meets in the area for a certain reason is low and they cannot spend time there. While this place forms a buffer zone for a transition from semi-public to private, it has 2nd degree street features with pedestrian density. The street can't make use of its potential with long-time activities. It can be concluded that the quality of space, where mandatory activities are assessed at high rates, is low. According to the PPS, the urban space appears to have good quality. Since busy commercial activities, metro exits, cafes and restaurants where university students use social environment are located in the space. According to the space syntax method, integration value is high and connectivity value is low. These values indicate that there is some human circulation, but the potential for socialisation is low.
- Crowded people groups spend time in Beyazit Square. Following the space syntax method, its integration value is low. However, situations like the presence of architectural sitting elements, the monumental campus gate defines the square and the second-hand book bazaar increase the circulation of people in the square.

- Ordu Street has a high integration value. The presence of the first-degree quality road, the presence of public spaces such as mosques and universities, is frequently preferred by the pedestrian to pass by, and the presence of a diversity of usage is observed in the area. The connectivity value in the area is moderate.
- The integration value of Yeşil Tulumba Street is low, but it has a high pedestrian circulation. There are a hotel entrance and other commercial units. The existence of semi-public spaces and transportation opportunities are positive for pedestrians. There are limiting elements such as the presence of overflowing shop windows, swarming cafes and billboards. However, this situation does not prevent pedestrian movement. This street meets quality parameters in different ways. Though the connection value is low in space syntax analysis, the perceptual space during the street is observed high in daily life.
- Bakırcılar street: Integration and connectivity values are low, although bazaar units lined through the street attracts user and increases people density. Also, this space forms the main transportation axle connecting the Grand Bazaar to the square. Therefore, pedestrian density is high. Besides, the aim of underpasses providing entrances and exits of the subway is constructed to decrease the people density and pedestrianize them.
- According to space syntax values, Bakırcılar street

Table 3. Comparative analysis of space syntax and PPS approach

			CONNECTIVITY Connectivity: Min:0 Max:37 Average 4.20								
			INTELLEGIBILITY R2 value: 0.42.								
INTEGRATION Global Integration min:1.09 max:1.65 average:0.96 Local Integration min 0.33 max 3.97 average1.94											
USAGE AND ACTIVITIES			SOCIALITY			ACCESS AND LINKAGES			COMFORT AND IMAGE		
C1%			A1%			B1%			D1%		
Transportation 1.88	Touristic 30.1	Working 50.9	Comfortable 32	Safe 3.77	Free 15	Pedestrian 9.4	Tram / Subway 35.8	I feel it very much 20.7		I feel so 16.9	
			Alone 11.32	Unfamiliar 22.6	Other 15	Bus 22.6	Private vehicle 32	So 26.4	I do not feel so 18.8	I do not feel so at all 16.9	
Education 11.3	Housing 1.88	Other 3.7	A2%			B2%			D2%		
			Meeting 16.98	Eat & drink 20.7	Event 5.66	No 54.7	Yes 45.3	Open ended question			
C2%			Action 1.88	Don't use 43.33	Other 11.32	B3%			D3%		
Everyday 49	Several times a week 9.4					No 45.3	Yes 54.7	I feel very safe 20.7		I feel safe 35.8	
Several times a month 13.2	Several times a year 24.5	Other 3.7				So 18.8	I do not feel safe 13.2	I don't feel safe at all 11.3			
C3%			A3%			B4%			D4%		
Open ended question			Attractive 13.2	Friendly/ warm 24.5	Crowded 37.7	Affects too much 43.4		Affects 20.7	I feel very safe 7.5		I feel safe 11.3
			Disturbing 22.6		Other 1.88	So at all 20.7	Dos not affect 5.6	Does not affect 9.4	D5%		
									I find it very clean 13.2		I find it clean 26.4
									So 28.3	I do not find it clean 24.5	Do not find it clean at all 7.5
C4%									D6%		
Open ended question									I don't find it noisy at all 0		I don't find it noisy 7.54
									So 9.4	I find it noisy 28.3	I find it very noisy 54.7

has no potential to enhance social interaction, easy direction finding and good environmental perception.

- Vezneciler street: It is seen that the integration and connectivity values in the space are low. However, the street is important with the Gate of Istanbul University, located between the subway station and the square.
- There are cafes and commercial units on the street. Pedestrian circulation is improved. The transfer station is on this street (buses, etc.). Interpreting this space by adhering to this method alone is misleading (Table 3).

