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ICONARP aims to be a reputable platform for the studies of Architecture, Planning and Design. ICONARP's objectives are:

- To question global and local interactions in the field of Architecture, Planning and Design,
- To discover the relationship between Architecture, Planning and Design,
- To increase the contribution of Architecture, Planning and Design to social and behavioral sciences,
- To discover the relationship of Architecture, Planning and Design with other fields of science that are affected and affect,

- To develop theoretical and methodological foundations of Architecture, Planning and Design,
- To discuss the role of architects, planners, designers and real estate players today and in the future,
- To compare the differences between architecture, planning and design research, practices and education in different countries,
- To bring a scientific view of current issues and discussions in field of Architecture, Planning, Design and Real Estate,
- To discover innovative methods and techniques in the field of Architecture, Planning, Design and Real Estate

ABSTRACTING AND INDEXING

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CONTENTS

Volume 9, Issue 1, June 2021
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Research Article

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The Urban and Architectural Characteristics of Voyvoda Street from Past to Present

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Abstract

Purpose

Voyvoda Street in Galata district of Istanbul originated centuries ago at the inner walls of the medieval city and was one of the most significant of its era, which has preserved its unique character and urban identity. In the nineteenth century, it became an important financial axis for the city. This study aims to understand the factors which determined the axial character of Voyvoda Street and its urban identity. The street, which is under the influence of new dynamics is examined in relation to spatial and functional transformation.

Design/Methodology/Approach

The analysis was developed by two essential components: the street and the buildings that define the character of the street by its architectural components, and their functional transformation since the nineteenth century. The axial character of the street has been evaluated due to selected criteria. The data is based on literature review, the survey of historical maps, visual materials such as photographs and gravure prints, and on-site observations.

Findings

The street has been shaped and transformed by social, political, and economic developments, external and internal migrations, the influence of modernist architectural movements, urban reforms, Western innovations in transportation, and technical developments. Voyvoda Street's strong character as an axis is determined by its historical buildings, which are attached to each other continuously that form a wall defining the boundaries of the street. It is one of the essential pedestrian connections and functions as a path. Since most of the buildings lost their original functions, following the re-use for various needs, the service and cultural industries have become dominant. Although the historical characters of some buildings have been changed by new additions, the original silhouette of the nineteenth century is still dominant.

Research Limitations/Implications

Visual materials and resources of some buildings were available in detail, while for some of them, the materials were limited.

Originality/Value

The previous studies concentrated on urban, and architectural aspects of Galata district as a whole, whereas this study focused on the urban identity of Voyvoda Street. The street and the historical buildings that define the axial character and the image of the street by its architectural components, and their functional transformation have been analyzed.

Keywords: *Axial character, built heritage, street ıdentity, transformation, Voyvoda Street*

INTRODUCTION

The urban and architectural characteristics of cities are shaped by various factors at different periods in history. Social and economic changes have always been constituted the spatial formation of the historical urban areas. It is a challenge for a historical city to respond to the changing needs of urban life, and especially to maintain its identity as an accumulation of different cultures and experiences. As the buildings maintain their physical existence, the occurrence of social, economic, and political issues leads to replacing their original functions with the new ones and may lead to change in their architectural character as well.

The spatial and functional changes become an important determinant for the transformation of urban spaces surrounding them and the adaptation of new functions impact directly the identity of urban space. As Norberg-Schulz (1980, pp 18) has commented; 'A place which is only fitted for one particular purpose would soon become useless. To protect and conserve the genius loci means to concretize its essence in ever new historical contexts'. In that sense, consideration should be given to the conservation of the cultural, historical heritage and also to the social and economic needs of the city. In response to the needs, functional transformation provides an opportunity to make historical environments more attractive and contributes to the competitiveness of the city.

This study discusses the functional and spatial transformation of Voyvoda Street (Bankalar Avenue) in Istanbul, which is located in the historical center of Galata and has long been one of the most significant thoroughfares in its district. For ages, Voyvoda Street has preserved its unique architectural character and urban identity. According to Schulz (1971, 81), 'a street represents a section of life or a small universe, where the character of the larger district is presented in the condensed form'. The identity of a city, district, or street is determined by its idiosyncratic geography, history, community, socio-cultural values, and the built environment. The Voyvoda Street is an important axis in the Galata district, due to its distinctive image determined by its built heritage, significant economic and cultural role in history, considerable location, and radical modernization in the 19th century. Still, the transformation is ongoing which is based on building-based renovation for re-use.

This study aims to identify the factors which have produced and transformed the character of Voyvoda Street and to demonstrate its spatial transformation since the 19th century. The street has been mentioned in a limited sense among urban studies of Galata and studied in detail for its historical development through a book, as an outcome of an exhibition published by Ottoman Bank Museum (Eldem, 1999). Specifically, the archive of the museum has a huge number of historical documents such as images, writings, maps, and plans, which are one of the main sources for this study. The research is structured by the following questions: What are the essential architectural features of its urban character as a historical axis, and how it has transformed in time? How functions have been changed in relation to the urban context since

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the 19th century? Consequently, the axial character of the street and the historical buildings, which define the impressive boundaries and image of Voyvoda Street are analyzed in terms of their architectural features and functional change.

LITERATURE REVIEW

The historical character of urban space is defined as a whole including location, heritage, architectural assets (Bullen & Love, 2011) such as the street, which is defined by the boundaries of the buildings (Scott, 2008; Plevoets & Van Cleempoel, 2013; Powell, 1999). Many historical analyses of the built environment demonstrate that streets are the essential elements for the formal organization of the settlement form. Moughtin (2003, pp.131) defines ''the street as a link between buildings, both within the street, and in the city at large'' and ''the street is also a path, which is two-directional''. Due to Moudon (1991, pp.13) ''More than any other element of the urban infrastructure, streets both record and determine the history of city form.'' Also, Rapoport (1987, pp.81) demonstrates the street as ''the more or less narrow, linear space lined by buildings found in settlements and used for circulation and, sometimes, other activities''. In addition to the formal meaning of the street, some scholars emphasize the public aspect of it. For instance, Kostof (1992, pp.114) points out ''The only legitimacy of the street is as public space''. According to Carmona et al. (2003, pp.111), ''streets constitute the public space in its purest form that is accessible to all''. Also, Smithson et all. (1967, pp.15) says ''the street is not only a means of access but also an arena for social expression''.

The memories of a historical city are embedded on its streets including public, cultural, and commercial buildings and urban spaces. Revitalization of historical streets has the potential to restore their unique image and identity (Mehta, 2013). These areas are essential to social interactions, which produce cultural heritage (Zukin, 2012), and also attract tourists, visitors, and commercial activities (Bandarin, 2015). Since the '90s, urban built heritage areas, which define the identity of the city or a place, are essential to urban and economic development (Bandarin and Van Oers 2012; Aspa, 2004; Ashworth &Tunbridge, 1990; Ashworth &Larkham, 1994; García-Hernández M, De la Calle-Vaquero M, Yubero C., 2017). The identity or character of a place has been variously termed as 'genius loci', 'place-identity', and 'sense of place' (Norberg-Schulz, 1980; Relph, 1976; Lynch, 1960; Steele, 1981), and the physical environment, which is mostly characterized by the buildings enrich the local character and provide a sense of place (Lowenthal & Binney, 1981). Relph (1976, pp.30) refers to the importance of the physical environment in his comment on the place as 'possessing intangible qualities, changing through time and, above all, having a physical, visible form'.

Gibberd (1955) asserts the street as a space where buildings are grouped to form a series of street views while Gutman (1986) defines the street as a type of intermediate urban space between buildings and other open

spaces. Together with the building's relation to each other, the physical factors that have a strong impact in the planning process of a street are ''user density, land-use mix, pedestrian-vehicular interaction, configuration and context'' (Schumacher, 1986 pp.132).

All types of visual elements of the historical urban areas are one of the essential inputs of the morphological analysis for historical urban areas. According to Hosagrahar (2015), the importance of analyzing visual elements lies behind figuring out the components of urban identity. Especially, the analysis showing figure-ground or solid-void relations, the hierarchy of buildings and urban spaces, and the links connecting them are part of the identification of the physical articulation of the urban area. For the analysis of urban space in the urban scale, the aerial maps are beneficial tools to define the exact location of buildings, streets, or natural areas. Visual documentation of the street elevation is also necessary for the analysis. Visual representation of the street elevations including visual integrity is important for any kind of intervention, restoration, or re-functioning of the buildings (Hosagrahar, 2015).

Classification of buildings and urban spaces based on their spatial aspects such as formal language, visual elements, or typology is also an important tool for the analysis. For instance, the classification of buildings defining a street elevation may be based on the height of the buildings, their location on the street, architectural features, the function of the buildings, or the geometry of the facade, facade materials, or roof form of each building (Hosagrahar, 2015). Moughtin (2003) makes a suggestion more based on the urban design about analyzing the form of the street regarding the qualities such as straight or curved, long or short, wide or narrow, enclosed or open, formal or informal. Also, the street can be analyzed in terms of its scale, proportion, or connections to other streets and squares.

Galata was surrounded by the medieval city walls, which is seen in the gravures of the 15th century. The 1905 Goad map shows that the density of the built environment increased and Voyvoda Street is seen as an important axis (Çelik, 1998). In the 19th century, many large commercial and public buildings were built that define the urban identity of the Street (Akın, 1998). Although Voyvoda Street is not a main Street today, it forms the horizontal axis of the region (Eroğlu, 1992; Çelik, 1998). In this study, the factors which have produced and transformed the character of Voyvoda Street since the 19th century is analyzed.

RESEARCH METHODOLOGY

The analysis is based on defining the changing character of the street by its architectural features of historical buildings and axial analysis regarding specific urban space criteria, and functional change since the 19th century (Figure 1). According to Larkham and Jones (1993), to evaluate the character of the urban space townscape analysis should be done that studies the essential elements such as buildings, open spaces, streets, and site layouts. Also, the massing and height of buildings and the

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relationship between existing structures and open spaces should be given importance among these analyses.

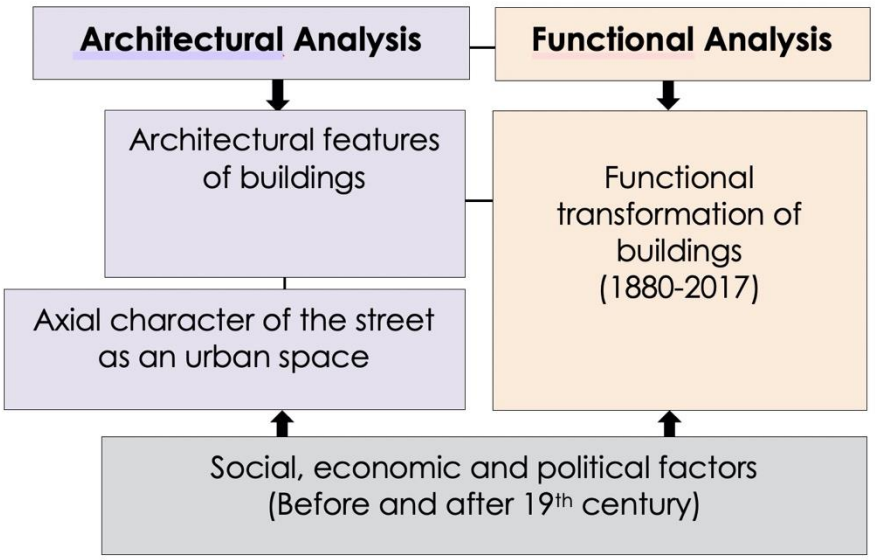

Figure 1. Analysis for spatial and functional change

Fifteen buildings have been selected as they reflect Voyvoda Street's urban identity. The main selection criteria are the architectural style such as their facades and construction systems, and the construction period of the buildings no later than 1880–1920. In this study, the spatial and functional analyses are conducted for four significant periods (1880–1920; 1990; 2010; and 2017). The axial analysis is based on the urban space criteria compiled from the works of Schulz (1971) and Lynch (1960), which are;

- the images and activities at the starting and ending points of the connections and movement,
- the relative width of the street,
- the block structures,
- the dimensions and lengths of the facades,
- horizontal and vertical components,
- symbolic direction with its image and historical function,
- a place for urban activities (destinations along the axis).

The discussion considers the transformation in relation to urban issues, especially about how social, economic, and political factors of the nineteenth, twentieth, and twenty-first centuries have had significant impacts on Voyvoda Street. The data used in this study is based on a literature review, the survey of historical maps (Pervititch, 1905; Goad, 1905; Stolpe, 1863; Cavand, 1872–74; Moltke, 1836; Kauffer, 1786; D'ostoya, 1860), visual materials (such as photographs and gravure prints) as well as on-site observations.

THE SPATIAL DEVELOPMENT OF VOYVODA AND ITS URBAN CONTEXT IN HISTORY

Istanbul, a city with varied, dynamic, and global relations, has been a heterogeneous cultural and physical phenomenon for 1,500 years. It is constantly influenced by changing life conditions, cultural variations, hybrid spatial formations, dynamic urban practices, diverse social expectations, and continuously evolving identity (Batur, 1996; Kuban, 1998; Bilgin, 2010; Akpinar, 2011; Akin, 2011). Istanbul, as a twenty-first century World city, is a global metropolitan with complex urban characteristics and it is subject to ongoing change with large-scale projects (Dokmeci, Altunbas, &Yazgi, 2007; Özbay, C., & Candan, B. A., 2014; Güvenç, M., et al., 2012).

Figure 2. Voyvoda Street and Galata district context

The urban structure and the image of the city have been governed by its dynamic topography, distinctive natural environment, and geographical position between the Marmara Sea, the natural harbor of the Golden Horn, and the international waterway of the Bosphorus. The first settlement area was the peninsula (known as the Historical Peninsula, and the city's administrative center), which is located between The Marmara Sea and the Golden Horn, declared as World Heritage Site by UNESCO in 1985. Kuban (1998) defined the eighteenth-century Istanbul as a Western mercantilist city whose character was the product of its specific West–East culture. In the nineteenth century, Istanbul consisted of three main settlements geographically separated from each other by water: Istanbul (historic peninsula), Galata, and Uskudar. Galata, with its harbor to the north of Istanbul and its location across the Historical Peninsula, is where trade relations with the West were established and operated (Figure 2).

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Figure 3. Historical Galata settlement in the fifteenth century (Matrukçu Nasuh, Gravure, 15th century)

The history of the Galata region dates back to ancient times. Before the fall of Constantinople in 1453 (İstanbul), Galata was a Genoese colony and had the characteristics of a walled medieval city (Eyice, 1996; Akin, 1998; Celik, 1998; Batur, 2001) (Figure 3). Unlike the Historical Peninsula, which was established as a planned Roman city, Galata was developed in an organic manner (Batur, 2001). In the fifteenth century, Italians, Jews, Armenians, and Turks were living in Galata, each in their own neighborhoods separated by walls. The social and cultural context was the main determinant for the spatial layout of Galata since the traces of these walls were the prospective streets of the nineteenth-century Galata (Eyice, 1996; Akin, 1998; Celik, 1998; Batur, 2001).

Throughout its history, Galata has always been an important port settlement. Like the other port cities, different ethnic and religious groups settled in Galata. In addition to various religious structures (such as churches and synagogues), the first municipality, theatres, embassies, hotels, a stock market, banks, translation bureaus, trade centers, and warehouses were built there. Typical for an important port city, Galata was distinguished until the end of the nineteenth century by its colorful urban life, with its many restaurants, cafes, casinos, taverns, and passages (Akin, 1998; Celik, 1998; Batur, 2001).

As a matter of fact, there are cities in history established, dominantly, for trade purposes. For instance, the medieval bastide, a European form, adopted a rectangular regular street plan, which served as an economic place, with trade being a major function. Streets had equal status in the bastide, which had no central avenues or broad boulevards that were designed as working places (Hartshorn, 1992). Much like the medieval bastide, the medieval Galata had the role of being the trade center of the city but its streets didn't have the regular order like the bastide. The city had the traditional morphology of Mediterranean port cities: it pursued maritime activities, connected the city's main axis to the port, and constructed important commercial centers (Eyice, 1996; Akin, 1998; Celik, 1998; Batur, 2001).

Significant Determinants for the Development of Voyvoda Street

The nineteenth-century is the most determinant period for the urban identity of Galata. Due to reforming policies, as well as new urban standards and ideas, Galata was the first settlement in the Ottoman Empire to experience a process of modernization. The demolition of the medieval walls and the construction of new streets in their place in the 1860s are considered as important developments. These streets, which formed a network that expanded accessibility, were constructed according to European models rather than to the traditional pattern of Ottoman cities (Figure 4). As a business and commercial center of the city, which has improved physical accessibility significantly benefited Voyvoda (Eyice, 1996; Akin, 1998; Celik, 1998; Batur, 2001).

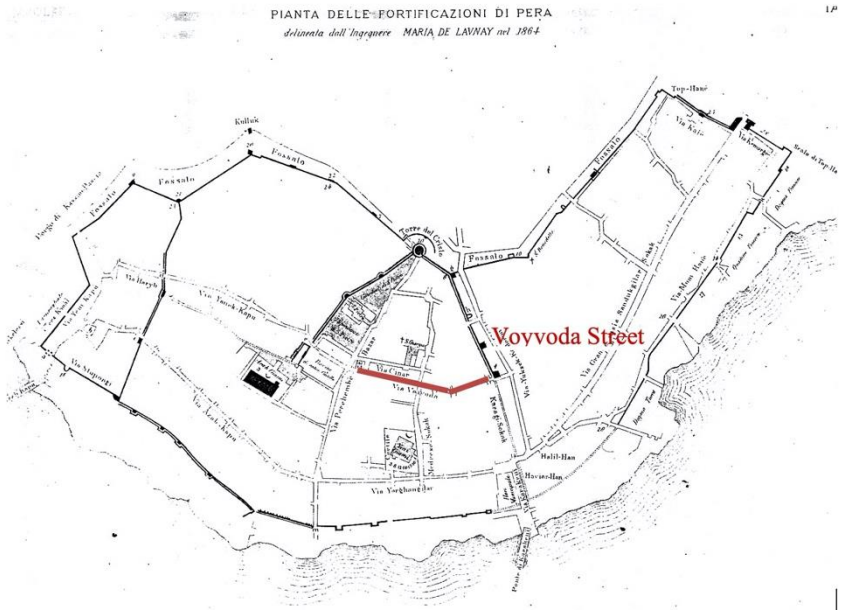

Figure 4. 1864 Launey Plan (Jean-Luc Arnaud, 2009; from'Une source pour l'histoire de l'espace urbain: l'investigation des documents icono-graphiques représentant les villes de l'Orientméditerranéen. Panzac. Les villesdans l'Empire ottoman: activités et sociétés', CNRS, pp.121–47, 1991. <halshs-00423964>)

In general, practices introduced by administrations frequently bring about changes in the architecture of that particular country and the appearance of its cities. The change may be displayed in architectural forms, stylistic features, construction techniques, materials employed, or even in large urban layouts (Can, 1999). During the reformist movement in 1839 due to the urban policies, traditional wooden architecture was replaced with masonry structural development, which had a huge impact on the Galata and the city's image (Gençer, C.İ., Çokuğraş, I, 2016). At the beginning of the twentieth century, the urban image of Galata was characterized by high-rise masonry buildings with bank and inns' functions, which were located particularly on Voyvoda Street and Kemeraltı Street and their surrounding areas, and by dense housing units higher on the hills (Akin, 1998). According to Ortaylı (2016), the nineteenth-century Galata represented the European way of life in the Eastern Mediterranean with its environment of masonry buildings, multilingual and multicultural population, and varied entertainment events (Ortayli, 2016). In Galata and Pera districts, the European city

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image created by its architecture and urban environment, with buildings inspired by Western European styles, reflecting the distinctive character of the population and the role of global financial powers in the urban space of Ottoman society (Eldem, 2000; Akin, 1998).

THE ROLE OF VOYVODA STREET AS AN AXIS

The pre-urban villages and settlements had the organic paths for movement, and as cities developed these paths evolved into formal street networks. The street as an institution is a critical subject with its architectural identity, economical activities and social aspect. According to Kostof (1992), the purpose of the streets included physical connections and social exchange. Thus, the street is both a container and has its specific content (Kostof, 1992).

The Voyvoda Street of Galata had been an important axis in history, which extended parallel to the waterfront and on which were lined administrative and government buildings. The Genoese parliament building and the market square were located there; subsequently, Ottoman local administrations were located on Voyvoda Street as well, preserving the area's significance. During the nineteenth century, a new social, economic and architectural development in Galata resulted in the construction of banks. In particular, the Ottoman Bank designed by Alexander Vallaury was constructed in 1890 with its twin monumental buildings and was considered the main attraction of the street at the time. Following the Ottoman Bank, numerous other banks, such as Banco di Roma, Deutsche Bank, and the Banque d'Athenes, took their place on the axis, to be followed later by local banks, such as the Central Bank. As a result, the road was renamed Bankalar (Banks) Street. In the final fifty years of the Ottoman Empire, Voyvoda Street hosted companies related to banking, insurance, law, architecture, mining, railways and technology, which was creating the distinguished urban identity. Most of the large commercial buildings, that were built on the axis, followed the plans and layouts of typical European structures for business, with impressive facades and interior architectural features (Akin, 1998; Celik, 1998).

The development of the transportation system had a huge impact on the development of the street. As the borders of the city expanded in the nineteenth century, so public transportation developed rapidly. Public transportation between the Historical Peninsula, Galata, and the Bosphorus villages were provided by waterways that made use of the city's waterfront character. At the end of the nineteenth century, the Historical Peninsula and Galata became connected by the Galata Bridge, which is a pedestrian and vehicular bridge that formed a strong axis affecting development (Akin, 2011). The first horse-drawn trams operated on Voyvoda Street in the second half of the nineteenth century and electric trams started to serve the area at the beginning of the twentieth century (Celik, 1998). Like other streets (Cadde-I Kebir, Tepebaşı) in the district with high population density, Voyvoda street benefited from the extension of the tram network. The stalls and

administration center of the tram company were also located on the Street and enhancing its importance as an axis of the district (Eldem, 2000).

Another Western innovation providing transportation was a railway tunnel between Galata and Pera, the construction of which was completed in 1874 (Akin, 1998). Voyvoda Street became an important center in Galata and also in Istanbul as a whole in the second half of the nineteenth century (Eldem, 1999; Eldem, 2000). The Galata stock market, which was founded in the 1850s, was one of the most important stock exchanges in the world until the late 1920s (Altan, 2007; Alpay, 2007). The most important financial and stock exchange activities were conducted by Galata bankers, who were highly influential in the economic life of the Empire. In addition to the stock market, vibrant economic activity occurred in Street's inns, trading centers, bureaus, warehouses, and shops (Akin, 1998).

However, following the proclamation of the Republic, Ankara became the new capital, and the population of Istanbul declined in the1930s. Consequently, Galata gradually began to lose its attractiveness as a commercial center. Again, in the 1950s, the city faced a period of demographic expansion resulting from immigration, a phenomenon that has continued to the present day. Mass immigration from Eastern Turkey, as well as the migration of the non-Muslim population for political reasons, has led the Street to changes in social profile and economic activities. The Street has experienced new economic activity through the expansion of electronic retail due to the rapid growth of technology during the 1950s. In the 1990s, Levent-Maslak urban axis was developed as the Central Business District, attracting the administrative headquarters of financial companies, which were previously located on Voyvoda Street. Today, the Street still accommodates some banks, alongside some electrical supply shops (Eldem, 1999).

Figure 5. Electrical retail, banks and abandoned buildings (Photo: Authors).

Since the beginning of 2000s, technological and electrical retail is being replaced by other services, such as accommodation, culture, and leisure services. The main reason behind this functional change is the rise of arts and culture centers in Galata and Pera. In the 2000s, museums and modern art institutions have established in the city (Hansen, 2012). Also, the redevelopment of old Galata Harbor as a Cruise Terminal has triggered the urban tourism and economy. Today, most of the electrical supply shops have already left the street and there is an ongoing process of restoration for re-use (Figure 5). Although the street is developing, the number of

DOI: 10.15320/ICONARP.2021.148

abandoned buildings is not negligible. As mentioned above, sociological, economic and political factors were the main determinants of spatial and functional change for the axis. Despite the radical functional and socio-economic change in the historical process, the axial and architectural character of the street is still defined by its historical buildings.

SPATIAL AND FUNCTIONAL ANALYSIS

Spatial and Functional Analysis

Initially, the functional transformation is demonstrated through four different periods of the 1890s, 1950s, 2010s and 2017, which were determined due to significant changes. These analyses are going to be evaluated by considering the socio-economic determinants of its period. As Harvey has noted, political and economic developments are strongly connected to spatial production (Harvey, 2008). The physical context of Voyvoda Street, which generates a unique identity, is shaped in the nineteenth century due to the diffusion of the global economy. Around the 1890s, there were various functions such as retail (daily services like bakery, pharmacy, pub), trade (mechanical companies), global financial and insurance companies, warehouses, post offices, Ottoman Bank, and even residential units. The street was more like a commercial street. Later on, with the influence of the Ottoman Bank at the beginning of the 20th century, banks and other financial functions were increased and the street gained more financial character. Around the 1950s, electrical and mechanical supply was flourished and became dominant, due to the mass migration. The end of the 20th century was the time when most of the financial companies moved to the New Business District in Levent-Maslak, resulted in an increase in electrical supply retail, which has continued until the 2000s (Eldem, 1999).

Figure 6. Functional change (1880–2017), reproduced from Eldem (1999) and on-site studies.

Figure 7. Functional change (1880–2017), reproduced from Eldem (1999) and on-site studies.

Figure 8. Functional change (1880–2017), reproduced from Eldem (1999) and on-site studies.

The SALT and the Ottoman Bank Museum have been established in 2011 in the former Ottoman Bank building, as a reflection of the growth in the arts, culture, and service industry in the city. Once again in history, the Ottoman Bank building came onto the ground as the dominant function, which has launched the revitalization. The functions have been diversified as daily services, cafes, and cultural institutes and still facing an ongoing re-functioning process. Today, a considerable number of underutilized buildings wait for their new functions. Electrical and mechanical supply retail has almost left. Besides, by the influence of urban tourism and the economy, specifically Galata Port development, the accommodation service is taking its place on the street. The identity

DOI: 10.15320/ICONARP.2021.148

of the street is going to be defined by the new functions such as arts, culture, leisure, business, accommodation, and prospective services (Figure 6, 7, 8, 9).

Figure 9. Functional change (1880–2017), reproduced from Eldem (1999) and on-site studies.

The Axial Character of the Street as an Urban Space

In contrast to the various functional alteration, the spatial change of the street is more static. The significant spatial features are the role of its axial character and place identity that depends on its physical components, which comprise the buildings connected to each other constituting a continuous urban wall parallel to the street itself. These masonry buildings reflect the powerful image of their original economic and administrative functions in the nineteenth century. Although the height of the original façade of the street has been changed, the axial character is still maintained (Figure 10).

Figure 10. Views from Voyvoda Street (Photos: Authors).

In terms of its spatial properties, Voyvoda Street functions both as a path and an axis, which makes it a unique artifact. It is an essential path for movement within the district and it represents a symbolic direction with

its image and historical function. It has horizontal as well as vertical components, demonstrating its figural character and its role as a place for urban activities. As Schulz (1971) has suggested, the organizing axis is not intended for real movement; rather, it represents a symbolic direction that unifies several elements and often relates to a larger totality. Often, the path and axis are identical that the real path, and the more abstract axis may have horizontal and vertical components (Schulz, 1971). According to Lynch (1960), an urban axis contributes to the formation of the city image. The images and activities at the starting and ending points of the connections, the relative width of the streets, the block structures, the dimensions and lengths of facades are important in scaling people to the city. The Voyvoda urban axis provides a link between the buildings all along the street, and to the wider city. It intersects another axis, which leads to the Galata Tower, one of the most iconic symbols of the old city.

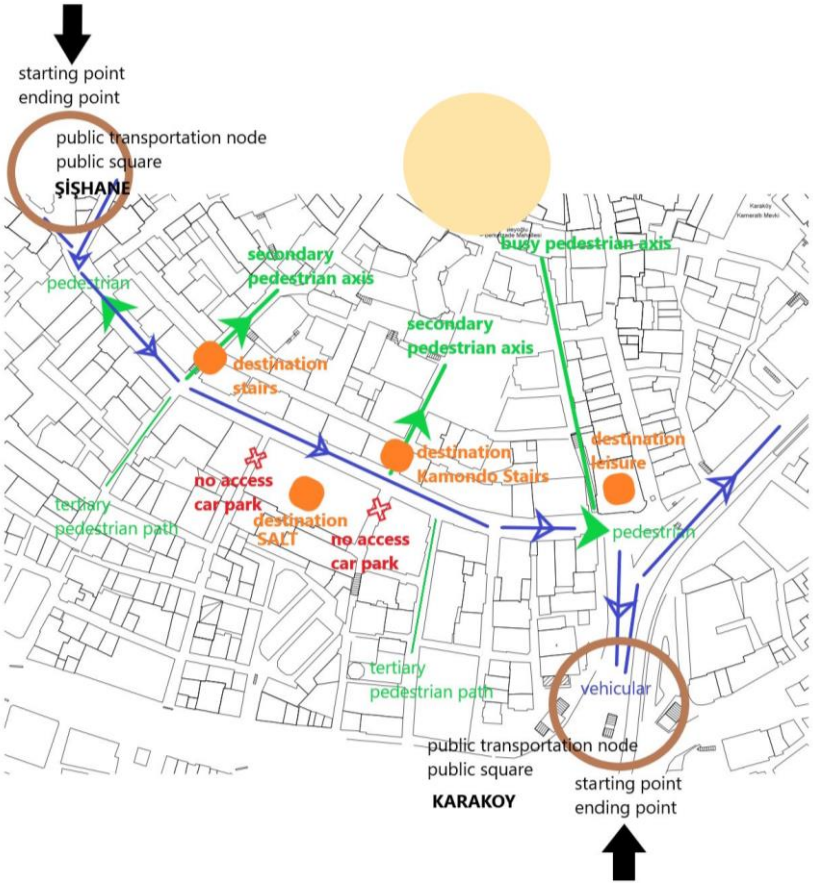


Figure 11. Axial Character of Voyvoda Street (1).

Considering the axial character of the street and architectural features of the buildings, the spatial analysis developed by these two essential components: the street and the buildings. Initially, for the analytical evaluation for the axial character of the street, eight criteria are demonstrated, which are the images and activities at the starting and ending points of the connections and movement, the relative width of the street, the block structures, the dimensions, and lengths of the facades,

DOI: 10.15320/ICONARP.2021.148

horizontal and vertical components, symbolic direction with its image and historical function, and a place for urban activities (destinations along the axis).

Figure 12. Axial Character of Voyvoda Street (2).

- The images and activities at the starting and ending points of the connections and movement: Voyvoda is the main connection between two busy nodes, Sishane and Karakoy, consisting of several modes of public transportation. Karakoy Square is the citywide public transportation node of the essential tramline, metro line, bus, tunnel tramline, waterborne transportation, and pedestrian movement. Sishane is not as busy as Karakoy Square in terms of pedestrian movement, but it is still one of the essential starting\ending points for pedestrian connection from Voyvoda to Karakoy. In this case, these two public spaces are the main stationaries providing pedestrian movement up and down along the Voyvoda. The Galata Tower is the image, as being a historical and touristic attraction, which provides the secondary pedestrian movement from Voyvoda. Other pedestrian paths don't function as an axis due to a lack of activities and no entrance to the buildings. Even, some of these narrow and dull streets function as car parking. Vehicular movement pours down only in one direction from Galata to Karakoy Square through Voyvoda, which dominates the axis during the daytime. Voyvoda has a strong relation with Galata Bridge that is one of the significant connections between Historical Peninsula and Galata (Figure 11 and Figure 12).

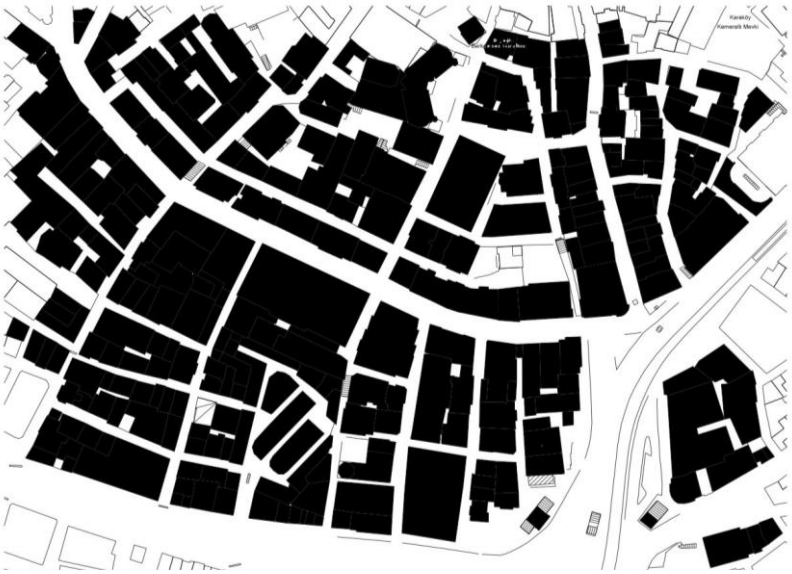


Figure 13. Figure-Ground Relation of Voyvoda Street.

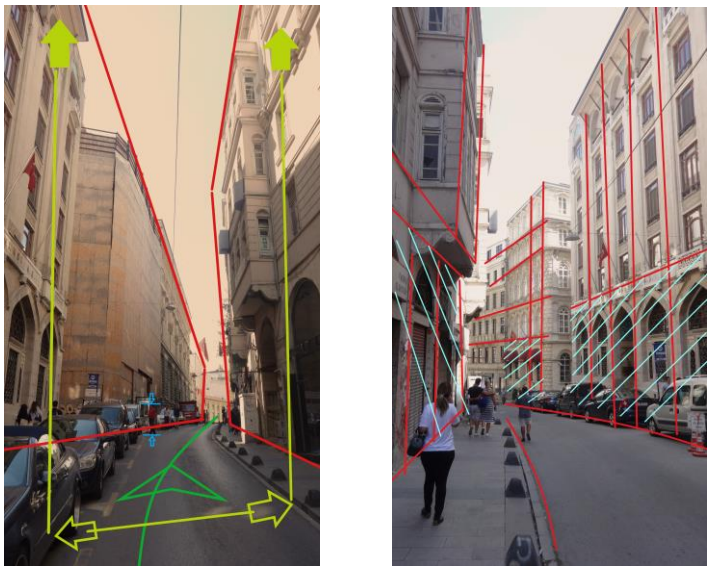


Figure 14. Axial Character of Voyvoda Street (3).

- The relative width of the street: The regular street pattern surrounding Voyvoda provides permeability and the good quality physical access from Voyvoda to Galata and Karakoy. Considering figure and ground relation, Voyvoda Street is seen as the spine of the network in terms of its central location, which intersects and connects the lateral streets. Although it is obvious that Voyvoda Street is the widest in comparison with the width of the other streets in the network, the silhouette of the Voyvoda Street cannot be perceived easily by pedestrians due to the height of the buildings. Consequently, the street is proportionally narrow due to its top-level, but still largest within the network (Figure 13 and Figure 14).
- The block structures: The figure-ground relation shows that the physical context comprises massive structural elements (Figure 13 and Figure 14).

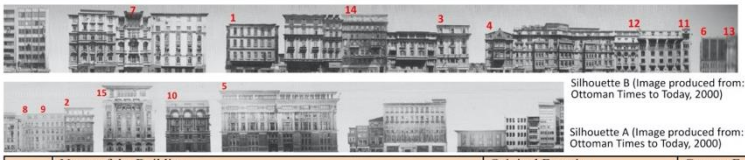
DOI: 10.15320/ICONARP.2021.148

- The main components of this pattern are the inns and the architectural typology of European-based economic function. This is valid also for the rest of the context, where the trade and economic function was dominant before.
- The dimensions and lengths of the facades: The lengths of the façades at both sides of the street are continuous and the dimensions are perceived as if there is a sense of proportion due to their height and width. However, the sense of human scale is weak, which is related to the proportional width of the street and the height of the buildings. So, the street is perceived narrower (Figure 13 and Figure 14).
- Horizontal and vertical components: The buildings are the main components and the essential configuration of the facades are vertical and horizontal. The rectangular planes of the entrance spaces with the higher level are providing a sense of direction horizontally, which are composed of vertical elements (Figure 14).
- Symbolic direction with the image and historical function: The buildings on Voyvoda are constituting a continuous wall parallel to the street itself. These masonry buildings reflect the image of their historical economic functions of the nineteenth century in terms of symbolic direction for the axial character (Figure 14).
- A place for urban activities (destinations): The opaque façade of the buildings provides limited visual relation between the outdoor and indoor. This necessitates the destinations for various urban activities to maintain the sense of place and vitality of the street. In terms of supporting urban activities, there are three essential and attractive destinations. These are the two narrow streets-partially staired; a café directed to the view of both Voyvoda Street and Karakoy Square; and SALT the arts and culture institute. So, the destinations provide urban activities of recreation, arts and culture, education, and movement that provides a ground for socializing and strengthens the potential of the street as a public space. In addition to its arts and culture activities also on the street level the activities such as waiting, standing, watching, having a conservation occurs in front of the SALT. Three destinations are strong as second movement axis providing connections to Galata Tower Square. Additionally, one of these destinations has one of the unique historical Kamondo stairs in Istanbul constructed in the nineteenth century. It provides another essential ground for urban activities such as standing, watching, taking the photo, sitting on the steps, and meeting. Frequently, tourists, visitors and even local people take photo of themselves with the stairs background. In this case, this distinctive architectural feature of Voyvoda is one of the most

important built element for activity and movement (Figure 11 and Figure 12).

Architectural Features of Buildings

Although there are reinforced concrete buildings, on both sides of the street, 40 historical buildings reflect the urban development during the last period of the empire and nation (Eldem, 1999). Despite their common architectural qualities – the basic components of physical form and the shared identity of the street – the buildings also exhibit some different architectural expressions (Figure 15 and Figure 16). As Hegemann and Peets (1922, pp 187) point out, 'the street architecture reflects the difficulty of combining the large amount of individuality required by the difference of taste and practical needs of the individual owners with the necessary element of harmony'.



Silhouette B (Image produced from: Voyvoda Street from Ottoman Times to Today, 2000)

Silhouette A (Image produced from: Voyvoda Street from Ottoman Times to Today, 2000)

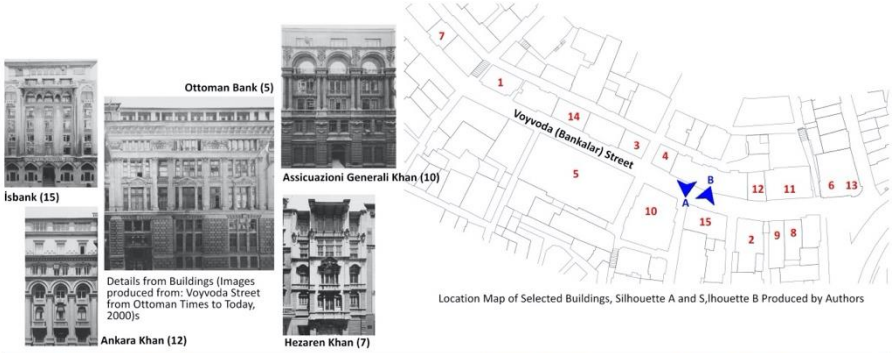
	Name of the Building	Original Function	Current Function
1	**BEREKET KHAN (1316-1880s):** Architect (Unknown), originally 4 storey building of classical style with plain facade	Palazzo del Commune (14th CC)	Underutilized
2	**SUMERBANK (1880s):** Architect (Unknown), originally 4 storey currently 5 storey building with arched windows, ancient greek elements such as pilaster facade, hanging eaves	Credit Gen.Ottoman (1880), Anatolian Railway co.(1910), Sumerbank (1933)	Hotel
3	**DEMİRBANK (1880s):** Architect (Alexandre Vallauri), originally 5 storey building, neo-classical style located next to Kamondo Stairs on its left side	British Consulate (1940), Bank(1998)	Office
4	**HAS KHAN (1870s):** Architect (Unknown), 5 storey of neo-classical style with neo-greek facade elements: pilasters, decorative framing around window; located next to Kamondo Stairs, on its right side	Post Office	Art Gallery
5	**OTTOMAN BANK/TOBACCO REGIE OTTOMAN (1890-1892):** Architect (Alexandre Vallauri), originally 4 storey currently 5, with distinct architectural styles of neo-classical and oriental-applied on opposite façades. The front façade on Voyvoda Street has a neo-classical or neo-renaissance style, however, its rear façade facing the old Istanbul have traces of neo-orientalist style. This conscious contrast between the two facades, spoke of the position of the bank between East and West, Symmetrical axial layouts and facade decoration ornate, with sculptured columns and precast facade elements.	Bank (1892-1930) / Tobacco Firm (1892-1925)	Cultural Institute / Bank
6	**IMAR BANK (1890-1895):** Architect (Unknown), original 3 storey with 1 floor added (1960) and 3 floor added (1980), main facade element gothic/oriental style windows	Bank	Hotel
7	**HEZAREN KHAN (1902):** Architect (Alexandre Vallauri), 5 storey, 1st storey orientalist style, 2nd storey rokoko style, 4th storey art nouveau	Bank	Ground floor: electrical supply retail, Floors: underutilized
8	**BOZKURT HAN (1904-1905): Architect** (Unknown), originally 4 currently 6 storey of classical style with few ornamental elements on facade	Insurance agency and offices	Electrical supply retail
9	**JENERAL KHAN (1904-1905):** Architect (Unknown), originally 4 currently 6 storey classical style with few ornamental elements on facade	International retail, bank and maritime offices	Ground floor: pharmacy

Table 1a: Architectural Features of Selected Buildings on Voyvoda (produced from: Voyvoda Street from Ottoman Times to Today, 2000)

Figure 15. Architectural Features of the Buildings (1).

In general, the architectural identity of the street can be described as high-rise masonry buildings with neoclassical facades. In addition to the predominant art nouveau and rococo styles, neo-Greek items are expressed on the building facades as structural and decorative elements. Symmetrical axial layouts were generally preferred in the facades and façade decoration became ornate with sculptured columns and precast facade elements (Kuban, 2016) however most of the buildings are without ornamentation. There are also early examples of the national style containing gothic orientalist items and mosaic ornamentations from the twentieth century (Figure 15 and Figure 16).

DOI: 10.15320/ICONARP.2021.148



	Name of the Building	Original Function	Current Function
10	**ASSICURAZIONI GENERALI KHAN (1909):** Architect (Giulio Mengeri), originally 5 currently 6 storey, neo-classical style with neo-greek elements, highly ornamental facade decoration with pilasters	Generali Assurance and Offices	Hotel
11	**TUTUN KHAN (1910-1911):** Architect (Unknown), originally 5 currently 6 storey, 1st National style with a corner tower of vault roof	Bank, insurance agency and offices	Underutilized (registered as hotel)
12	**ANKARA KHAN (1911-1912):** Architect (Unknown), originally 5 currently 7 storey, distinctive facade element is massive pilasters rising along four floors ending with orientalist archways, similar to Ass.Gen.Khan	Insurance Agency	Market (ground floor)
13	**MINERVA KHAN (1911-1913):** Architect (Basile Couremenos), 5 storey of classical style corner tower with sculptures of goddess Minerva on facade	Bank	Sabancı University Science and Culture Academy
14	**ŞARK KHAN (1918):** Architect (Michel Nouridjan), original 6 currently 7, classical style, ground floor and first floor masonry facade similar to Ottoman Bank building	Insurance Agency	Electrical Supply Retail
15	**ISBANK (1918):** Architect (Unknown), originally 7 currently 9 storey, national style, orientalist arched facade work on ground floor and top floor with mosaic tiles decoration	Ottoman Assurance (1918), D.Orientbank (1930)	Bank

Table 2a: Architectural Features of Selected Buildings on Voyvoda (produced from: Voyvoda Street from Ottoman Times to Today, 2000)

Figure 16. Architectural Features of the Buildings (2).

The Ottoman Bank building is one of the most important structures on the Street and has become a focal point. The building has distinctive architectural styles –the front façade on Voyvoda Street has a neoclassical or neo-Renaissance style; however, its rear façade facing the old Istanbul has traces of a neo-Orientalist style. This conscious contrast between the two facades emphasizes the East–West synthesis (Altan, 2007; Alpay, 2007). Another distinctive built element, Kamondo Stairs with its art nouveau style functions as the vertical connection between Galata and Voyvoda and it is one of the most significant features defining the street's identity. In time, the historical characters of some buildings have been changed by new additions, which do not correspond with the original identity of the street. Nevertheless, the number of reinforced concrete buildings has increased in the post-Republic period, the original silhouette of the nineteenth century is still dominant.

DISCUSSION

Cities grow, transform, and sprawl with economic, social, cultural, technical, and political dynamics. The historical background, urban context, and identical elements identify the character of any place in a city. The conservation of the place identity and changing social and economic needs of the city should be concurrently taken into consideration. Contemporary planning approaches for historical areas are based on the integration of heritage assets within its larger urban setting. The aim of planning should consider the values and identity of historical urban space in a holistic way as part of the living city. The street is one of the main determinants of the urban context, which represents the history of the city as a space where buildings form a character and series of view.

Voyvoda Street, which is a stunning and unique axis, has retained its distinctive character over centuries and generated its own urban value throughout history. The street has been produced and transformed by social, political, and economic developments, external and internal migrations, the influence of modernist architectural movements, urban reforms, Western innovations in transportation, and technical developments. The built environment of Voyvoda Street, which has significant historical value, reflects the knowledge, construction methods, architectural styles, and traditions of the nineteenth century. The essential urban identity of Voyvoda Street is the axial form and its functional role in history. The buildings on the street are the main physical elements, and together they define a whole image. Furthermore, the street is the essential link binding these buildings socially and economically, since it supports their ability to function together. In brief, the effects of various phenomena throughout history and reflections of milestones are:

- The geographical position in the city and the socio-economic effects of being a port throughout history
- Modernization in the last period of the Ottoman Empire with the adoption of Western approaches to urbanization at the beginning of the nineteenth century
- Transformation of medieval walls into urban streets connecting the whole Galata area to its surroundings
- Capitalist decisions for economic power at the end of the nineteenth century
- Construction of national identity and the financial sector role at the beginning of the twentieth century
- Development of the central business district and its abandonment at the end of the twentieth century
- The dominance of service sector and culture industries since the beginning of the twenty-first century

In the history of the street, the strongest axial character has been produced with the financial function of the banks during the nineteenth century. Later on, by the loss of original functions, the axial character has weakened until the twenty-first century. Following the rise of tourism and cultural industries in the district, the revitalization of the street has been launched during the 2000s. Still, the street is under the influence of new dynamics and is undergoing a process of reconstruction of its identity. It is important to maintain and emphasize the axial character through association with the urban dynamics of the street as a place for urban activities.

Since most of the buildings lost their original functions, following the re-use for various needs, the service and cultural industries have become dominant. For instance, one of the initial examples of the growth of cultural industries on Voyvoda Street is SALT, a public cultural institution that serves as a social gathering space and produces public value for the

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city. However, the re-use process proceeds as a building-based approach in contrast to Voyvoda Street's unity and its centuries-old axial character. So, rather than taking individual structural and functional decisions, it is necessary to evaluate the axis with a street-scale planning approach.

CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

FINANCIAL DISCLOSURE

The authors declared that this study has received no financial support.

ETHICS COMMITTEE APPROVAL

Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS

In this research, the necessary permissions were obtained from the relevant participants during the site observations.

REFERENCES

Akin, G. (2011). *20. Yüzyıl Başında İstanbul: Toplumsal ve Mekansal Farklılaşma, Osmanlı Başkentinden Küreselleşen İstanbul'a: Mimarlık ve Kent 1910-2010.* İstanbul, Osmanlı Bankası Arşiv ve Araştırma Merkezi.

Akin, N. (1998). *19. Yüzyılın İkinci Yarısında Galata ve Pera.* Literatür Yayıncılık.

Akpınar, İ. (2011). *Osmanlı Başkentinden Küreselleşen İstanbul'a: Mimarlık ve Kent 1910-2010.* Osmanlı Bankası Arşiv ve Araştırma Merkezi.

Alpay, S. (2007). Voyvoda (Bankalar) Caddesi'nin Tarihsel Gelişimi ve Hezaren Han, Master of Science Thesis, Yildiz Technical University, Institute of Science.

Altan, B. (2007). 'Arşiv Belgeleri Işığında Hezaren Han'ın Yapısal Çözümlemesi, Master of Science Thesis, Istanbul Technical University, Institute of Science.

Ashworth, G. J. & Tunbridge, J. E. (1990). *The Tourist-Historic City.* Belhaven.

Ashworth, G. J. & Larkham, P. J. (1994). *Building a New Heritage: Tourism, Culture and Identity in the New Europe*. London, Routledge.

Bandarin, F. and Van Oers, R. (2012). *The Historic Urban Landscape.* Hoboken Wiley.

Bandarin, F. and Van Oers, R. (2015). Introduction Urban Conservation and the End of Planning, In F, Bandarin, and Oers, V (Eds.). *Reconnecting the City.* Wiley, UK.

Batur, A. (1996). *Dünya Kenti İstanbul.* Yapı Kredi Yayınları.

Batur, A. (2001). Galata and Pera, A Short History: Urban Development Architecture and Today. *ARI: The Bulletin of the Istanbul Technical University,* 55(1), 1-10.

Bilgin, I. (2010). *İstanbul 1910-2010, Kent, Yapılı Çevre ve Mimarlık Sergisi Kataloğu.* İstanbul Bilgi Üniversitesi Yayınları.

Bullen, P. A., &Love, P. E. D. (2010). The rhetoric of adaptive reuse or reality of demolition: Views from the field. *Cities,* 27, 215–224.

Can, C. (1999). Tanzimat and Architecture. In N.Akın (Eds.) *7 Centuries of Ottoman Architecture: A Supra-National Heritage.* İstanbul, Yapı-Endüstri Merkezi Publications.

Carmona, M., Heath, T., Oc, T. and Tiesdell, S. (2003). The Dimensions of Urban Design. In M. Carmona et al. (Eds.) *Public Places – Urban Spaces.* Oxford, Architectural Press.

Celik, Z. (1998). *19. Yüzyılda Osmanlı Başkenti Değişen Istanbul*. Tarih Vakfı Yurt Yayınları.

Dokmeci, V., Altunbas, U., & Yazgi, B. (2007). Revitalisation of the main street of a distinguished old neighbourhood in Istanbul. *European Planning Studies,* 15(1), 153–166.

Eldem, E. (1999). *Bankalar Caddesi: Osmanlı'dan Günümüze Voyvoda Caddesi.* Osmanlı Bankası Arşiv ve Araştırma Merkezi. Tarih Vakfı.

Eldem, E. (2000). İstanbul: İmparatorluk Payitahtından Periferleşmiş bir Başkente. In E. Eldem; D. Goffman; B. Masters; translation S. Yalçın. *Doğu ve Batı kenti arasında Osmanlı Kenti: Halep, İzmir, İstanbul.* İstanbul, Tarih Vakfı Yayınları.

Eroğlu, Ö. (1992). Sur İçi Galata'sı Üzerine Bir Deneme, Istanbul Üniversitesi Sosyal Bilimler Enstitüsü Yüksek Lisans Tezi.

Eyice, S. (1996). Galata Kulesi, Türkiye Diyanet Vakfı İslam Araştırmaları Merkezi, İslam Ansiklopedisi, (13), 313-316.

García-Hernández M, De la Calle-Vaquero M, Yubero C. (2017). Cultural Heritage and Urban Tourism: Historic City Centres under Pressure. *Sustainability,* 9(8), 13-46.

Gençer, C. İ., Çokuğraş, I, (2016). Osmanlı İmparatorluğu'nda Kentsel Mekânın Düzenlenmesi: İstanbul Örneği (1820–1900). *Megaron*, 11(1), 1-14.

Gibberd, F. (1955). *Town Design.* Architectural Press.

Gospodini, A. (2004). Urban Morphology and Place Identity in European Cities: Built Heritage and Innovative Design. *Journal of Urban Design,* 9(2), 225-248.

Gutman, R. (1986). The Street Generation. In S. Anderson (Eds.). *On Streets.* MIT Press, Cambridge, Mass.

Güvenç, M., et al., (2012). Azman Sanayi Kentinden Kentsel Bölgeye. In *İstanbul 1910-2010, Kent, Yapılı Çevre ve Mimarlık Sergisi Kataloğu.* İstanbul Bilgi Üniversitesi.

Hansen, H. (2012, February 12). The Istanbul Art-Boom Bubble. The New York Times Magazine, Retrieved from URL www.nytimes.com.

Hartshorn, T.A. (1992). *Interpreting the City.* Canada, Jon Wiley and Sons.

Harvey, D. (2008). The Right to the City. *New Left Review*, 53, 23-40.

DOI: 10.15320/ICONARP.2021.148

Hegemann, W. & Peets, E. (1922). *The American Vitrivius, An Architect's Handbook of Civic Art.* Benjamin Blom.

Hosagrahar, J. (2015). Knowledge and Planning Tools. In F. Bandarin and O. Van (Eds.). *Reconnecting the City.* Wiley, UK.

Kostof, S. (1992). *The City Assembled.* Bullfinch Press.

Kuban, D. (1998). *Kent ve Mimarlık Üzerine İstanbul Yazıları.* Yem Yayınları.

Kuban, D. (2016). *Osmanlı Mimarisi.* Yem Yayınları.

Larkham, P. & Jones, A. (1993). The character of conservation areas in Great Britain. *Town Planning Review*, 64(4), 395–413.

Lowenthal, D., &Binney, D. (1981). Caring for the past: Changing attitudes. In D. Lowenthal & D. Binney (Eds.). *Our past before us: Why do we save it?*. London, Temple Smith.

Lynch, K (1960). *The Image of the City.* MIT Press.

Mehta, V. (2013). *The Street: A Quintessential Social Public Space.* Routledge. ISBN: 0415527104, 9780415527101.

Moudon, A.V. (1991). *Public Streets for Public Use*. Columbia University Press. ISBN: 0231075995, 9780231075992.

Moughtin, C. (2003). *Urban Design: Street and Square.* Architectural Press.

Norberg-Schulz, C. (1971). *Existence, Space and Architecture*. Cox and Wyman.

Norberg-Schulz, C. (1980). *Genius Loci: Towards a Phenomenology of Architecture*. Academy Editions.

Ortayli, I. (2016). *Eski Beyoğlu'ndan Çizgiler*. İnkılap Kitabevi.

Özbay, C., Candan, B. A., (2014). Sunuş, In C. Özbay and B. A. Candan *Yeni İstanbul Çalışmaları.* İstanbul, Metis Yayıncılık.

Plevoets, B., & Van Cleempoel, K. (2013). Adaptive reuse as an emerging discipline: An historic survey. In G. Carns (Eds.) *Reinventing architecture and interiors: a socio-political view on building adaptation,* London, Libri Publishers.

Powell, K. (1999). *Architecture reborn. Converting old buildings for new uses.* Rizzoli International Publications.

Rapoport, A. (1987) Pedestrian Street Use: Culture and Perception. In A. V. Moudon (Eds.) *Public Streets for Public Uses.* Portland, VNR.

Relph, E. (1976). *Place and Placelessness*. Pion.

Schumacher, T. (1986) Buildings and streets. In S. Anderson *(Eds.) On Streets (pp.132–149).* MIT Press, Cambridge, Mass.

Scott, F. (2008). *On altering architecture.* Routledge.

Smithson, A. and Smithson, P. (1967). *Urban Structuring*. Studio Vista.

Steele, F. (1981). *The Sense of Place.* Boston, CBI.

Tunbridge, J. E. & Ashworth, G. J. (1996). *Dissonant Heritage: The Management of the Past as a Resource in Conflict.* Chichester, Wiley.

Zukin, S. (2012). The social production of urban cultural heritage: Identity and ecosystem on an Amsterdam shopping Street, City. *Culture and Society*, 3, 281–291.

Resume

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Evaluation of Ecological Design Principles in Traditional Houses in Mersin

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Abstract

Purpose

Advances in technology and rapidly developing built environment lead to increased energy consumption and depletion of natural resources while harming the environment. The concept of ecological architecture emerged to generate solutions to these problems and various characteristics of traditional architecture, such as use of local and natural materials, energy saving etc. became important for contemporary ecological architecture. This paper addresses, from an ecological perspective, vernacular traditional architecture in Mersin, which has rapidly grown into a metropole from a 19th century Mediterranean port town. This study focuses on the ecological design components among traditional Mersin houses. The objective of this study is to reveal the relationships between vernacular traditional houses of Mersin and ecological architecture and to serve as a guide and reference for architects to design and construct in a way that they do not harm the natural environment and ecological balance by learning from vernacular architecture.

Design/Methodology/Approach

For the case study, 30 traditional houses located in Mersin old city centre, have been chosen to be inspected in terms of storey height, structural system, materials used for the construction, roof shape and materials, topography, selection of orientation, vegetation pattern, building form, spatial organisation, building envelope, use of renewable energy sources, sanitary installation and circulation systems. Yes and no scaled checklists were used to assess 30 traditional houses to identify the components of their ecological status and the quantitative data drawn from these checklists were used for the analyses of the urban texture.

Findings

It is observable from the analysis that traditional vernacular architecture of Mersin has various qualities that are compatible with ecological design criteria of our day.

Research Limitations/Implications

30 traditional houses which have not been restored, have been chosen in Mersin old city centre.

Originality/Value

The results presented in charts and diagrams are aimed to serve as design recommendations in today's architectural practice in the area and as an ecological pattern in sustainable development projects performed in the future.

Keywords: *Vernacular architecture, ecological design, Mersin traditional houses, ecology and architecture*

INTRODUCTION

The industrial revolution and ensuing technological developments resulted in architectural characteristics, such as proportion, scale, construction practices, materials and locality that ensure eco-friendliness, being overlooked. Certain characteristics of traditional architecture highlighting environmental soundness, use of local and natural materials, harmony with topography, energy efficiency seem to take a backseat in today's architecture. Structures emerging today are disconnected from locality, harmful to their surroundings and the environment, high-energy consumers. Ecological Architecture approach is a system of thought, which argues that buildings should not be designed solely based on functional and aesthetic concerns by questioning production techniques and design criteria used for today's structures, that is environmentally friendly, and aims to protect habitats and natural resources.

Vernacular architecture has already achieved the ecologic solutions required for living comfort; moreover, current ecological discourses in sustainable housing have already been adopted in the typology of the traditional dwellings (Kırbaş and Hızlı, 2016). The features of the traditional architecture such as environment friendliness, use of local and natural materials, respecting the topography and focusing on energy-saving seem to remain in the background in the contemporary architecture. The construction sector, including housing, comprises 30 to 40% of the world's total energy demand and approximately 44% of total material use (Li, 2006). Similarly, greenhouse gases causing global warming result mostly from the construction sector (Sayın, 2006). Therefore, ecological building design has recently gained importance. The numbers of ecological designs in the world has been increasing rapidly. In parallel to this increase, in Turkey, especially universities start several applications on this matter. In Turkey, ecological buildings that have different usage areas, different numbers of floors and different functions are being designed starting from 1980 up to our day (Gültekin and Bengü, 2011). The ecological, spatial and sociocultural sustainability of traditional settlements will be ensured by spanning the planning and design processes on ecological basis and the application of nature friendly design approaches (Erdoğan and Yıldız, 2017).

Founded as a harbour on the Mediterranean coast in early 19th century, Mersin was transformed into a metropole in early 20th century. Such rapid growth resulted in Mersin's traditional architecture being pushed aside and a multitude of rapidly produced and consumed structures. Majority of these buildings are designed and built as structures that are disconnected from locality, with high-energy consumption and with sole concern around aesthetics and revenue. This study aims to show the relationship between eco-architecture and vernacular architecture based on an analysis of the examples of traditional architecture in Mersin from an ecological point of view. It is emphasized that ecological

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data of Mersin traditional architecture may provide an insight for new eco-friendly housing ideas in the future.

ECOLOGICAL DESIGN PRINCIPLES

Human beings, a part of nature themselves, started to flex their muscles on nature and use up what the nature offered them selfishly and without restraint, having been strengthened by technological advances and mechanisation. This has disturbed the balance of the environment in which we live and caused irreversible destruction over time. However, it is the natural right of all living beings to live in a healthy environment. On the protection of environment, the article 56 of the Constitution of the Republic of Turkey stipulates that, *"Everyone has the right to live in a healthy and balanced environment. It is the duty of the State and citizens to improve the natural environment, to protect the environmental health and to prevent environmental provision"* (URL 1).

High on the global agenda, environmental pollution necessitated the emergence of a new understanding considering not only today's needs but also those of future generations over time. Concept of eco-architecture has developed as a result of this understanding. Krusche, Gabriel and Althaus (1982) sum up key points to consider in ecological designs as follows:

- Positioning buildings with a rational approach to environmental and energy-related matters, building design approaches, building form, building design organisation, organisation of spatial schemes and functions, selection of materials, sanitary system installations and designing fit-for-purpose green vegetation,
- Minimising the use of energy and scarce resources during both the construction and use of the building,
- Rational use of natural environmental systems (taking advantage of solar power, natural air conditioning and green vegetation)
- Minimising the pollution of soil and water basins that are contaminated by thermal, liquid and solid waste,
- Protecting fauna and flora potential in the region, and increasing them in number and variety,
- Placing the building with minimum damage possible to the natural environment to create a healthy residential and work environment (Tönük, 2001).

Ecological design is sustainable systems, consistent with ecological principles, which integrate human society with its natural environment for the benefit of both. In many ways, the environmental crisis is a design crisis. It is a consequence of how things are made, buildings are constructed, and landscapes are used. We have used design cleverly in the service of narrowly defined human interests but have neglected its relationship with our fellow creatures. We will all have to create new lives based on ecological design principles (Van Der Ryn and Stuart, 1996).

ICONARP – Volume 9, Issue 1 / Published: 21.06.2021

Ecological design principles comprise multi-faceted and variable components depending on the baseline situation. Although it is said that there is no definitive model for design criteria to be used to understand eco-architecture, most researchers emphasize the need to identify some criteria (Lyle, 1985). In this context, the guiding criteria in compliance with the principles of eco-architecture may possibly be grouped under two categories, namely, settlement and design criteria (Table 1).

Table 1. Ecological Design Criteria (Lyle, 1985)

Settlement Criteria	Design Criteria
Land Data	Building Form
Topography	Spatial Organisation
Selection of Orientation	Building Envelope
Vegetation Pattern	Selection of Materials
Climate Data	Use of Renewable Energy Sources
	Sanitary Installation and Circulation Systems

Settlement criteria comprise land data, topography, selection of orientation, vegetation pattern and climate data, whereas design criteria comprise building form, spatial organisation, building envelope, selection of materials, use of renewable energy sources as well as sanitary installation and circulation systems. A building's integration with environment primarily involves the consideration of some features like topography and climate. Rational use of these environmental systems which minimize negative effects on ecosystem, leads to the physical environmental components of ecological architecture (Crowther, 1992). Features such as building properties, compatibility with buildings' environment, use of material, heating and cooling systems are the factors affecting building energy consumption. From this point of view, traditional buildings are built with the surrounding material, adapting to the local climatic conditions, so they are healthy and have high sustainability. It is possible to learn how to use energy most efficiently from traditional houses (Karahan and Ergöz, 2017; Sanchez and Medrano, 2015). When the traditional architecture examples are analyzed, it is seen that the ecological approach, has been adopted in these examples in advance and balanced solutions have been reached with the environment and climate in this context. (Şen, etc., 2010; Zorlu and Faiz, 2012).

VERNACULAR ARCHITECTURE IN MERSİN

Mersin is located between 36-37 ° north altitude and 33-35 ° east longitude. Mersin portrays all typical characteristics of Mediterranean climate and meteorological conditions.

Climatic Data

Mersin has all the typical features and meteorological conditions of the Mediterranean climate. The Mediterranean climate is hot and dry in the summer, warm and rainy in the winter. The average annual temperature in Mersin is 18.7°C. The average temperature of summer months varies

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between 25-33°C. Low temperatures of up to 10°C are observed in the interior and upland skirts. In winter, the average temperature varies between 9-15 °C. Snowfall is not seen in coastal areas. However, during the winter months, varying amounts of snowfall occur in the foothills and plateaus of the Taurus Mountains. The total amount of annual precipitation is 593.7 mm. Most precipitation is in December and the least is in August. Most of the year the weather is clear and little cloudy (Ministry of Environment and Urbanization Mersin Reports, 2011-2012).

Topography

Mersin province area is located on the Western and Central Taurus Mountains. The Taurus Mountains, which fall into the provincial borders, lies between the Konya plain of Central Anatolia and the Mediterranean as a high-roofed belt in the West-East direction. Considering the overall geomorphological state of the province; wide plateau plains, Mediterranean coastal belts and wide plains and valleys around the Göksu River. The valleys stretching from south to north are inserted into the Taurus Mountains. The landforms and physical geography of the region are plains and valleys in the coastal region, plateaus and hills in the middle zone and mountainous areas in the highlands. The physical geography of the region is an important factor affecting microclimate, climate, vegetation, settlement pattern, distribution of population and economic activities.

Figure 1. Inclination status of Mersin province. (Mersin Metropolitan Municipality, 2011)

Climate

Mersin has more than 300 sunny days per year. If we group them according to the amount of sun rays Turkey receives, Mersin has the same values as Adana, Gaziantep, Diyarbakır and Şanlıurfa in the first zone district (Buldum and Külekçi). (Table 2)

Table 2. Climatic Data of Mersin Province (Source: URL2)

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
	Measurement Period (1940 - 2019)												
Mean Temperature(°C)	10,1	11,0	13,7	17,4	21,2	25,0	27,7	28,3	25,7	21,4	16,1	11,8	19,1
Highest Mean Temperature (°C)	14,5	15,4	18,1	21,6	24,9	28,1	30,7	31,5	30,0	26,6	21,5	16,4	23,3
Highest Mean Temperature (°C)	6,2	6,8	9,1	12,8	16,8	20,8	23,9	24,2	20,8	16,2	11,5	7,8	14,7
Mean Sunshine Duration (hour)	4,7	5,6	6,7	7,6	8,4	9,8	9,9	9,8	9,1	7,5	5,7	4,7	89,5
Mean Number of Rainy Days	10,6	9,2	7,6	6,7	5,1	2,2	0,9	0,8	1,7	5,0	6,6	10,4	66,8
Mean Monthly Precipitation (mm)	118,5	85,5	56,2	34,8	23,8	10,2	11,6	6,9	11,7	39,2	77,8	139,6	615,8
	Measurement Period (1940 - 2019)												
Highest Temperature (°C)	25,2	26,5	29,8	34,7	36,0	40,0	38,1	39,8	39,0	37,5	31,0	27,0	40,0
Lowest Temperature (°C)	-6,3	-6,6	-2,2	0,6	7,0	12,0	16,1	15,0	11,0	2,7	-3,3	-3,0	-6,6

Highest Daily Total Precipitation		Fastest Wind Force		Highest Snow Depth	
26.12.1968	199.5 mm	7.02.2003	123.1 km/sa	13.01.1950	2.0 cm

Mersin is one of the cities which have Turkey's highest sunshine duration. Sunshine duration is 7.4 hours per day and in the summer period; it varies between 8-10 hours. The dominant wind direction in Mersin is northwest, but this situation varies according to the months and seasons during the year. Winter and spring (except May), the dominant wind direction is north-northwest in a six-months, whereas in summer (May, June, July and August) dominant wind direction is south-southwest. Strong winds are effective in the south and southwest directions in the city center. According to 2011 data in the city center, the average wind speed is 1.51 m/s per year. MGM states the highest value of wind speed as 123 km/h measured in February. Long-term and strong winds are generally in the south-southwest direction in winter and spring. (Ministry of Environment and Urbanization Mersin EIA reports, 2011-2012)

The average pressure in Mersin varies within months. In the summer, the city is under the influence of Basra's low pressure, and it receives arid and rare precipitation. During the winter months, Mersin is usually under the influence of low pressure from the Middle Mediterranean.

TRADITIONAL SETTLEMENT IN MERSIN

Mersin's first emergence as a harbour and then as a city was influenced by changing functions and characteristics of Çukurova cities in the early 19th century (Ünlü, 2009). Enjoying uninterrupted settlement since antiquity, the city of Tarsus was one of the most important settlements of Cilicia up until early 19th century due to its close proximity to important trade and caravan routes and its location as a safe inland port (Akkaya, 2004). Mersin developed as a harbour that accelerated the transition of the region into high-capacity commercial agriculture and

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helped Çukurova to establish its identity as the most important cotton producer and exporter of the Ottoman Empire (Toksöz, 2006). As in many other harbours, cosmopolitism comprising migrants and the Levantines proved a significant feature of the urban demography in Mersin (Adıyeke and Adıyeke, 2004). Another component influencing the city's development and physical formation was the shifting relationship of transportation and product flows. Far-reaching effects of the Suez Canal on the region and Mersin were marked since the construction of the former, increasing Mersin's significance (Develi, 2001). One of the first neighbourhoods of the city cited in the archival records of the 19th century is Cami-i Şerif Neighbourhood, which still stands today (TŞS, No: 318, s.365, h.no: 625, 25 Cemazeyilevvel 1298). The urban fabric starting with the triangle of Gümrük Square, Yoğurt Market and Uray Street and forming Cami-i Şerif Neighbourhood seem to have expanded to include Frenk Neighbourhood, Kiremithane, Bahçe, Mahmudiye, Mesudiye, İhsaniye (Giritli), Osmaniye and Medrese (present day Hamidiye) Neighbourhoods due to growing population (Ünlü, 2009). Formation and development of neighbourhoods in the city were due to religious, cultural and political influences. This is one of the most important characteristics of Mersin that sets it apart from the traditional Ottoman city. Given the development of the city, particularly after 1980's, it can be said that urban development took place under pressures from rapid population growth and intense migration (Mediterranean Urban Research Centre Report,2005).

Traditional houses of Mersin bear different characteristics to the known traditional vernacular architecture in nearby cities in terms of the period in which they were built. Administrative innovations introduced by the Ottoman Empire in the 19th century and changes in people's lifestyles greatly influenced the way the architecture was shaped. The variety of domestic architecture in Mersin reflects the social and economic background of their owners. According to the plan of a house, one can determine from which region of the Empire the owner migrated to Mersin (Yenişehirlioğu, Özveren and Ünlü, 2019). The city, formed by a cosmopolitan community with its members coming from different countries and regions, was brought together as a blend of many factors including climate, economy and culture. Traditional Mersin houses, which have no separate spatial compartments such as *Harem* and *Selamlik*, usually have façades and openings directly overlooking the street. With clear-cut and right-angled plan drawings, these houses have lines running parallel to streets and façades formed with a symmetrical, simple and straight geometry. They usually have one or two floors, most of which are built with cut-stones while first floors or projections are sometimes built with *bagdadi* (timber frame and infill construction) technique. Majority of these houses built with cut-stones have gardens or exterior porches on the upper floor, overlooking the north or the east. This is how the open space ensuring airflow into the house is protected against the scorching sun and seaward winds from the south or the

west. In houses with external sofas, garden is larger than closed spaces of the house. Most of the daily life is spent in these gardens, which house the lodge and the pool. Louvered shutters made of wood are used for the ventilation of homes in traditional Mersin houses in order to prevent visual access from outside. Mersin houses have their unique, different and advanced aspects unlike the classical Ottoman housing typology. In terms of plan typology, there are many variations as *"Pike", "Interior hall", "Exterior hall"* and *"Eclectic"* (Yenişehirlioğlu, Müderrisoğlu & Alp, 1965).

Façades may differ as street walls and sidewalls. Street-facing walls are decorated with some architectural elements and ornaments. Sidewalls are built in a leaner manner. The building system is generally detached housing. Eaves were generally not used in Mersin houses. Roofs are built with wooden materials and covered with Marseille roof tiles. Entrances are categorised as ground floor entrance and upper floor entrance. Upper floor entrances of these mostly two-storey vernacular houses are built sometimes on the side facade and sometimes on and symmetrical to the street facade, which is also the ground floor entrance. Ground floor entrances directly open up to the street from the road front. Direct linkage of living spaces in the house with both the street and the inner courtyard showcases that two different concepts, namely, consistency of cohabitation and protection of house privacy run parallel (Dizdar, 2009). Located on vertical axis, windows lend a lean appearance to the façade, having been placed rhythmically and regularly on a horizontal axis. Windows allowing light into sofas or the stairwell leading to the sofa in houses with internal sofas are peculiar to Mersin vernacular. Windows are built double sash and parts of double sash windows that are above the lintel work independently from the bottom part, ensuring ventilation from the upper part. Houses have wooden louvered shutters covering windows to keep the indoors from being visible while ensuring ventilation (Yenişehirlioğlu, 2005).

Figure 2. Shutter Example (Fatih Müderrisoğlu)

Windows are made with a biplane, and the parts on the lintel above the

DOI: 10.15320/ICONARP.2021.149

two-leaf windows can work separately from the bottom to provide ventilation from the top (Figure 3-4-5-6). There are shutters made of wood covering the windows to prevent the visibility of the interior while ensuring the ventilation of the houses. Depending on the climate, other features such as wide overhangs, airlock entries, arcades or porches, atria and natural ventilation may boost the building's efficiency (Oktay, 2002). To render shutters adjustable according to the arrival of the light, the wing of the shutter consists of two separate parts and can be doubled vertically. Sometimes, in two-winged shutters, the types of shutters are made, where the lower part of the shutter opens up without folding the shutter. Shutter is mostly seen in houses with external sofas in ground floor windows (Figure 2). They are formed by frequent nailing of wooden slats. Such shutters can slide from the bottom of the window to the top.

Figure 3-4-5-6. Window Samples of Mersin Traditional Houses (Ebubekir Gündoğdu)

Mersin houses developed differently from classical Ottoman vernacular typology, with their original and distinctive aspects. Eclectic houses of European families residing in Ottoman cities due to trade relations. One of the most important reasons for the development of this style is that the architecture in the XIX. century was not realised by the Ottoman central palace and state organisations but by independent architects (Yenişehirlioğlu, 2004).

ICONARP – Volume 9, Issue 1 / Published: 21.06.2021

METHODOLOGY

This study focuses on the ecological design among traditional Mersin houses and their settlement criteria (topography, orientation and green texture) and design criteria (building form, space organization, building envelope, choice of materials, use of renewable energy sources, sanitary and circulatory systems). In this context, 30 vernacular structures that have not been renovated were selected from this area of the city centre, where 129 out of 220 registered immovable cultural assets are located and where there is still strong presence of traditional vernacular fabric, to identify ecological characteristics of Mersin traditional vernaculars. (Figure 8) For an ecological assessment of traditional vernaculars, binary checklists were prepared on yes and no scale, in line with the guiding criteria for housing design complying with the principles of ecological architecture. The selected houses were inspected in accordance with these checklists. Analytic data was produced with the figures drawn from these checklists to display the percentages of ecologic compatibility among the selection.

Research Area

Research area covers the zone surrounded by İsmet İnönü Boulevard in the south, 5113th Street in the north, the Orthodox Church in the east and Tevfik Sırrı Gür High School in the west. (Figure 7) Atatürk Park is located in the south of the area and Republic Area is in the west. The fact that the important commercial and administrative centers of the city are located within the area causes the intensity of pedestrian and vehicle traffic throughout the area. The part of the south of Istiklal Street, which developed as the administrative and commercial center of the city in the historical period, is an important administrative and commercial center of the city today. There are mostly residential buildings in the region located in the north of İstasyon Avenue. The majority of the traditional buildings in the area consist of two-storey buildings.

Figure 7. Research Area (Source: Google Earth)

DOI: 10.15320/ICONARP.2021.149

ECOLOGICAL DESIGN STRATEGIES IN MERSIN TRADITIONAL HOUSES

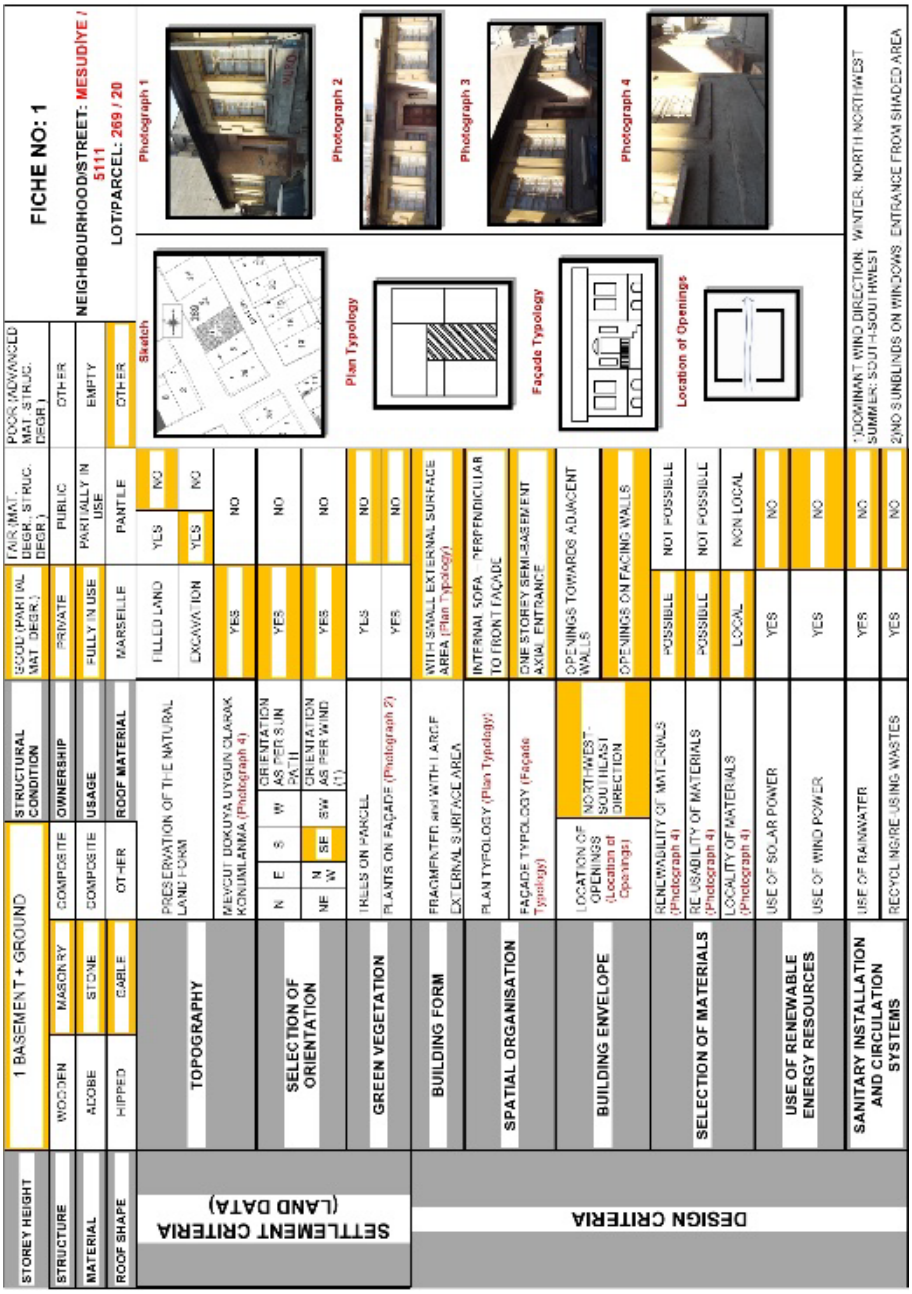
The evaluation of vernacular architecture is a mean to comprehend significant element of their environment and construction (Gunewardene 2016). It is hoped that this analysis will give architects a general understanding of the ecological value of the traditional heritage and will contribute to the search for a more sustainable method of development (Baran, Yıldırım and Yılmaz, 2011) Given that both heritage and sustainability are two crucial facts for societies, continuity of original features should be ensured in a historical site, design features should be transferred to future generations and sustainability should be supported as yet another critical objective (Kaptanoğlu and Mıhçıoğlu Bilgi, 2018). As a consequence of this opinion 30 traditional Mersin houses are evaluated from their settlement criteria and design criteria by their checklists.

Figure 8. Traditional Houses of Mersin under Study (Authors' Archive)

The guiding criteria cover the location, architectural features, structural condition, ownership status, usage status, photographs, sketch and some drawings of the structure on checklists (Table 3) Storey height, structural system, materials used for the construction, roof shape and roof materials of the structure were also studied. Settlement criteria were examined under three categories; namely: topography, selection of orientation, vegetation pattern. Design criteria were examined under six categories; namely: building form, spatial organisation, building envelope, selection of materials, use of renewable energy sources, sanitary installation and circulation systems.

ICONARP – Volume 9, Issue 1 / Published: 21.06.2021

Table 3. Ecological Assessment Checklist



Floor height of structure was defined for each structure while studying in the area. Structural systems were classified as wood, masonry construction and wood-masonry (the last will be referred to as composite construction within the text from this point on). Materials used in the construction of the structure were classified as brick, stone and brick-stone. While roof shapes were pitched roof, gable roof and other, roofing was analysed as Marseille tiles, squat tiles and other. Structural condition is evaluated as good where structures have partial material degradation; as fine where structures have material and structural degradation; as poor where structures have advanced material and structural degradation. Property status was analysed as private, public and other, and usage was analysed as totally, partly and

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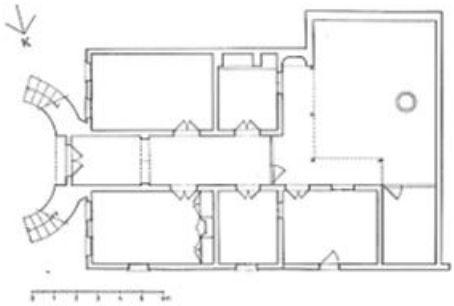
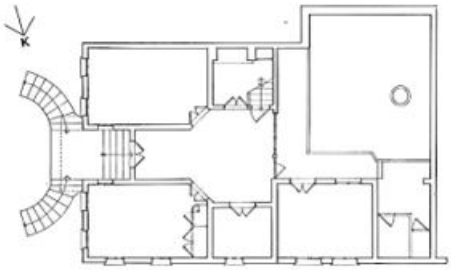
vacant house. Settlement criteria were analysed under three titles as topography, direction selection and green texture. Topography was analysed under 2 titles as the protection of the natural form of the land and proper positioning of the texture. Under the title of "Protection of the natural form of the land", it was analysed whether the landfill or excavation process was in place on the existing topography during the positioning of the building. Under the title of "Proper positioning of the texture", it was analysed whether the positioning of the building was made according to the structure of the street and terrain textures. In the selection of the direction, the orientation of the structure was analysed according to the sun and the dominant wind conditions. Under the title of "Green texture", it was analysed whether the vegetation was used or not in the parcel and facade of the building.

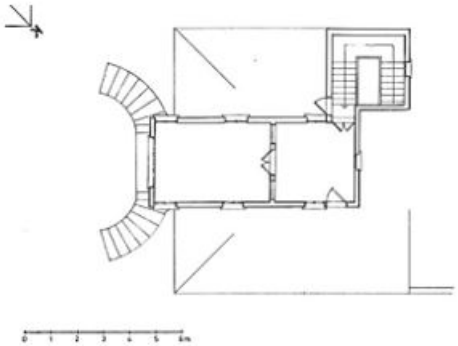


Ground Floor Plan of Traditional House



First Floor Plan of Traditional House

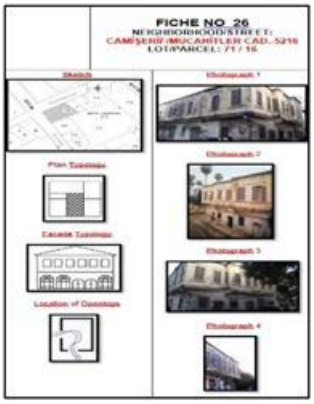
Inside Photo of Traditional House

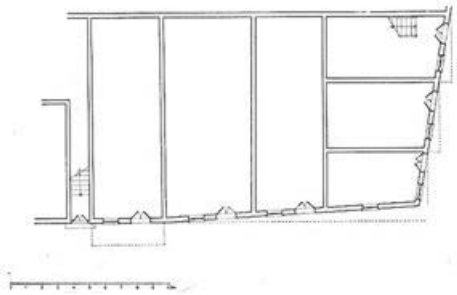


Second Floor Plan of Traditional House

Figure 9. Sample 1 Traditional House of Mersin under Study (Yenişehirlioğlu, F., Müderrisoğlu, F. S. Alp, (1965) "*Mersin Evleri" is taken as a source for plans and inside photos)*

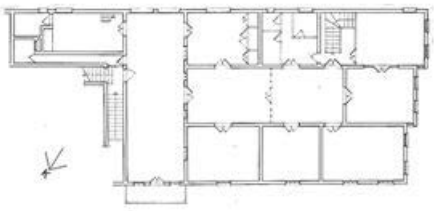
Design criteria were analysed under six titles as building form, space organization, building envelope, choice of materials, use of renewable energy sources, sanitary and circulatory systems. Building forms in ecological design and surface area are important criteria for determining the building's heat retention. Therefore, building forms were studied under two titles as fragmented and large external surface area of the building form and small external surface area of the building forms. Large external surface area of buildings form: Construction of the buildings with wider fragmented and exterior space in order to increase the possible heat loss on the surfaces in hot climates. Small external surface area of the building form: Construction of the buildings with narrower fragmented and exterior space in order to prevent the possible heat loss on the surfaces in cold climates. Location organization was studied under two titles as plan and front typology.





Ground Floor Plan of Traditional House

Photo of Traditional House



First Floor Plan of Traditional House

Figure 10. Sample 2 Traditional House of Mersin under Study (Yenişehirlioğlu, F., Müderrisoğlu, F. S. Alp, (1965) *"Mersin Evleri" is taken as a source for plans and inside photos)*

Plan typology is an important criterion in terms of heating, cooling and natural ventilation methods of structures. Location organization should be constructed so that ventilation can be made and the heat in the house can be reduced easily. It is important to heat the building in cold climates, thus spaces producing heat such as the kitchen should be constructed in the centre of the structure. Front building typology in the natural ventilation and air circulation structure is associated with the occupancy and space in front of the building. Moreover, the movements

DOI: 10.15320/ICONARP.2021.149

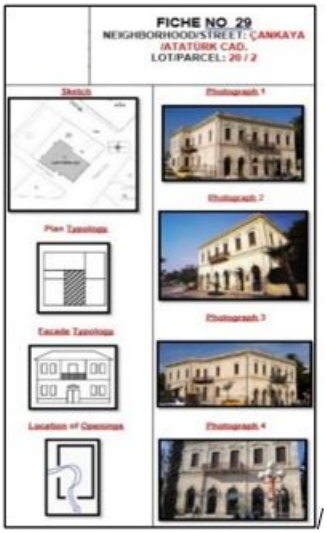
on the facade of the structure will change the surface area and thus the structure will be affected from the outside air much.

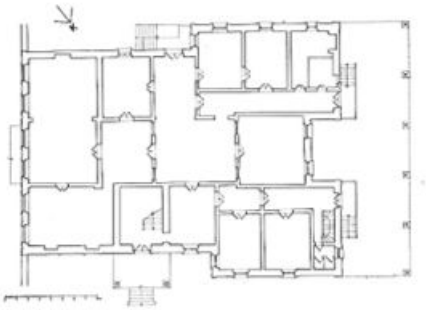
Building envelope was analysed under two titles as spaces opened to adjacent wall and spaces opened to opposite walls. The rate and location of the spaces for doors and windows opened on the building envelope determine the heat loss and gain of the building as well as the comfort conditions of the indoor area.

There are examples of different plan schemes in the residential buildings within the research area. Apart from houses with a planning scheme, there are also structures with different plan features. It is the most common type of interior plan that we encounter. The ground floors of the buildings whose upper floors are arranged as residences are frequently located in the area in the examples used as warehouses or shops. In terms of spaces opening to adjacent walls, it is important to ventilate the constructions using natural methods especially in hot and hot-humid climates. Therefore, the decision where to place a certain space in the building should be given attention to ensure the efficiency of the natural ventilation. Placing the window on the opposite side of the surface of the facade towards the air intake direction will provide high-speed close airflow. If the window is placed in the opposite direction and the direction of the wind, the airflow is provided through the interior space. Spaces opened to opposite walls: airflow rate inside the building can be provided by opening the spares for windows and doors on the opposite sides.

Material selection has been analysed under three titles as locality of material, recyclability of the material and the material reusability. In terms of the locality of the material, materials that require less energy in the production and transportation phases, damage the nature less should be used in ecological designs. In terms of recyclability of the material, materials should be chosen as the least damaging the nature during construction usage and demolishment phases, and they should be reusable after the demolishment of the building. In terms of the reusability of the material, reusable recyclable materials reduce the consumption of natural resources. The use of local material can be considered as an ecological challenge. Since local materials are abundant, reusable and recyclable, they have a low impact on the environment and cause a cash flow within the community (Karahan and Davardoust, 2020). These features should be taken into consideration in the material selection.