CONCLUSION

This study was designed to test the consistency of two different qualitative and quantitative methods for measuring the quality of urban space.

Evaluating Space Syntax Values

Within the scope of this study, the space syntax was matched with the criteria of the PPS itself and the evaluation of the result was based on this matching. When all the data were combined, some inconsistencies were identified regarding the practical and theoretical use of space. First, the space is actively used. Although the diversity of users is limited, the young population in the area creates a dynamic urban space. When users are in the space for a specific activity, they feel comfortable during their stay. This shows that the environmental perception of the area on people is positive. Nevertheless, the local integration value ranges from 0.33 to 3.97 and the colours vary from blue to red. The average local integration value was calculated as 1.94. When the intelligibility values (R2 value: 0.42) were applied to the social aspect of the space, negative values were found. This shows that the theory is not able to realise the feature of bringing people together.

Evaluating PPS Criteria

- Although crowding has a negative impact, the survey and observation results suggest that access and linkages have a positive impact. Access to the space is perceived positively by many users. However, integration and connectivity show average and low values.
- The analysis of uses and activities shows that the users of the space are mostly there for business purposes. This situation, which indicates a high number of residents, is in a parallel relationship with the average integration value. Therefore, PPS and Space Syntax values under this heading are consistent.
- Comfort and image values indicate a strong sense of belonging in the district. It is also considered clean and safe by users in daylight. There is a contradiction between connectivity and intelligibility values.

Comparing the Results of PPS and Space Syntax

The overall result is that the quality of the space is average for the PPS values, but below average for the Space Syntax method. This leads to a few generalisations about the models:

- Space syntax and PPS approach provide data for spatial quality measurement.
- PPS is assessed with feedback from individuals about the socio-cultural effects of physical phenomena. Space syntax, on the other hand, is evaluated entirely with assumptions about individual behaviour in terms of physical phenomena. This is because, compared to space syntax, PPS reveals the living situation of the city by considering the human factor together. In space syntax, the mobility within the city is determined by morphological elements.
- In measuring the quality of urban spaces, while the space syntax method enables the discovery of fixed situations, PPS approach enables the exploration of variable situations.
- Space syntax calculations should be done with the numerical measurement while the PPS approach reveals how it is in practice.
- While PPS is handled independently of numerical data, space syntax depends on numerical measurements.
- The data obtained from the space syntax method depend on the size of the field study area. However, the results of the PPS approach are independent of the size of the place.
- Space syntax and PPS evaluations do not often overlap. Yet, the advantages of space syntax such as providing fast data, and measuring with numeric data make it reasonable to use the space syntax method as a primary data acquisition method before the space experience.
- While the Space Syntax method extracts data from inanimate elements that make up the city method, in the PPS approach, the data is obtained by considering living and inanimate elements that make up the whole city.
- The evaluation of the PPS evaluation revealed by the survey and observation with space syntax enables the evaluation of the profile of the people who experience the space and the differences in quality criteria such as the difference in day and night use and safety in use, which cannot be observed with space syntax alone. As a result of the research, the study carried out through one-to-one contact with the users of the region reflects the current situation of the region more clearly. Therefore, while the quality of the region is determined, useful information is also provided to determine the need for increasing the quality.

While these results play a role in answering the question of which method is more efficient in quality measurement, they may provide guidance on the choice or use of the methods that will be used in future research. By including the users who are the most important actors in the quality of the space, it was determined that the research about the place are proceeding with more safety data.