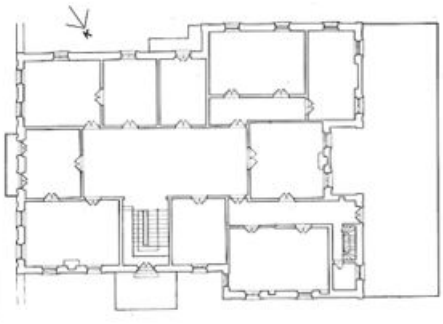
ICONARP – Volume 9, Issue 1 / Published: 21.06.2021





Ground Floor Plan of Traditional House

Inside Photo of Traditional House



First Floor Plan of Traditional House

Figure 11. Sample 3 Traditional House of Mersin under Study (Yenişehirlioğlu, F., Müderrisoğlu, F. S. Alp, (1965) *"Mersin Evleri" is taken as a source for plans and inside photos)*

The use of renewable energy sources has been analysed under two titles as benefit from solar energy and wind energy. To benefit from wind energy, air movement is required in hot-humid climate regions in terms of the ventilation of the interior. Air currents between the courtyard and the building occurring by means of natural convection in hot-dry climates are achieved by means of wind pressure in warm-humid climate regions. Plumbing and circulation systems were analysed under two titles as the use of rainwater and the recycling and reuse of waste. In terms of the ecological approach of recycling and reuse of waste, waste is provided for usage as raw materials after being processed. Therefore, the recycling or use of waste that arise during the use of the structure is quite important. In terms of the use of rainwater, collection and reuse of the rainwater is one of the precautions that can reduce the risk of the exhaustion of the water in the world.

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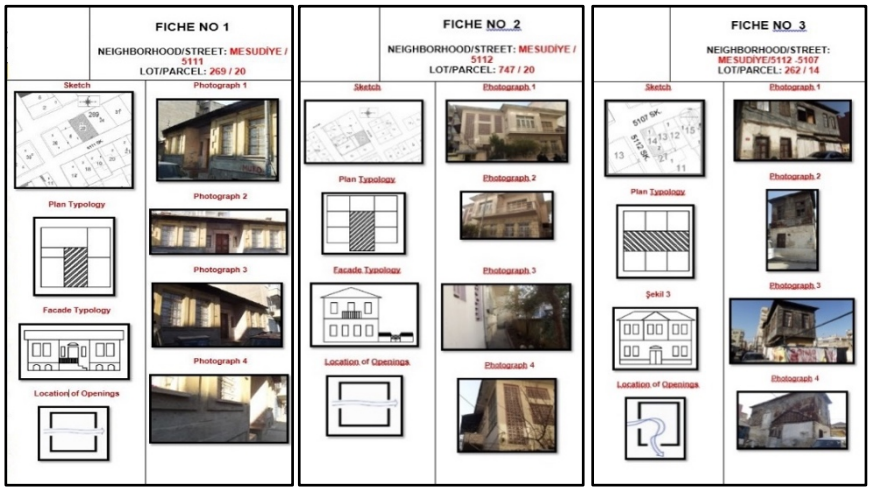
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NEIGHBORHOOD/STREET: MESUDİYE / 5111
LOT/PARCEL: 269 / 20
Sketch
Photograph 1
Photograph 2
Photograph 3
Photograph 4
Plan Typology
Facade Typology
Location of Openings
FICHE NO 2
NEIGHBORHOOD/STREET: MESUDİYE / 5112
LOT/PARCEL: 747 / 20
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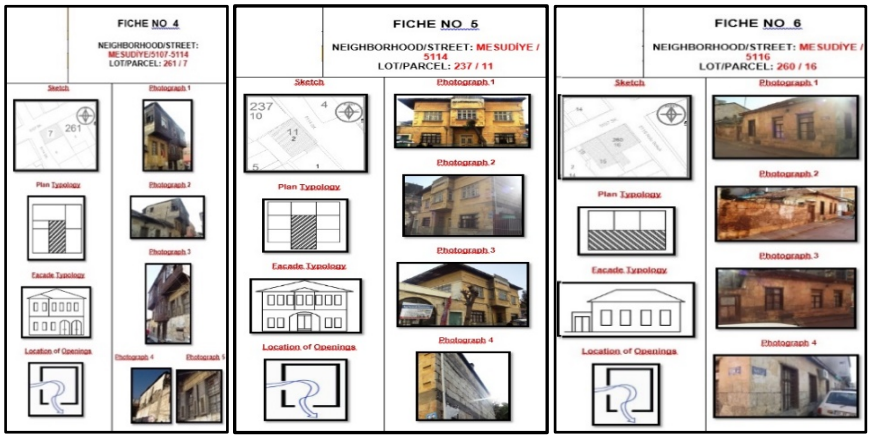
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LOT/PARCEL: 237 / 11
FICHE NO 6
NEIGHBORHOOD/STREET: MESUDİYE / 5116
LOT/PARCEL: 260 / 16


FICHE NO 7
NEIGHBORHOOD/STREET: MESUDİYE / 5116
LOT/PARCEL: 260 / 20
FICHE NO 8
NEIGHBORHOOD/STREET: MESUDİYE / 5116-5108
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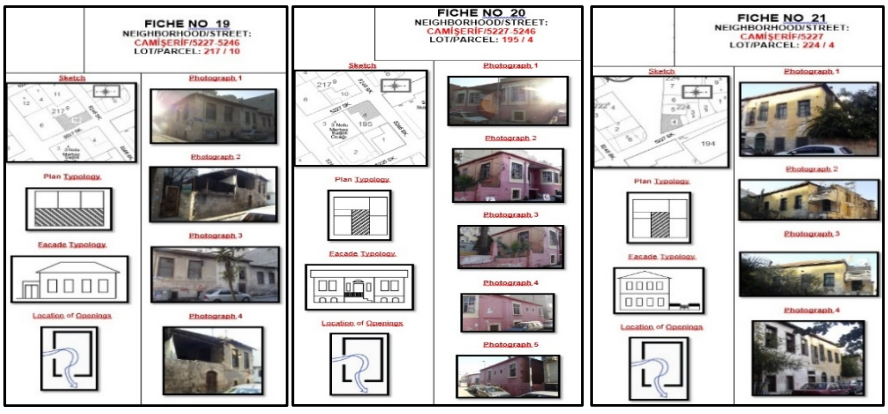

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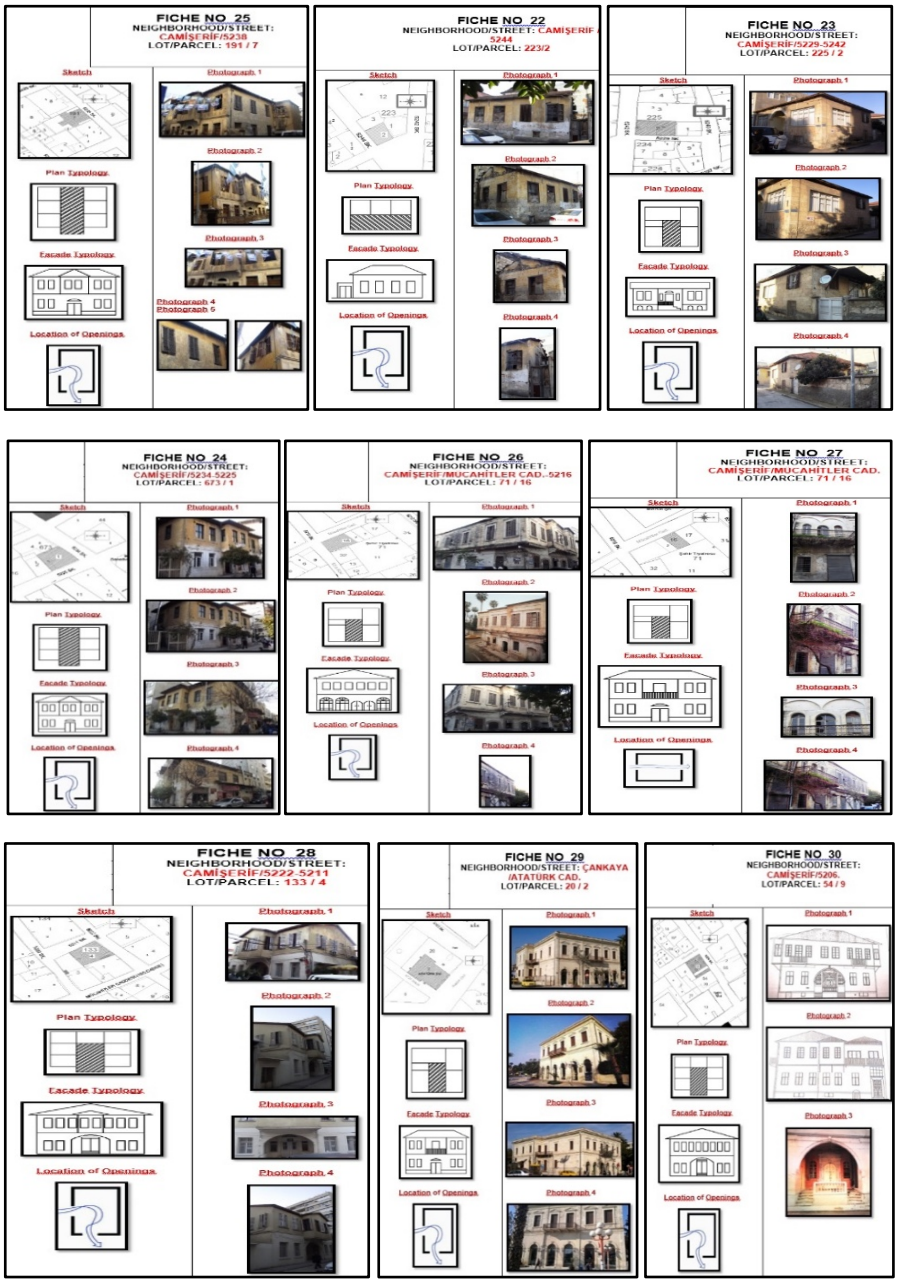

Figure 12. Sections from Fiches of 30 Traditional Houses

FINDINGS AND DISCUSSION

The following findings were made based on the 30 structures studied within the identified area (Figure 9-10-11-12).

Storey Height

Out of a total of 30 buildings under examination, 1 building comprised ground floor (3%), 5 buildings comprised 1 basement and ground floor (17%), 20 buildings comprised ground floor and 1 normal storey (67%), 4 buildings comprised 1 basement, ground floor and 1 normal storey 13% (Figure 13). In terms of thermal mass and surface to volume ratio, low-rise buildings are considered to be energy efficient and therefore environment friendly (Mazouz, Zoulala, 2013). According to these findings, traditional Mersin houses maintain their connection to the

nature and the environment because they have few storeys, which makes them ecological from this point of view.

Structural Condition

Structural condition of all 30 buildings under examination: 10 in good condition (with partial degradation of materials) (34%), 13 in fair condition (with material and structural degradation) (43%), seven in poor condition (with advanced material and structural degradation) (23%). (Figure 13) It is significant from the viewpoint of their sustainability that the buildings are in good and fair condition to a large extent.

Structural System

Examination of all 30 buildings in terms of their structural systems revealed that 19 were of masonry (63%) and 11 were of composite (37%) structure. (Figure 13) No building with wooden structure was encountered.

Ownership Status

Ownership status of all 30 buildings in the study was as follows: 28 private property (93%), 1 public property (4%), 1 other (3%). (Figure 13)

Material State

State of materials in all 30 buildings under examination was identified as follows: 17 buildings with stone (57%), 13 buildings with composite materials (43%). (Figure 13) No adobe brick materials were found in buildings under examination. The fact that the majority of materials used in the buildings were stone and composite show that they were built from natural materials. Stone structures are ecological for they help cool down inner spaces in summer while keeping them warm in winter. Composite buildings made of stone and wood are ecological structures due to both stone with its natural insulation properties and wood, which is a living and breating material. These construction materials are considered to be environmentally conscious for they comply with the life cycle criterion that evaluates materials in terms of their effect on the environment throughout their different life stages (Bovea, M.D., Pérez-Belis, V., 2012). On the other hand, using vernacular materials require less energy consumption in the production, therefore these buildings are ecological (Chandel, S. S., Sharma, V., Marwah, B. M., 2016).

State of Usage

State of usage of all 30 buildings under examination: 13 buildings were fully in use (43%), 2 buildings were partially in use (7%), and 15 buildings were vacant (50%). (Figure 13) The fact that 43% of buildings are fully and 7% are partially in use shows that the structures are

DOI: 10.15320/ICONARP.2021.149

preserved, repaired and maintained regularly, and that life inside and around the buildings is sustainable.

Shape of Roof

Roof shapes of all 30 buildings were identified as follows: 8 pitched roofs (27%), 21 gable roofs (70%), 1 other (3%). (Figure 13) Roof shapes of almost all of the buildings are either gable or pitched, which prevent excessive heating in summer and excessive cooling in winter. As roof shapes contribute to heating and cooling of buildings, they are ecological (Chandel, S. S., Sharma, V., Marwah, B. M., 2016).

Roof Materials

Out of all 30 buildings under examination, 27 had Marseille roof tiles (90%), 3 had other roof materials (10%) while no pantiles were found. (Figure 13) Having Marseille roof tiles, for being made out of clay, as roof materials is an ecological approach from recycling in terms of life cycle approach (Bovea, M.D., Pérez-Belis, V., 2012).

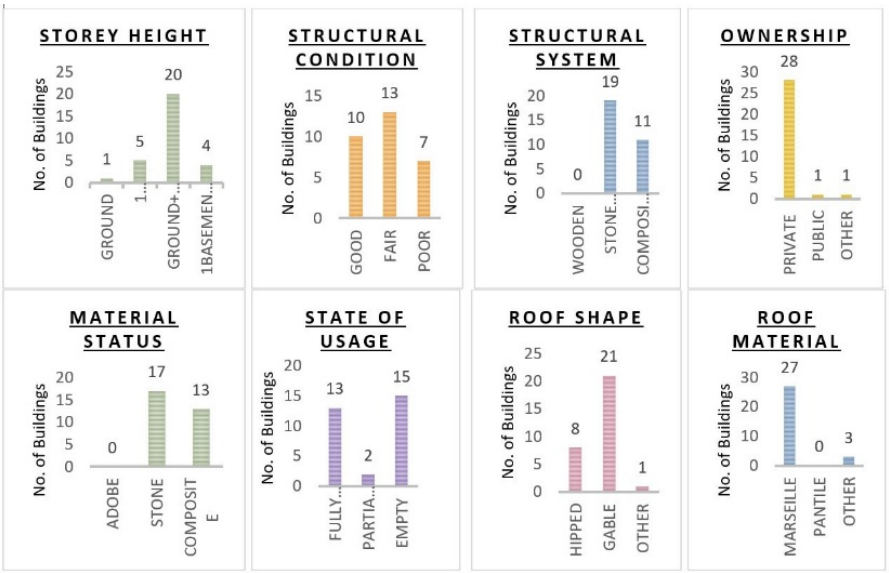

Figure 13. Findings

Assessment of the Settlement Criteria

All 30 buildings (100%) were positioned in harmony with the existing fabric. From the viewpoint of preservation of the natural land form, none of the 30 buildings (100%) were on filled land. 9 buildings required (30%) excavation works. 21 buildings did not require (70%) excavation works. (Table 5) According to present findings, vast majority of buildings are ecological because they did not intervene in the topography since "reduction of impact during use" is a significant eco-design criterion (Vallet, F., Eynard, B., 2012).

Selection of orientation

Orientations of 30 buildings were as follows: 2 towards the west (7%), 9 towards the northeast (30%), 4 towards the northwest (13%), 12

towards the southeast (40%) and 3 towards the southwest (10%). 17 buildings were oriented (57%) with respect to the sun path, 13 were not (43%) oriented with respect to sun path. 12 buildings (40%) were oriented with respect to dominant wind, 18 (60%) were not oriented with respect to the dominant wind. (Figure 14) Positioning the masses in relation to the sun path and wind directions is an ecological approach for these passive climatization techniques reduce the need for external energy inputs which results is further consumption (Chandel, S. S., Sharma, V., Marwah, B. M., 2016) According to these findings, 57% of all buildings are ecological because they are oriented with respect to the sun path, and 40% are ecological because they are oriented with respect to the dominant wind.

Vegetation pattern

Out of all 30 buildings under examination, 19 (63%) had trees in their parcels while 11 (37%) did not. 4 buildings (13%) had plants on their façades, 26 did not (87%) have any plants on their façades. (Figure 14) As per these findings, the 63% which have plants in their parcels and the 13% which have plants on their façades are ecological.

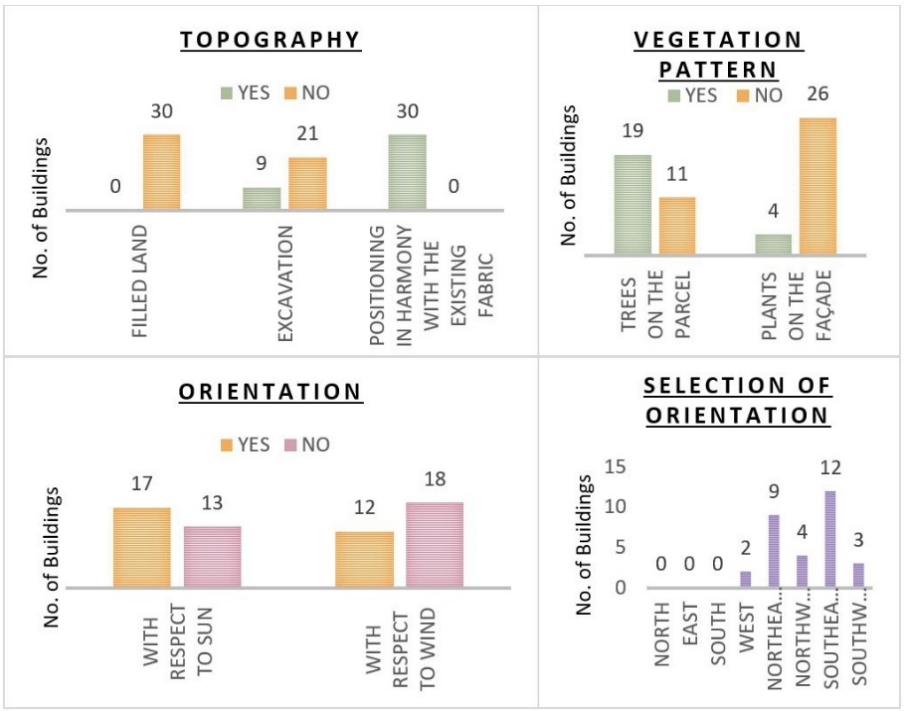

Figure 14. Findings

Assessment of the Design Criteria

Building form

Form of all 30 buildings under examination was small building form with small external surface area. Since external surface areas of buildings are small and areas exposed to elements are limited, energy losses are also at a minimum. With regard to the relationship between

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energy efficiency and building form, they are ecological (Mazouz, Zoulala, 2013).

Spatial organisation

All 30 buildings were identified in terms of spatial organisation as follows: 22 with (73%) internal sofa – sofa perpendicular to the front façade, 4 with (14%) internal sofa – sofa in parallel to the front façade, 3 with (10%) external sofa – sofa in parallel to the front façade, 1 with (3%) external sofa – sofa perpendicular to the front façade. (Table 6) Internal sofa, facilitating air circulation inside the building, is present in 87% of all buildings. With this particular characteristic, these buildings are ecological for they contribute to passive climatization (Chandel, S. S., Sharma, V., Marwah, B. M., 2016).

Table 6. Spatial Organisation

façade typology	single storey-semi-basement-axial entrance	2
	garden house- internal sofa with balcony	1
	two storey-axial entrance-with projection	5
	two storey-two entrance-with projection	3
	two storey-semi-axial inner entrance- with projection	2
	external sofa-single storey	1
	two storey- axial entrance- with balcony	4
	two storey- axial entrance- flat façade	1
	garden house-internal sofa- with closed balcony	1
	garden house-internal sofa-with balcony	2
	two storey- axial entrance-no projection	2
	two storey-two entrance-closed cihannuma (octagonal shaped gazebo)	1
	garden house-external sofa- single storey	2
	one storey- semi-basement-axial entrance	2
	two storey -semi-axial inner entrance-no projection	1

Out of all 30 buildings under examination, 15 were found to have different façade typologies.

Building envelope

Out of a total of 30 buildings under examination; 22 (73%) had spaces opening up to adjacent walls, while 8 (27%) had spaces opening up to facing walls. (Figure 15) Since they facilitate airflow inside the building and help more spaces with ventilation, buildings with spaces opening up to adjacent walls are ecological. According to present findings, 73% percent of all buildings are ecological in this respect.

Selection of materials

Out of all 30 buildings under examination, recycling was possible for the materials used in 28 (93%), while it was not possible for those used in 2 (7%). Materials of 19 buildings (63%) were re-usable; materials of 11 (37%) buildings were not re-usable. 29 buildings (97%) were constructed using local materials, while one building (3%) was constructed with non-local materials. (Figure 15) According to present findings, since 93% of all buildings was constructed using recyclable materials, they are ecological in this respect. Since 63% of all buildings was constructed using re-usable materials, they are ecological in this

ICONARP – Volume 9, Issue 1 / Published: 21.06.2021

respect. Since 97% of buildings were constructed using local materials, they are ecological in this respect for they comply with the multi-criteria and life-cycle approaches in eco-design (Bovea, M.D., Pérez-Belis, V., 2012).

Use of renewable energy sources

None of the 30 buildings under examination generated power using solar or wind power. Thus, the buildings are not ecological on this aspect. The use of solar and wind energy has been questioned actively under this article.

Sanitary installation and circulation systems

None of the 30 buildings under examination had rainwater usage or waste recycling/re-usage. Thus, the buildings are not ecological on this aspect.

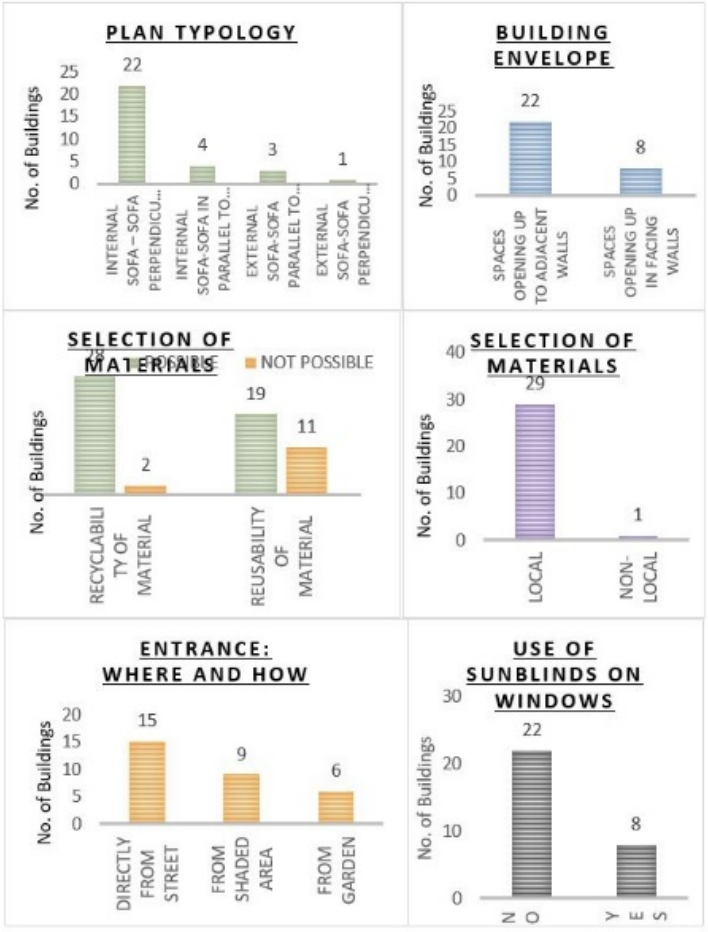

Figure 15. Findings

Use of Sunblind on Windows

8 (27%) out of a total of 30 buildings in this study have sunblind elements on their windows, 22 had (73%) none. (Figure 15) The 27% with sunblind elements are ecological from this point of view because sunblind elements control the harmful rays of sun.

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Building Entrance: Where and How

Out of all 30 buildings under examination, 15 have (50%) direct entrance from street, 9 have (30%) entrance from a shaded area, 6 have (20%) entrance from the garden. (Figure 15) When building entrances are from shaded areas or gardens, they help circulate the cool air in those areas into the building, naturally decreasing the building heat. From this point of view, the 30% with shaded area entrance and the 20% with garden entrance are ecological buildings.

CONCLUSION

The traditional Mersin houses typically have a compact texture, and they have been affected by topography, culture, economical level of dwellings as well as climatic conditions. The traditional houses, which were built in an era where today's modern construction systems were not developed, available material variety was limited, technological means were inadequate and technical staff were few and far between, environmentally friendly, in harmony with the nature and held ecological value. It can be presumed that these vernacular characteristics generate eco-design benefits because people who had lived in them but have recently moved into new buildings complained that the new buildings are not as comfortable as the traditional ones.

The city of Mersin evidently has the ecologically necessary climatic and natural richness. Spatial reflections of this natural richness are observable in the use of construction techniques, selection of materials, orientation, spatial organisation and vegetation pattern of traditional houses. Traditional Mersin houses are a group of structures that are in harmony with the existing fabric, reflect the cultural diversity of the city on spaces and have ecological value. Preservation of these buildings is important for the city for they are part of the history and memory of the city. During the case study, many of these buildings were observed to be abandoned and in a state of ruin and collapse due to lack of maintenance. Buildings that are constructed by ignoring the natural and cultural richness of Mersin and through disrespectful interventions in the nature and the environment are rapidly multiplying. Buildings should be designed with Mersin's climatic and natural richness in mind and on the basis of ecological criteria during design, application and utilisation stages. The study hopes to serve as a systematic reference to guide architects through ecologic design processes based on the ecological application in the dwelling texture of Mersin. The findings of this study qualify as a general understanding of the ecological value of the vernacular architecture and a contribution to the search for a more sustainable method of development in the future.

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Criteria for Traditional Housing and Its Adaptation to New Housing Design", and was expanded into journal article form.
Moving cases have been developed based on the master thesis entitled as "Investigating Ecological Aspects of the Traditional House Architecture in Mersin", by Ebubekir Gündoğdu under the supervision of Emel Birer in Istanbul Kultur University.

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ETHICS COMMITTEE APPROVAL
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LEGAL PUBLIC/PRIVATE PERMISSIONS
In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions, and organizations) during the survey and in-depth interviews.

REFERENCES
Adıyeke, N., Adıyeke, N. (2004). *Modernleşmenin Doğurduğu Kent: Mersin.* Sırtı Dağ, Yüzü Deniz: Mersin, Yapı Kredi Yayınları, Prep. Filiz Özdem, İstanbul, 69-89.

Akdeniz Kent Araştırmaları Merkezi Raporu, (2005), MEÜ Mimarlık Fakültesi, Mersin Kültür Envanteri: Kentsel Kültür Varlıkları Belgeleme Projesi 1, Selim Ofset.

Akkaya, Y. (2004). 19. *Yüzyıldan 20. Yüzyıla Mersin Ekonomisi, Sırtı Dağ, Yüzü Deniz: Mersin*, (Hazırlayan: Filiz Özdem), Yapı Kredi Yayınları, İstanbul, 335.

Baran, M., M. Yıldırım, and A. Yılmaz, (2011). Evaluation of Ecological Design Strategies in Traditional Houses in Diyarbakir, Turkey, *Journal of Cleaner Production* 19.6-7: 609-619.

Bovea, M.D., Pérez-Belis, V., (2012). A Taxonomy of Ecodesign Tools for Integrating Environmental Requirements into the Product Design Process, *Journal of Cleaner Production*, 20: 61-71

Buldum, B., Külekçi M., K. (2008). Mersin İlinin Güneş Enerjisi Potansiyeli ve Mevcut Durumu, VII. Ulusal Temiz Enerji Sempozyumu, İstanbul.

Chandel, S. S., Sharma, V., Marwah, B. M. (2016). Review of Energy Efficient Features in Vernacular Architecture for Improving Indoor Thermal Comfort Conditions, *Renewable and Sustainable Energy Reviews,* 65, pp. 459-477

Crowther, R.L., (1992). *Ecologic Architecture.* Butterworth, Boston.

Develi, Ş. (2001). *Dünden Bugüne Mersin, 1836-1837*, Mersin Ticaret ve Sanayi Odası Yayını, 143.

Dizdar, İ. (2009). Mübadele ve Konut Bağlamında Mersin İhsaniye Mahallesi, *TÜBA-KED,* no:7, 125.

Erdoğan, E., Yıldız, E.N. (2017). The Evaluation of Kayseri, Ağırnas

DOI: 10.15320/ICONARP.2021.149

Traditional Houses in the Frame of Ecological Design, *Eurasian Journal of Agricultural Research*, VOL1/1, 64-72.

Gunewardene, N. (2016). Documentation of Vernacular Heritage in Architectural Education: 'Measured Drawing of Devala Buildings' with Level 1 Students of Architecture, University of Moratuwa, Sri Lanka, I*nternational Journal of Environmental Studies* 73: 502–511. doi:10.1080/00207233.2016.1178983.

Gültekin, A., Bengu A, (2011). Ecological Building Design Criteria: A Case Study in Ankara. *Gazi University Journal of Science* 24.3, 605-616.

Kaptanoğlu, İ.Z., Mıhçıoğlu Bilgi, E. (2018). Conservation of Historic Sarıyer District in Istanbul: Improving Sustainability and Energy Efficiency of A Bosphorus Village, *Megaron,* v.4, 1.

Karahan, F., Davardoust, S., (2020). Evaluation of Vernacular Architecture of Uzundere District (Architectural Typology And Physical Form of Building) in Relation To Ecological Sustainable Development, *Journal of Asian Architecture and Building Engineering*, DOI: 10.1080/13467581.2020.1758108

Karahan, E. Ergöz. (2017). Sustainability of Traditional and Contemporary Housing and Household Lifestyles: Case of Osmaneli//Geleneksel ve Günümüz Konutunda Sürdürülebilirlik ve Yaşam Alışkanlıkları: Osmaneli Örneği, *Megaron* 12.3: 497.

Karaosman, S. (2008), Vernacular Design as the Teaching Tool of the Ecological Architecture, Designtrain Congress, Trailer: II, Designing Design Education, Modern Education in Architectural Design Basics, 5-7 Haziran 2008, Amsterdam, Hollanda

Kırbaş, B., Hızlı, N. (2016). Learning from Vernacular Architecture: Ecological Solutions in Traditional Erzurum Houses, *Procedia - Social and Behavioural Sciences* 216 (2016) 788 – 799.

Krusche, P., Althaus, D., Gabrıel, I., (1982). *Okologisches Baunen, Herausgegeben vom Umweltbundesamt,* Bauwerlag GmblH, Wiesbaden und Berlin, 22.

Li, Z., (2006). A New Life Cycle Impact Assessment Approach for Buildings, *Building and Environment,* Elsevier Ltd.

Lyle, J.T. (1985). *Design for Human Ecosystems*, Van Nostrand Reinhold Company, New York, 183-192.

Mazouz, S., Zarouala, M. S. (2013). The Derivaton and Re-Use of Vernacular Urban Space Concepts, *Architectural Science Review,* 42:1, pp. 3-13.

Oktay, D., (2002). Design with the Climate in Housing Environments: An Analysis in Northern Cyprus, *Building and Environment Journal*, 37 (2002) 1003–1012.

Sanchez, P.A.L., Medrano, F.J.S. (2015). *Sustainable Architecture in the Traditional Rural Environment: Moratalla*, Mileto, C., Vegas, F., Garcia, L., Cristini, V. (editörler), Vernacular Architecture: Towards a Sustainable Future, Londra, Taylor and Francis Group, s. 449-454.

Sayın, S. (2006), The Significance of the Use of Renewable Energy in our Country's Building Sector and the Opportunities of Utilizing of Solar

Energy in Buildings (Yenilenebilir Enerjinin Ülkemiz Yapı Sektöründe Kullanımının Önemi ve Yapılarda Güneş Enerjisinden Yararlanma Olanakları), M.Sc. Thesis, *Selçuk University Institute of Science and Technology*, Konya, Turkey.

Sözen, İ., Koçlar Oral, G. (2019). Evaluation of Parameters Affecting Energy Efficiency of Vernacular Mardin Houses: a case study, *Megaron,* Yıldız Technical University, Faculty of Architecture E-Journal, V14, s:1.

Şen, D.E., R.M. Sarı, S. Özgen ve A. Sağsöz, (2010). Design Principles of Nature Friendly House in the Context of Vernacular Architecture of Eastern Blacksea Region, *Research Journal of International Studies*, sayı:17.

Tönük, S. (2001). *Bina Tasarımında Ekoloji,* İstanbul, Yıldız Teknik Üniversitesi Basım Yayın Merkezi, 50.

Toksöz, M.,(2006). Bir Coğrafya, Bir Ürün, Bir Bölge: 19. Yüzyılda Çukurova, *Kebikeç İnsan Bilimleri İçin Kaynak Araştırmaları Dergisi,* Sanat Kitabevi, Ankara, issue 21, 97-110.

TŞS, No: 318, s.365, h.no: 625, 25 Cemazeyilevvel 1298 (M. 25 Nisan 1881).

Ünlü, T.S., (2009). Bir İskeleden Liman Kentine Doğu Akdeniz'in Önemli Bir Limanı Olarak On Dokuzuncu Yüzyılın İkinci Yarısında Mersin'de Mekânsal Gelişim, *Planlama Dergisi,* V:3-4, 5-26.

Van Der Ryn, S., Stuart, C., (1996). *Ecological Design,* Island Press.

Vallet, F., (2012). Using Eco-design Tools: An overview of experts' practices, *Design Studies,* 34.3, pp. 345-377

Yenişehirlioğlu, F. Müderrisoğlu, F. Alp, S. (1965). *Mersin Evleri,* T.C. Kültür Bakanlığı Yayınları, Ankara.

Yenişehirlioğlu, F.Ç (2004). *Mersin Evleri, Sırtı Dağ, Yüzü Deniz: Mersin,* Prep: Filiz Özdem, Yapı Kredi Yayınları, First Edition, İstanbul, 177-189.

Yenişehirlioğlu, F., Özveren, E., Ünlü T.S. (*Editors)* (2019), *Eastern Mediterranean Port Cities, A Study of Mersin, Turkey From Antiquity to Modernity,* ISSN 2365-757X, The Urban Book Series, Springer, pp,5.

Zorlu, T., Faiz, S., (2012). Çevre Duyarlı Mimarlık, *Mimarlık Dergisi,* Sayı: 367.

URL 1:https://www.saglik.gov.tr/TR,11472/tcanayasasi-56madde.html date accessed: 12.06.2015.
URL2:https://www.mgm.gov.tr/veridegerlendirme/il-ve-ilceler-istatistik.aspx?k=A&m=MERSIN) date accessed: 12.11.2020

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Housing Conditions and Problems of Seasonal Agricultural Workers in Eskişehir Sarıcakaya Settlement, and Suggestions

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Abstract

Purpose

The purpose of this research is to determine the seasonal agricultural workers' housing problems in Laçin Village in Eskişehir and to reveal the solvability of these problems through an architectural design studio.

Design/Methodology/Approach

The research includes two methodological sections. The first section consists of a review of the relevant literature to investigate the historical, legal, administrative and architectural issues on the housing problems of the seasonal agricultural workers. The second phase is based on a case study and a design studio process depending on that case study. The research was conducted in Laçin, to identify the characteristics of the housing problem in place. The data was obtained by observing, measuring, drawing, and photographing the existing housing. A survey was prepared and applied to the workers to gather data about the duration and the character of their stay.

Findings

It was determined that the seasonal agricultural workers in Laçin had some interrelated social, economic, and spatial problems. The duration of the stay excessing 6 months is found to be the main determinant of the life. In the light of these data, the type of housing of seasonal agricultural workers in Laçin was defined as a "new" typology. It is discovered to be neither temporary, nor permanent housing. It is found to be "semi-temporary housing". In the research-based design process, the prominent design concepts for the "semi-temporary housing" type were identified from the local parameters and the existing user preferences. They are set as convenience, flexibility, sustainability, and being low-cost.

Research Limitations/Implications

The scope of the study is the sheltering problem of seasonal agricultural workers in Turkey. Therefore, it needs specifically to be determined and identified within local parameters.

Social/Practical Implications

The study makes an existing problem visible through fieldwork and reveals that a social change can be provided by developing a physical design proposal.

Originality/Value

The fieldwork and design studios are important sources of original knowledge production. The information generated in the field belongs to the place, and this data is articulated and adopted for the nine different design solutions.

Keywords: *Flexible design, semi-temporary housing, seasonal housing, minimum space, sustainable design*

INTRODUCTION

The main subjects of this study are seasonal agricultural workers and their housing problems. The temporariness and the accommodative problems of the workers are the concepts, which can be discussed in various ways separately; yet these two concepts converge in seasonal agricultural work.

In the historical process, the "housing for workers" is firstly encountered as a typology in Egyptian civilization. The ancient city of Kahun (1991-1786 BC), near Giza, and the workers' residences in the city of Amarna are considered as the first examples of the settlements of housing for workers (1991-1786 BC). The Egyptian city of Dar-el Medina (1400 BC) takes its place exclusively in the history for being a settlement inhabited only by the artisan class (Smith, 1958). During the Roman Empire, "insula", the typology of high-rise and rental housing, was born for the first time. This type of housing serves the mobile working class of the period. The "insula" can still be seen in the city of Ostia, which connects Rome to the Mediterranean. The emergence of the working class as a social layer is after the Industrial Revolution. As modern immigrants, this new class also brought the housing problem to the city and changed the appearance of the cities. Between the beginning of the 19th century and early 20th century, the main topic of architectural history had almost become the history of workers' houses (Mumford, 1961; Benevolo, 1993). Tents, a type of shelter in traditional nomadic communities, resolved the temporariness of the shelter. Today, temporary housing comprises various subject groups. These groups may be voluntarily or compulsorily nomadic subjects. The mandatory nomadism in cities includes those who lose their homes after a disaster, the homeless and refugees; while the voluntary nomadic people can be defined as the "urban nomad" demanding the freedom of movement and the right to use the city's public spaces. These groups are groups that have temporarily left leave their dwellings or houses temporarily. However, it is essential that the definition of temporariness should be re-done when it comes to seasonal agricultural workers. Seasonal agricultural workers are employed in agriculture in multiple workplaces during various periods. There are also seasonal agricultural workers who live regularly in the same farming area for six months or more. Nearly all of the workers in the Laçin quarter of Saricakaya District of Eskişehir are working in the same area for more than six months on a regular basis. Therefore, it would not be proper to call their stay as temporary accommodation. In this study, it is proposed to redefine the lifestyles and housing types of the seasonal workers, who regularly spend the same period and half of the year outside their local housing. This way of life should be defined as "semi-temporary" or "semi-permanent" way of life, while the type of housing of this way of life should be defined as "semi-temporary housing". The problem can be studied after this conceptual separation.

"Semi-temporary housing" corresponds to a type of nomadism called "trans-humanism" in the Mediterranean climate and associates with the

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act of migrating to the summer plateau in the Black Sea region. In these migration movements based on animal husbandry, we see a tent or Highland House as a shelter typology. Mediterranean semi-migrants are in a constant migration movement to find suitable pastures and live in temporary, quickly installed, portable housing tents. Although the Black Sea Highland migration and the Mediterranean Highland migration are not economically based entirely on livestock, the types of the shelter of migrants are permanent shelters. However, seasonal agricultural workers differ from other migrants in terms of working hours, and these workers work under the patronage of an employer within a certain working time. Although the housing units are tents that are structures of temporariness, the six-months accommodation makes reference starts to evoke concepts about permanence. For this reason, although the settlements of seasonal agricultural workers are in the "semi-temporary" settlement feature as described above, workers whose settlement is long-term, together with their families, are trying to live in the venues of temporariness.

In this study, the problems related to seasonal agricultural workers and the place in Laçin mentioned above were treated as a research and design problem by being considered as a form of “semi-temporary housing”.

General information on seasonal agricultural workers from national and international sources is given to describe the conceptual framework. The local information is discussed through the field research and design studio productions. In the light of this information, the topicality, validity, and research potentials of the discussion are revealed.

LITERATURE REVIEW

International Studies on Seasonal Agricultural Workers

Legal measures on the working and living conditions of seasonal agricultural workers, a topic that has been debated in America since half of the 20th century, have been brought up at various periods. Immigration rights for agricultural labourers from different countries have also been discussed at the same time. The Farm Labour Contractor Registration Act of 1963 and the Migrant and Seasonal Agricultural Worker Protection Act (MSPA) of 1983 are the most important of these (Culp & Umbarger, 2004).

Similar regulations have been introduced in New Zealand since 2007, and the Recognised Seasonal Employer (RSE) program has been successful. The program has been an example for countries such as Australia, both in terms of improving the legal and physical conditions of seasonal agricultural workers and in terms of increasing agricultural production (Maclellan, 2008).

However, the issue is not just about bringing about legal arrangements; it is also about implementing the applications. Many laws enacted in Europe and the United States are primarily focused on job security and social rights. The measures concerning the living and housing conditions of the employees are generally left to the preferences of the employer. In

agricultural production, where economic competition is intense and wages are low, employers' thoughts about housing employees may remain secondary. An example of this is the agricultural breakthrough that led to the economic development of California through the process of workers labouring in heavy and savage conditions (Mitchell, 1996; Gertel&Sippel, 2014). Another issue that needs to be underlined is the seasonal agricultural labour and its association with the migration phenomenon.

One of the countries where seasonal agricultural labour is experienced intensively is India. Every year, an increasing number of women, men, and children make migrations migrate within India for agricultural labour to make their living (Rogarly, 1998).

In the face of this global problem, have there been efforts made to accommodate seasonal agricultural workers?

According to a study in Minnesota, 20,000 workers migrate to work in agriculture each year and are subject to temporary housing conditions. At this point, the Migrant and Seasonal Agricultural Worker Protection Act of 1983 provides the legal framework for housing. The necessary funds for the establishment of housing conditions are provided by this law. The Minnesota case includes field research and survey assessment, as in this study, in terms of methods for determining housing conditions. The survey asked participants about their origins, the length of time they stayed in Minnesota for agricultural labour, the number of children in the family (Ziebart, 2006).

A field study and a questionnaire were primarily conducted similarly to the study on sheltering seasonal agricultural workers in Virginia, too. In the current situation, workers often talk about the lack of electricity and water infrastructure and stress that structural elements pose problems (Koebel&Daniels, 1997). Another important study concentrates on the housing problems of the seasonal agricultural workers and the housing characteristics of farmworker families in North Carolina (Thomas, 2006). This research compares the family structures, duration of the stay and the housing conditions by utilizing surveys and interviews and describes the existing situation of housing conditions. Recently, North Carolina is studied for its migrant workers with a particular emphasis on their housing problems as well. In their research Vallejos et al. (2011) applied surveys in between 2007 and 2008 on random families showing the common substandard conditions in migrant housing. According to the study, all camps had at least one exterior housing problem; 93% had at least one interior problem. Housing conditions worsen across the agricultural season (Vallejos et al, 2011).

It is seen that there are many studies that discuss the housing problem of the seasonal workers legally, as well as socially and architecturally. However, there is a common point for all these studies, that there are no visual, spatial or architectural determination for the existing settlements. In a research to understand the housing conditions and the problems of the seasonal workers and then to suggest new ideas for their living, it is a

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very crucial point to define and present the existing patterns visually. Therefore, even though there are many similarities in methodological manner and in gathering data and analysing them; this paper differs in presenting the visual documentation and the architectural drawings of the existing housing patterns. This gives us opportunities to read either the cultural and daily life tendencies related to the spatial preferences of the users. Furthermore, in this article, unlike other studies, after the existing situation is analysed, a response is developed through a design proposal. These spatial solutions, and design proposals are shaped contextually by data obtained from the field.

Definition and General Problems of Seasonal Agricultural Labour in Turkey

The problem of "Seasonal Agricultural Worker" is a social phenomenon that has increased in recent years and is waiting for a solution in Turkey. This phenomenon has been the subject of various researches on a global scale and in our country. According to data from the Ministry of Labour and Social Security, it is estimated that seasonal mobile agricultural workers, around 300,000, cover a population of at least one million, with de facto informants and children (MIGA, 2012). According to TUIK data of March 2018, 17.7% of those employed in Turkey work in the agricultural sector. However, this data does not reflect the exact number due to the fact that temporarily employed seasonal agricultural workers are not registered, making seasonal agricultural workers invisible. Despite the recognition of its global presence, it has been described as a problem in our country on a local scale, but operational improvements have remained in small number. This remains as an unresolved problem between the worker and the employer. TUIK describes seasonal agricultural workers among "Those Who Are Not Included in the Workforce" in the "General Description of Household Labour Research". In other words, they can be defined as unemployed. who are identified. The descriptions of employees who are not involved in the workforce are as follows.

"Those who are not involved in the workforce: The working population who are not unemployed or who are in non-institutional employment. Those who are not included in the workforce are divided into the following groups.

1. Those who are not looking for work but are ready to work: People who do not seek a job for a variety of reasons, but who indicate that they are ready to start work within 2 weeks. They are covered in two sub-titles:

Those who have no hope of finding a job: They are those who are not looking for a job before or who do not believe that they can find a job that is suitable for their own qualifications, but who are ready to take up a job.

Other: They are who do not seek a job for reasons such as being seasonal worker, being a housewife, being a student, having an income, retirement, and being unable to work, but who state that they are ready to start work.

2. Seasonal workers: These are the people who are not looking for a job and are not ready to start work in any permanent job due to their seasonal work."

Selek and Bulut (2013) state that the definition of seasonal agricultural workers can be made only after defining the words seasonal and agricultural workers separately. Here we should understand that the "seasonal" means the temporary period of time of the year, which is separated according to a certain quality, not in the known sense. In the agricultural context, the word seasonal defines a range that lasts from March to early October, covering pre-harvest and harvest season. If the concepts of seasonal workplaces and seasonal work and seasonal workers are examined, workplaces that operate only in one period of the year and stop their activities at other times can be defined as "seasonal workplaces" (Taşkent, 2010). The characteristic that distinguishes the seasonal agricultural worker from the agricultural worker is that they move to the seasonal workplace or workplaces by migrating from where they live in the defined time frame. In response to the question of whether seasonal agricultural labour is temporary work, Okur (2008) answers it by describing temporality as follows: "although it means a work that is repeated every year in a workplace; a temporary work is not regularly repeated every year in a workplace, it is a work that is applied when needed, sometimes ending in a few days, sometimes ending after continuing for months". In this case, the seasonal agricultural worker is an agricultural worker who works in a seasonal workplace (only 1 or 2 years in this workplace) in a semi-regular period of time, which is not temporary but may not be permanent. Seasonal work can be long or short, depending on the natural conditions. According to Şakar (2010); it should be accepted that a period in seasonal work can be a maximum of six months. So if a work takes 9 or 10 months a year, there can be no mention of seasonal work or workers. In such a case, either the contract has a specific duration or there is intermittent work.

Seasonal workers are the employees who live half of the year by working and sheltering as temporary or both temporary and itinerant. The most basic feature distinguishing from the other employee definition is that they do not have formal visibility. They have houses in a fixed location but they do not use them for half of the year. In the other half of the year, as well as those who reside like travellers, there may be employees working only in a particular seasonal workplace. Common characteristics of employees in a particular location or multi-seasonal workplaces are that their housing is provided by temporary accommodation units. The characteristics of mobility and semi-impermanence cause them to be out of economical registrations. According to Çınar and Lordoğlu (2011), temporary agricultural labour is among the main elements of an informal economy. Here, seasonal job descriptions should also be considered with the phenomenon of migration. Migration in seasonal agricultural labour occurs as a mechanism that allows the space organization to adapt to the demands of the system by redistributing the labour force in a way that

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makes production in space more effective (Tekeli, 1998). Based on this definition, seasonal labour migration in rural areas can also be considered as a result of re-distributing the labour force and meeting the labour demand that occurs in a period in agriculture (Çınar, 2014).

In terms of seasonal agricultural work, it is stated in the clause (b) of the 4th article of the Labour Law dated 2003 and numbered 4857 that the Labour Law will not be applied in the workplaces or enterprises where less than 50 workers are employed (including 50). Therefore, workplaces employing 51 or more agricultural workers are covered by the Labour Code. Workers in agricultural establishments employing 50 or fewer workers are subject to the Code of Obligations (Selek&Bulut,2013).

Studies on Seasonal Agricultural Workers in Turkey

There are few civil initiatives on this issue. One of the working groups operating in Turkey is MIGA, abbreviated from the Seasonal Worker Migration Communication Network. Istanbul Bilgi University Migration Studies Application and Research Centre has made an attempt to address the various dimensions of the 'seasonal migrant agricultural workers' phenomenon by organizing a network of relevant parties to participate and to develop policy proposals by evaluating the long-standing application of seasonal agricultural labour and the existence of multidimensional social and economic problems arising from it.

It was enacted as a project called METIP through a circular issued by the prime minister's office for seasonal agricultural workers in 2010. METIP financed by the national budget is a project implemented by the Ministry of Labour and Social Security through local governorships in the provinces where seasonal agricultural workers are most concentrated to improve the working and social lives of seasonal agricultural workers. The project provides financing for seasonal agricultural workers in various areas such as training, health, transportation, housing, infrastructure, and social environment-related activities throughout the province. The METIP project is fully funded by the national budget.

The research carried out by the Development Workshop in 2012, within the framework of the concept of "child poverty", aimed that seasonal agricultural workers working in Ordu, Yozgat, Şanlıurfa, and Adana-Mersin had access to educational opportunities for their children aged 6-12. The study discussed not only the educational problems of children but also the sheltering conditions of seasonal agricultural workers.

Another research project carried out by the Development Workshop includes the model action plan for children working in seasonal agricultural work in Çukurova. In this study conducted in 2013, the 6-14 age group was designated as a focus group and the working and educational relationships were determined according to the crop pattern in which these children produced defined as agricultural workers.

UNFPA (United Nations Population Fund) is a UN agency that works to make a world where every birth is safe and every young person's potential is evaluated. The agency started its activities in 1969 and also

started working with Turkey in 1971. For more than forty years, UNFPA in Turkey has been supporting studies on seasonal agricultural workers.

Major Problems of Seasonal Agricultural Workers

The main issues of seasonal migrant agricultural workers can be summarized as transportation, housing, nutrition, hygiene (clean water and toilet), working conditions (working 12-13 hours a day), wages, job security, lack of Health and Social Security, education of children, ethnic discrimination and exclusion (MIGA, 2012).

Seasonal agricultural workers are treated around the world as a group of with inappropriate living conditions and housing conditions, malnourished nutrition, accidents and injuries, reproductive health problems, pesticide effect, excessive heat and cold, premature deaths and diseases due to inability to access service, exposed to the worst conditions of working life and living all aspects of social exclusion. Until recent years, decision-makers, public and non-governmental organizations, as well as, scientists and research institutions have defined them as "unseen and inaudible" (UNFPA 2011).

In a research by UNFPA completed in 2011 and published in 2012, which is conducted in Şanlıurfa and Adıyaman provincial centres, where the majority of the population is seasonal agricultural workers, they reported long and tiring working conditions, lack of bathroom and toilet, problems in accessing health care and clean water. When the families were asked what they did while they were not working in the field, they often replied, "talking to each other."

In the "Report of the Parliamentary Research Commission established to determine the measures to be taken by investigating the problems of Seasonal Agricultural Workers" published in March 2015, the titles of the problems of seasonal agricultural workers are listed as follows:

1. Transportation Issues,
2. Housing Issues,
3. Health Issues,
4. Occupational Health and safety issues,
5. Educational Problems (Especially Educational Problems of Child Workers of Educational Age),
6. Social Security Issues,
7. Problems of wage and Labour Relations,
8. Problems of Intermediary Relationships,
9. Problems associated with the social environment, problems of Seasonal Agricultural Women Workers,
10. Child Labour Issues,
11. The problem of Foreign Workers in Seasonal Agricultural Jobs,
12. Problems related to organization and use of political rights

The titles listed above clearly show that seasonal agricultural labour is a problematic phenomenon.

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Suggestions on Improvement

In the revised European Social Charter adopted in 1996, some rights that can be adapted to the lives of seasonal agricultural workers can be listed as follows:

Fair working conditions, safe and healthy working conditions, right to protection of children and young people, right to benefit from social welfare services, right to protection against social exclusion and poverty, right to protection in cases where the employment contract ends, right to protection and assistance of working migrants and their families (Steel, 2005).

The Official Gazette of 19 April 2017 also published a circular of Seasonal Agricultural Workers by the Prime Ministry. This circular contains proposals for improvement through 36 articles. The parts of these articles related to the terms of the settlement are as follows:

"The following works will be carried out with the cooperation of related institutions and organizations to resolve the problems of our citizens and their families who went to other provinces to work as seasonal agricultural workers."

1. In places where seasonal agricultural workers work extensively, the governorates should establish temporary settlements with a building of sufficient size with a reinforced concrete or steel frame, with electricity, water, and sewage substructure and superstructure, which have common use areas where workers can meet their basic needs and their educational and social activities.
2. Temporary residential areas will be chosen from among the public purse immovable properties that will not be adversely affected by natural events such as floods and waters, where road and infrastructure services can be provided easily, suitable for health conditions, at a sufficient distance to dangerous and forbidden places, capable of supplying the minimum needs of workers and suitable for the number of the workers. In this context, the immovable property requested and deemed appropriate by the Ministry of Finance shall be allocated for use for the stated purposes.
3. The subscription and usage fees for providing water and electricity services to temporary settlements will be paid by the appropriations transferred by the Ministry of Labour and Social Security to the budgets of the investment monitoring and coordination presidencies and special provincial administrations.
4. Disposal of wastes by disinfecting temporary settlement areas against all kinds of pests at regular intervals, providing clean drinking and utility water, shall be carried out by the relevant municipalities within the boundaries of the municipality or in the adjacent areas, and by the special provincial administrations outside the boundaries of the municipality; In the temporary settlement areas, no expenditure will be allowed by the governorates for any temporary or permanent structure (tent, prefabricated, building, etc.) other than those specified in the first article. Transportation infrastructure will not be established except for

the purpose of ensuring the connection between temporary residential areas and the roads.

The situation in 2017 is that steps are being taken for improvement. Although there are promising measures in this circular, supervision is still a major problem.

The concept of seasonal agricultural work, which is tried to be defined with the general expressions above, is actually visible by the state but remains weak in practice, which forms the basis of the encountered problems.

In the next chapter, the design process is described within the scope of the design studio experienced with the students of Anadolu University, Department of Architecture, at the 2017-2018 Fall Period, in Eskişehir Province, Sarıcakaya district, Laçin Village. During that semester, alternative solutions are presented for the housing conditions of seasonal workers who migrated from their permanent residence for asparagus agriculture. Designs proposals involving various approaches for the housing of workers improved by the fieldwork, in which problems specific to Laçin were identified.

CASE STUDY

Design Brief

In the fall semester of 2017-2018, students were asked to develop housing proposals for seasonal agricultural workers within the course of Architectural Design Studio V.

Design concepts

temporariness x permanence
portability x location dependent
placeless x place-dependent
without infrastructure x a new infrastructure
self-made x or ....

The purpose of the studio is to produce designs for the construction of "temporary", "mobile" or "portable" shelters for agricultural workers who come to the place temporarily from other provinces to work in agricultural areas and have to live with limited facilities in tents during the working period between March and October.

Requirements of the design:

- Agricultural workers should have the appropriate living standards during the working period.
- Alternative and renewable energy technologies should be provided on the settlement area, thus achieving sustainable resource strategy.
- They should adapt to the natural environment near the residential area.
- Different shelter models should be examined.

It should be temporary
It should be mobile,
It should be "Portable" for users,
It can be "built" by the users
The construction processes in which these types are treated as complex should be tried,
It should be addressed the criteria as much as endurance and affordability.

Environmental planning and designs of new accommodation units on the new residential area should be made.

Figure 1. Poster, Brief, and Content of the Architectural Design Studio V

There is a particular group of workers who can be described as voluntary or compulsory nomadic subjects who often left their established order for economic reasons and who are in a position to make temporary housing in different geographies for periods determined by the cultivated plant season and climate. Seasonal workers farming asparagus in Laçin, Sarıcakaya District of Eskişehir, are also among these communities. However, due to the experience required by the production of asparagus annually and because the climate is favourable for periods of more than six months, a housing problem that cannot be called “temporary” has arisen. Therefore, the area –Laçin - that is the case study of the architectural design studio has created a basis for the interpretation of

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concepts such as temporariness-permanence, portability-dependence on place, placelessness-belonging to place, contributing to the production of original and diverse design knowledge. The poster and content of the studio are in Figure 1.

Fieldwork

The region chosen to identify the housing problems of seasonal agricultural workers is located in Eskişehir province, Sarıcakaya district. In the study, seasonal workers who emigrated from the areas where they lived for asparagus agriculture to the village of Laçin, were examined.

Sarıcakaya district is located in the Central Sakarya Valley, 51 km north of Eskisehir. It is located in the south of Bolu, southwest of Ankara, west of Alpu district, northwest and north of Eskişehir Central District, east of Mihalgazi district, south and southeast of Bilecik province. Thanks to the favorable climate of the valley, which is in the view of natural greenhouses, all kinds of vegetables and fruits can be produced in the district (Altınsapan and Parla, 2004).

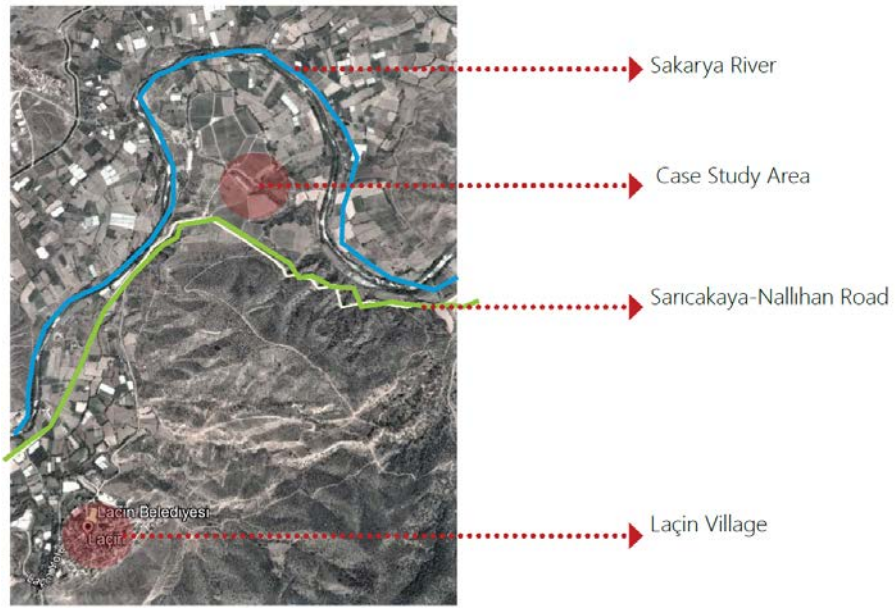

Figure 2. Location of Case Study Area in the Aerial Map

Sakarya River passes through the district. Sakarya River, which returns to the west after Sarıyar Dam, passes through the territory of Sarıcakaya between narrow and deep Bosporus (Albek, 1991). Sarıcakaya, located at an altitude of 220 meters above sea level, has microclimate conditioning. Because the area is surrounded by high mountains, the surrounding terrestrial climate conditions do not reach the inland areas, and there is Mediterranean climate characteristic (Anonymous, 2015). This situation also positively affects Sarıcakaya, whose climate, water resources, and soil are suitable for agriculture, making it very efficient in terms of agricultural production. Therefore, the district is witnessing the migration of agricultural labour intensively in a seasonal basis. (Figure 2).

Social Structure of the Workers

Sixteen families were identified in the area for seasonal farming purposes. Of these 16 families, 10 were surveyed. The number of adults in the shelter, education status of adults, number of children, age of children, school attendance status of them, the provinces from which they came were inferred from the information gathered in the survey. According to this, 5 of the 16 families were from Diyarbakir, 3 from Adana, and 8 from Urfa (Figure 3).

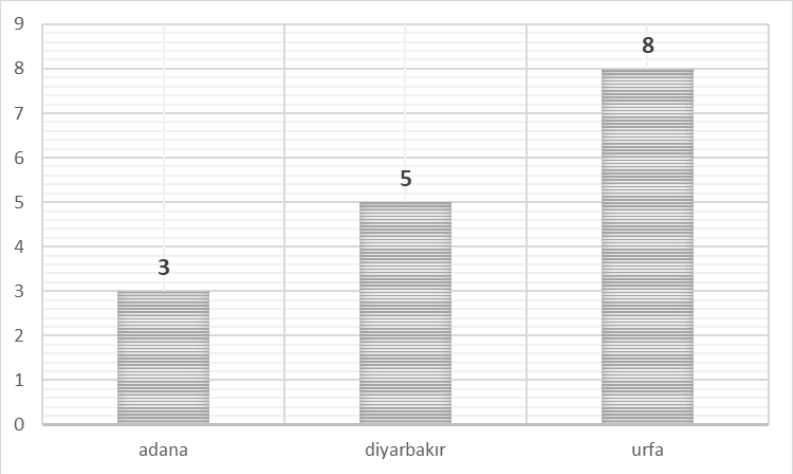

Figure 3. Origins of the Families

Information about 12 families was obtained from 10 families. Accordingly, a total of 83 individuals, 53 of them children, were found in 12 shelters (Figure 4). As a result, according to information obtained from 12 families, 63.9% of those living in tents in the area are children, and the rest is adult.

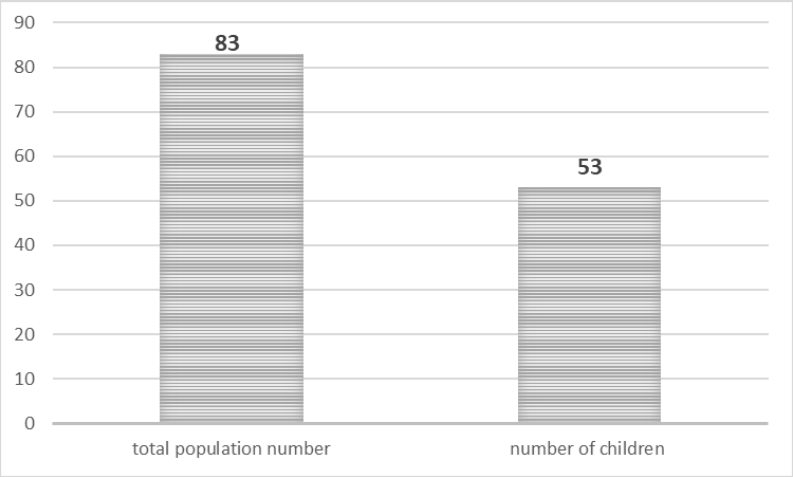

Figure 4. Number of Adults and Children

The high number of children is intriguing about child age distribution and continuity to school. According to the questions asked in this direction, 45 of the 53 children were of school age; only 20 of these 45 children

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attend school; The other 25 were found to be working in the field, not going to school (Figure 5).

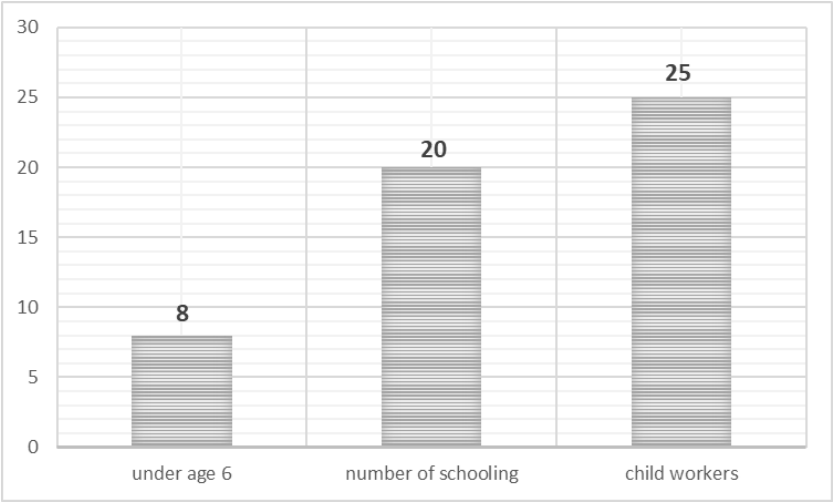

Figure 5. The Distribution of Age of Children and School Attendance

Another information is about the educational status of the father and mother of the family. Accordingly, 20% of the men in families are illiterate; 40% of them know reading and writing but have no diploma; 30% finished primary school; the remaining 10% were found to be secondary school graduates. These rates change for spouses towards only the capability of reading and writing. It was determined that 80% of spouses do not read.

Another point observed in the field is that among the total of sixteen families, a family from Urfa, has three wives and fifteen individuals, including eleven children in the family. Other than that, polygamy was not observed in any tent. In addition, 30% of those living in tents are in the form of a large family; the remaining 70% were marked to live as a core family.

The Conditions for Housing in the Field

Seasonal agricultural workers work in asparagus agriculture in Laçin. The workers' shelter area is located at the entrance of the farm fields. There are a total of sixteen shelters. There are two separate elevations in the residential area with a height difference of about 3m. The upper level is where seasonal agricultural workers' housing units are dense. The term housing unit was used in the study. This is because the spaces required for a housing take place in different tents. One family was identified to have one housing unit. The housing unit was composed of units such as a shelter tent, cooking tent, warehouse, bathroom, and toilet tent. These settlements are not temporary. The majority are the working families who come and settle every six months and spend six months of their lives working here again every year. Only five or six families are one-time workers in a year. Other families regularly come to the working area. All housing units have electrical wiring. The water is stored in bins outside the housing units. There is no sewage infrastructure. Electric

power is provided by solar collectors. There are two families living in the lower level, one with three wives, and the housing areas are separated and privatized. Fourteen families live in the upper level. (Figure 6)

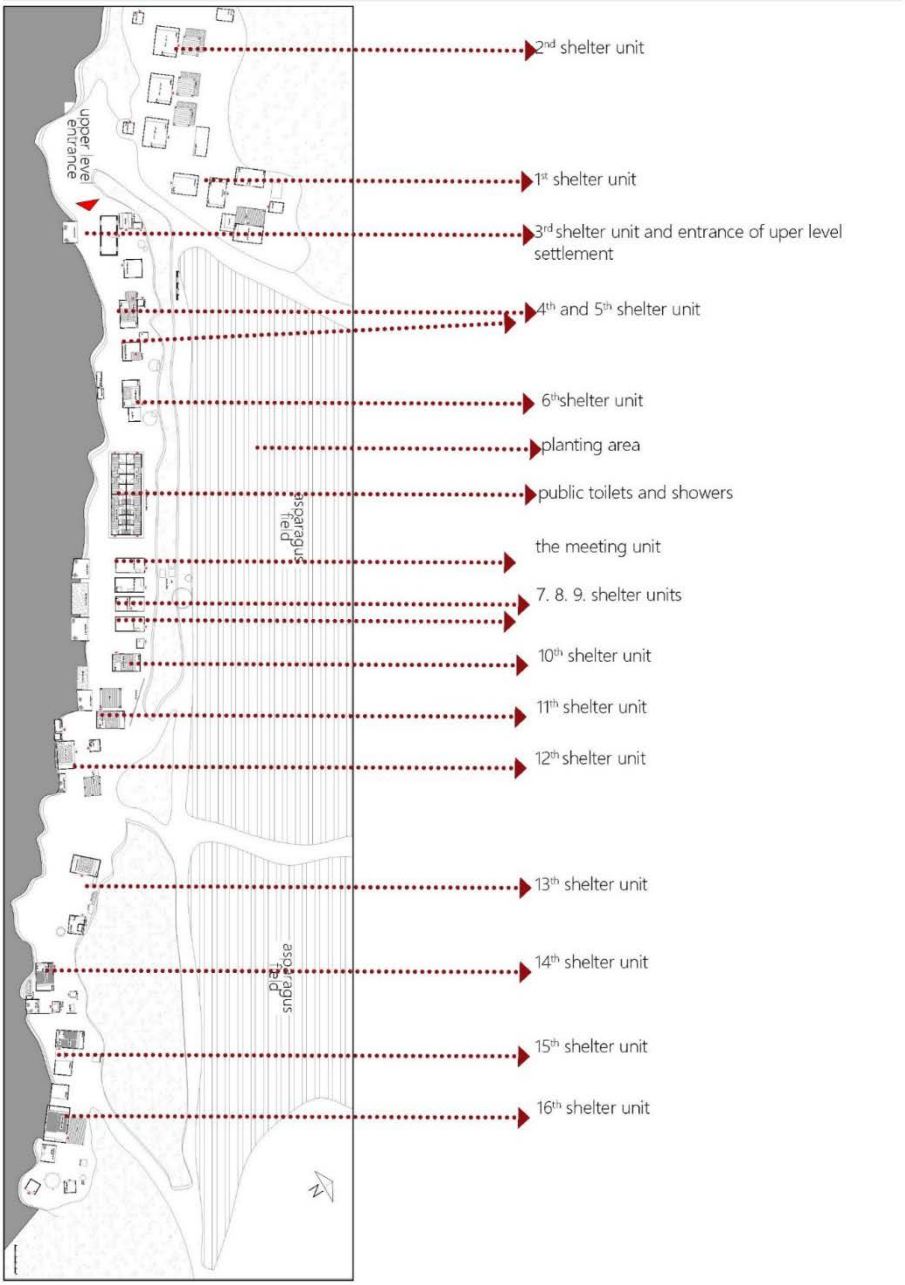

Figure 6. Existing Site Plan

There is a shared toilet and shower area in the housing area (Figure 7). However, common toilets and showers are not much preferred, and families set up their own toilet and bathroom tents. Families are mostly crowded ones.

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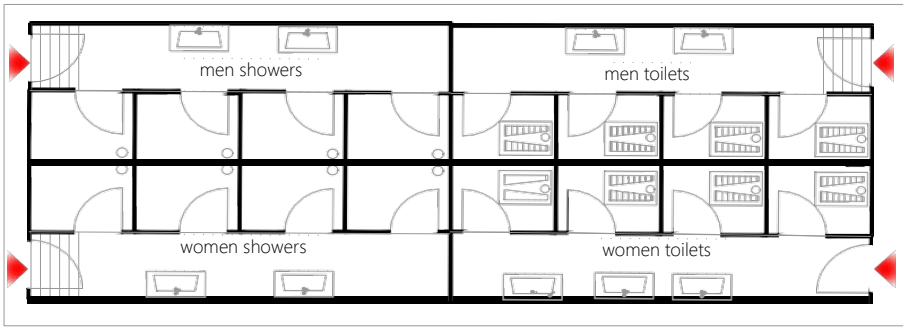
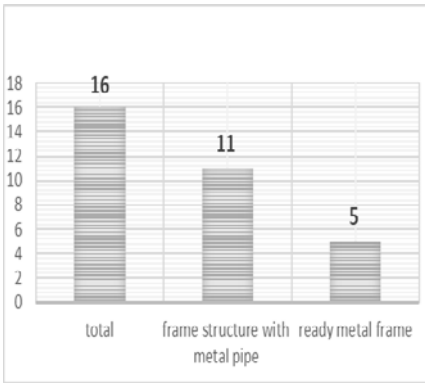


Figure 7. Plan of Public Toilets and Showers

Figure 8. Informative sheet about the existing housing (1st- 10th units)

Figure 9. Informative sheet about the existing housing (11th- 16h units)



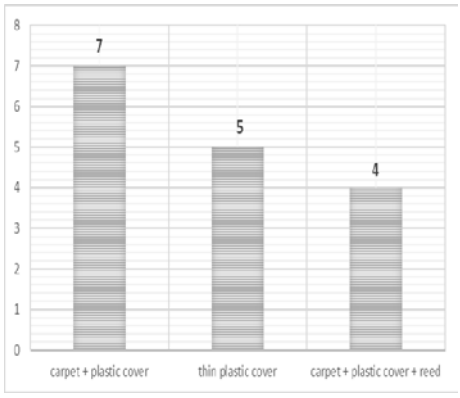


Figure 10. Materials used in existing housing

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Housing units are structurally similar. The tents were created by building frames from metal pipe profiles belonging to the workers themselves. Some tents are made of ready-to-use and vault-shaped metal profiles commonly used in greenhouse construction. The floors of the interior are covered with carpet. Housing units themselves are covered with rugs, cloth, and plastic coating on a metal structure. In some houses, reed covers were used on external surfaces, thus providing natural air conditioning (Figure 10 and Figure 11).

Figure 11. 1. Reed coating 2.Kitchen shelf 3.Cooking, 4.Frame structure with pipe profiles
5. Flooring: carpet and plastic cover above the soil

There is no furniture in the housing units. There are shelves in the main living tent, which is set up from metal pipe profiles used only for the structural system, and in some of the separately arranged kitchen tents.

The common characteristics of the housing units are that the cooking areas are separate, that there is a small planting area next to the coop, and almost all sheep pen units. There are simple wooden metal-framed countertops outside for cooking and washing dishes (on hot days). Families bring most of their dry foods from their homes. For this reason, some units have separate warehouse tents. Some housing units have open arbour areas whose top are covered. Most of the housing units have a refrigerator and a washing machine. Almost all housing tents have televisions. There are a washing machine, fridge, and television as an electrical home appliance, and television exists in 13 housing units out of 16 (Figure 12).

Workers complain about the lack of common areas. There is no social connection with the settlement in the immediate area. This situation is caused by the lack of the desire of the indigenous people to communicate and the limited means of the workers. The number of children in primary school age is high. According to authorities, children of educational age are attending school. However, they are mostly educated in another school from March, which creates disruption and failure in children's education.

Fieldwork has become an example of what makes the sheltering problem of seasonal agricultural workers visible. After obtaining the available data, it was discussed whether there were concepts that could be used for

design proposals. Because of this data, design ideas were proposed and presented in architectural education.

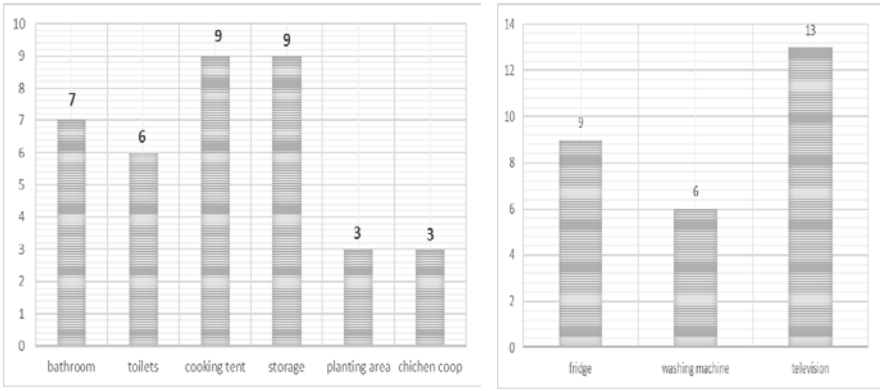

Figure 12. Spatial Distribution of the Tents and the Appliances

HOUSING DESIGN PROPOSALS FOR THE CASE STUDY

The proposals made for the studied area began with discussions of what should be done sociologically, rather than suggesting the paradigms of housing and semi-temporary spaces. The aim of the projects to be carried out in the area given as the project subject is to design a type of residence to be defined as "semi-temporary" housing as a solution to the housing problems of agricultural workers who come from other provinces to work in agricultural areas between March and October and have to live in tents with limited opportunities during the working period. Semi-temporary housing bears both the characteristics of impermanence and the characteristics of permanence. Seasonal housing, called semi-temporary housing, is described in the design proposals. The proposals suggest a physical improvement as well as improvement in the social context.

The definition of semi-temporary housing can be explained as follows: They are “portable”, “easily installed and stored”, sustainable housing in terms of material use, allowing the physical comfort level with natural air conditioning, which have no infrastructure problem, which are easily dismantled and installed in the following periods when workers return to their homes. It derives its impermanence from the fact that it is “portable”, which allows it to be easily installed and stored while it provides the condition of permanence through the fulfilment of the conditions of comfort and social improvement through the means of space. The main difference between semi-temporary housing and temporary housing is the use of time in terms of space. What is meant by temporary housing is the type of housing that hosts people for a short period of time, the space requirement is met with minimum criteria, and the user leaves the hobby, rest, and weekend orders for a short time. Semi-temporary housing to be designed for workers is a type of shelter where its daytime use is not for working individuals, but where they can rest and sleep, eat, and meet their bathroom needs after the end of work after 7:00 pm. In addition, some women who work in the field during the

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day perform the task of cooking. For this reason, resting activity becomes even more limited in the accommodation unit for these women.

In the process of solution proposals, it was aimed to make environmentally appropriate planning and design of new housing units on the new settlement area where agricultural workers can have an appropriate standard of living during the working period, providing alternative and renewable energy technologies to achieve sustainable sourcing strategy, adapting them to the natural environment near the residential area, being semi-temporary, mobile, "portable" and "buildable" by users, in which the complex construction processes are tested, durability and economy criteria are discussed.

Housing units provided with comfort for resting hours should be indispensable for agricultural workers. The shelter tent should include the actions of preparing food, eating, washing, sleeping, storing, and sometimes the toilet should be inside or outside.

Proposals include design concepts that will enable social improvement. Workers were offered a social space on a micro and macro scale. Semi-public spaces-courtyards were proposed to increase socialization among housing units for micro-scale socialization. On the macro scale, social areas, educational areas, and gathering areas were also proposed in the general area of settlement. A project proposal suggested a permanent settlement and a permanent social structure change. The theme of this proposal is that during the other six months when agricultural workers are not working, housing units are transformed into places where seasonal agricultural workers can be trained. Another suggestion of social improvement is to ensure continuity of cultural identity and thus provide spatial acquaintance. Agricultural workers are mostly from a particular region, and their feelings of belonging can be strengthened through a spatial acquaintance. The use of the courtyard, the coexistence of indoor and outdoor spaces, the area for cooking tandoor bread, the cultivation area for small-scale vegetable growing, the proposal of a henhouse for poultries were deemed necessary to keep their local identity alive.

Because there is not much funds allocated in the current state for housing units, workers spend six months in a single-room, privacy-deprived venue. The main distinguishing element of the shelter tent is the veil, and the beds used at night provide cover for personal items. Research in the field found that there was no separate room of the parents. Privacy is considered to be a primary design parameter in recommended projects.

In the field study conducted in Sarıcakaya agricultural area, it was determined that the seasonal agricultural workers' housing problem was met with a single type tent that can be set up easily, which can be moved and contains uncomfortable housing conditions. In the solution proposals, the easy establishment and storage of the structures of the existing shelters can be regarded as a positive feature because they have a pragmatic correspondence (Table 1). The aim of the proposals is to explain that the tent, which is seen and continues to be seen as a uniform

ICONARP – Volume 9, Issue 1 / Published: 21.06.2021

kind of shelter, should not be a shelter of a way of life spanning six months, and to show that the sheltering can be varied.

Table 1. Positive and Negative Inferences from the Existing Sheltering

INFERENCES FROM THE CURRENT LAYOUT	
Negative Inferences	**Positive Inferences**
Insufficiency and unhealthiness of Places with Insufficient Hygiene	Low-Cost Material Use
Uncomfortable Interiors due to Insufficient Insulation	Easy setup
Hygiene Insufficiency in Cooking Areas	Easy Storage
Lack of Storage Space	Easy Assemble
Lack of Social Space	Reusability
Infrastructure Insufficiency Roads Access to Clean Water	Places that are divided according to the purpose of use (cooking)
Lack of After-School Study Area for Children	Multi-purpose uses (life and sleep)
Use of materials that are not resistant to cold and heat in shelter units and tents	

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Table 2. Design Concepts Regarded for the Proposals

DESIGN CONCEPTS FOR PROPOSALS	
Design Concepts For Improvement of Physical Conditions	**Design Concepts For Improving Social Conditions**
SUSTAINABLE DESIGN *Sustainable Material* *Use of Recycled Materials*	**SUSTAINABILITY OF LOCAL IDENTITY** Courtyard Use Having a Planting Area Establishing Spatial Acquaintance
LOW-COST DESIGN *Use of Recycled Material* *Redesigning and Reuse of Low-Cost Material* *Local Material Use*	
PHYSICAL COMFORT *Natural Air Conditioning* *Courtyard Usage* *Using Open and Closed Spaces Together* *Ergonomics*	**PUBLIC SPACE DESIGN** Courtyard Use Open space/closed space balance of sheltering
FLEXIBILITY *Min. and Max. Area Usage* *Articulation* *Adaptability* Flexible Furniture Use	
CONVENIENCE Easy Installation Easy Storage	**SOCIAL STRUCTURE FORMATION** Permanent Housing Proposal Multi-Functional Use Of Permanent Housing

The concepts discussed for the workshop are low-cost design, physical comfort, flexibility, and convenience within the framework of a sustainable design concept. These design concepts are based on the inferences from the existing sheltering (Table 1) and the data from survey and on-situ observations. The survey and observations provided the research with the concepts of cultural, economic and ecological sustainability (Table 2).

Low-Cost Design

The use of recycled materials and the redesign and reuse of low-cost material are important factors that reduce the cost. The problem of unsanitary accommodation of seasonal agricultural workers is sourced from unqualified-economical sheltering. Employers do not invest in the housing requirement and leave the housing to the initiative of the workers. The workers tried to solve this problem by means of tents, which are the cheapest, easiest to move, and easiest to install. However, economic sheltering can also be in a qualified way by reuse and rational use of their own materials. In many of the designs proposed in the studio,

solutions were suggested with both the use of recycled materials and with the selection of low-cost materials, so that the cost is kept low.

Improving Physical Comfort Conditions

Natural air conditioning

Dealing with hot and cold climate conditions is the most fundamental problem of housing in Laçin. In the current case, the most insulated cover detail is to wrap a veil from the reed mesh for insulation purposes in front of the tent material. Instead, the measures to be taken in the shelter shell can be realized by spatial forming, which allows natural ventilation against temperature. Natural ventilation can be solved by the geometry of housing, positioning of the openings of the spaces, and cooling the interiors by wind, and the use of courtyards. Ensuring natural ventilation allows the wind to circulate indoors. In this way, the air entering will be able to ensure natural ventilation by accelerating the circulation of the air.

The combined use of indoor and outdoor space and spatial solutions with courtyards make this type of airflow possible. The layout of the full and empty masses providing the airflow is important in natural air conditioning. In the present case, however, seasonal workers provide their accommodation not in a certain order, but with a linear alignment indiscriminately as permitted by the area. General settlement proposals were developed in many of the works produced in the studio, where the relationship of materials, surfaces, and masses for natural air conditioning concern is considered important.

Flexibility

The concept of flexibility, which is the product of modern movement in architecture, gained prominence after the 1950s, adding factors of "time" and "unknown" to design, giving a new perspective to functional architecture (Colquhoun, 1990; Forty, 2000). Gropius introduced flexibility as the main agenda item in the post-war years and saw flexibility as the method of the age (İslamoglu&Gulay, 2018). For some architects, flexibility is defined as the ability of the same unit to respond to different user needs without changing the building system and the possibility of the same volumes being used for multiple functions; some architects describe it as behaviour that requires the change of the building system to meet differentiated needs and actions. Flexibility in architecture can be stated as the ability of design to adapt to the changing needs of its user. In this adaptation process, spatial processes such as expansion, reduction, transformation should be areas that design allows while maintaining its identity.

In addition, Herman Hertzberger (1991) considers flexibility as open-ended solutions, referring to the "rhetorical value" of flexibility defined by Schneider and Till (2005). Maccreanor (1998) claims that flexibility does not mean an "infinite change" and that structures that were initially not designed for flexibility could be structures with the ability to change

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and adapt best. According to Forty (2000), flexibility is an illusion that gives architects future controls of their structure and is the wealth provided for the architect against the dilemma the architect faces about participation. One of the most up-to-date definitions in this regard is as follows: "It is the integrated attitude and freedom to use of existing requirements with possible changes of the future" (Kronenburg, 2011).
The concept of flexibility in architecture, which has many different qualities such as mobility, variability, divisibleness, is discussed as transition, articulation, adaptability, and flexible furniture use between the minimum and maximum space usage in housing proposals in the studio.

Convenience

The concept of convenience includes easy installation, disassembly, easy storage, and easy transport. The concept of convenience is one of the main features that are functional in the current situation and perhaps reinforce it. The fact that workers are able to provide shelter quickly and practically from the moment they come from their own place of residence, the extensiveness of employers who have completely left the housing process to the workers, and the need to recover the housing stuff after the end of the agricultural labour process, provide conditions that highlight the convenience. The seasonal agricultural workers build, dismantle, transport, and store their shelters themselves. For this reason, convenience was one of the most important topics of discussion in the projects produced in the workshop. In almost all cases where permanent housing is not recommended, the logic of bringing the worker's housing unit together by moving it easily on his own was transferred to the design. In the same way, attention was given to the idea that the unit could be dismantled and stored in a minimum space when the seasonal process would be completed.
The aspect of convenience, which also reduces the weight and cost of the structure, has increased the search for this quality in the designs. For this reason, each presented project has somehow reflected the concept of convenience in the design, as well as other concepts that it weighs on.