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REFERENCES

- Akça, M. (2008). Tarihi Yarımada İçerisinde Bulunan Hanlar Bölgesi'nin Kentsel Tasarım İlkeleri Açısından İncelenmesi, (Publication no.252056), [Master Thesis, Istanbul Technical University], The Council of Higher Education.
- Azami, A. S. and Razavian, M. (2013). Analysis moving towards sustainable development of a city with emphasis on the quality of urban life: The case of Noor. *Journal Environment and Urbanization ASIA* 4(1):31–56.
- Baycan, L. T. and Nijkamp, P. (2006). Quality of urban life: A taxonomic perspective. *Studies in Regional Science* 36(2):269–ss281.
- Biddulph, M. (2012). The problem with thinking about or for urban design. *Journal of Urban Design* 17(1):1–20.
- Buckman, S. (2016). Canal oriented development as waterfront place-making: an analysis of the built form. *Journal of Urban Design* 21(6):785–801. <https://doi.org/10.1080/13574809.2016.1234332>.
- Carmona, M., Heath, T., Oc, T., and Tiesdell, S. (2003). *Public Places, Urban Spaces*, Oxford, Architectural Press.
- Coventry City Council. (2004). *Coventry Urban Design Guidance*. City Development Directorate, United Kingdom.
- D'Acci, L. (2019). Orientational versus esthetical urban street morphology parameterization. *Space Syntax, Spatial Cognition & Computation* 19(3):172–189.
- DETR. (2000). *Urban design in the planning system: Towards better practice*. Department of the Environment, Transport and the Regions. Available at: https://www.designcouncil.org.uk/sites/default/files/asset/document/by-design_0.pdf (accessed 20 August 2018).
- Doratlı, N., Hoşkara, Ş., and Pulhan, H. (2003). Questioning the Quality of Life in the City of Gazimagusa (North Cyprus), [Conference Presentation]. International Conference on Quality of Urban Life: Policy versus Practice Proceedings, Istanbul, Turkey.
- El Din, H. S., Shalaby, A., Farouh, H. E., and Elariane, S. A. (2013). Principles of urban quality of life for a neighbourhood, *HBRC Journal*, 9(1):86–92. doi: 10.1016/j.hbrj.2013.02.007.
- Erkök, F. (2009). Waterfronts: Potentials for improving quality of urban life. *İTU A-Z Journal* 6(1):126–145.
- French, J. S. (1973). *Urban Green: City Parks of the Western World*, Kendall/Hunt, Dubuque, Iowa.
- Garaou, C., Annunziata, A., and Yamu, C. (2020). A walkability assessment tool coupling multi-criteria analysis and space syntax: the case study of Iglesias, Italy. *European Planning Studies*. doi: 10.1080/09654313.2020.1761947.
- Geng, S., Chau, H.-W., Yan, S., Zhang, W., and Zhang, C. (2021). Comparative analysis of hospital environments in Australia and China using the space syntax approach. *International Journal of Building Pathology and Adaptation* 39(3):525–546.
- Haq, S. (2001). *Complex Architectural Settings: An Investigation of Spatial and Cognitive Variables through Wayfinding Behavior*. [Unpublished PhD Dissertation], Georgia Institute of Technology, Atlanta.
- Hillier, B. (1996). *Space is The Machine*. Cambridge: Cambridge University Press.
- Hillier, B., Penn, A., Hanson, J., Grajewski, T., and Xu, J. (1993). Natural movement: Or, configuration and attraction, in *Urban Pedestrian Movement*. *Environment and Planning B: Planning and Design* 20:29–66.
- Idziorek, K. and Chalana, M. (2019). Managing change: Seattle's 21st century urban renaissance. *Journal of Urbanism: International Research on Placemaking and Urban Sustainability* 12(3):320–345. DOI: 10.1080/17549175.2019.1598471.
- İnceoğlu, M. and Aytuğ, A. (2009). Kentsel Mekanda Kalite Kavramı. *Megaron* 4(3):131–146.
- İşözen, E. (1987). *Beyazıt Meydanı Kentsel Tasarım Proje Yarışması: Redesigning of Beyazıt Square*. İstanbul: İstanbul Büyükşehir Belediyesi.
- Kickert, C. (2020). Walkable city rules: 101 steps to making better places, by Jeff Speck. *Journal of Urban Affairs* 42(6):939–941. DOI: 10.1080/07352166.2019.1703421.
- Krier, R. (1979). *Urban Space*. New York: Rizzoli.
- Li, X., Lv, Z., Zheng, Z., Zhong, C., Hijazi, I. H., and Cheng, S. (2017). Assessment of lively street network based on geographic information system and space syntax. *Multimedia Tools and Applications* 76(17):17801–17819. <https://doi.org/10.1007/s11042-015-3095-2>.