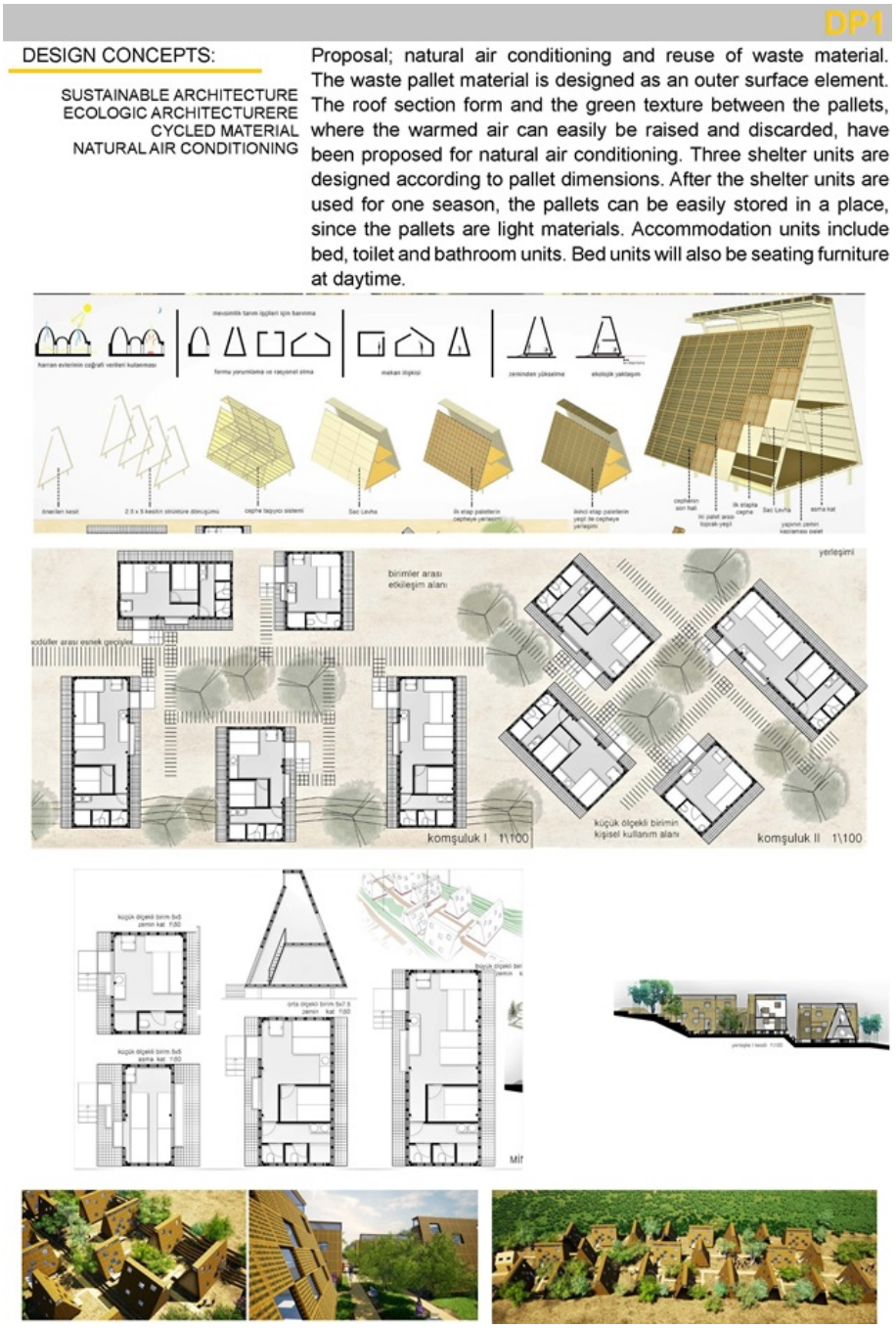

Figure 13. DP1: Design Proposal by Bünyamin Atan

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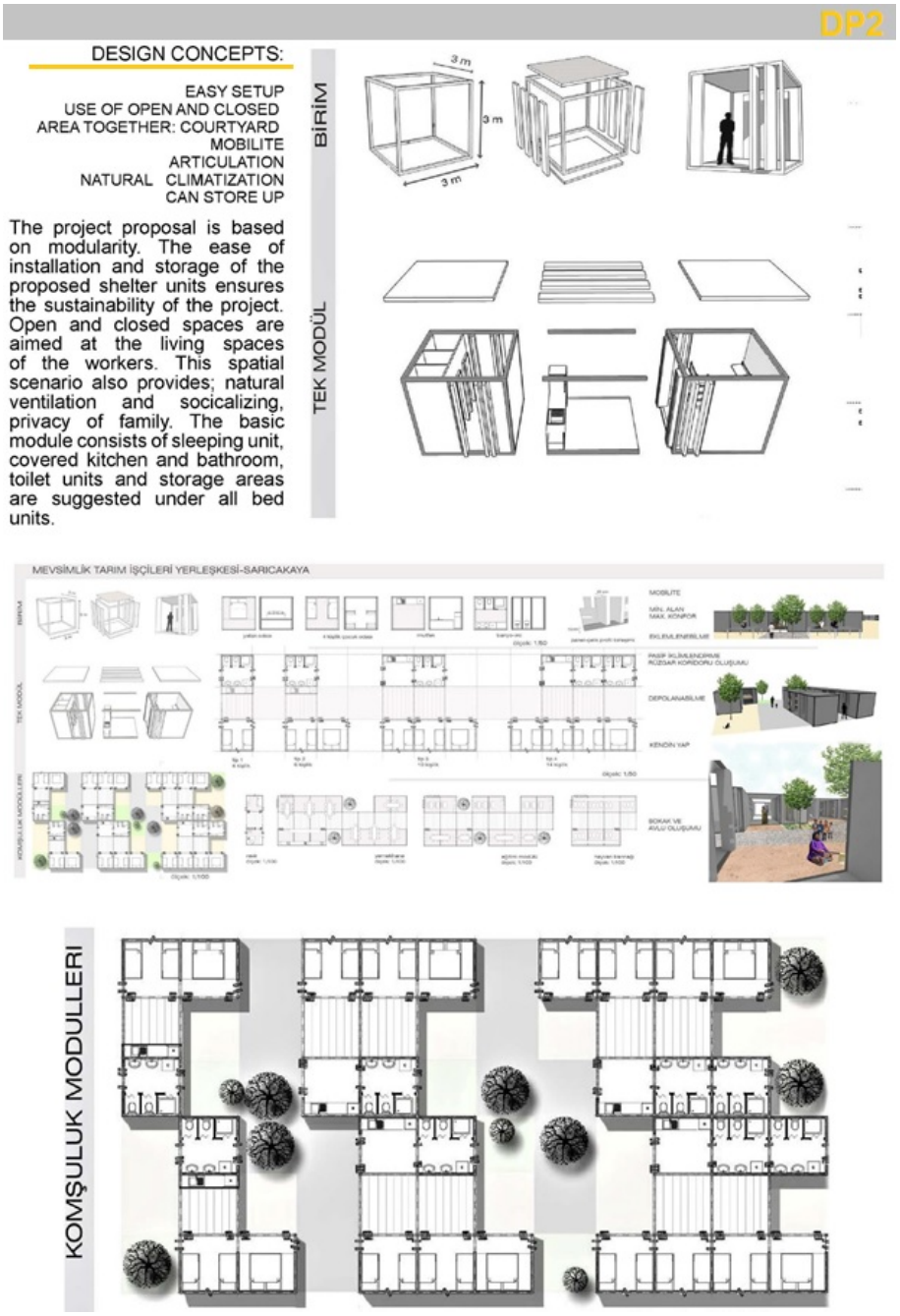

Figure 14. DP2: Design Proposal by Gizem Şenel

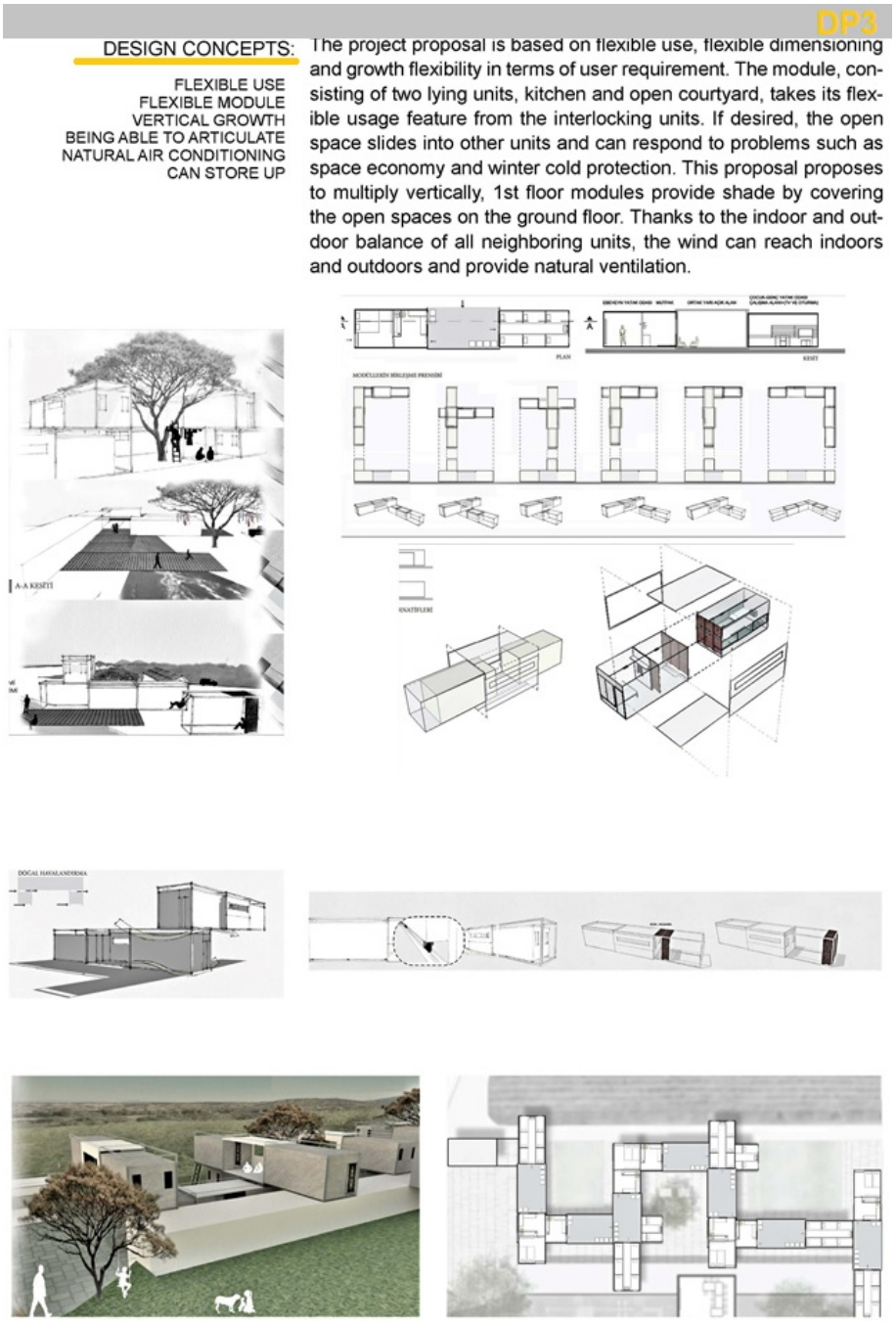

Figure 15. DP3: Design Proposal by Merve Ulukol

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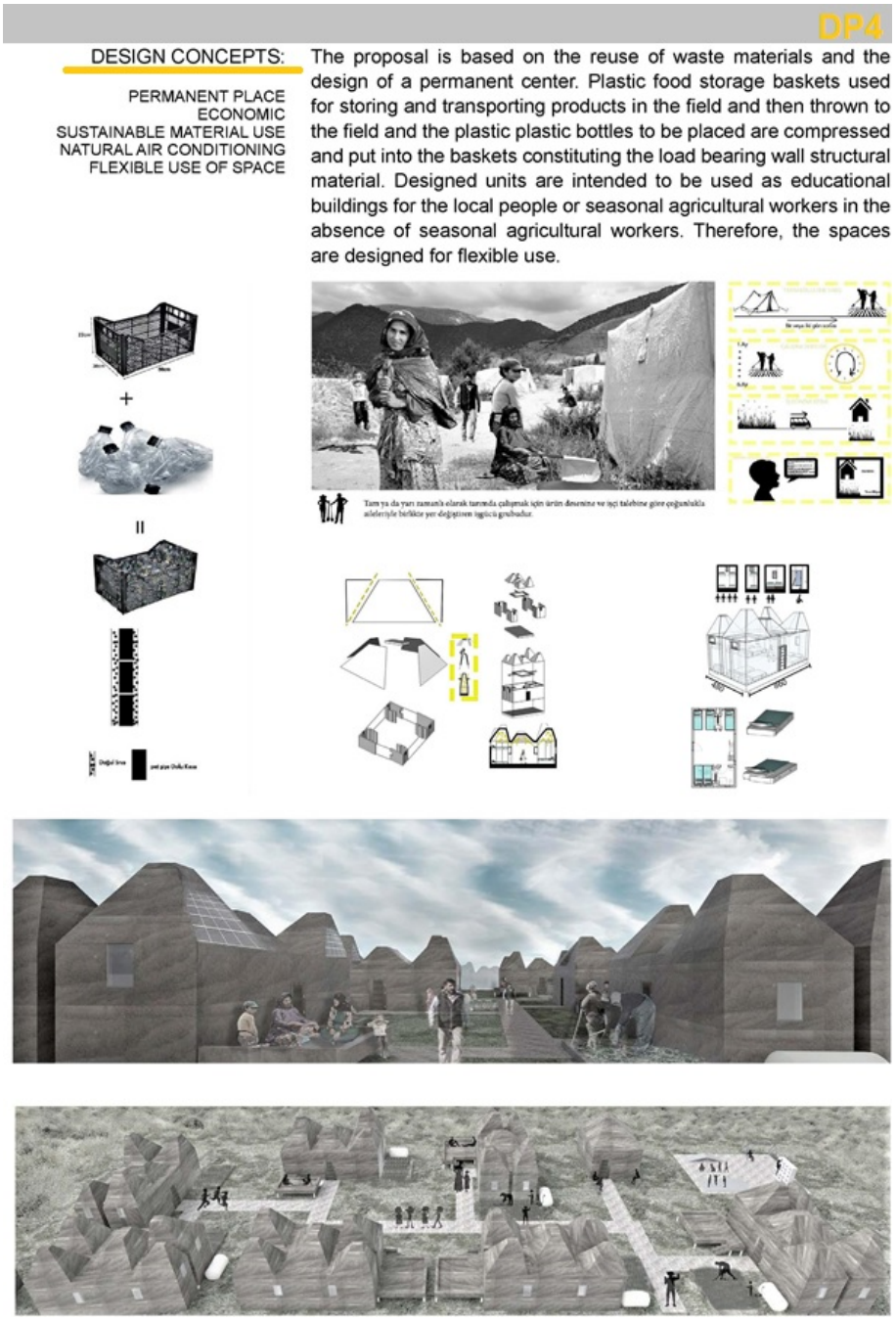

Figure 16. DP4: Design Proposal by Müslüm Varış

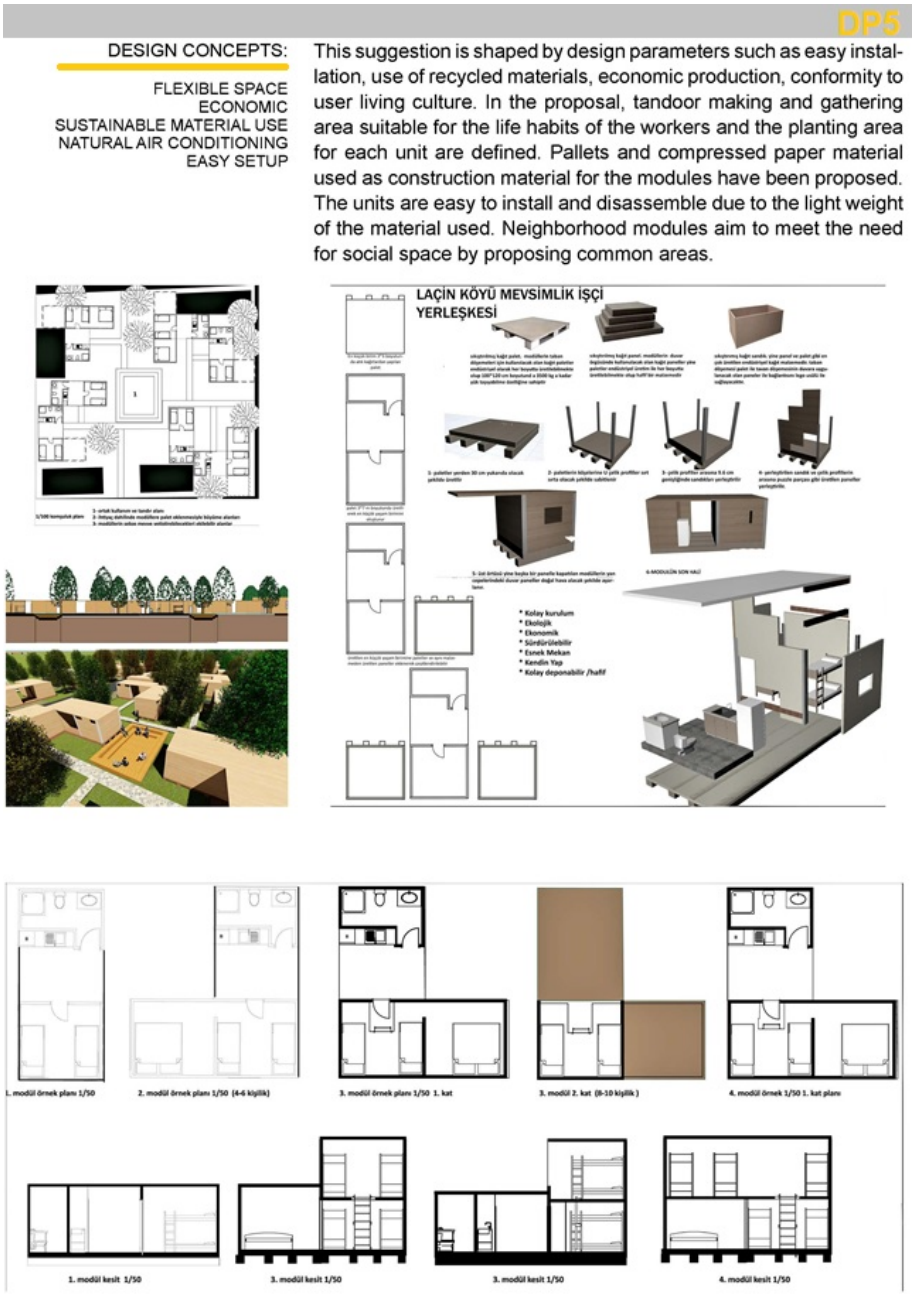

Figure 17. DP5: Design Proposal by Burak Kılıçkaya

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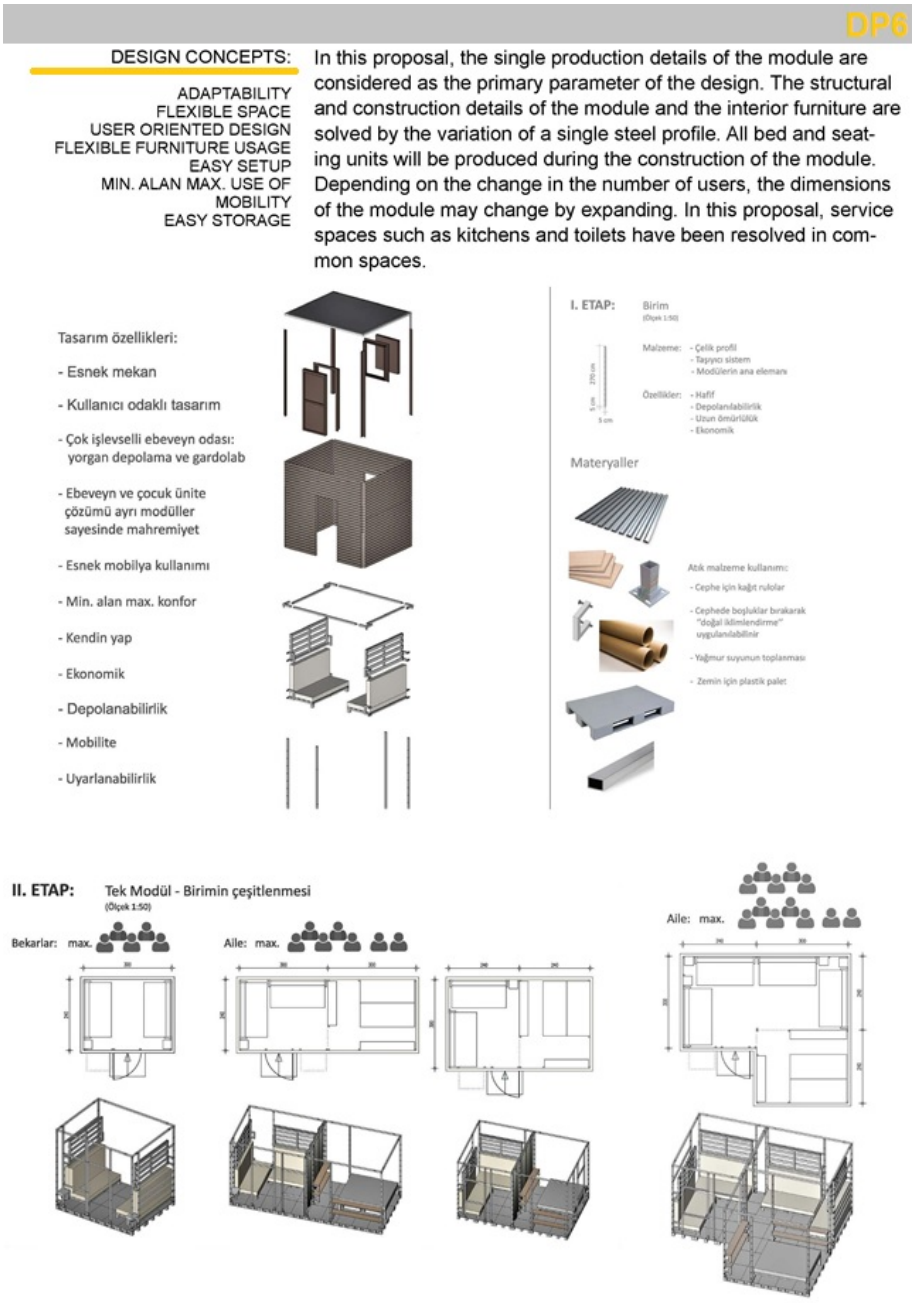

Figure 18. DP6: Design Proposal by Şelmin Çetin

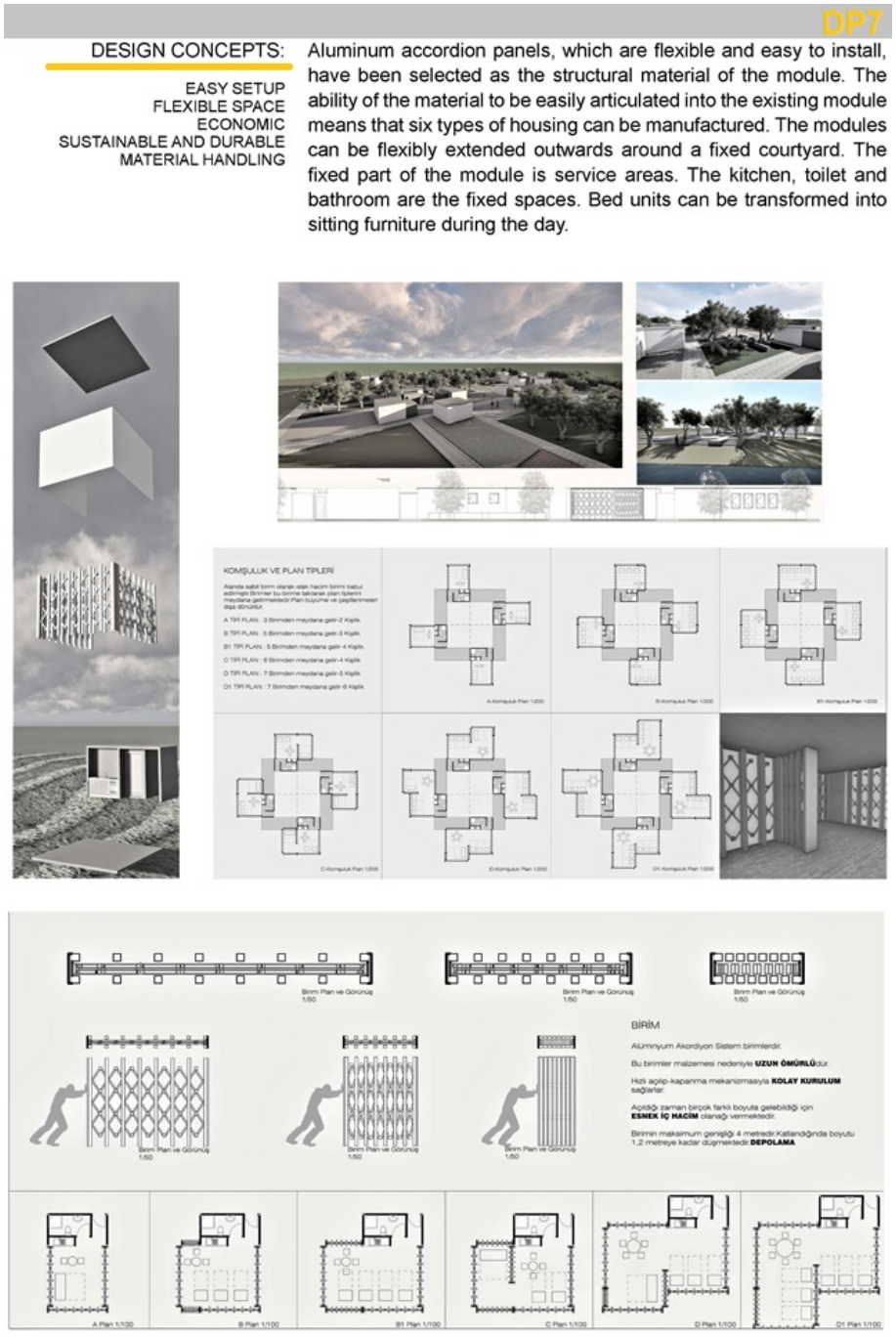

Figure 19. DP7: Design Proposal by Kübra Özer

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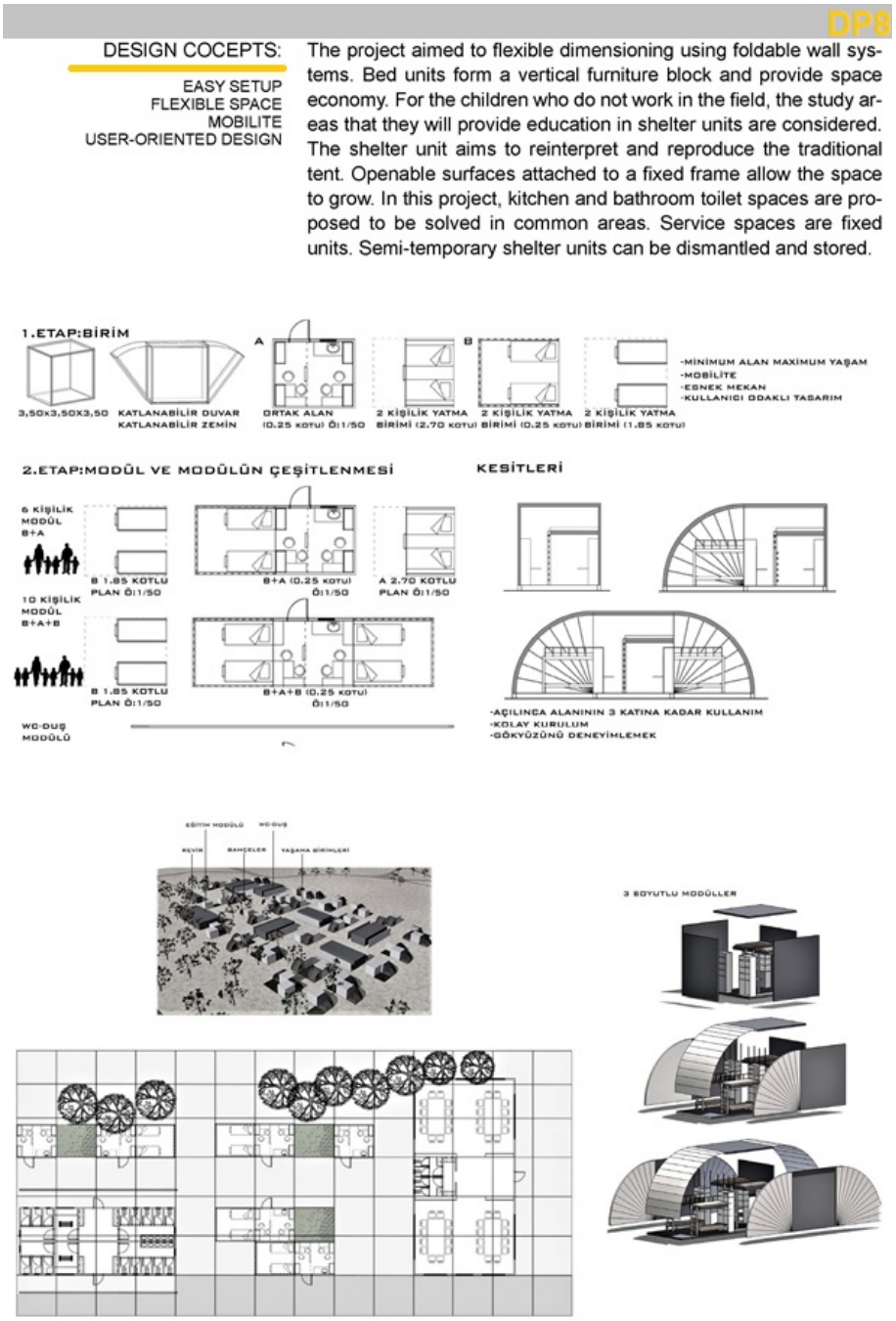

Figure 20. DP8: Design Proposal by Merve Yıldız

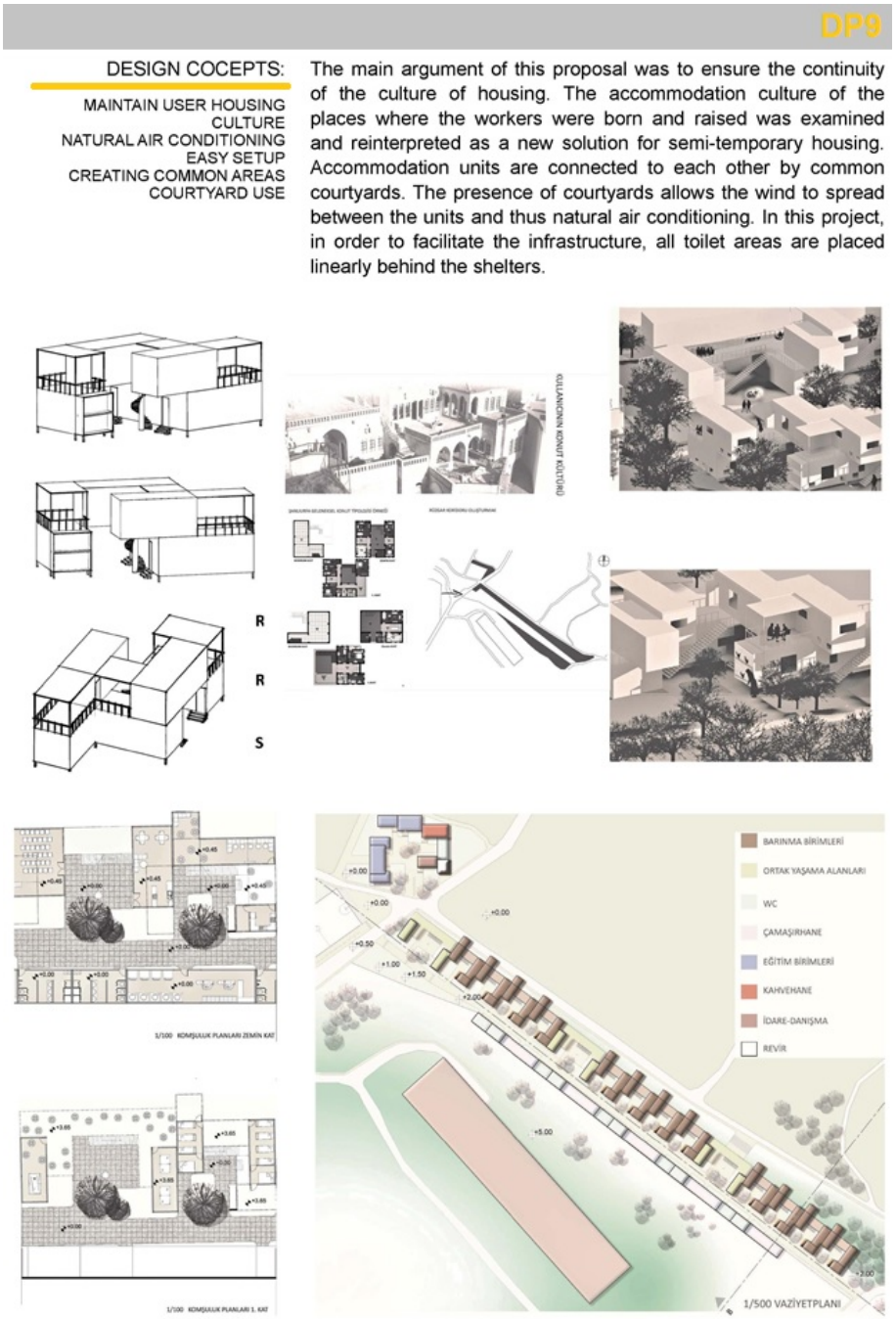

Figure 21. DP9: Design Proposal by Ezgi Aksoy

As a result of the main arguments of the design studio, the design solutions proposed for the housing problem of seasonal agricultural workers in Laçin are oriented by an approach of semi-temporary housing design. The design ideas shaped by the data from the existing conditions and the designerly positive concepts leading the life in the field. Those concepts were classified and categorized in Table 3 with respect to the dominant design configuration of the proposals.

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Table 3. The Design Proposals According to the Preferred Design Concepts

DESIGN CONCEPTS VS. DESIGN PROPOSALS	SUSTAINABLE DESIGN		LOW-COST DESIGN			PHYSICAL COMFORT			FLEXIBILITY				CONVENIENCE	
	Sustainable Material Usage	Use of Recycled Materials	Use of Recycled Materials	Redesign And Use Of Low-Cost Material	Use Of Regional Materials	Courtyard Use	Use of open and closed	Air conditioning openings designed according to	Min. and Max. Area Use	Being mountable	Adaptability	Flexible Use of Furniture	Easy Installation	Easy Storage
DP1	*	*	*				*	*				*	*	*
DP2						*							*	*
DP3						*	*			*	*		*	*
DP4	*	*	*		*				*	*	*			
DP5	*	*	*			*	*	*		*			*	*
DP6									*	*	*	*	*	*
DP7				*			*	*	*	*	*	*	*	*
DP8				*		*			*				*	*
DP9					*	*			*	*				

CONCLUSION

Physical and social infrastructure deficiencies were identified as a result of the field study in which seasonal agricultural workers' housing problems were determined and design proposals were presented in Laçin, Sarikaya district, Eskişehir. The main problems identified regarding physical infrastructure can be listed as follows;

1. Although there is an electricity infrastructure in the housing area, there is no dirty and clean water infrastructure;
2. Lack of any natural air conditioning, thermal insulation in shelter tents;
3. Lack of privacy in shelter tents;
4. Lack of hygiene conditions of cooking areas;
5. Lack of hygiene conditions of bathroom and toilet places;
6. Lack of furniture (table and chair) in the shelter tents so that the children can continue their education and do their homework;
7. Lack of children's playgrounds;
8. Lack of floor pavement outdoors

How the social infrastructure is provided does not always refer to a visible situation in the field. However, it may be partially visible by the presence of socializing spaces. The main problems identified regarding social infrastructure can be listed as follows;

1. There are no social spaces where workers can gather;
2. Workers can only reach the nearest settlement by means of a vehicle. This prevents them from contacting the locals and they are unable to socialize;

3. They complain that they are ostracized by locals;
4. To ensure that children's education was not disrupted, a school service was hired by an employer, and the children were taken to school and brought back, but their education schedule was interrupted because they changed two schools during a year;
5. Families have young children, so when the parents work in the field, the youngest family member is cared for by other children 3 to 4 years older than him, and this disrupts the education of children in educational age.
6. The socialization area of children is only the areas outside the shelter tents.
7. Health problems can be postponed since they are 5km away from the nearest health centre except for the small emergency first aid unit.

As a result, although the findings are focused on the housing problem as shown above, seasonal agricultural workers are also lacking in many issues in the field they work in terms of socialization requirements. Children are undoubtedly the most affected persons by seasonal agricultural labour. The field study reveals a frame of problems that match the seasonal agricultural labour problematics revealed by nationwide surveys discussed in the first chapters of the study. When the problems in other works are examined, positive differences can be noted, such as the provision of electrical infrastructure for the workers of the area, the provision of metal structures for the construction of housing units by the employer, and the provision of a building with a limited but stable public toilet and shower for the use of the workers. However, most of the workers in the area reported that they were satisfied that their work was continuous for the following years as well as the wages they received. The survey found that no family, especially women, was satisfied with housing problems. The education of children is the subject of concern for families, although it is not at the top of their problems. The infirmary operates as a centre that responds to urgent health problems, and regular physician assistance can be obtained. Vaccinations of children are carried out in the field.

After these findings, solutions for housing problems in the field were developed within the scope of the Design Studio with Anadolu University Architecture Department students, and the above projects were developed by discussing various concepts based on user-geography-needs.

Sustainable architecture was discussed through design parameters such as user-centred design, natural air conditioning, conditions for the improvement of physical comfort with the use of the courtyard, use of durable materials, mobility, easy installation, economical design, easy storage, flexible space and the use of flexible furniture, and adaptability. In addition, places such as socialization research centres, muster areas, health centres were designed on the scale of the layout plan.

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This study defines semi-temporary housing through seasonal agricultural workers. As a result of the inferences of this study, the design concepts of the proposals for seasonal housing or semi-temporary housing type can be summarized as follows:

1-Convenience: Easy to install, transportable, easy storage;

2-Flexibility: Spaces with more than one function; minimum area and maximum use; the ability to be articulated new spaces when necessary

3-Economic: Optimum economic cost;

4- Sustainability: Use of materials converted from waste material

5- Ensuring physical comfort conditions: Providing climate-compliant, ergonomic, privacy-ensuring conditions

6- Spatial designs that will strengthen socialization; Use of the courtyard, Suggestion of social spaces, Developing the sense of belonging through space.

This study identified the problems of the working area of seasonal agricultural workers and aimed to transform and improve the current situation through architectural solution proposals in this direction. When examining the problems, it was found that there were similarities with other areas of study. Today, it has been shown once again that the lack of physical and social infrastructure of seasonal agricultural workers continues in our country. However, if the relevant institutions of the state are functioning and working with local governments, the recognition of seasonal agricultural labour will be provided first and then funds for the solutions to housing problems will be produced. The solution to the housing problem should not be provided by seasonal agricultural workers, but necessary works should be done to make it a policy of employer and state. Otherwise, the current situation will remain an ongoing form of unhealthy housing, which is the way seasonal agricultural workers produce their own solutions.

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In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions and organizations) during the survey, in-depth interview, focus group interview, observation or experiment.

REFERENCES

Albek, S. (1991). Dorylaion'dan Eskişehir'e (No. 89). T.C. Anadolu Üniversitesi.

Altınsapan, E., & Parla, C. (2004). Eskişehir Selçuklu ve Osmanlı yapıları I: Günyžü-Mihalıççık-Seyitgazi-Mihalgazi-Sarıcakaya-Sivrihisar. TC Anadolu Üniversitesi.

Anonymus. (2015). Tarihi, Doğası, Kültürü Ve Gelenekleriyle Sarıcakaya. Sarıcaya Kaymakamlığı.

Benevolo, L. (1993). The European City (P. 135). Oxford: Blackwell.

Çelik, A. (2005). Avrupa Sosyal Şartı ve Türkiye'nin Çekinceleri. Türk-İş Dergisi, 366, 91-98.

Çinar S. & Lordoğlu, K. (2011, October 25-26). Mevsimlik Tarım İşçileri: Marabadan Ücretli Tarım İşçiliğine [Paper Presentation]. Sosyal Haklar Sempozyumu. Bildiri Kitabı, P. 419-448, Istanbul. https://www.petrol-is.org.tr/sites/default/files/shus-iii-bildiriler-20.10.11_asil.pdf

Çinar, S. (2014). Öteki Proletarya: De-Proletarizasyon ve Mevsimlik Tarım İşçileri. Notabene Yayınları.

Colquhoun, A. (1990). Beaubourg Platosu. Mimari Elestiri Yazıları. (A. Cengizkan, Trans.). Sevki Vanlı Mimarlık Vakfı. İstanbul. (Original Work published 1981)

Culp, K., & Umbarger, M. (2004). Seasonal and Migrant Agricultural Workers: A Neglected Work Force. Aaohn Journal, 52(9), 383-390.

Egemen E. A. (2015). Mevsimlik Tarım İşçileri Ve Barınma Sorunları [unpublished master's dissertation]. Istanbul Technical University.

Forty, A. (2000). Words and Buildings. Thames & Hudson. London.

Gertel, J., & Sippel, S. R. (Eds.). (2014). Seasonal Workers In Mediterranean Agriculture: The Social Costs Of Eating Fresh. Routledge.

Görücü, İ. & Akbiyik, N. (2010). Türkiye'de Mevsimlik Tarım İşçiliği: Sorunları Ve Çözüm Önerileri Hikmet Yurdu. Sosyal Bilimler Araştırma Dergisi, 5, 189 – 219.

Hertzberger, H. (1991). Lessons for Students. 010 Publishers. Rotterdam.

İslamoğlu, Ö. & Gülay, U. (2018). Mimari Tasarimda Esneklik Yaklaşimlarina Kuramsal Bir Bakiş. The Turkish Online Journal of Design Art and Communication, 8(4), 673-683.

Karabiyik, E. (2012). Mevsimlik Tarım Göçünden Etkilenen 6-12 Yaş Grubu Çocuklar İçin Temel Araştırma. Kalkınma Atölyesi. Ankara.

Karabiyik, E. (2013). Çukurova'da Mevsimlik Tarım İşlerinde Çalışan Çocuklar İçin Model Eylem Planı. Kalkınma Atölyesi. Ankara.

Koebel, C. T. & Daniels, M. P. (1997). Housing Conditions of Migrant and Seasonal Farmworkers. Virginia Center for Housing Research.

Koruk, İ. (2010). İhmal Edilen Bir Grup: Göçebe Mevsimlik Tarım İşçileri. Türk Tabipler Birliği Meslek Sağlık Ve Güvenliği Dergisi, Ekim Kasım Aralık Sayısı.

Kronenburg, R. (2011). Lecture on Flexible Architecture at the Building Centre in London

Maccreanor, G. (1998). Adaptability. A+T Magazine, December, 40-45.

DOI: 10.15320/ICONARP.2021.150

Maclellan, N. (2008). Seasonal Workers for Australia—Lessons from New Zealand. Farm Policy Journal, 5(3), 43-53.

MIGA. (2012). Tarımda Mevsimlik İşçi Göçü Türkiye Durum Özeti. http://www.fes-tuerkei.org/media/pdf/D%C3%BCnyadan/d%C3%BCnyadan_12%20(1).pdf

Mitchell, D. (1996). The Lie of the Land: Migrant Workers and the California Landscape. Minnesota Press.

Mumford, L. (1961). The City in History: Its Origins, Its Transformations, and Its Prospects (Vol. 67). Houghton Mifflin Harcourt.

Okur, Z. (2008). Mevsimlik İşlerde Yıllık Ücretli İzin (Karar İncelemesi). Kamu İş Dergisi, C: 10, S: 2, S. 1-17.

Özbekmezci Ş. & Sahil S. (2004). Mevsimlik Tarım İşçilerinin Sosyal, Ekonomik Ve Barınma Sorunlarının Analizi. Gazi Üniversitesi Müh. Mim. Fak. Dergisi, Cilt 19, No 3, 261-274

Rogaly, B. (1998). Workers on the Move: Seasonal Migration and Changing Social Relations in Rural India. Gender & Development, 6(1), 21-29.

Şakar, M. (2010). İş Kanunu Açısından Mevsim Ve Kampanya İşlerinde Çalışan İşçilerin Durumu. Yaklaşım Dergisi, Ekim Sayısı.

Schneider, T. & Till, J. (2005). Flexible housing: opportunities and limits. Arq: Architectural Research Quarterly, 9(2), 157-166.

Selek Ö.C. & Bulut E. (2013). Mevsimlik Tarım İşçilerinin Türk Hukuk Sistemi İçerisindeki Yeri, ÇSGB Çalışma Dünyası Dergisi, 1(1), Temmuz-Eylül 2013, 94-111

Smith, W. S. (1958). The Art and Architecture of Ancient Egypt. Penguin Books. London.

Şimşek Z. (2012). Nüfus Tarım İşgücü Göçü Yaşam Koşulları Üreme Sağlığı Raporu. T.C. Anadolu Üniversitesi.

Taşkent, S. (2010). Karar İncelemesi: Mevsimlik Bir İşte Yapılan Belirli Süreli İş Sözleşmesi. Çalışma Ve Toplum, 2010/3, S.: 223-242.

Tekeli İ. (1998). Türkiye'de İçgöç Sorunsalı Yeniden Tanımlanma Aşamasına Geldi. Türkiye'de İçgöç, İstanbul: Tarih Vakfı Yayını, P. 10.

Thomas A. (2006). Housing characteristics of farmworker families in North Carolina. Journal of Immigrant and Minority Health, 8(2), 173-184.

TUIK. (2018). İşgücü İstatistikleri. 15.05.2018.

UNFPA. (2011). Mevsimlik Tarım İşçilerinin Ve Ailelerinin İhtiyaçlarının Belirlenmesi Araştırması Vallejos, Quirina M, Quandt, Sara A, Grzywacz, Joseph G, Isom, Scott, Chen, Haiying, Galván, Leonardo, . . . Arcury, Thomas A. (2011). Migrant farmworkers' housing conditions across an agricultural season in North Carolina. American Journal of Industrial Medicine, 54(7), 533-544.

Ziebarth, A. (2006). Housing Seasonal Workers For The Minnesota Processed Vegetable Industry. Rural Sociology, 71(2), 335-357.

Url-1: Https:// Goc.Bilgi.Edu.Tr/ Last Visitied On 08-07-2019

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A Study on Determination of Turkish Adjective Pairs for Speech Sound

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Abstract

Purpose

Disagreement between the designer and the audience causes creation of acoustically uncomfortable spaces, eventually these disagreements cause financial loss. To describe a phenomenon with the same modifier is the key to settle the conflict. It is very important to reveal acoustic conditions and it is necessary to use a common terminology for this purpose. To this end subjective evaluation studies are frequently used, especially in terms of room acoustics. To define sound via adjective and adjective pairs is a method used in determining architectural acoustic conditions in halls, mostly used for music-function halls but subjective evaluation studies are not common for speech-function halls. Turkish adjectives for speech sound that determine audience preferences are missing. Adjectives obtained from translations of different languages do not show the same descriptive effect in a specific language. Therefore, it is important to identify adjectives that define sound for each language.

Design/Methodology/Approach

In order to determine the Turkish adjectives that define the speech sound, which are absent from the literature, a two-step survey was performed. Sets of modifiers associated with acoustics parameters -reverberation, clarity and loudness- were prepared, that include direct translations from common English modifiers as well as Turkish modifiers that were derived from expert opinion. These sets of adjectives were then presented to the subjects and they were asked to make choices among them.

Findings

The results of survey where modifiers defining speech sound are assessed are presented. The results show that some are unsuitable in Turkish despite the same word is used in subjective evaluations in English often. Based on the survey results, a questionnaire can be prepared for determining the user preferences in speech-function halls to increase the acoustic comfort conditions.

Research Limitations/Implications

Need of explaining the room acoustics parameters to the subjects.

Social/Practical Implications

It is thought that the questionnaire text will benefit the increase of the acoustic comfort conditions in the new and / or existing buildings and reduce economic loss.

Originality/Value

This study is the first research which examines Turkish adjectives to describe speech sound.

Keywords: *Architectural acoustics, subjective acoustic evaluation, speech sound, speech-function halls, Turkish adjective pairs*

INTRODUCTION

To provide suitable acoustic conditions in accordance with the function of the space is indeed a major issue that has substantial social and economic consequences (Yılmaz Karaman & Berber Üçkaya, 2015). Thus, careful design and constant improvements are needed to safeguard against acoustic problems. In the field of room acoustics, such improvements are typically made by taking into consideration during the design stage by listening on simulations or later on according to the comments of the in-situ audience. Preference surveys based on listening tests are the most used method for these studies. It is common to define the sound via adjective and / or adjective pairs in these surveys. Hence, the researchers' or designers' examination heavily depends on the ability of the audience to describe the sound as an adjective or an adjective pair in an articulate manner.

Despite being used often in defining sound of music, use of adjectives is not common in defining sound of speech. This may be due to the association of the sound of music with more subjective acoustic parameters than the sound of speech. Moreover, subjective evaluations of speech-function halls are mostly excluded from the scope of the studies in Turkey due to the absence of Turkish adjectives in particular.

To match measurable or calculable values -objective parameters- and subjective evaluations has a primary importance in acoustics, as in any field of design. The objective parameters used in acoustic design is determined with international (British Standards Institution, 2009). A universal terminology unity is provided in this area by this standardization. On the other hand, the modifiers (adjectives or adjective pairs) to be used for matching objective parameters with subjective evaluations are unique to each language and are difficult to use effectively with direct translation from another language.

In this study, translated adjectives do not show the same descriptive effect to define sound and thus it is important to identify adjectives that define music and speech sound for one's native language is hypothesized.

Accordingly, a comprehensive literature research (some are shown in Table 2) is conducted on subjective evaluation of speech-function halls in Turkish which clearly showed a lack of such vocabulary and raised the need a study to determine the Turkish adjectives that can be used in subjective evaluations.

The aim of this study is to fill the observed gap and to help the researchers and designers to collect subjective evaluation on speech-function halls. Towards this goal two-step survey experiment was performed to define Turkish modifiers. This methodology has been used in a collaborative study with Istanbul Technical University and Yıldız Technical University to choose words as annoyance modifiers in terms of noise in 1999 (Kurra, 2009), to be served by International Commission on Biological Effects of Noise as a recommendation to

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create a common terminology in terms of noise annoyance (Fields et al., 1998).

A two-step survey experiment is designed to determine Turkish adjectives as the first step and adjective pairs as the second step. Finally, based on the survey results, a list of modifiers is recommended for a questionnaire that can be used in subjective evaluation of speech-function halls and help researchers and designers reduce complications that arise from lack of information.

ROOM ACOUSTIC PARAMETERS ASSOCIATED WITH SPEECH SOUND AND THE TEST PROCEDURE

Subjective studies of the acoustical characteristics of auditoria have shown that several quantities that can be obtained from measured impulse responses are correlated with particular subjective aspects of the acoustical character of an auditorium (British Standards Institution, 2009).

The relation between subjective aspect and objective quantities given in the standard can be seen in Table 1.

Table 1. Adjectives used in the first step of the tests

Subjective Listener Aspect (Subjective)	Acoustic Quantity (Objective)
Subjective level of sound	Sound strength, G (dB)
Perceived reverberance	Early decay time, EDT (s)
Perceived clarity of sound	Clarity, C_{80} (dB) Definition, D_{50} Centre time, T_s (ms)

In order to determine adjective pairs, room acoustics parameters that are directly related to speech function were first determined. These parameters and their definitions are listed below:

- Reverberation ("Yansışım, Çınlama" in Turkish): After the sound source has been silenced, a certain amount of time is required to absorb the existing sound energy so that it cannot be heard (Furrer et al., 1964). This phenomenon that occurs over time is called reverberation.

Reverberation time is the duration required for the space-averaged sound energy density in an enclosure to decrease by 60 dB after the source emission has stopped. The reverberation time of a room was once regarded as the predominant indicator of its acoustical properties. While reverberation time continues to be regarded as a significant parameter, there is reasonable agreement that other types of measurements, such as relative sound pressure levels, early/late energy ratios, lateral energy fractions, interaural cross-correlation functions and background noise levels, are needed for a more complete evaluation of the acoustical quality of rooms (British Standards Institution, 2009).

It is clear that the reverberation has a significant effect on the acoustic behaviour of the hall. It is a phenomenon that plays an important role in all areas of room acoustics and is least discussed parameter in evaluating the acoustic quality of any type of space (Kuttruff, 1979).

- Clarity ("Netlik" in Turkish): Clarity is an early-to-late arriving sound energy ratio. This can be calculated for either a 50 ms or an 80 ms early time limit, depending on whether the results are intended to relate to conditions for speech or music, respectively. The early time limit of either 50 ms or 80 ms is defined as clarity (British Standards Institution, 2009).

Clarity describes the degree to which every detail of the performance is perceived. This parameter is to a large extent a property complementary to reverberation. The more the early sound dominates, the higher the impression of clarity (Gade, 2007). Clarity is defined as the ratio of early to late arriving sound, with the distinction for speech made at 50 ms between early and late (Harvie-Clark et al., 2014).

- Level of Sound, Loudness ("Düzey, Gürlük" in Turkish): The sound strength is the logarithmic ratio of the sound energy of the measured impulse response to that of the response measured in a free field at a distance of 10 m from the sound source (British Standards Institution, 2009). To put it simply, it can be described as the level of sound heard in the receiver point (Barron, 2009). It is clear that the sound must be loud enough at all receiver (listener) locations for all audiences to hear well. The voice can be raised naturally to adjust the loudness according to the size of the audience speaker is addressing; however, this has a certain limit.

Next, a literature research is conducted to compile a list of adjectives that are used in the description of the parameters above –reverberation, clarity and loudness- and adjectives related to general evaluation of sound. Hence, the evaluations are disintegrated into four categories, which are;

- Reverberation,
- Clarity,
- Loudness,
- General Evaluation.

The test procedure is consisted of two steps;

- Selection of the adjectives,
- Selection of the adjective pairs.

In order to conduct the test procedure successfully, a training session is organized with the subjects where they listened to audio recordings representing the extreme states of reference acoustic parameters to get familiar with how these parameters sound. Audio recordings used in the listening session are obtained from the simulation of a hall designed as a reference. Odeon v.15 is used for the simulations. The simulation variations of the hall with high and low values of the room acoustics parameters (extreme states of reverberation time, clarity and loudness) are modelled. Speech signals recorded under anechoic conditions are added to the prepared hall simulations and auralisations are obtained for the extreme conditions. Anechoic recordings are obtained from Odeon Room Acoustics Software's database (Odeon A / S, 2019).

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Twenty subjects, five of which are trained in acoustics, participated in the two-step survey where they were asked to select among the adjectives and pairs of adjectives that are given in the lists. Selections made by two types of subjects are weighted differently: weight of 2 is issued for the subjects trained in acoustics. Thus, the text data is obtained by integrating 25 total points to 100.

The tests conducted are independent of any hall and aimed only to identify the sound. It is aimed to identify the appropriate Turkish modifiers that are usually being used in defining an acoustic environment, to correlate relationship between the listener's subjective aspect objective quantities. Therefore, any listening was not included during the tests.

FIRST STEP OF THE TESTS, DETERMINATION OF ADJECTIVES

In the first step of the tests, subjects are given adjectives that define the room acoustic parameters and general evaluation, and they are asked to select the adjectives which they consider appropriate to define the relevant category. The descriptive adjective list is expanded by adding the adjectives obtained in the researches. Adjectives used in the first step of the tests are given in Table 2.

Table 2. Adjectives used in the first step of the tests

Reverberation	**Clarity**	**Loudness**	**General Evaluation**
Dead (Ölü) (Vural, 2009)	Complicated (Karışık) (Vural, 2009) (Özçevik, 2012)	Quiet (Sessiz) (Vural, 2009) (Özçevik, 2012)	I Found it Hard (Zorlandım) (Orhan, 2019)
Dry (Kuru) (Farina, 2001)	Clear (Açık) (Vural, 2009)	Loud (Yüksek Sesli) (Vural, 2009) (Orhan, 2019)	I Didn't Find it Hard (Zorlanmadım)
Live (Canlı) (Vural, 2009) (Çoktaş, 2019)	Blurred (Bulanık) (Savcı Özgüven, 2015)	Weak (Zayıf) (Farina, 2001) (Özçevik, 2012)	I Made Effort to Understand (Anlamak için Çaba Gösterdim)
Reverberant (Çınlamalı) (Farina, 2001)	Neat (Net) (Özçevik, 2012) (Berber Üçkaya, 2014) (Savcı Özgüven, 2015) (Çoktaş, 2019)	Strong (Güçlü) (Farina, 2001) (Özçevik, 2012) (Çoktaş, 2019)	I Didn't Make Effort to Understand (Anlamak için Çaba Göstermedim)
Occupied (Dolu)	Murmuring (Mırıltılı)	Close (Yakın)	I am Satisfied (Memnun Kaldım) (Farina, 2001)
Unoccupied (Boş)	Understandable (Anlaşılır)	Far (Uzak) (Vural, 2009)	I am Disturbed (Rahatsız Oldum) (Farina, 2001)
Non-Echoed (Yankı Yok)	Easy to Understand (Kolay Anlaşılır)	Speaker Should Make Effort (Konuşmacı Çaba Göstermeli)	-

Echoed (Yankı Var) (Berber Üçkaya, 2014) (Savcı Özgüven, 2015)	Non-Understandable (Anlaşılmaz)	Speaker Doesn't Need to Make Effort (Konuşmacının Çaba Göstermesine Gerek Yok)	-
Large (Büyük) (Berber Üçkaya, 2014)	Fast (Hızlı) (Özçevik, 2012)	Sound Level is not Enough (Ses Düzeyi Yetersiz)	-
Small (Küçük)	Slow (Yavaş) (Özçevik, 2012)	Sound Level is Enough (Ses Düzeyi Yeterli)	-
-	At Normal Speed (Normal Hızda)	-	-

The selections made in the test are given in Table 3.

Table 3. Selections made in the first step of the tests

Adjective	Subject																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Dead (Ölü)		•	•	•			•				•	•		•						
Dry (Kuru)	•						•	•												
Live (Canlı)	•	•	•	•	•	•	•	•		•	•	•	•	•	•		•			•
Reverberant (Çınlamalı)	•		•	•		•	•	•				•		•		•	•	•	•	•
Occupied (Dolu)	•			•				•	•	•		•							•	•
Unoccupied (Boş)	•			•				•	•		•	•								•
Non-Echoed (Yankı Yok)	•	•	•	•	•		•	•	•	•		•		•	•	•	•	•	•	•
Echoed (Yankı Var)	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•
Large (Büyük)	•							•	•						•				•	•
Small (Küçük)	•							•	•						•				•	•
Complicated (Karışık)			•									•				•				
Clear (Açık)			•	•		•		•		•		•		•						
Blurred (Bulanık)	•			•			•	•				•		•	•			•		
Neat (Net)	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•
Murmuring (Mırıltılı)			•	•				•				•	•		•	•		•		
Understandable (Anlaşılır)	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•
Esay to Understand (Kolay Anlaşılır)	•			•	•		•	•		•	•	•			•	•	•	•	•	•
Non-Understandable (Anlaşılmaz)	•	•	•	•	•		•	•	•		•	•		•	•	•	•	•	•	•
Fast (Hızlı)			•					•	•		•	•			•		•		•	
Slow (Yavaş)			•					•	•		•	•			•		•		•	
At Normal Speed			•			•		•		•	•	•			•		•		•	

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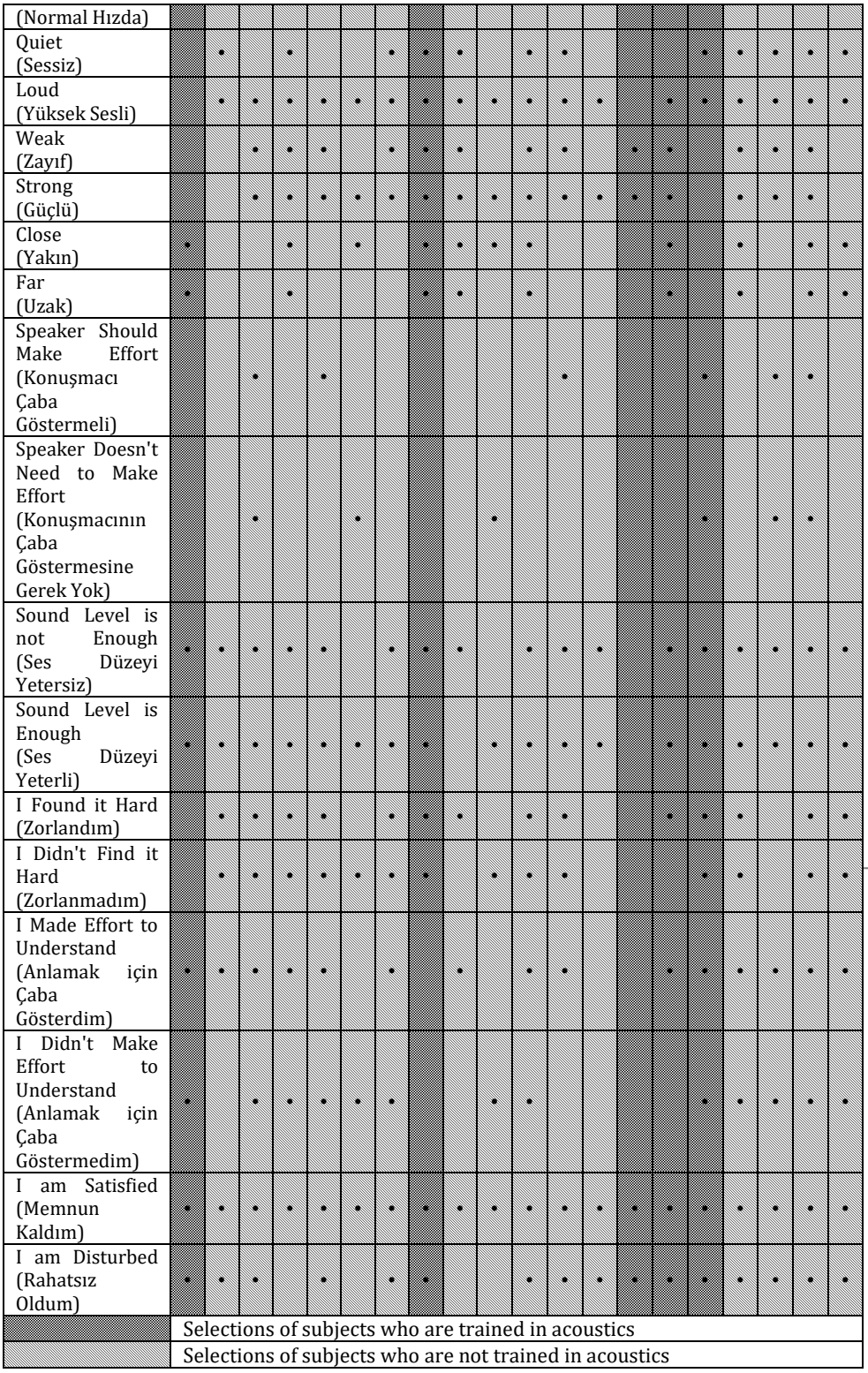

Table 4 shows the ratio of the selections decreasingly made by the subjects for each of the four categories.

Table 4. Data obtained in the first step of the tests

Category	Scale	Adjective	Preferance Ratio (%)
Reverberation	Low	Non-Echoed (Yankı Yok)	88
		Occupied (Dolu)	40
		Small (Küçük)	36

		Dead (Ölü)	32
		Dry (Kuru)	20
	High	Echoed (Yankı Var)	96
		Live (Canlı)	80
		Reverberant (Çınlamalı)	68
		Large (Büyük)	36
		Unoccupied (Boş)	36
Clarity	Low	Non-Understandable (Anlaşılmaz)	88
		Blurred (Bulanık)	48
		Murmuring (Mırıltılı)	44
		Fast (Hızlı)	40
		Complicated (Karışık)	16
	High	Understandable (Anlaşılır)	96
		Neat (Net)	96
		Easy to Understand (Kolay Anlaşılır)	72
		At Normal Speed (Normal Hızda)	44
		Slow (Yavaş)	40
		Clear (Açık)	36
Loudness	Low	Sound Level is not Enough (Ses Düzeyi Yetersiz)	84
		Weak (Zayıf)	64
		Quiet (Sessiz)	56
		Far (Uzak)	48
		Speaker Should Make Effort (Konuşmacı Çaba Göstermeli)	28
	High	Sound Level is Enough (Ses Düzeyi Yeterli)	88
		Loud (Yüksek Sesli)	84
		Strong (Güçlü)	76
		Close (Yakın)	56
		Speaker Doesn't Need to Make Effort (Konuşmacının Çaba Göstermesine Gerek Yok)	28
General Evaluation	Negative	I am Disturbed (Rahatsız Oldum)	84
		I Made Effort to Understand (Anlamak için Çaba Gösterdim)	72
		I Found it Hard (Zorlandım)	68
	Positive	I am Satisfied (Memnun Kaldım)	100
		I Didn't Find it Hard (Zorlanmadım)	64
		I Didn't Make Effort to Understand Anlamak için Çaba Göstermedim)	60

During the tests, various comments are obtained from the subjects. These comments suggest that there are different adjectives that may be more descriptive for the selected room acoustic parameters for tests. On the other hand, some adjectives are found to be difficult to understand by the subjects. In the second step of the tests the comments of the subjects are taken into consideration for determining the adjective pairs to be used.

SECOND STEP OF THE TESTS, DETERMINATION OF ADJECTIVE PAIRS

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The second step tests are performed with the subjects of the previous step. Before the tests, the room acoustics parameters that are desired to be defined are explained briefly to the subjects and the audio samples are played to help the subjects to identify them.

In the second step of the tests, subjects are asked to select adjective pairs that they consider appropriate to be used for describing speech sound. For the sake of clarity maximum five adjective pairs for each category is considered to be sufficient in the questionnaire for determining audience preferences in speech-function halls per the aim of the study. Therefore, subjects are expected to limit their selections with five adjective pairs per category they consider appropriate.

The adjective pairs used in the second step of the tests are given in Table 5.

Table 5. Adjective pairs used in the second step of the tests

Reverberation	**Clarity**
Dead – Live (Ölü - Canlı)	Complicated - Clear (Karışık - Açık)
Dry – Live (Kuru - Canlı)	Blurred – Neat (Bulanık - Net)
Dry – Reverberant (Kuru - Çınlamalı)	Murmuring – Understandable (Mırıltılı - Anlaşılır)
Dead – Reverberant (Ölü - Çınlamalı)	Non-Understandable – Understandable (Anlaşılmaz - Anlaşılır)
Non-Reverberant – Reverberant (Çınlamasız - Çınlamalı)	Non-Understandable - Easy to Understand (Anlaşılmaz - Kolay Anlaşılır)
Howling- Non-Howling Uğultulu - Uğultusuz	Hard to Understand - Easy to Understand (Anlaşılması Zor - Kolay Anlaşılır)
Echoed - Non-Echoed (Yankı Var (Yankılı) - Yankı Yok (Yankısız))	I Found it Hard to Understand - I Didn't Find it Hard to Understand Anlamakta Zorlandım - Anlamakta Zorlanmadım
Large Hall - Small Hall (Büyük Salon - Küçük Salon)	Speaker Should Talk OnebyOne - Speaker is Talking One by One (Tane Tane Konuşmalı - Tane tane Konuşuyor)
Occupied – Unoccupied (Dolu - Boş)	Not One by One - One by One (Tane Tane Değil - Tane Tane)
Absorbent - Non-Absorbent (Yutucu - Yutucu Değil)	Fast - At Normal Speed (Hızlı - Normal Hızda)
Absorbent – Reverberant (Yutucu - Çınlamalı)	Fast – Slow (Hızlı - Yavaş)
Loudness	**General Evaluation**
Quiet – Loud (Sessiz - Yüksek Sesli)	I Found it Hard to Listen - I Didn't Find it Hard to Listen (Dinlerken Zorlandım - Dinlerken Zorlanmadım)
Weak Sound - Strong Sound (Zayıf Ses - Güçlü Ses)	I Found it Hard - I Didn't Find it Hard (Zorlandım - Zorlanmadım)
Speaker is Close - Speaker is Far Away (Konuşmacı Yakın Konumda - Konuşmacı Uzak Konumda)	Acoustical Environment is Bad - Acoustical Environment is Good (Akustik Ortam Kötü - Akustik Ortam İyi)
Low Sound-Loud Sound (Alçak Ses - Yüksek Ses)	I am Pleased- I m Uncomfortable (Memnunum - Rahatsızım)
I Found it Hard to Hear- I Didn't Find it Hard to Hear (Duymakta Zorlandım - Duymakta	I am Satisfied - I am Disturbed (Memnun Oldum - Rahatsız Oldum)

ICONARP – Volume 9, Issue 1 / Published: 21.06.2021

Zorlanmadım)	
Careless-Related (Umursamaz - İlgili)	I Prefer the Hall - I Don't Prefer the Hall (Salonu Tercih Ederim - Salonu Tercih Etmem)
	I Made Effort While Listening - I Didn't Make Effort While Listening (Dinlerken Çaba Gösterdim - Dinlerken Çaba Göstermedim)

The selections made in the second step tests are given in Table 6.

Table 6. Selections made in the second step of the tests

Adjective Pair	Subject																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Dead - Live (Ölü - Canlı)	•							•		•	•	•	•		•		•		•	•
Dry - Live (Kuru - Canlı)														•						
Dry - Reverberant (Kuru - Çınlamalı)		•					•							•						
Dead - Reverberant (Ölü - Çınlamalı)																				
Non-Reverberant - Reverberant (Çınlamasız - Çınlamalı)	•		•	•	•	•	•	•	•	•	•	•		•	•		•	•	•	•
Howling - Non-Howling (Uğultulu - Uğultusuz)		•							•		•		•		•	•	•		•	
Echoed - Non-Ecnoed (Yankı Var (Yankılı) - Yankı Yok (Yankısız))		•	•	•	•	•	•	•	•	•	•		•	•	•	•		•		•
Large Hall - Small Hall (Büyük Salon - Küçük Salon)		•	•	•	•	•	•		•							•				
Occupied - Unoccupied (Dolu - Boş)			•	•	•			•					•						•	
Absorbent - Non-Absorbent (Yutucu - Yutucu Değil)	•		•	•		•							•				•			
Absorbent - Reverberant (Yutucu - Çınlamalı)						•	•	•				•		•	•	•	•			•
Complicated - Clear (Karışık - Açık)				•		•	•			•	•									
Blurred - Neat (Bulanık - Net)	•			•	•	•	•	•				•	•	•	•	•	•	•	•	
Murmuring - Understandable (Mırıltılı - Anlaşılır)		•	•		•				•	•						•		•		
Non-Understandable - Understandable	•	•	•	•		•	•		•			•		•	•		•	•	•	•

DOI: 10.15320/ICONARP.2021.151

(Anlaşılmaz - Anlaşılır)																		
Non-Understandable - Easy to Understand (Anlaşılmaz - Kolay Anlaşılır)						•				•								
Hard to Understand - Easy to Understand (Anlaşılması Zor - Kolay Anlaşılır)		•			•	•	•	•		•	•		•	•				•
I Found it Hard to Understand - I Didn't Find it Hard to Understand (Anlamakta Zorlandım - Zorlanmadım)		•	•	•	•	•			•	•				•	•	•	•	
Speaker Should Talk One by One - Speaker is Talking One by One (Tane Tane Konuşmalı - Tane tane Konuşuyor)										•					•			
Not One by One - One by One (Tane Tane Değil - Tane Tane)					•			•	•						•	•	•	•
Fast - At Normal Speed (Hızlı - Normal Hızda)										•								•
Fast - Slow (Hızlı - Yavaş)									•		•		•		•			
Quiet - Loud (Sessiz - Yüksek Sesli)				•	•	•	•		•		•			•	•	•	•	
Weak Sound - Strong Sound (Zayıf Ses - Güçlü Ses)	•	•	•	•	•	•	•	•		•	•		•	•	•	•	•	•
Speaker is Close - Speaker is Far Away (Konuşmacı Yakın Konumda - Uzak Konumda)	•		•	•	•	•	•	•	•	•					•	•	•	
Low Sound-LoudSound (Alçak Ses - Yüksek Ses)		•		•	•	•	•	•		•	•	•	•	•	•	•	•	
I Found it Hard to Hear - I Didn't Find it Hard to Hear (Duymakta Zorlandım - Duymakta Zorlanmadım)		•	•	•	•		•	•	•	•		•	•	•	•	•	•	•

Careless - Related (Umursamaz - İlgili)					•				•										
I Found it Hard to Listen - I Didn't Find it Hard to Listen (Dinlerken Zorlandım - Dinlerken Zorlanmadım)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•
I Found it Hard - I Didn't Find it Hard (Zorlandım - Zorlanmadım)						•	•		•									•	
Acoustical Environment is Bad - Acoustical Environment is Good (Akustik Ortam Kötü - Akustik Ortam İyi)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•
I am Pleased - I am Uncomfortable (Memnunum - Rahatsızım)								•					•					•	
I am Satisfied - I am Disturbed (Memnun Oldum - Rahatsız Oldum)	•	•	•		•	•		•		•			•	•		•	•	•	•
I Prefer the Hall - I Don't Prefer the Hall (Salonu Tercih Ederim - Salonu Tercih Etmem)				•	•				•	•	•	•		•	•	•		•	•
I Made Effort While Listening - I Didn't Make Effort While Listening (Dinlerken Çaba Gösterdim - Dinlerken Çaba Göstermedim)		•	•	•	•	•	•		•	•		•	•	•		•	•	•	
	Selections of subjects who are trained in acoustics																		
	Selections of subjects who are not trained in acoustics																		

The selections made for adjective pairs belonging to different categories can be seen in Figures 1-4.

DOI: 10.15320/ICONARP.2021.151

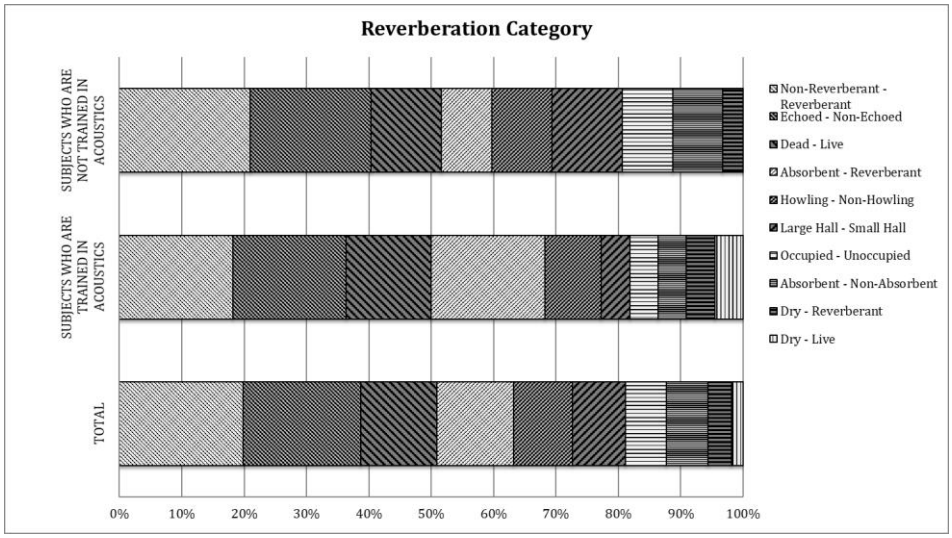

Figure 1. Adjective Pair Selections for Reverberation Category

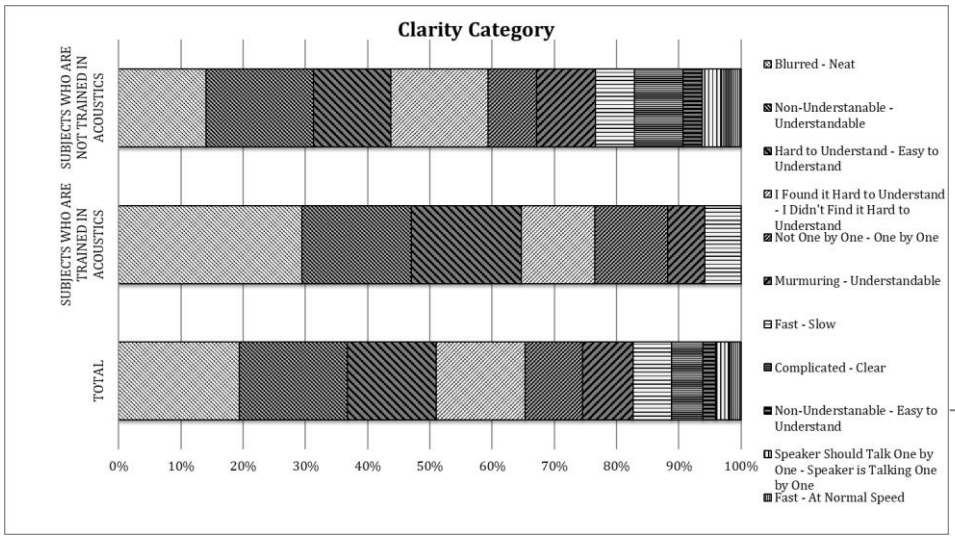

Figure 2. Adjective Pair Selections for Clarity Category

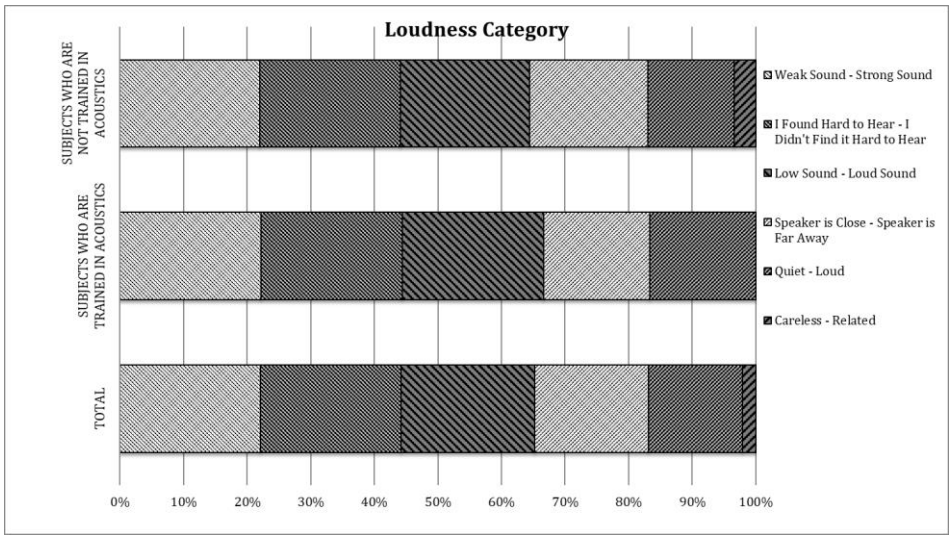

Figure 3. Adjective Pair Selections for Loudness Category

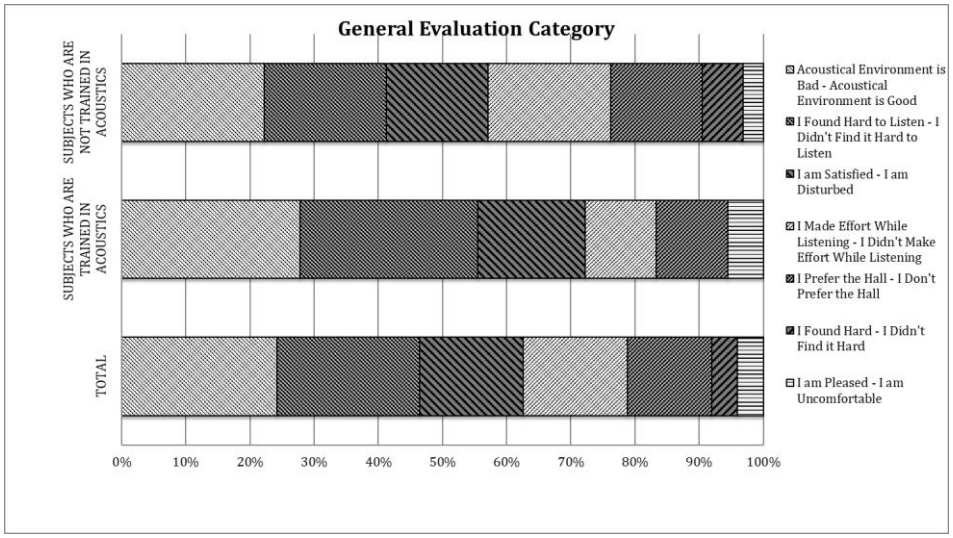

Figure 4. Adjective Pair Selections for General Evaluation Category

SELECTED ADJECTIVE PAIRS

In the light of the data obtained from the second step tests, the adjective pair selections made by the subjects are examined.

For the reverberation category, the subjects found the adjective "dry (kuru in Turkish)" to be unsuitable despite the same word is used in subjective evaluations in English often. On the other hand, the subjects considered the adjectives "non-reverberant (çınlamasız in Turkish)" and "dead (ölü in Turkish")" appropriate for short reverberation time. However, instead of the adjective pair "complicated – clear (karışık – açık in Turkish)" which is obtained from the literature research for the clarity category, the subjects found the "blurred – neat (bulanık – net in Turkish)" adjective pair more appropriate.

Our results show that the subjects are more likely to define the speech sound and the place where the speech is made rather than identifying the speaker. It is also found that those who are not trained in acoustics are more likely to identify more adjective pairs than those who are trained in acoustics, subjects who are trained in acoustics generally made selections less than five for the categories except the general evaluation.

In the second step tests, some highly selected pairs of adjectives contained the same adjectives. This may cause confusion in the questionnaires. It is appropriate to include one of the adjective pairs containing repetitive adjectives in the questionnaires to be prepared.

Therefore, the following adjective pairs are excluded from the list accordingly: a) "absorbent – reverberant (yutucu – çınlamalı in Turkish)" pair is removed from the reverberation category in favor of the "non-reverberant – reverberant (çınlamalı – çınlamasız in Turkish)" pair, b) "hard to understand – easy to understand (anlaşılması zor – kolay anlaşılır in Turkish)" pair is removed from the clarity category in favor of the "not-understandable – understandable (anlaşılır – anlaşılmaz in Turkish)" pair, c) "murmuring – understandable (mırıltılı – anlaşılır in Turkish)" pair is removed from the clarity category in favor

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of the "not-understandable – understandable (anlaşılır – anlaşılmaz in Turkish) pair, d) "quiet– loud (sessiz – yüksek sesli in Turkish)" pair is removed from the loudness category in favor of the "low sound – loud sound (alçak ses – yüksek ses in Turkish)" pair.
The resulting adjective pair list is given in Table 7.

Table 7. Adjective pair list (edited)

Category	Adjective Pair	Preference Ratio (%)
Reverberation	Non-Reverberant – Reverberant (Çınlamasız - Çınlamalı)	84
	Echoed - Non-Echoed (Yankı Var (Yankılı) - Yankı Yok (Yankısız))	80
	Dead – Live (Ölü - Canlı)	52
	Howling - Non-Howling Uğultulu - Uğultusuz	40
	Large Hall - Small Hall (Büyük Salon - Küçük Salon)	36
Clarity	Blurred – Neat (Bulanık - Net)	76
	Non-Understandable – Understandable (Anlaşılmaz - Anlaşılır)	68
	Not One by One - One by One (Tane Tane Değil - Tane Tane)	36
	Fast – Slow (Hızlı - Yavaş)	24
	Complicated – Clear (Karışık - Açık)	20
Loudness	Weak Sound - Strong Sound (Zayıf Ses - Güçlü Ses)	84
	I Found it Hard to Hear- I Didn't Find it Hard to Hear (Duymakta Zorlandım - Duymakta Zorlanmadım)	84
	Low Sound - Loud Sound (Alçak Ses - Yüksek Ses)	80
	Speaker is Close - Speaker is Far Away (Konuşmacı Yakın Konumda - Konuşmacı Uzak Konumda)	68
	Careless – Related (Umursamaz - İlgili)	8
General Evaluation	Acoustical Environment is Bad - Acoustical Environment is Good (Akustik Ortam Kötü - Akustik Ortam İyi)	96
	I Found it Hard to Listen - I Didn't Find it Hard to Listen (Dinlerken Zorlandım - Dinlerken Zorlanmadım)	88
	I am Satisfied - I am Disturbed (Memnun Oldum - Rahatsız Oldum)	64
	I Made Effort While Listening - I Didn't Make Effort While Listening (Dinlerken Çaba Gösterdim - Dinlerken Çaba Göstermedim)	64
	I Prefer the Hall - I Don't Prefer the Hall (Salonu Tercih Ederim - Salonu Tercih Etmem)	52

As seen from the resulting table (Table 7), some of the adjective pairs are preferred with a very low percentage despite being in the top five selections. Therefore, we further considered an approach where we

apply a cut-off limit of >50% (Table 8). When the cut-off is applied, the number of adjective pairs ended up being less than five for the categories (except the general evaluation) in the questionnaires to be prepared. When the same concepts (scales for categories) are defined with different words, the correlation between these adjective pairs is expected to be high. Therefore, it has been found appropriate to reduce the number of adjective pairs in the questionnaires.

Table 8. List of adjective pairs (cut-off applied)

Category	Adjective Pair	Preference Ratio %
Reverberation	Non-Reverberant – Reverberant (Çınlamasız - Çınlamalı)	84
	Echoed - Non-Echoed (Yankı Var (Yankılı) - Yankı Yok (Yankısız))	80
	Dead – Live (Ölü - Canlı)	52
Clarity	Blurred – Neat (Bulanık - Net)	76
	Non-Understandable – Understandable (Anlaşılmaz - Anlaşılır)	68
Loudness	Weak Sound - Strong Sound (Zayıf Ses - Güçlü Ses)	84
	I Found it Hard to Hear- I Didn't Find it Hard to Hear (Duymakta Zorlandım - Duymakta Zorlanmadım)	84
	Low Sound - Loud Sound (Alçak Ses - Yüksek Ses)	80
	Speaker is Close - Speaker is Far Away (Konuşmacı Yakın Konumda - Konuşmacı Uzak Konumda)	68
General Evaluation	Acoustical Environment is Bad - Acoustical Environment is Good (Akustik Ortam Kötü - Akustik Ortam İyi)	96
	I Found it Hard to Listen - I Didn't Find it Hard to Listen (Dinlerken Zorlandım - Dinlerken Zorlanmadım)	88
	I am Satisfied - I am Disturbed (Memnun Oldum - Rahatsız Oldum)	64
	I Made Effort While Listening - I Didn't Make Effort While Listening (Dinlerken Çaba Gösterdim - Dinlerken Çaba Göstermedim)	64
	I Prefer the Hall - I Don't Prefer the Hall (Salonu Tercih Ederim - Salonu Tercih Etmem)	52

We recommend this final list of descriptive adjective pairs to be included in the questionnaire texts for the subjective evaluations of speech function-halls.

CONCLUSION

It is important to use a common terminology between the audience and the researcher and / or designer during the subjective evaluation studies within the scope of the acoustic design of the halls. With the hypothesis that translations from different foreign sources do not have the same descriptive effect in one's native language, a two-step study was performed to remedy lack of modifiers for speech sound in Turkish.

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The adjectives and adjective pairs defining speech sound were determined through the choices made by the subjects. Revisions are made to this list according to the interviews with the subjects who have and have not received acoustical training during the study. In the end, a common terminology is established between the listener and the researcher and / or designer and the connection for the flow of information is achieved. With result from the study, it is now possible to present coherent questionnaire texts to the audience for subjective evaluations of speech-function halls during the design or renewal stages of the speech-function halls.

Two step approach designed proved to be effective in terms of communicating with the subjects and obtaining outcome-oriented responses. Indeed, the final recommended list have modifiers came from incorporated subject feedback.

Our survey design revealed the difference between trained versus untrained subjects. We found the recommendations from the trained subjects to be more practical for our purposes in this study. However, giving a concrete recommendation for future studies in terms of using or not using training exercise in their survey design is beyond the scope of this study. It is believed a more comprehensive study with a controlled design of usefulness of questionnaires prepared by trained and untrained subjects would benefit this area of research in subjective evaluations of acoustics parameters.

Architectural acoustics is an inevitable design parameter in order to reach high standards in terms of the success of architectural design and performances based on listening. The results of the study can be used in the field of research to correlate the subjective evaluations with objective quantities obtained from simulations or measurements. Selected modifiers will bridge the gap in between these parameters for speech-function halls.

It is expected this study will contribute to the increase the effectiveness of the activities in the speech-function halls, including the educational spaces and therefore the quality of life in conclusion. This indicates an important social gain. In practice, the study will provide economic benefits by contributing to the design of the halls that do not need improvement afterwards.

This study filled an important gap in this area and will help increase the acoustic comfort conditions in the new and / or existing buildings while reducing financial losses with better service to the customers and with more targeted investments for the owners.

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CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

FINANCIAL DISCLOSURE

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ETHICS COMMITTEE APPROVAL

Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS

In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions and organizations) during the survey, in-depth interview, focus group interview, observation or experiment.

REFERENCES

Barron, M. (2009). *Auditorium Acoustics and Architectural Design*. Taylor & Francis. https://books.google.com.tr/books?id=jPuMAgAAQBAJ

Berber Üçkaya, N. (2014). *Eğitim Mekanlarının Akustik Konfor Koşulları Bakımından İrdelenmesi: DEÜ Mimarlık Fakültesi Örneği* [Master's Thesis, Dokuz Eylül University].

British Standards Institution. (2009). *Acoustics, measurement of room acoustic parameters. Part 1: Performance spaces (ISO 3382-1:2009)*. BSI Standards, 2009. https://www.iso.org/standard/40979.html

Çoktaş, K. (2019). *İşitsel Verilere Dayanarak Mekansal Atmosferin Taşkışla Örneği Üzerinden İncelenmesi* [Master's Thesis, Istanbul Technical University].

Farina, A. (2001). Acoustic quality of theatres: Correlations between experimental measures and subjective evaluations. *Applied Acoustics*, *62*(8), 889–916. https://doi.org/10.1016/S0003-682X(00)00082-7

Fields, J. M., Jong, R. G., Flindell, I. H., Gjestland, T., Job, raymond S., Kurra, S., Schuemer-Kohrs, A., Lercher, P., Vallet, M., & Yano, T. (1998). Recommendation for shared annoyance questions in noise annoyance surveys. *Noise Effects '98*, *2*, 481–486.

Furrer, W., Robinson, E. R., & Lord, P. (1964). *Room and building acoustics and noise abatement*. Butterworth. https://books.google.com.tr/books?id=JEDNzQEACAAJ

Gade, A. (2007). Acoustics in Halls for Speech and Music. In T. D. Rossing (Ed.), *Springer Handbook of Acoustics* (pp. 301–350). Springer New York. https://doi.org/10.1007/978-0-387-30425-0_9

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Harvie-Clark, J., Wallace, D., Dobinson, N., & Larrieu, F. (2014). Reverberation time, strength & clarity in school halls: Measurements and modelling. *Proceedings of the Institute of Acoustics*, 36(3), 121–138.

Kurra, S. (2009). *Çevre gürültüsü ve yönetimi*. Bahçeşehir Üniversitesi Yayınları.

Kuttruff, H. (1979). *Room Acoustics*. Applied Science Publishers. https://books.google.com.tr/books?id=dKNsyVAgAYIC

Odeon A / S (2019). *Anechoic Recordings*. https://odeon.dk/downloads/anechoic-recordings/

Orhan, C. (2019). *A Comparative Study on Indoor Soundscape in Museum Environments* [Master's Thesis, İhsan Doğramacı Bilkent University].

Özçevik, A. (2012). *'İşitsel Peyzaj – Soundscape' Kavramı ile Kentsel Akustik Konforun İrdelenmesinde Yeni Bir Yaklaşım* [Doctoral Thesis, Yıldız Technical University].