- Llewellyn, D. (2000). *Urban Design Compendium*. London: English Partnerships.
- Lynch, K. (1960). *The Image of the City*. Cambridge: The MIT Press.
- Mitchell, G., Namdeo, A., and Kay, D. (2001). A new disease-burden method for estimating the impact of outdoor air quality on human health. *Science of the Total Environment* 246:153–164.
- Monokrousou, K. and Giannopoulou, M. (2016). Interpreting and predicting pedestrian movement in public space through space syntax analysis. *Procedia - Social and Behavioral Sciences* 223:509–514. <https://doi.org/10.1016/j.sbspro.2016.05.312>.
- Newman, O. (1972). *Defensible Space: People and Design in the Violent City*. London: Architectural Press.
- Önder, D. E. and Gigi, Y. (2010). Reading urban spaces by the space-syntax method: A proposal for the South Haliç Region. *Cities* 27:260–271.
- Pacione, M. (1982). The use of objective and subjective measures of quality of life in human geography. *Progress in Human Geography* 6(4):495–514.
- Pafka, E., Dovey, K., and Aschwanden, G. D. (2018). Limits of space syntax for urban design: Axiality, scale and sinuosity. *Environment and Planning B: Urban Analytics and City Science* 47(3):508–522. <https://doi.org/10.1177/2399808318786512>.
- Pissourios, I. A. (2013). An interdisciplinary study on indicators: A comparative review of quality-of-life, macroeconomic, environmental, welfare and sustainability indicators. *Ecological Indicators* 34:420–427.
- PPS. (2019). What makes a successful place? Available at: https://www.pps.org/art_cle/grplacefeat (accessed 15 July 2019).
- Punter, J. (2007). Developing urban design as public policy: Best practice principles for design review and development management. *Journal of Urban Design* 12(2):167–202.
- Rossi, A. (1982). *The architecture of the city*. The MIT Press: England.
- Schuch, J. C. and Wang, Q. (2015). Immigrant businesses, place-making, and community development: a case from an emerging immigrant gateway. *Journal of Cultural Geography* 32(2):214–241. <https://doi.org/10.1080/08873631.2014.995403>.
- Sharmin, S. and Kamruzzaman, M. D. (2018). Meta-analysis of the relationships between space syntax measures and pedestrian movement. *Transport Reviews* 38(4):524–550.
- Sulaiman, N., Qamaruz Zaman, N. H., Hamdani, H., and Abdullah, Y. A. (2016). Rethinking potentials of public space and its management through place-making in Kuala Lumpur. *MATEC Web of Conferences* 66:00056. <https://doi.org/10.1051/mateconf/20166600056>.
- Szalai, A. (1980). The Meaning of Comparative Research on the Quality Of Life. In: Szalai, A. and Andrews, F. (eds). *The Quality of Life*. Sage, Beverly Hills, CA, pp. 7–24.
- Talen, E. (2002). Pedestrian access as a measure of urban quality. *Planning Practice and Research* 17(3):257–278.
- Tepe, D. and Sönmez, İ. Ö. (2018). Farklı Özelliklere Sahip Kentsel Dokularda Kamusal Mekân Özelliklerinin Mekânın Sosyal Kullanımına Etkisinin İncelenmesi - İzmir-Bostanlı Örneği, “DeğişKent” Değişen Kent, Mekân ve Biçim Türkiye Kentsel Morfoloji Araştırma Ağı II. Kentsel Morfoloji Sempozyumu, Türkiye ISBN: 978-605-80820-1-4.
- Topçu, M. (2021). Syntactic legibility of image elements: Eskisehir case. *MEGARON / Yıldız Technical University. Faculty of Architecture E-journal*. <https://doi.org/10.14744/megaron.2021.62515>.
- Verstegen, I. and Ceen, A. (2013). *Giambattista Nolli and Rome: Mapping the City before and after the Pianta Grande*. Rome: Studium Urbis Rome Center.
- Vidou, K. and Latinopoulos, D. (2021). Implementation of a Place Game tool in the city of Rotterdam to enhance urban resilience to climate change through placemaking. *Journal of Urbanism: International Research on Placemaking and Urban Sustainability* 1–24. <https://doi.org/10.1080/17549175.2021.1973077>.
- Whyte, W. H. (1980). *The Social Life of Small Urban Spaces*. Washington, DC: Conservation Foundation.
- Yamu, C., van Nes, A., and Garau, C. (2021). Bill Hillier’s legacy: Space syntax—A synopsis of basic concepts, measures, and empirical application. *Sustainability* 13(6):3394. MDPI AG. Retrieved from <http://dx.doi.org/10.3390/su13063394>.
- Zamanifard, H., Alizadeh, T., Bosman, C., and Coiacetto, E. (2019). Measuring experiential qualities of urban public spaces: users’ perspective. *Journal of Urban Design* 24(3):340–364. <https://doi.org/10.1080/13574809.2018.1484664>.