Savcı Özgüven, İ. Z. (2015). *İlköğretim Binalarında Konuşma Anlaşılabilirliği ve Ses Kalitesini İncelemek Üzerine Bir Alan Araştırması* [Master's Thesis, Istanbul Technical University]. http://hdl.handle.net/11527/8171

Vural, A. (2009). *İstanbul'da Bulunan Dört Konser Salonunun Akustik Açıdan Değerlendirilmesi* [Master's Thesis, Istanbul Technical University]. http://hdl.handle.net/11527/8199

Yılmaz Karaman, Ö., & Berber Üçkaya, N. (2015). Eğitim Mekanlarında Akustik Konfor: Dokuz Eylül Üniversitesi Mimarlık Fakültesi Örneği. *MEGARON*, *10*(4), 503–521. https://doi.org/10.5505/megaron.2015.58076

Resume

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Use of Augmented Reality in the Preservation of Architectural Heritage: Case of the Aqueduct Kuru Kopru (Kayseri, Turkey)

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Abstract

Purpose

The architectural preservation embeds all the activities dealing with the sustainability of the built heritage. The representation and diffusion of heritage take a core place in that process. This study aims at the diffusion of the Aqueduct Kuru Kopru towards a broad public audience, establishment of the awareness that Augmented Reality (AR) methods can be used for the evaluation and presentation of the semi-collapsed structures and serving as a model for the representation and diffusion of virtual reconstructions of Architectural Heritage (AH).

Design/Methodology/Approach

This work refers to restoration and heritage visualization charters, combines Computer-Aided Design (CAD), photogrammetry survey method, and advanced texturing techniques to acquire and model virtual reconstructions of the Aqueduct Kuru Kopru from the Roman-Byzantine period to the year 2017. The paper also describes the frameworks for the implementation of a non-immersive and an immersive AR application to visualize modelled reconstructions. The method used consists of three main stages: modelling of the virtual reconstructions, texturing of models, and development of AR applications.

Findings

This study establishes AR and cultural heritage digitization techniques as efficient tools to represent and diffuse the Aqueduct Kuru Kopru. It engages a broad public audience in better comprehension and assessment of the aqueduct.

Research Limitations/Implications

The fact that the research is based on a single case study is a limitation for its generalisation. However, the case examined provides a basis for future work that may validate its findings in different contexts.

Originality/Value

The paper proposes the rediscovering of long-abandoned aqueduct Kuru Kopru by learning its spatio-temporal evolution through AR. The developed methodology can be easily implemented and puts forward the use of low-cost materials.

Keywords: *Architectural preservation, augmented reality, Kayseri Kuru Kopru, aqueducts*

INTRODUCTION

The principles laid down in the foundations of modern architectural restoration stipulate, "the cultural heritages constitute pieces of evidence of the history of humanity." In this sense, all necessary measures must be taken to ensure their sustainability (Ahunbay, 2014). Various charters and conventions defined internationally by organizations such as the United Nations Educational, Scientific and Cultural Organization (UNESCO), the International Council on Monuments and Sites (ICOMOS), or locally by states define heritage classifications, selection criteria, and restoration principles. The UNESCO classifies Cultural Heritage (CH) according to tangible and intangible values (UNESCO, 2018). The tangible heritage includes movable heritage (paintings, sculptures, wall drawings, etc.) and real estate heritage (historical buildings, archaeological sites, monuments), which is the main object of architectural restoration. The restoration of AH is a multidisciplinary work resulting from a process of documentation, research, analysis of degradations, the definition of a conservation approach, determination of the nature of the interventions, and a monitoring process (ICOMOS, 2013). Beyond this process aiming at the physical preservation of the Cultural Heritage (CH), the ICOMOS Charter for the Interpretation and Presentation of Cultural Heritages Sites states the diffusion of CH towards a broad public as an essential component of the preservation process. The charter stresses that any interpretation and preservation of CH must be based on the scientific research methods, has to provide a global and contextual comprehension and physical and intellectual access to the CH site (ICOMOS, 2008). To this charter, Töre identifies The London Charter for the Computer-Based Visualization of Cultural Heritage and the Seville Charter as the main charters for the dissemination of CH (Töre, 2017). The London Charter for the Computer-Based Visualization of Cultural Heritage presents the intellectual and technical principles for the visualization of CH through implementation, aims and methods, research sources, documentation, sustainability, and access principles (Denard, 2009). To increase the applicability of the London Charter, Seville Charter puts forward eight principles, namely interdisciplinary, purpose, complementarity, authenticity, historical rigour, efficiency, scientific transparency, and training and evaluation. These principles posit that computer-based visualization of CH must be done by an interdisciplinary expert group as a complementary effective management tool. It must be based on historical, archaeological and architectural evidence; must also preserve the authenticity of the heritage and be developed efficiently. The Cultural Heritage is visualized as virtual restoration, virtual anastylosis, virtual reconstruction, or virtual recreation. Virtual restoration refers to the process of creating and using a virtual model to reorder available material remains in order to recreate visually something that existed in the past. In virtual reconstruction, a virtual model helps to recover

Note: This study have been developed based on the master thesis entitled as “Use of Augmented Reality Applications in Architectural Conservation An Assessment Based on the Case Study of Aqueduct Kuru Köprü”, by Adeoti Oke under the supervision of H. Hale Kozlu in Erciyes University, Kayseri.

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visually a building or object made by humans at a given moment in the past. As far as virtual recreation is concerned, a virtual model is used to recover or to recreate an archaeological site visually at a given moment in the past. (Virtual Archaeology International Network, 2016).

The digitization of CH stands as the core part of the virtual digital heritage. This digital approach is sometimes called informational preservation, referring to its capacity to save without damages, several features of the artefact for possibly further reconstruction (Töre, 2017). Several methods and techniques have been used to acquire, register, integrate, and texture data. (Zhao, 2009) describing the modelling of virtual environment distinguishes model data types and modelling methods. While model data types bear methods for the acquisition of data and the link they have with some aspects of real-world objects, modelling methods emphasize the perception modalities of the final user and the features of the simulated object in the virtual environment. In this approach, the data acquisition sub-category gathers primary techniques to digitize the CH. They are actual measurement, mathematical measurement, and artificial construction. Actual measurement involves using data acquisition equipment such as 2D and 3D scanning techniques (Zhao, 2009). Classified onto Image-based modelling, Range-based modelling, Image-based rendering, photogrammetric, and the combination of image-and range-based modelling, these techniques for 3D reconstruction are well described in (Noh et al., 2009) and (Voinea et al., 2018).

Regarding mathematical measurement, a model of the real environment is generated by mathematical models and experimental analysis(Bekele et al., 2018). For instance, (Berk, 2018) proposed a semi-automated generative computer-aided form-finding system to deduce the authentic morphology of traditional Siirt Cas Houses in Turkey. The proposed system extrapolates authentic morphology from existing Siirt Cas Houses analyzing their features and comparing them to original Siirt Cas Houses construction techniques, urban expansion patterns, shapes, and the rhythmic layout of façade elements. Lastly, artificial construction techniques spawn an environment created by the human imagination (Bekele et al., 2018). This latter approach seems unsuitable regarding the scientific foundation that the preservation of CH required. Once the CH is digitized, its features are diffused and communicate thanks to several options like Augmented Reality.

Azuma defines the Augmented Reality (AR) as a variation of Virtual Reality (VR) that is characterized by the combination of Reality and Virtuality, a three-dimensional alignment of those realities and simultaneous interactivity. While VR is an interactive, immersive, and virtual environment entirely produced by computers, the AR allows the user to see his real environment augmented by a virtual layer like virtual 3D models (Azuma, 1997). The full understanding of the relation between AR and VR is provided by the path, namely the virtuality continuum. At the ends of the path, there is Reality and Virtuality

respectively, and between them AR and VR. AR is close to Reality, while VR is close to Virtuality, and the mix between the AR and VR is called Mixed Reality (MR) (Milgram & Kishino, 1994). Pragmatically, AR is considered as a partial or total immersive real-time interactive communication tool that increases the different senses of the user by adding virtual contents to Reality. An augmented reality system incorporates hardware and software architecture. The hardware architecture comprises output interfaces (VR/AR helmets, mobile screens, among others), input interfaces (mouse, touch controllers, remotes, etc.), tracking systems (optical sensors, GPS, accelerometers, gyroscopes, among others) and processors (tablet, workstation, etc.)(Carmigniani & Furht, 2011). The Augmented Reality's software architecture principally includes tools for 3D modelling (Blender, Unity 3D, 3DS Max, Google Sketchup, etc.), a database for markers, a 3D engine (Unity3D, Papervision3D, Away3D, Sandy3D among others), the mobile applications and the software development kits (Augment, Vuforia, etc.). There are several classifications of AR systems basing on the type of hardware architecture, recognition methods, and the environment (outdoor, indoor, etc.). Nonetheless, AR systems can be grouped into image recognition based systems and imageless recognition based systems. Image recognition based systems utilize a printed image or recognize a real object as a trigger (marker) and align with them a pre-recorded virtual data. The second group is a conglomerate of all other types of systems (applications based on projection, on different recognition systems, on location, among others) (Içten & Bal, 2017).

The combination of digitization techniques of CH and virtual technologies like AR rises what is indiscriminately called a technological approach of CH or a Virtual Heritage System. This system helps to document the built heritage for further reconstructions in case of phenomena like hurricanes, tsunami, and wars that can severely damage the structure. It is also the support for the diffusion and the visualization of no longer existing historic buildings parts. Moreover, this system intervenes in the implementation of virtual tour and museums, of educational content and the enhancing accessibility to historic sites by providing points of views that could be hard to observe in the real world because of the size of the building or issues about its physical accessibility(El-Hakim et al., 2004). Specifically, (Bekele et al., 2018) state that the three main application fields of AR in CH are enhancing visitor's experience, heritage reconstruction, and heritage management and exploration. Accordingly, they mainly distinguish applications dedicated to exhibition improvement, exploration, and reconstruction. Exhibition oriented applications enhance the user experience during heritage tours. Regarding exploration applications, the user visualizes and explores the past and present view of the built heritage for interpretation, discovery, and gaining new insight and knowledge (Bekele et al., 2018). In this category, we could notice the possibility of making tests on new restoration techniques from synthetic

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models and formulating hypothesis analysis (de la Fuente Prieto et al., 2017). Whereas explorations applications are more professionally oriented, reconstruction AR applications by enabling interactions with reconstructed heritage views, target a broad public audience without necessarily the requirement of discovering new insights (Bekele et al., 2018). Concisely, AR in the preservation of the AH field is visualization support of virtual restoration, virtual anastylosis, virtual reconstruction, or virtual recreation, and aiming at the improvement of site tours, the exploration of heritage "unseen" features, and the interactions with heritage reconstructed view by a broad audience. Even though several experiences have been developed for the digital preservation of CH, it appears that there is not a unified framework followed by different study cases. Although (Di Mascio et al., 2016) and (Özer et al., 2016) attempted to sum up the process in three main stages: data collecting, data processing, and presentation. The data collection gathers the process of collecting all items needed for digital preservation. They can be sketches, old photographs, videos, laser surveys, models, and a photogrammetric survey, among others. The second phase, namely data processing, has two sub-categories. The first one deals with the generation of the 3D replica (as-built 3D reconstruction) from surveys. The second one is the processing of collected items to generate analytic drawings, realistic renderings, structuration of information management system, and to prepare AR, VR, or MR applications. In the last step, processed items are presented in the form of AR, VR, or MR applications or even in 3D printed model.

The project ARCHEOGUIDE is one of the first attempts to integrate AR to AH. It is an exhibition oriented mobile AR application for archaeological site embedding virtual reconstruction of ruined monuments and virtual recreation of antique sport. A custom tour path is generated according to the user profile. Along the tour, a "cumbersome" unit carried by the user tracks the position and communicates with a central repository to add aligned virtual content to the user view (Vlahakis et al., 2001). The Augmented Reality In Cultural Heritage (ARICH) is another one of the early studies in this field. It proposes an indoor AR application where modelled 3D reconstructions by means of multiple techniques and referring to architectural plans are presented. This project is reconstruction oriented with a real emphasis on learning (Mourkoussis et al., 2002). Up to now, several AR applications have been developed. They provide new technological approaches and techniques, and their whole range can not be covered within this study. A holistic approach of the AR in CH and AH accordingly is discussed in (Bekele et al., 2018). Nevertheless, applications like Nanchang and Guangji temples AR, @rkademi, Aurelian wall AR project, and Parion Theatre AR project should be mentioned because they have somehow close ties to the applications developed in the current study. Nanchang and Gangnji temples are Chinese iconic and historical buildings used as a case study for the development of reconstruction oriented immersive MR

application. This application aims at the digital preservation of these artefacts and the spreading of their features. Unmanned Aerial Vehicle Photogrammetric survey and panoramic photograph shooting are done to obtain 3D replica and panoramic database, respectively. The user can choose either AR or VR scenes through a mobile device interface. The AR scene is based on an image-based indoor architecture system meaning that the user triggers the 3D reconstruction model by scanning a printed 2D marker (Zhang, 2016). As far as the Rome Aurelian wall AR project is concerned, it integrates exhibition and reconstruction oriented AR applications. An integrated survey method combining topographic and photogrammetric surveys is used to replicate the wall digitally. Thereafter, basing on virtual reconstruction hypothesizes and using textures retrieved from the photogrammetric survey, the reconstruction of no-longer-existing Northern door is modelled. The model is uploaded into a commercial AR platform and view in both outdoor and indoor conditions. In outdoor, different points of view of the Northern door are provided in-situ through a mobile device and according to pre-defined hotspots where the user has to stand by. The indoor application aligns the 3D model to a 2D marker(Canciani et al., 2016). @rkademi is an AR experience developed for the twin palaces located at the Fındıklı campus of Istanbul Mimar Sinan Fine Arts University in Turkey. This exhibition-oriented experience integrates into a mobile AR platform 25 scenarios (old photographs, sketches, audios…) and relates, along a QR codes path tour, previous states, and evolution of palaces. Thus, the scanning of each QR code triggers the playing of specific audio and display of a picture aligned with the current Reality (Binan et al., 2013). Similarly, the Parion Theatre AR project takes place in Turkey at the old city of Parion and aims at the digital preservation of the theatre and the diffusion of its features to archaeologists, architects, and tourists. After the theatre and its surroundings were surveyed by the photogrammetric surveying technique, part of the obtained 3D replica is 3D-printed in a white texture. The 3D printed area is laid on a printed site plan, and thanks to markers, the textured site 3D replica, structure elements in fillet mode, and sections are shown through dedicated mobile AR application (Özer et al., 2016).

In this study, two reconstruction-oriented AR applications are developed to present and diffuse towards the professional and non-professional audience the features of the Aqueduct Kuru Kopru by modelling the existing state (virtual 3D replica) and previous states reconstructions. The Kuru Kopru aqueduct is erected in the Kuru Kopru neighbourhood, K35-d-09 block, plots 1073-1074 in Talas district, Kayseri town in Anatolian region of Turkey. Kayseri is one of the oldest cities in Turkey, with a history dating back to 3000 BC. The city has been controlled by several civilizations, especially Hittite, Roman, and Byzantine. Built during the Roman-Byzantine period around the 8th century to meet the water needs of the city, the Aqueduct Kuru Kopru was part of the water supply system where water was taken from the

DOI: 10.15320/ICONARP.2021.152

village of Gurpinar and was made flow through channels dug into rocks (Sezer, 2012). Built at the bottom of the Gomurderesi valley, the aqueduct is 172m long, with an average height of 16m, 12 round arches, and a three-pointed arch (**Figure 1**). With a thickness of about 150 cm, its walls are built with the caisson wall technique and are characterized by the use of ashlar and partly pitch-faced stones as outer leaves. The space between the leaves is filled with quarry stone and pozzolanic lime mortar. While the ashlar is mainly pink and grey andesite tuffs, pitch-faced and quarry stones are pink-grey andesites and basalt tuffs. The buttresses at the north elevation are built with the same techniques and stones (Kozlu, 2010). There are ten buttresses in the north elevation, of which nine were built in the Roman-Byzantine period, and the tenth was added in the Seljuk-Ottoman period. The water channel has a width ranging between 70-80cm, and its form is shaped by two lateral walls of a height of about 50 cm (GEEAYK, 1988).

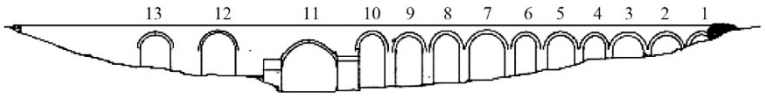


Figure 1. South elevation of the Kuru Kopru Aqueduct during the Roman-Byzantine period (Sezer, 2012).

From the Roman-Byzantine period until the year 2017, the aqueduct experienced four main changes:

1. Seljuk-Ottoman Period: Three arches (numbered 10, 9, and 8) located to the east of the valley bottom were closed with filling walls in order to transform the aqueduct into a water dam whereas arches 1 to 7 were closed by ashlars as a preventive measure to beat their collapse. A buttress was added at the north elevation nearly in the middle of arch 7 to support the filling wall (Sezer, 2012) ;
2. Recent period: In an unspecified date of the recent period, an inappropriate stone and briquette construction was added at the north elevation of the bridge between arches 5 and 6 ; (Sezer, 2012);
3. In 2016: A large part of the aqueduct was in advanced degradation. Arches 12 and 13 were utterly collapsed, and arches 3 and 4 were largely destroyed. On the various spots of the structure, the stones fell, the water canal and its walls collapsed, vegetation and moss grew on the buttresses, among others.
4. In 2017: While the previous deteriorations were worsening, the part of the water channel, supported by arches 3 and 4, was destroyed.

Referring to the history above of the aqueduct and an approach based on three stages: modelling of virtual reconstructions, texturing of models and development of AR applications, the following virtual 3D reconstructions were modelled and presented in AR:

- Kuru Kopru during the Roman-Byzantine period;
- Kuru Kopru during the Seljuk-Ottoman period;
- Kuru Kopru during the so-called recent period
- Kuru Kopru in the year 2016

- Kuru Kopru in the year 2017.

All of these models are presented in two AR applications. The first one; KurukopruAR; is an immersive AR application requiring a printed marker, an AR helmet (Google cardboard), a smartphone, and a Bluetooth Remote Control. By scanning the printed marker and using the remote control, the user can chronologically display each model and the related data in either English or Turkish languages. The second one, KurukopruB, links the reconstruction models to the Aqueduct Kuru Kopru presentation booklet. In this brochure, a marker was inserted for each period of the aqueduct. The user displays the appropriate model by scanning each marker.

This work seeks to reach the following specific objectives:

- Contribute to the diffusion of the Aqueduct Kuru Kopru;
- Establish awareness that semi-collapsed structure could be evaluated and presented thanks to AR methods;
- Serve as a model for the representation and diffusion of virtual reconstructions of the built heritage.

METHODOLOGY

The developed method follows three steps as described by the framework below (**Figure 2**):

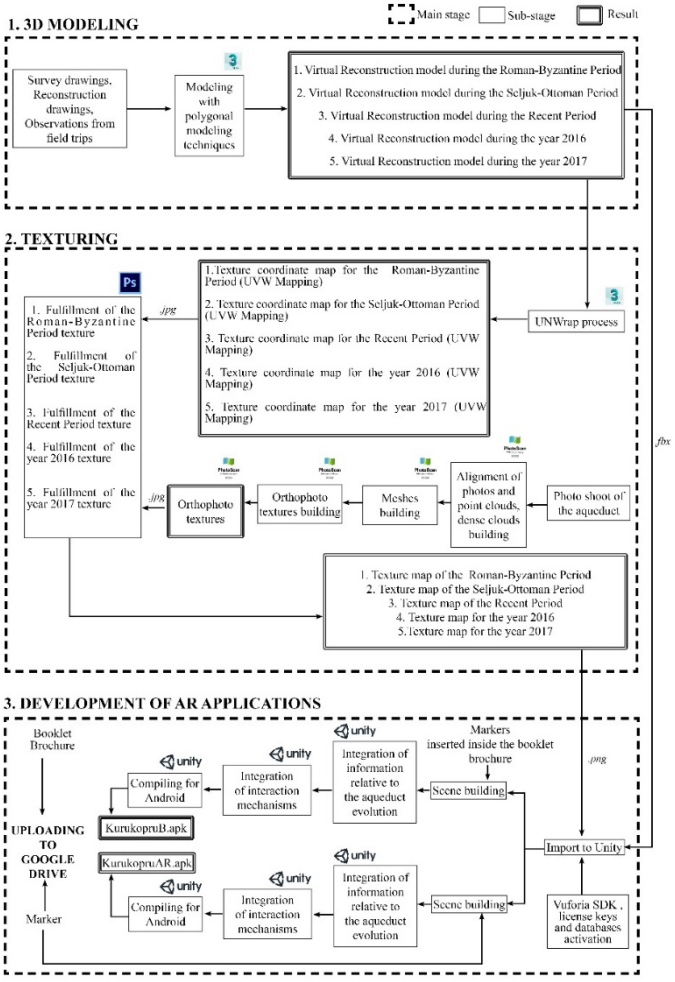


Figure 2. The framework developed for Kuru Kopru Aqueduct Augmented Reality applications

DOI: 10.15320/ICONARP.2021.152

Modelling of the Virtual Reconstructions

At this stage, evolution through the time of the aqueduct was modelled. Modelling was made based on field trips conducted during the years 2016 and 2017, surveying and reconstruction drawings made by the architect Mustafa Sezer as part of the restoration project of the aqueduct. This restoration project has been validated by the Directorate in charge of the preservation of CH in Kayseri but has not yet been implemented. The graphic folder of the restoration project used consists of survey drawings for the year 2011, the reconstruction drawings of the Roman-Byzantine Period, and the Seljuk-Ottoman Period. All of the Autocad drawings were imported into a single Autodesk 3DSMax file and organized in layers. For each drawing, plan, sections, and elevations were aligned (**Figure 3**). By using a polygonal modelling technique, the Roman-Byzantine virtual reconstruction was modelled bearing on the reconstruction drawing of the Roman-Byzantine period (**Figure 4**). To obtain the Seljuk-Ottoman reconstruction model, filling walls and added buttresses were modelled and integrated into a copy of the previous model. Similarly, the virtual reconstruction model of the Recent Period was made through the modelling and integration of the inappropriate stone and briquette wall construction to the copy of the Seljuk-Ottoman model. Afterwards, on the survey drawings and observations carried out on the site, the virtual model reconstruction for the year 2016 was gotten by modelling degradations on the copy of the Recent Period model. The reconstruction model of the year 2017 resulted from the removal of the water channel part supported by arches 3 and 4 from the copy of the reconstruction model of the year 2016. The real textures of the aqueduct were applied to the reconstruction models to ensure their scientific truth, to increase the perception of the reality and the user experience.

Apart from the virtual reconstruction models, two versions of landscapes were modelled based on the topographic data extracted from the drawing survey, and contour lines generated using the software Global Mapper and the aerial view of the site. The first landscape model was used as a topography for the reconstruction models from the Roman-Byzantine Period to the Recent Period while the second was used for the remaining models. While the first model is textured with uniform grass due to the lack of information relative to the landscape condition from the Roman-Byzantine to the Recent Period, the second depicts the actual state of the aqueduct surrounding. The models used in this work record 63226 polys and 64167 vertices; which are lower than the recommended maximum value of 100000 vertices (Unity, 2018); to avoid memory issues while loading models in the mobile AR applications.

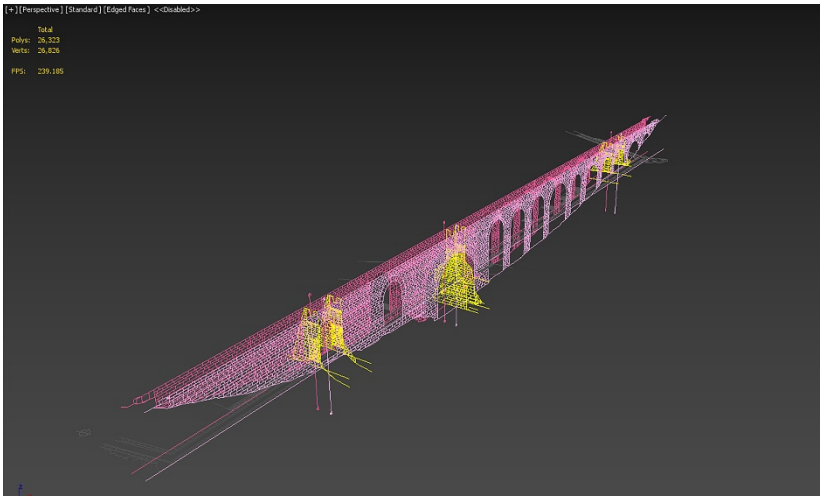


Figure 3. Alignment of plan, sections and elevations in Autodesk 3DS Max software

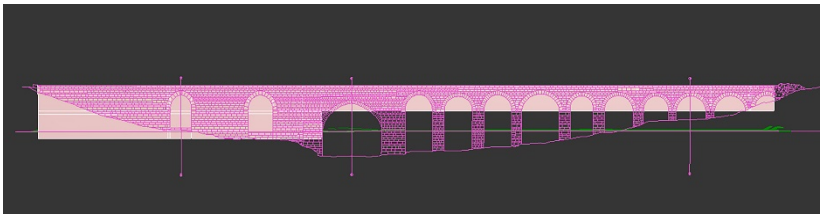


Figure 4. Modelling of the Roman-Byzantine period reconstruction model with the polygonal modelling technique

Texturing of Models

The texturing stage includes the production of a texture coordinate map for each model and the application of real textures obtained from the site to the maps mentioned above. Texture coordinate maps were produced through the application of the Unwrap UVW modifier onto each model. Unwrap UVW mapping allows the assignation of texture coordinates to objects and sub-objects. This mathematical technique uses a system called UVW coordinate system similar to the XYZ system to control the way procedural materials appear on the surface of an object (Autodesk, 2018). At the end of this process, five 10000 x 10000 pixels of square texture coordinate maps were generated (**Figure 5**).

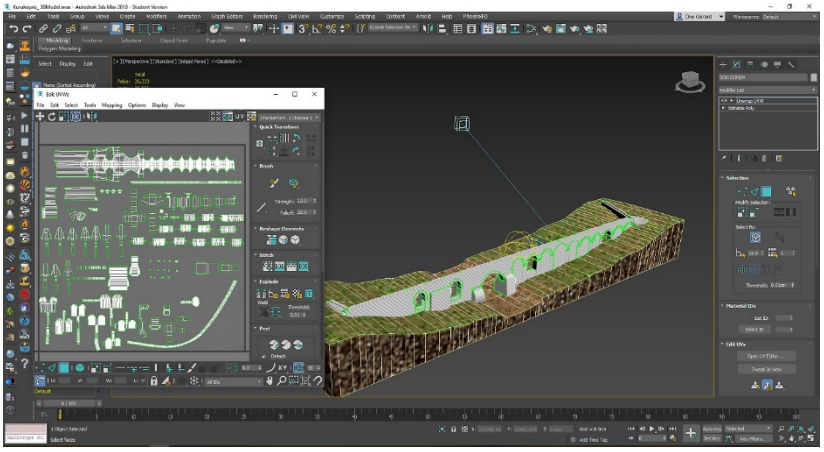


Figure 5. Texture coordinate map (front plan) and the reconstruction model to which it is linked (back plan).

In the second step of this process, the aqueduct photos from the site were taken and processed to have orthophoto textures. To reach this

DOI: 10.15320/ICONARP.2021.152

result, the photogrammetry technique, which can be defined as the science and art of determining qualitative and quantitative characteristics of objects from the images recorded on photographic emulsions, was used. While objects are identified and qualitatively described by observing photographic image characteristics such as shape, pattern, tone, and texture; their quantitative characteristics such as size, orientation, and position are determined from measured image positions in the image plane of the camera taking the photo (The University of Arizona, 1993). The photogrammetry process started with the photo shooting of the aqueduct. The aqueduct was shot using a semi-professional camera Canon 1100D with a 55 mm focal length. During the shooting process, great attention was given to the weather to avoid shading effects on photos. A total of 1500 photos grouped into four sets (north and south elevations, details, upper part) were made. Within each set, photos were overlapped to about 60% to allow the reconstitution of the texture thanks to the analysis and the interpretation of mutual pixels between photos through the photogrammetry algorithm. However, a significant area of the upper part and north elevation was not shot due to the advanced degradations of the aqueduct and the presence of large trees in the front of the north elevation. Photos were imported to the Agisoft Photoscan software, where they were aligned, and point clouds were generated. From point clouds, dense clouds, meshes, and orthophoto textures were created (**Figure 6**).

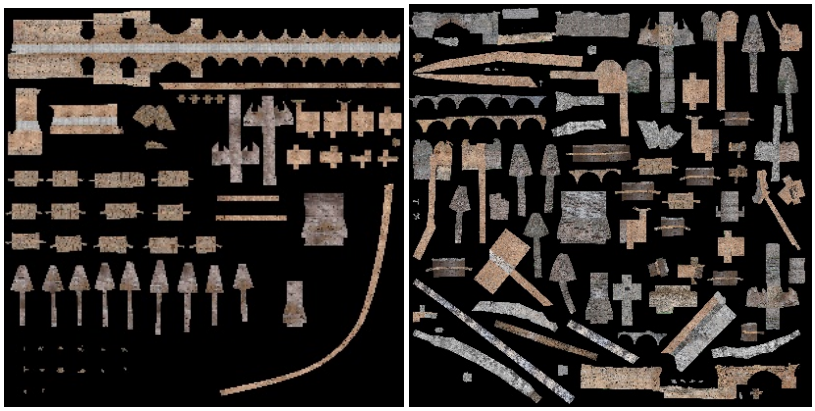
Figure 6. A part of orthophoto textures for the south elevation of the aqueduct

The created textures were exported in .jpg format as orthophoto textures and were applied onto the texture coordinate maps employing Adobe Photoshop software. The principle was to apply orthophoto textures to each texture coordinate map to replicate the textures of Kuru Kopru aqueduct precisely as they were during its evolution. Once orthophoto textures were applied to coordinate maps, it appeared that some parts of textures were missing either because they had disappeared, degraded, or could not be taken on the photos. To solve these issues:

- Orthophoto textures were used to reproduce current missing parts belonging to the Roman-Byzantine period;
- Filling walls textures of the existing closed arches were used to complete other filling walls of Seljuk-Ottoman period that are lost today;

- Existing briquette textures were used to complete parts of the briquette structure of the Recent period that are degraded today;
- Orthophoto textures served as the basis to complete parts of the aqueduct textures that could not be reached on the site. This method was used for the 2016 and 2017 texture coordinate maps.

At the end of this process, five texture maps and two landscape texture maps were brought out (**Figure 7**). Finally, virtual reconstructions of aqueduct and texture maps were imported to the 3D engine Unity software for the development of the AR applications.



(a) (b)

Figure 7. (a) Texture map for the Roman-Byzantine period; (b) Texture map for the year 2017

Development of AR Applications

Reconstruction models in Autodesk Filmbox (.Fbx) file format and texture maps in .png file format were imported to a 3D engine Unity software as a basis for the development of AR applications. The Vuforia Software Development Kit (SDK) was integrated into Unity software as the AR development platform. Two image-based AR applications were developed: KurukopruAR presenting reconstruction models and their detailed history in an immersive environment, and KurukopruB associating each model to a different marker inserted in the Kuru Kopru presentation booklet. For each application, markers database and a license key were generated from the Vuforia developer account**.** Once models and textures were imported in Unity, each texture map was applied to the appropriate model to generate the virtual textured reconstructions models of the aqueduct (**Figure 8**). Lighting, menus, targets, cameras, and texts (number of arches, names of elevations) were added to models to compose the scene. After that, the interactivity mechanisms were added to the scene, and an android compatible KurukopruAR.apk and KurukopruB.apk executable files were generated.

(a)

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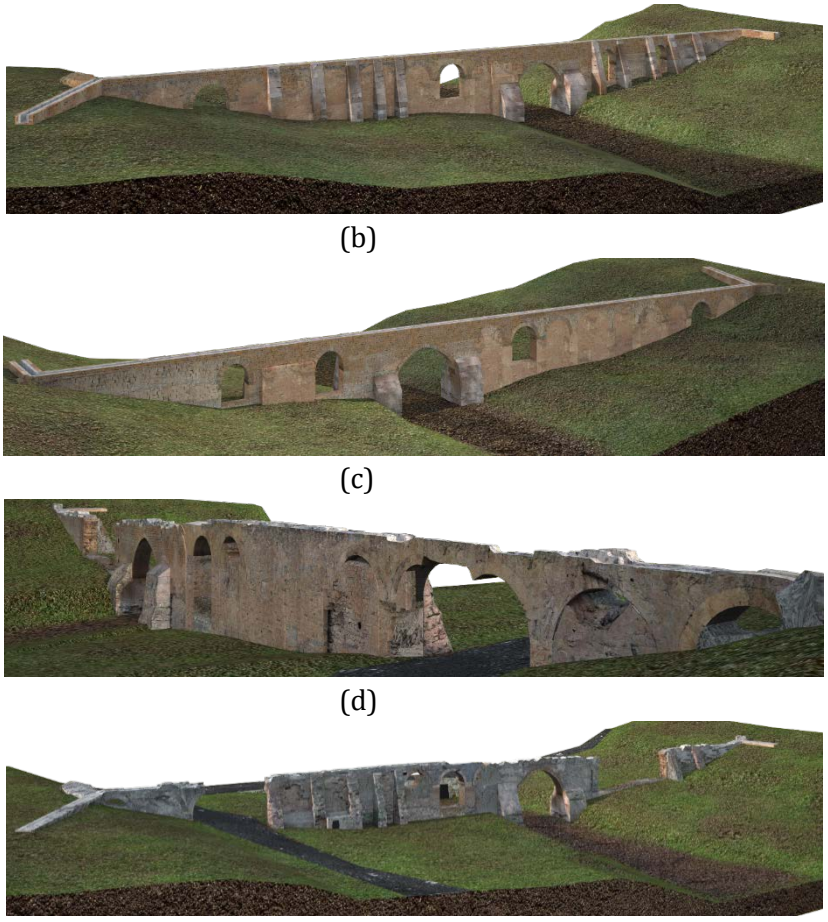


(b)

(c)

(d)

(e)

Figure 8. Virtual reconstruction models (a): during the Roman-Byzantine period (south perspective); (b) during Seljuk-Ottoman period (north perspective); (c): During the Recent Period (south perspective); (d): during the year 2016 (south perspective); (e): during the year 2017 (north perspective)

KurukopruAR Application

KurukopruAR application is an immersive application requiring the use of an AR headset and a Bluetooth Remote. Its general architecture could be summarized as follows (**Figure 9**):

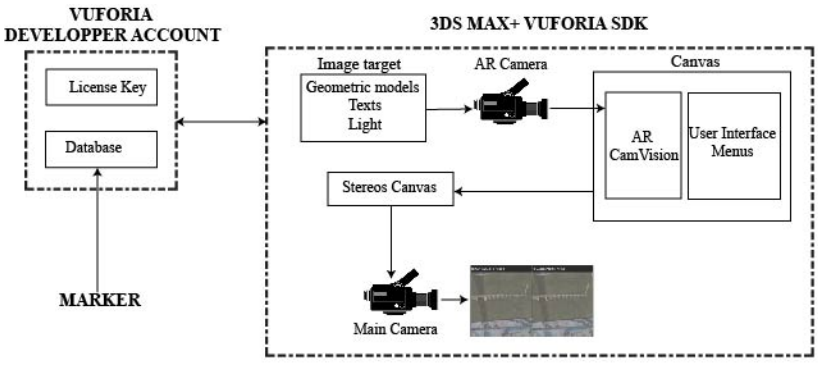


Figure 9. KurukopruAR application architecture

AR camera saves the image of models already aligned to the marker (**Figure 10**). This captured image at each frame is saved as the camera texture under the name ARCamVision in the frame called Canvas. This frame also integrates the nine menus of the user interface. The first menu explains the use of the Bluetooth remote; the second asks the user

to choose between English and Turkish as the language of the application, the third menu shows a general introduction to the Kuru Kopru aqueduct while the fourth to the eighth display reconstruction models chronologically (**Figure 11**). The ninth menu concludes the application. Canvas content is sent to a frame called Stereo Canvas, where it is divided into two equal frames. The content of the stereo camera is sent to the Main Camera and displayed on the user screen. For the usability of the application, the following codes were written in C#:

- "InputManager," which manages the buttons of Bluetooth Remote;
- "Language," where the texts that will be displayed in the application are written;
- "UIController," which manages the content of the user interface. For instance, it allows the display in a precise menu of a specific text taken from the code '' Language '';
- "MainController," which coordinates the codes above: it manages; for example, the display order of models and menus.

Figure 10. Marker for the KurukopruAR application

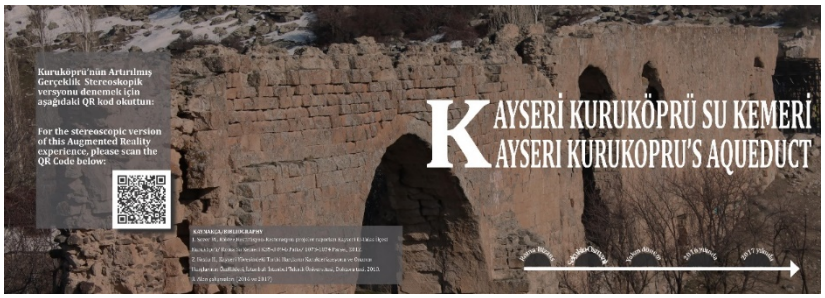
Figure 11. Screenshot of KurukopruAR application

KurukopruB Application

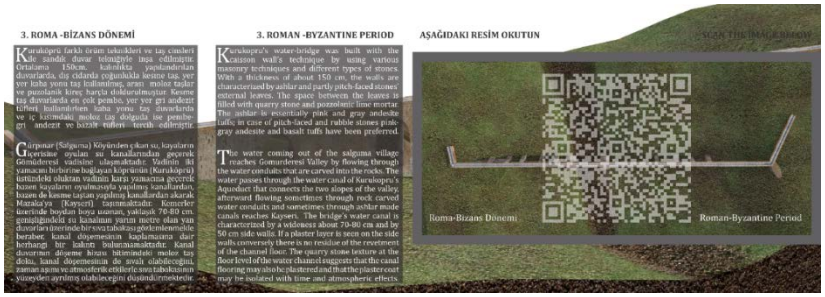
KurukopruB application is based on a Turkish-English Language Kuru Kopru presentation booklet brochure (**Figure 12**). Inside this brochure, five different markers are inserted, and each marker is associated with a

DOI: 10.15320/ICONARP.2021.152

unique reconstruction model of the aqueduct. Its general architecture can be summarized as follows (**Figure 13**).



(a)



(b)

Figure 12. (a) Kuru Kopru booklet Brochure cover page; (b) Page and marker inside the booklet

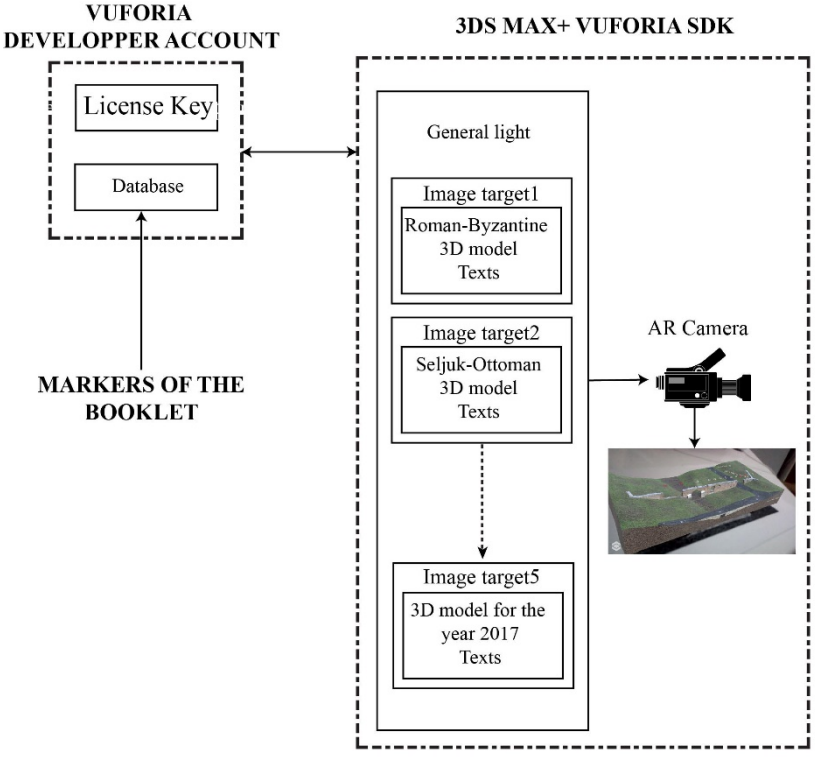


Figure 13. KurukopruB application framework

The AR camera captures and displays the reconstruction models linked to the scanned marker, and thanks to the use of the Lean Touch Plus asset, the user can zoom, shrink and rotate with fingers the reconstruction models. By scanning a marker, the associated model is displayed, as shown in **Figure 14**.

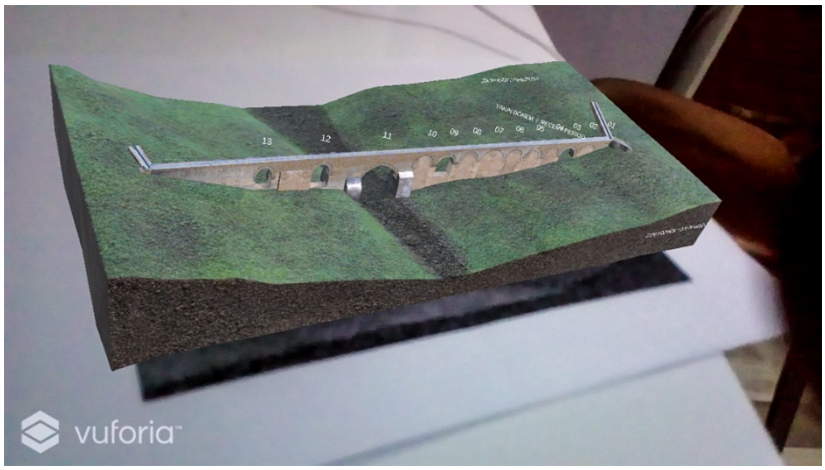


Figure 14. Screenshot of KurukopruB application

AR applications and their targets were arrayed in KurukopruAR and KurukopruB folders, which were later uploaded to Google Drive. While the download link of KurukopruAR is https://drive.google.com/drive/folders/19vqg1_8vXWnoS3-ndeJULC_Ew-_Tv3Z?usp=sharing, that of KurukopruB is https://drive.google.com/drive/folders/19vqg1_8vXWnoS3-ndeJULC_Ew-_Tv3Z?usp=sharing.

CONCLUSION

The digital technologies provide additional tools for the informational preservation of AH. Thanks to digitization and modelling techniques, it is now possible to acquire the existing as-built AH digitally and virtually rebuilt its previous states. This ability allows the visualization of the AH as virtual restoration, virtual anastylosis, virtual reconstruction, or virtual recreation. The AR as a communication tool is the support of the diffusion of the above-mentioned 3D models aiming at the enhancement of tour guidance, exploration of new insights and techniques for professional purposes, and interaction with reconstructed models for inclusive learning.

This study, through developed two AR applications, positions itself in the segment of reconstruction models for the representation, diffusion, and general learning of the Aqueduct Kuru Kopru features by a professional and non-professional audience. The specific objectives namely the contribution to the diffusion of the Aqueduct Kuru Kopru, the establishment of the awareness related to the possibility of evaluation and presentation of semi-collapsed structures thanks to AR methods and the plausibility for this study to serve as a model for the representation and diffusion of virtual reconstructions of AH are achieved as follows:

- Contribution to the diffusion of Aqueduct Kuru Kopru: the diffusion of the aqueduct refers to the ease of access to the aqueduct from any place in the world. The publishing online of the developed AR applications makes this purpose achieved by allowing professionals

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(architects, archaeologists, engineers, researchers, scholars) and non-professional (tourists, students) to reach virtually the aqueduct features and its evolution through the time. Moreover, in case of the availability of the KurukopruB application booklet in tourism promotion centres, more people could be impacted and be aware of the cultural and architectural values of the aqueduct.

- AR methods can favour the evaluation and the presentation of semi-collapsed structures: as stated, Kuru Kopru Aqueduct is currently in advanced deteriorations conditions. Hence, it is tough for visitors to figure out the previous states of the aqueduct. By providing the current aqueduct's 3D replica and old 3D reconstructions through the AR applications, it is somehow easy to compare its different states visually, understand its decay process and enhance the awareness for its preservation. From a professional perspective, developed AR applications could be helpful for the visual inspection of the rate of decay of materials and degradations and the selection of the most adapted restoration approach. Thus, the application of the developed AR approach to other semi-collapsed AH could allow their better evaluation and preservation.
- Serve as the model for the representation and diffusion of virtual reconstructions of the built heritage: it is crucial to ensure the scientific validity of the representation and the diffusion of virtual reconstructions of AH by nesting the proposed method within the framework of international charters. The elaborated AR method obeys to the preservation-related international charters and especially to Seville charters. In other words, it is founded by the principles of purpose, complementarity, authenticity, scientific transparency, and historical rigour. The purpose is the presentation of reconstructions models to achieve ubiquitous learning; the complementary principle is achieved by allowing the visual comparison and diffusion of aqueduct features. The authenticity is ensured by the use of the Aqueduct real textures; the scientific transparency and historical rigour are validated by the use of approved restoration project, scientific articles, and thesis for documenting and, lastly, the validation of efficiency principle is proved by the use of low-cost material (semi-professional digital camera) for a relatively high-quality result. Thus, the developed method could be used efficiently for the representation and visualization of other AH.

From economic and commercial perspectives, the usage of low-cost materials to capture, process, and develop AR applications for the Aqueduct Kuru Kopru demonstrates the potentialities for tourism organizations and public policy to favour the development of several applications that will efficiently engage each one in interactions with any AH. The AR applications that would be developed within this scope could be an appeal for tourists to visit the real AH sites. Thus, the increasing of the number of tourists visiting AH sites could positively impact the tourism economy. In other respects, the digitization of the

aqueduct provides to the body of knowledge a virtual database that could be the starting point of other scientific researches related to the aqueduct Kuru Kopru. From the teaching perspective, developed AR applications could serve as a study case showing to architecture students the degradations that could occur on an abandoned and exposed to natural and human factors built heritage.

For the further developments, in situ Kuru Kopru AR could be implanted. No-longer existing parts could be added directly on the aqueduct remains to offer more contextualised content to the users.

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LEGAL PUBLIC/PRIVATE PERMISSIONS

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REFERENCES

Ahunbay, Z. (2014). *Tarihi Çevre koruma ve restorasyon*. Yapi Endustri Merkezi Yayinlari.

Autodesk. (2018, December 11). *UVW Map Modifier*. Autodesk Knowledge Network. https://knowledge.autodesk.com/support/3ds-max/learn-explore/caas/CloudHelp/cloudhelp/2019/ENU/3DSMax-Modifiers/files/GUID-78327298-4741-470C-848D-4C3618B18FCA-htm.html

Azuma. (1997). A Survey of Augmented Reality. *Presence: Teleoperators and Virtual Environments*, *6*(4), 355–385.

Bekele, M. kassahun, Pierdicca, R., Frontoni, E., & Malinverni, S. (2018). *A Survey of Augmented, Virtual, and Mixed Reality for Cultural Heritage*. *11*(2), 36. https://doi.org/10.1145/3145534

Berk, M. G. (2018). Proposal for an Automated Form Finder System to Deduce the Authentic Morphology of Siirt Cas Houses. *VR Technologies in Cultural Heritage*, 20–33. https://doi.org/10.1007/978-3-030-05819-7

Binan, D., Töre, T., & Kut, S. (2013). *Mimari Koruma Alanında Artırılmış Gerçekliğin Kullanımı ve Değerlendirmesi Mimar Sinan Güzel Sanatlar*

DOI: 10.15320/ICONARP.2021.152

Üniversitesi Örneği (Technical Report No. 2013–12; p. 43). Mimar Sinan Fine Arts University. https://doi.org/10.13140/RG.2.1.2732.5521

Canciani, M., Conigliaro, E., Del Grasso, M., Papalini, P., & Saccone, M. (2016). 3D Survey And Augmented Reality For Cultural Heritage. The Case Study of Aurelian Wall At Castra Praetoria In Rome. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, *XLI*, 931–937. https://doi.org/10.5194/isprs-archives-XLI-B5-931-2016

Carmigniani, J., & Furht, B. (2011). Augmented Reality: An Overview. In *Augmented Reality: An Overview* (pp. 3–46). Springer. https://doi.org/10.1007/978-1-4614-0064-6_1

de la Fuente Prieto, J., Castano-Perea, E., & Arroyo, F. (2017). Augmented Reality in Architecture: Rebuilding Archaeological Heritage. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, *XLII-2/W3*, 311–315. https://doi.org/10.5194/isprs-archives-XLII-2-W3-311-2017

Denard, H. (2009). *A new introduction to the London Charter*. Londoncharter for the Computer-Based Visualisation of Cultural Heritage. http://www.londoncharter.org/fileadmin/templates/main/docs/london_charter_2_1_en.pdf

Di Mascio, D., Chiuini, M., Fillwalk, J., & Pauwels, P. (2016). 3D Digital Reconstructions of Lost Buildings. *Digital Heritage*, *2*, 511–520.

El-Hakim, S. F., Beraldin, J. A., Picard, M., & Godin, G. (2004). Detailed 3D reconstruction of large-scale heritage sites with integrated techniques. *IEEE Computer Graphics and Applications*, *24*(3), 21–29. https://doi.org/10.1109/mcg.2004.1318815

GEEAYK. (1988). *Tescil Fişi* (No. 177). GEEAYK.

ICOMOS. (2008). *Charte ICOMOS pour l'interprétation et la présentation des patrimoines culturels patrimoniaux*. ICOMOS – 16e AG / 16th GA Interpretation and presentation of cultural Heritage Sites / Interprétation et présentation des sites culturels patrimoniaux, Quebec. https://www.icomos.org/charters/interpretation_e.pdf

ICOMOS. (2013). *ICOMOS Türkiye Mimari koruma bildirgesi*. Ulusal Mimari Koruma Uzmanları Toplantıları ve ICOMOS Türkiye Milli Komitesi, Turkey. http://www.icomos.org.tr/Dosyalar/ICOMOSTR_tr0784192001542192602.pdf

Içten, T., & Bal, G. (2017). Artırılmış Gerçeklik Üzerine Son Gelişmelerin ve Uygulamaların İncelenmesi. *Gazi Üniversitesi, Fen Bilimleri Dergisi PART C: TASARIM VE TEKNOLOJİ*, *5*(2), 111–136.

Kozlu, H. (2010). *Kayseri Yöresindeki Tarihi Harçların Karakterizasyonu ve Onarım Harçlarının Özellikleri* [Doctoral Thesis]. Istanbul Technical University.

Milgram, P., & Kishino, F. (1994). A Taxonomy of Mixed Reality Visual Displays. *IEICE Trans. Information Systems*, *E77-D, no. 12*, 1321–1329.

Mourkoussis, N., Liarokapis, F., Darcy, J., Pettersson, M., Petridis, P., Lister, P. F., & White, M. (2002). Virtual and Augmented Reality Applied

to Educationnal and Cultural Heritage Domains. *Proceedings of BIS*. Business information Systems, Poznan.

Noh, Z., Sunar, M. S., & Pan, Z. (2009). A Review on Augmented Reality for Virtual Heritage System. In M. Chang, R. Kuo, Kinshuk, G.-D. Chen, & M. Hirose (Eds.), *Learning by Playing. Game-based Education System Design and Development* (pp. 50–61). Springer Berlin Heidelberg.

Özer, D., Nagakura, T., & Vlavianos, N. (2016). Augmented Reality (AR) of historic environments: Representation of Parion Theater, Biga,Turkey. *ITU AZ*, *13*(2), 185–193.

Sezer, M. (2012). *Rölöve,Restitüsyon-Restorasyon projeler raporları Kayseri ili-Talas İlçesi Kuruköprü/ Roma Su Kemeri K35-d 09-b Pafta/ 1073-1074 Parsel* [Technical Report].

The University of Arizona. (1993). *Principles of Photogrammetry*. https://www.lpl.arizona.edu/hamilton/sites/lpl.arizona.edu.hamilton/files/courses/ptys551/Principles_of_Photogrammetry.pdf

Töre, T. (2017). *Mimari Koruma Bağlamında Artırılmış Mekân Uygulamalarının Kullanımı Ve Değerlendirilme Ölçütleri "@RKADEMI" Uygulaması* [PhD Thesis]. Mimar Sinan Fines Arts University.

UNESCO. (2018). *Qu'est-ce que le patrimoine culturel immatériel ?* UNESCO Patrimoine culturel immatériel. https://ich.unesco.org/fr/qu-est-ce-que-le-patrimoine-culturel-immateriel-00003

Unity. (2018). *Optimizing graphics performance*. Unity Documentation. https://docs.unity3d.com/Manual/OptimizingGraphicsPerformance.html

Virtual Archaeology International Network. (2016). *Seville Principles*. Alfredo Grande. http://sevilleprinciples.com/

Vlahakis, V., Karigiannis, J., Tsotros, M., Gounaris, M., Almeida, L., Stricker, D., Gleue, T., Christou, I., Carlucci, R., & Ioannidis, N. (2001, November). ARCHEOGUIDE: first results of an augmented reality, mobile computing system in cultural heritage sites. *Proceedings of the 2001 Conference on Virtual Reality, Archeology, and Cultural Heritage*. Conference on Virtual Reality, Archeology, and Cultural Heritage, Glyfada. https://doi.org/10.1145/584993.585015

Voinea, G.-D., Girbacia, F., Postelnicu, C. C., & Marto, A. (2018). Exploring Cultural Heritage Using Augmented Reality Through Google ' s Project Tango and ARCore. *VR Technologies in Cultural Heritage*, 93–106. https://doi.org/10.1007/978-3-030-05819-7

Zhang, Y. (2016). *Virtual Tourism-Digital Scanning, Augmented Reality and Virtual Reality as a Holistic Approach to Chinese Historic Building Preservation* [Master Thesis]. OCAD University.

Zhao, Q. (2009). A survey on virtual reality. In *Sci China Ser F-Inf Sci: Vol. 52* | (pp. 348–400).

Resume

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Hemp as a Potential Material in Architecture: Is it Possible in Turkey?

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Abstract

Purpose

Hemp, also known as cannabis sativa, has long been one of the most important agricultural crops—an essential food for humans and animals since the Neolithic period. It is also one of the most-durable raw materials used in both traditional crafts and many newer industries, such as the marine, clothing, automotive, and architectural industries. However, despite its beneficial health properties and use in making durable products, hemp has been banned in many developed countries largely because it has been labeled an illegal plant due to its psychoactive properties. After the 1980s, industrially cultivated hemp in the form of hempcrete, hemp brick or low or high technology cast in situ wall systems gained recognition in architecture. Since the industry 4.0 industrial revolution in the 2000s, the use of hemp has become increasingly important in medicine and nutrition and in industries such as paper, plastics, architecture and construction. Hemp has been illegal for many years in Turkey. However, in Turkish history, using cannabis, hemp and hashish for food, pleasure, socializing, clothing, rope, paper and mortar has been an accepted sociocultural phenomenon. Therefore, this article seeks to evaluate the possibility of using hemp in architecture by addressing its use in architecture, specifically in Turkey.

Design/Methodology/Approach

This research uses a literature review to explore both the history of hemp in Turkey and its construction applications.

Findings

The results showed that given enough support, the use of such materials could create beneficial effects for the architecture, construction and education sectors in Turkey.

Research Limitations/Implications

In the future, a research with funding and permissions could be conducted to observe of the physical and chemical characteristics of hemp and hemp-based materials, which is lacking in this study.

Social/Practical Implications

Recognizing the benefits of hemp could have positive effects on the economy, health, agriculture and architecture of communities in Turkey. Hemp can replace petroleum-based materials while having the advantages of being cost effective, providing a variety of production possibilities, and needing less water for cultivation.

Originality/Value

This is the first study to address the potential use of industrial hemp in Turkey from an architecture and design perspective.

Keywords: *Hemp architecture, Hempcrete, building material, sustainability*

INTRODUCTION

Although most people have knowledge of hemp, we hesitate to talk about it due to its controversial nature in contemporary societies. This avoidance is mainly due to attitudes in the civilized Western world and comes from a lack of knowledge of it or from the strict policies and regulations that governments and institutions have implemented regarding the use of hemp since the 1950s in Western societies. As a historically and culturally important plant, hemp has been one of the most important and largest agricultural crops in the history of humankind. In addition, hemp has been an essential food and high-protein resource for humans and animals due to its high nutritional properties (Herer, 2010).

Hemp one of the earliest recorded domestically grown plants, having been cultivated since Neolithic times (Stanwix & Sparrow, 2014); it is "the strongest, most-durable, longest-lasting natural soft-fiber" plant and can be grown in any climate or soil condition (Herer, 2010). Hemp, which is also known as cannabis sativa L. or indica L., is a plant that grows naturally in many different geographies (Pecenko et al., 2014)[1]; it is a versatile raw material that has been used in many ways over the past 10,000 years (Deitch, 2003).

The use of industrial hemp is currently spreading throughout many sectors, including architecture and construction. Since its recognition in Europe in the 1980s, hemp has regained its former importance, especially in the medicine and health sector, as well as in biocomposite industries.

Hemp use became widespread in Europe through migration to the shores of the Black Sea and towards India and the Middle East (Bouloc, 2013). The current state of hemp use currently remains ambiguous and contradictory due to research results that emphasize its importance in health and its other benefits.

The barriers and production bans are gradually being abolished by governments and nongovernmental organizations in many countries. Therefore, this article reviews the literature on the use of industrial hemp in architecture, design and construction worldwide, while specifically addressing its production possibilities in Turkey.

THE USE OF HEMP AND CANNABIS THROUGHOUT HISTORY

Hemp appeared in the earliest known woven fabric in 8,000–7,000 BC (Herer, 2010). Hemp emerged in China c. 8000 BC. Pottery has been found that was dated between 6200 and 4000 BC and depicted clothing that, through analysis, was shown to be made from hemp East (Bouloc, 2013). In the Neolithic Çatalhöyük settlement, hemp was found in a well-preserved linen cloth made from flax and placed between the skeletons of persons buried beneath the floors in one of the shelters; similar discoveries have been made in places from the Levant all the way to central Anatolia (Hodder, 2013). Hemp seeds and rope have also been found in graves and tombs in China from 2000 BC East (Bouloc,

[1] Initially studied and classified as two types—as cannabis sativa and indica—by Lamarck in 1785, a third type of hemp, i.e., cannabis ruderalis, was later found by the Russian botanist D. E. Janischevsky in 1924 (Hillig & Mahlberg, 2004).

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2013). In addition to having nutritional qualities, hemp leaves and flower tops (marijuana) have been commonly used as medicines for at least 3,000 years (Herer, 2010).

Cannabis was used in Mesopotamia since the time of the Sumerians, and its seeds were used as a medicine. It is estimated that cannabis may have been carried to Europe by the Scythians in the VII century BC. The first information about the use of cannabis as a drug is found in Herodotus's The Histories (5th century BC) (Baytop, 1995). From a sociocultural context, hemp has been smoked in various forms in many cultures. The cannabis indica form of hemp appeared in the 15th-century medieval art miniatures of Mehmed Siyah Kalem (Haydaroğlu, 2004); (Yörükan Karamağaralı, 1982) (Figure 1). In addition, in İslamic art, hemp and hashish motifs have been found in life trees on stone reliefs.

Figure 1. A miniature by Mehmed Siyah Kalem of a man presenting cannabis to another, 15th century (Yörükan Karamağaralı, 1982) Image from (Haydaroğlu, 2004) (The image is from the Topkapı Palace Museum, TSM 2160/10-A.).

The trade of hemp was also been "a fundamental driving force in the early colonization of America" (Deitch, 2003). Throughout history, hemp has been used for basic needs; oil extracted from hemp seeds was used as lamp oil, resin, paint and varnish "to waterproof the hulls of wooden ships [as well as for] fuel, medicines and cosmetics and paper" (Deitch, 2003). Hemp seeds were consumed as porridge, and hemp flour was used in baking. Its strong fibers have been valued for use as cordage, rope, cloth (linen), and sailcloth (Stanwix & Sparrow, 2014); (Deitch, 2003).

In addition to the abovementioned useful properties, hemp has had very important uses in healthcare because it can be used for easing pain, as well as for animal feed or in veterinary medicine (Herer, 2010); (Deitch, 2003). Hemp has been used in Arabia, Persia, Mesopotamia, Egypt, and India (Levey, 1979). Also referred to as *kendir, kenevir*, and *kınnab* in Turkish, hemp (cannabis sativa) was used in Ottoman medicine as a pain killer and by İbn-i Sina (Avicenna) (Kahya, 2017). In Western medicine, hemp was recognized for its health properties between 1850 and 1941. Extremely strong marijuana (known as *cannabis extractums*) and hashish extracts, tinctures and elixirs were previously used as

ICONARP – Volume 9, Issue 1 / Published: 21.06.2021

medicine in the USA (Eddy, 2011); (Herer, 2010). However, the rapid development and popularization of the cotton industry in the late 18th century (Allegret, 2013) caused a sharp decrease in the areas producing hemp over the last 150 years in Europe until the 2000s (Allegret, 2013). However, since anti-hemp propaganda began in the USA in the 1920s, hemp has faced restrictions and bans in many developed countries due to the illegal use and misuse of hemp for its psychoactive effects on humans (because of the THC content). After 1936, the USA "enacted laws to regulate marijuana. Its decline in medicine was hastened by the development of aspirin, morphine, and then other opium-derived drugs, all of which helped to replace marijuana in the treatment of pain and other medical conditions" (Eddy, 2011).

The production of both hemp and flax decreased continuously after World War I. Due to the its medical effects and pharmacological properties, hemp lost its "widespread use as a component fiber in many fabrics", as the chemical company DuPont was developing "synthetic fibers derived from the petrol industry" (Allegret, 2013). The discrimination against hemp due to its psychoactive properties and its misuse because of those properties has resulted in it being banned and poorly recognized today; thus, the value of a raw feedstock such as hemp must be contemplated not only from sociocultural, sustainability and health perspectives but also from the perspective of the monetary policies imposed on it.

Therefore, the story behind hemp helps us understand its importance and potential uses in many sectors, from human and animal health to the conservation of nature. Therefore, this article focuses on the use of hemp in our modern societies and urges us to reconsider its potential use in architecture and construction. Today, cannabinoids (CBD oil), nonpsychoactive compounds derived from the leaves of *cannabis sativa* and medical marijuana plants, have been recognized as having beneficial antitumor effects for some types of cancer (Velasco et al., 2012) and for soothing the symptoms of MS; additionally, they have been found to have beneficial health effects for those with many other chronic diseases.

Other beneficial uses of the hemp plant include its use in "crop rotation", as well as "erosion, pest and weed control", and "any other horticultural or environmental purposes" (Herer, 2010). Since hemp "needs less water and fertilizer than cotton and needs no pesticides" and is "high in cellulose", it has been evaluated as an alternative [out of sources other] to trees for paper making throughout history (Danenberg, 2002) (Figure 2).

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Figure 2. A hemp field in China (Hemp Edification, 2016).

INDUSTRIAL HEMP IN ARCHITECTURE, DESIGN AND CONSTRUCTION

Raw materials, including those used in earthen architecture, such as adobe, rammed earth, cob (mud mixed with straw) and straw bale houses, have been used in the making of spaces and in architecture since the beginning of humankind, both traditionally and as a modern design. Earthships are made of recycled materials such as used tires, while cob houses are made of mixtures of soil, sand, and straw. Cob houses do not usually have construction inside; the materials used in cob housing are not dried bricks. However, the houses are formed on site. In straw bale houses, straw bales are used as the loadbearing structural elements, which are plastered with a lime-based, earth or clay mixture. Sometimes the straws are bounded together with string or other support to add rigidity.

Since the 2000s and after the industry 4.0industrial revolution, hemp has gained importance in Europe, and the European Industrial Hemp Association (EIHA) (2005) was established (Ulaş, 2018). Today, as Peev mentions, "hemp production is still facing restrictions in many countries which make its implementation in the building sector difficult" (Peev, 2012). However, since the 1980s, hemp has been evaluated for its use in architecture, since it is a "renewable and low energy material" (Danenberg, 2002).

From a global perspective, between 1961-2000, Asia had the largest hempseed production, i.e., 56.8%, while Europe produced 41.1% and 2.1% of hemp was produced in the Americas; however, this shifted to 75.4% in Europe, 23.2% in Asia and 1.4% in the Americas between 2000 and 2018 (FAOSTAT, 2020a); (FAOSTAT, 2020b).

Plants such as flax, straw, hemp, reed, and those with starch-based fibers, such as banana, pineapple, coconut, bamboo and China-grass, have been used to make biocomposites (Gruber, 2011). In terms of agricultural livestock husbandry materials, products such as "straw, flax, sugar cane bagasse, corn, hemp, rice husk, groundnut shells, kenaf,

ICONARP – Volume 9, Issue 1 / Published: 21.06.2021

sheep wool, casein and polylactic acid (PLA)" have been used as raw materials in buildings (Suttie *et al*., 2017).

In terms of hemp, the fibrous bark and hemp hurds (shiv), as the softer parts of the plant, make good building and construction materials. Hemp seeds can be used as "a raw material for biologically derived plastics, resins, paints, varnishes and shellacs" (Danenberg, 2002). Both the stalks and the fibers of hemp are processed for and used as construction materials (Réh & Barbu, 2017). Hemp has been used as a traditional building material for centuries. The use of hemp in the history of architecture and construction goes back to the 6th century (between 500 and 751 AD), when hemp was used as a mortar in "bridge abutments" in Merovingian bridges in France (Hemp Edification, 2015). A stone bridge built with hemp mortar in Saint Céneri le Gérei in this period still stands. The mortar consists of more than 10% hemp, which allows the mortar to "absorb moisture, allowing the mortar to take in and release the excess water when conditions allow" (Cannalore, 2018) (Figure 3).

Figure 3. Hemp mortar stone Merovingian bridge, Sarthe River Bridge in Saint Céneri le Gérei, France (Cannalore, 2018).

As Réh and Barbu explain, "hemp fiber, as with many other natural fibers, is undergoing a renaissance within the construction sector" today. Hemp has gained importance due to its natural properties and "the environmental benefits in terms of energy saving during construction phases" (Réh & Barbu, 2017). Hemp fibers have been described as a material that is "cost effective", has "high tensile strength and stiffness", is "ideally suited for needle-punched nonwoven products", is an "effective replacement for glass fiber", "reduces molding time", "can be customized to meet a variety of specifications and different manufacturing systems", and in which a "consistent quality and availability of supply is possible" (Réh & Barbu, 2017) (Figure 4).

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Figure 4. Hemp/Flax Plant Straw (Hemp Straw Pellet Mill, n.d.).

Hemp a more sustainable raw material than other materials currently used, and the final product is also carbon negative. This means that hemp has the ability to absorb more greenhouse gases over its lifetime than are emitted during its production process (Réh & Barbu, 2017). According to the European Industrial Hemp Association (EIHA), which supports "the cultivation, processing and use of industrial hemp", within the confines of EU law, "hemp will and is playing an important role in the production of innovative biobased products like natural fiber reinforced plastics, insulation and construction materials" (EIHA (The European Industrial Hemp Association), 2009). Some other hemp associations include the Indian Industrial Hemp Association (founded 2011), the Hemp Industries Association, USA (1994), the Canadian Hemp Trade Alliance (2003). The top hemp-growing countries are China, Canada, the USA, France, Chile, and North Korea (James, 2019). Following hemp's growing popularity, "the International Hemp Building Association" (IHBA) was founded in Ireland in 2009 (The International Hemp Building Association (IHBA), 2019). This association, along with similar organizations, promote the use of hemp and its applications and practices using handmade and industrial techniques. In architecture, the IHBA and HempBuilding, which is directed by Steve Allin and is located in Ireland, aim to build a hemp community and develop and support the production and use of all hemp-based construction materials and their byproducts (The International Hemp Building Association (IHBA), 2020).

Hemp has been used in numerous products and industries for many years in Asia and Europe; however, as Gołębiewski mentions, because hemp crops were considered illegal, the hempcrete technology that emerged at the end of the twentieth century was prohibited (Gołębiewski, 2017). Despite these legislation barriers in many countries, the spread of industrial cannabis as an economic and sustainable raw material is increasing. Many governmental and nongovernmental organizations are making arrangements to overcome the obstacles to the use of hemp in many sectors, from healthcare to construction materials. Industrial hemp is receiving recognition in countries such as Ireland, Australia, Great Britain and France and is mostly used in single-family homes, multifamily and public buildings,

warehouses, and other structures. The current studies indicate that the long-term performance of this material is promising, and the legislation regarding hemp production is beginning to change; thus, it is likely that hemp will be used and produced in many countries in the near future (Gołębiewski, 2017).

Hemp composite building materials are "inexpensive, fire-resistant construction materials, with excellent thermal and sound-insulating qualities"; they are produced by "heating and compressing plant fibers to create strong construction paneling, replacing dry wall and plywood" (Herer, 2010) (Figure 5).

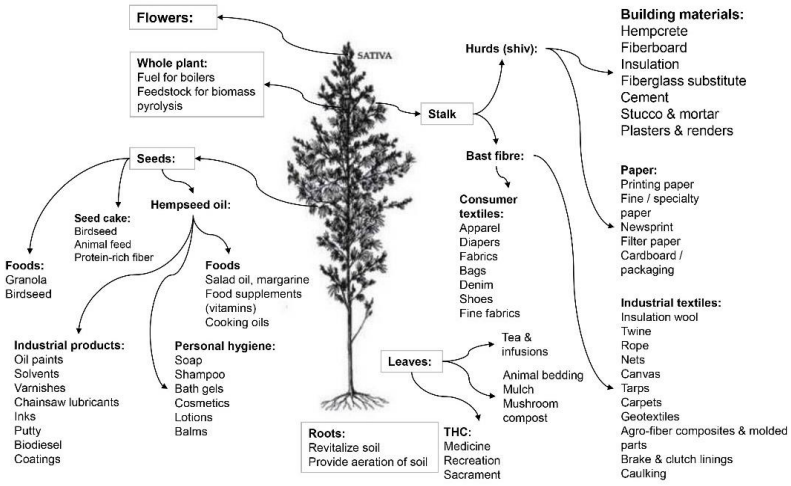

Figure 5. Commercial uses of hemp today (Data derived from (Stanwix & Sparrow, 2014); (Yörükan Karamağaralı, 1982); Image derived from (Leafscience, 2017).

In the Great Seljuq, Anatolian Seljuk and Ottoman periods, the hemp motif was used on tiles, ceramics, tombstones, carpets and miniatures (Yörükan Karamağaralı, 1982). There is also evidence that in Ottoman architecture, hemp and linen fibers mixed with porous and soft Horasan mortar were used as one of the three types of mortars in a number of mosques, such as the soft texture mortar used in the dome of the Rustem Pasha Mosque (1555-1561), which was built by an architect named Sinan, and the dome of the Sultan Ahmed Mosque, which used a harder texture mortar. "The hardness of this material, which is a good sound absorber at low and medium frequencies, can be controlled according to need" (Kayılı, 1988) (Figure 6). Additionally, in the Selimiye Mosque, the interior walls have a hemp motif.

Figure 6. Sultanahmet Mosque, 1603-1617, İstanbul, built by architect Sedefkar Mehmed Aga (Sultanahmetcamii, 2019).

DOI: 10.15320/ICONARP.2021.153

In Turkey, adobe architecture was prevalent in Anatolia throughout history, mainly in the Mesopotamian region. After the World War II, many countries developed contemporary earthen architecture. Having significant ecological and economic advantages, including being energy efficient, modern works on earthen architecture started in the 1950s in Turkey and were given the name *alker* in the early 1980s. *Alker* (adobe mixed with lime, gypsum and water) construction was developed by Ruhi Kafesçioğlu. Many *alker* construction buildings have been built, mainly in rural areas of Turkey (Kafesçioğlu, 2017). Another historic hemp house was built in Nagano, Japan, in 1698. Hemp stalks, also known as *asagara*, were used in the interior walls and under the roof (Figures 7, 8).

Figure 7. The Nakamura Family Residence, Miasa Mura, 1698, Japan (Miasa village, 2019).

Figure 8. The Nakamura Family Residence: *Asagara* (hemp stalks) used under a *Kaya* (Eulalia) roof; *asagara* used as an interior wall; hemp stalks at the base of thatched roof beams; and roof tied with hemp ropes (Miasa village, 2019) (from left to right)

HEMP USES IN ARCHITECTURE

Hempcrete (hemp-lime composite)

After the 1980s, hemp's use as an industrial raw material was rediscovered and redeveloped in France in the form of "hempcrete" (hemp-lime composite) in the construction industry (Herer, 2010). Hempcrete is "created by wet-mixing the chopped woody stem of the hemp plant (hemp shiv) with a lime-based binder (natural hydraulic lime) to create a material that can be cast into molds" (Allin, 2005); (Stanwix & Sparrow, 2014). Hemp shivs are byproducts of hemp fiber

harvesting and the trash burned in the field (Réh & Barbu, 2017). This mixture is a non-loadbearing, sustainable, "breathable" (vapor permeable) and insulating material that can be used to form walls, floor slabs, ceilings and roof insulation in both new build and restoration projects (Allin, 2005); (Stanwix & Sparrow, 2014). Other binders for hempcrete include cement clinker, pozzolanic ash, natural cement, clay, and gypsum (Maher, 2014) (Figures 9, 10).

Figure 9. A Hempcrete mixture (Allin, 2005); (Stanwix & Sparrow, 2014); Images derived from (Limetec, 2019); (Plainshemp, 2019).

Figure 10. a) The first Hempcrete use in the renovation of Nogent-sur-Seine, France; b) Maison d'Adam, Angers, France, renovated in 1994 (Chevreuil, 1966); (Google Map, 2019); (Gołębiewski, 2017).

Hemp fibers have been produced with the same technique and reintroduced in a material named Isochanvre in France. Isochanvre is "made from hemp hurds mixed with lime" (Herer, 2010). It can be used in drywall construction between form work or as interior or exterior insulation; it can also be poured as a floor or as an addition to an existing slab to raise the level of a floor. In Europe today, France is "the biggest producer of hemp, but only about 5% of hurds are used in the building sector" (Hemp Edification, 2015); (Danenberg, 2002). Hempcrete can be manually applied or sprayed, and it can be used in industrial buildings attached to steel frames with timber panels.

Since hempcrete has "low mechanical strength" (Gołębiewski, 2017), it does not have high strength or loadbearing characteristics; instead, it can be "used for walls, roofs and floor" as well as "wall insulation" on the "outer side of an existing home". Other properties of hempcrete include "low thermal conductivity", "high vapor permeability", and being "very water absorbent". Hempcrete is "fire resistant" and "resistant to biological" and "chemical corrosion" and has good "acoustic properties" (Gołębiewski, 2017). In addition, hempcrete "is very fire resistant, is an extremely efficient insulator, can be grown with very little water, and is

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virtually impermeable to termites. The lime content in the hemp blocks sucks in large quantities carbon dioxide—up to 12 tons, according to the company's own estimates—which it needs to harden, meaning that the wall continuously becomes more solid and that the structure, over time, becomes carbon negative" (Cannabric, 2012). Hempcrete can also be constructed in circular shapes (Hemptechglobal, 2019).

Hemp Technologies in the USA and Cannabric, designed by the German architect Monika Brümmer, are two of the main hemp companies engaged in hemp building projects. Cannabric has been successfully used in ecological and bioclimatic architecture, the restoration of historic buildings and the rehabilitation of traditional cave dwellings (Cannabric, 2019a). As a material similar to a concrete mixture, hempcrete is made of wood chips (hemp shivs) derived from hemp (cannabis sativa), a lime-based binder and water (Cannabric, 2012). This mixture is realized by using a mechanical mixer; the mixture is placed or sprayed onto surfaces; it can be poured into slabs or shaped with formwork (Stanwix & Sparrow, 2014); (Cannabric, 2012)[2]. It can be "built with prefab pressed bricks" and "the outer walls can then be finished with a coated wooden cover or with a plaster mix of lime and sand" (Réh & Barbu, 2017) (Figures 11, 12, 13, 14, 15).

[2] According to Stanwix and Sparrow, the mixture is applied rather than poured, since it does not have a liquid consistency (Stanwix & Sparrow, 2014).

Figure 11. Process of hempcrete: mixing; cast in situ hand-placed hempcrete around a softwood timber structural frame; spray-applying the mixture; and sprayed hemp is projected against a permanent shuttering board (Stanwix & Sparrow, 2014)

Figure 12. Hempbrick by Cannabric, compressed earth brick with hemp for insulating, loadbearing inside- and outside walls (Cannabric, 2019b).

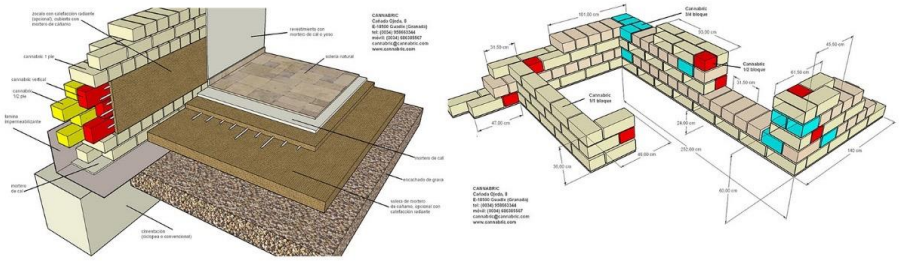

Figure 13. a) Hempbrick by Cannabric, with insulation and b) loadbearing properties (Cannabric, 2019b).

Figure 14. A Hempcrete residential building constructed in Asheville, North Carolina, by Hemptech Global (Hemptechglobal, 2019).

Figure 15. Hempcrete house in Marfa, Texas Hemptech Global (Hemptechglobal, 2019).

Hempcrete can be produced in both block form and panel form. “Hempcrete blocks are usually laid by wetting on the surface and bedded using a thin mortar of hydraulic lime and sand” (Stanwix & Sparrow, 2014). During application, hempcrete can be “cast in situ” or “precast”. In a cast in situ application, it takes weeks for the material to dry, and the process is affected by the environmental conditions, such as “temperature, exposure, humidity and effective management of drying”, but there are reduced labor costs in this type of application. However, in the precast method, the blocks have a time advantage because the material has dried prior to the application (Stanwix & Sparrow, 2014).

Another material produced from hemp fibers is hemp and flax wool, which was developed in 1998. Hemp wool is composed of hemp fibers “using heat-fusible fibers, generally of polyester” (Arnaud *et al.*, 2013). Housing insulation made from hemp is quickly becoming a popular eco-friendly alternative to traditional insulation materials, such as mineral wool. As a low energy, natural material, hemp can take its place among materials such as “biologically derived plastics, resins, paints, varnishes and shellacs” (Danenberg, 2002).

DOI: 10.15320/ICONARP.2021.153

Hemp Uses in Industrial Design

Hemp also contributes to strengthening bioplastics as raw feedstock. Whether or not it is biodegradable, natural or petroleum-based plastic can be made from natural fibers, such as those of "animal origin (wool, silk…) or of plant origin (cotton, flax, hemp, jute, sisal, kenaf, cocoa, abaca and wood)". Plant-based fibers are commonly used in plastics. In Europe, wood, flax and hemp are three of the most commonly used fibers (Mougin, 2013).

Hemp fibers have also been used in durable bioplastics to improve their quality (EIHA (The European Industrial Hemp Association), 2009); additionally, due to "their high strength and rigidity, these plastics are currently used in the construction of cars, boats, and even musical instruments" (O'Connell, 2017). "Some of the earliest plastics were made from cellulose fibers" that came from "nonpetroleum-based sources" (O'Connell, 2017). In the 1940s, Henry Ford designed a car with panels made of hemp fibers (Deitch, 2003) and other agricultural feedstock. Today, hemp is used in a variety of applications in industrial design ranging from everyday objects to the automotive industry and its components, such as car doors, as seen in the panels of some of BMW, Mercedes and Bugatti cars. A hemp plant contains "65-70% cellulose", making it a good source of cellulose (wood contains approximately 40%, flax 65-75%, and cotton up to 90%). Hemp can be added to conventional, petroleum-based plastics or, alternatively, can be used on its own. However, 100% hemp-based plastic is rarely produced because "composite bioplastics", which are a mixture of hemp and other plant-based sources, are on the market (O'Connell, 2017). As a low-cost, sustainable material with a low environmental impact, hemp bioplastics "reduce…CO2 emissions" (EIHA (The European Industrial Hemp Association), 2009); (O'Connell, 2017) (Figure 16).

Figure 16. Industrial products with hemp: 1) A hemp motorcycle; 2) a sports car, the Lotus Eco Elise, made from different natural fiber compounds using hand lay-up, vacuum bagging and RTM (UK), Lotus Cars; 3) BMW 5 Series car door, a case with natural fiber and polypropylene made using compression molding (Hempro International, Winter & Linotech); an urn made from hemp fiber and bioplastics using compression molding or injection molding; a scale; and a case made of natural fiber and polypropylene using compression molding (Germany), Hempro International, Winter & Linotech (EIHA (The European Industrial Hemp Association), 2009); (EIHA (The European Industrial Hemp Association), 2010); (Carus, 2013) (from left to right in order).

Hemp has attracted growing interest from designers, mainly in the furniture field, and it is used for a variety of products, from everyday objects such as water- and humidity-resistant plant containers, e.g., such as "Agri-Hemp" by Michele Armellini and Marco Grimandi; to water skateboards, e.g., the "Delta-9" by Gabriele Basei. One example is a stackable hemp chair designed by architect and designer Werner Aisslinger. To make the chair, hemp fibers are molded under heat. The design features "soft curves, along with a horizontal and vertical ring structure, [which] is a new approach to this complex seating typology" (Anon, 2016). Another experimental project called Fabric-Action explores the use of hemp in other everyday objects, such as skateboards,

swings, and even air purifiers. The forms can be shaped using techniques such as 3D-printing, CNC technology and laser-cutting (Novozhilova, 2017) (Figures 17, 18, 19).

Figure 17. Hemp chair by Werner Aisslinger, 2016 (Anon, 2016); chair and house made of hemp and kenaf, compressed with a water-based thermoset binder (Studioaisslinger, 2016).

Figure 18. Triangular modules made from recycled triangular hemp pieces made from recycled materials, Benjamin Hubert, 2015 (Layer, 2015).

Figure 19. Kinesis, by Ekaterina Shchetina and Libero Rutilo, is a swing made out of three different types of hemp; Agri-Hemp by Michele Armellini and Marco Grimandi is made with thermoformable woven hemp; "Delta-9", designed by Gabriele Basei, and is made with waterproof hemp (From left to right) (Novozhilova, 2017).

HEMP AS A POTENTIAL CONSTRUCTION MATERIAL IN TURKEY: ITS HISTORY

Although the laws regarding the control and production of industrial hemp in Turkey are quite new, the use of hemp and hashish is quite old. Hemp, also referred to as "kenevir/kendir" (esrar) or "çedene" in some districts of Turkey, is known as "beng/benc" in Iran; "banga, ganja" in India; "haşiş" in Iraq, Syria, and Egypt; "kif" in North Africa and marijuana in the Americas (Baytop, 1995). During the Great Seljuk, Anatolian Seljuk and Ottoman Empires, hashish and Indian hemp were used in handicrafts, such as tiles, ceramics, carpets, gravestones and miniatures (Yörükan Karamağaralı, 1982). According to the writings in the Sultanahmet Camii construction book, in the Ottoman period, "keteni sıva", "keteni rah-ı ab", and "keten-i kenevir" linen fibers were utilized in plaster construction and waterway insulation (Sultanahmet Cami, 2018).

In Turkish history, as mentioned in Mongeri's narrative, cannabis was used because of its psychoactive properties during the Ottoman Empire

DOI: 10.15320/ICONARP.2021.153

and was consumed in spaces known as “esrarkeş kahveleri” (coffee shops for cannabis) (Baytop, 1999)[3]. Although its use was occasionally prohibited, the use of cannabis was never fully prevented (Baytop, 1999); “In the early days, hemp leaves were burned to remove the smoke, or pills and pastes prepared from the leaves were swallowed to obtain a drug effect. After the widespread use of tobacco, the cannabis leaves were mixed with the tömbeki (a type of tobacco) and started being drunk in hookah…Although it has been banned from time to time and various fatwas have been made for the execution of the users, it has never been completely prevented from being obtained and used. There was a class called “esnâf-ı bengciyân” in Istanbul. They used to prepare mixtures containing syrup, paste, and cannabis-like products in their shops at the Tiryakiler Bazaar in the Süleymaniye District. Evliya Çelebi notes that there were sixteen shops of such tradesmen, and sixty people were employed in this line of business”. After 1864, “only pharmacies began selling cannabis in exchange for a prescription” (Baytop, 1995).

Cannabis was cultivated in many regions of the Ottoman Empire, and Izmit, Bursa and Mosul were the leading regions in terms of abundance and quality: “After explaining that marijuana is one of the causes of mental illnesses seen in the East (Istanbul) in 1860, Mongeri gives detailed information about cannabis cultivation, marijuana production and drinking in the Ottoman Empire... In 1860, more than half of the hashish was exported to Syria and Egypt... In Istanbul, hashish was mainly used for syrup for sherbet or plaque of tobacco” (Baytop, 1995).

In this context, in the Istanbul Encyclopedia, Reşat Ekrem Koçu provides detailed information and accounts of cannabis use, including in *esrarkeş dervish*, or coffee shops, for madrasah and cannabis in the Ottoman period. He mentions that Turkey, specifically Istanbul, is one of the places where marijuana is easiest to obtain and is most abundantly supplied (Koçu, 1971a). He later mentions tourists and travelers who used cannabis and participated in the Beatnik culture in İstanbul and caused the moral corruption of the young generation, supporting these stories with news articles published in periodicals (Koçu, 1971b). Although the use of cannabis and hashish has a place in Turkish society socially, as far as it is known, its use in the field of construction was not mentioned in the sources until the 1900s, from its use in the Ottoman period.

Until the middle of the 18th and 19th centuries, 80% of the textile fibers produced in the world consisted of flax and hemp, while this number lessened starting in the 1930s. It is estimated that the “cannabis policies of international policy makers [had] an important role in this” (Kılıç, 2017). After the Republic, early studies on hemp use in Turkey were conducted by agricultural engineers in Turkey. Hemp was grown in Kastamonu in 1938. Early research after the Republic was conducted by the agricultural engineer Fethi İncekara, who wrote his thesis on the morphology of hemp in the 1950s.

[3] Originally from L. Mongeri, “Etudes sur l’aliénation mentale en Orient: Causes de la folie - l’Esrar”, Gazette Medicale d’Orient, p. 8, İstanbul 1864, p. 69, 102).

ICONARP – Volume 9, Issue 1 / Published: 21.06.2021

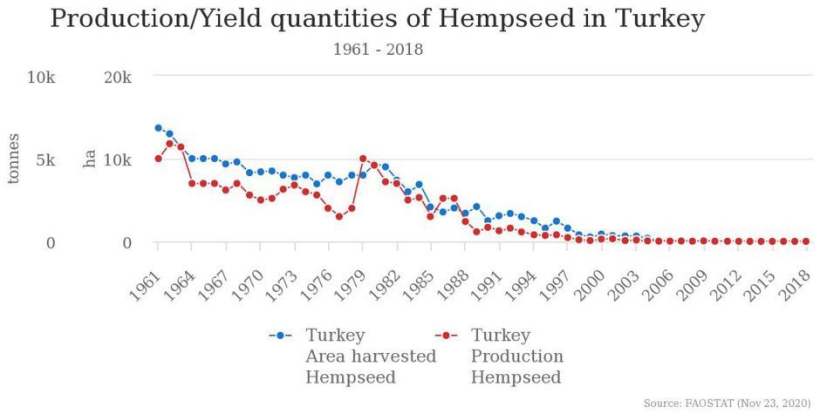

Figure 20. Production/Yield quantities of hempseed in Turkey, between 1961-2018 (FAOSTAT, 2020d).

The first production of hemp was in the Taşköprü (Kastamonu) Hemp Factory (Taşköprü Kendir Fabrikası), which was founded in 1946 by Sümerbank and was a hemp pooling and peeling facility; it closed due to its loss in 1951 (Ulaş, 2018). The second attempt was the Hemp Industry Establishment (Kendir Sanayii Müessesesi) established in Kastamonu in 1949 for the production of twine and canvas from hemp fiber. The factory, "which meets the sack needs of the Turkish Grain Board" (Toprak Mahsülleri Ofisi, 1938), started to import jute, which is used as the equivalent of hemp and is much cheaper in India, after 1953, due to the low yield and profitability of using hemp as a raw material. This had negative effects on the production of hemp, and later, SEKA used hemp for paper production. With the foundation of a factory in Taşköprü, which was established in 1984 and privatized, hemp was later imported due to its economic reasons, which nearly put an end to hemp production in Turkey (TMMOB Ziraat Mühendisleri Odası., 2019).

In Turkey, hemp is used in the production of medicine, paper, biofuel, fabric, textile, and automotive industry applications, in all areas where oil and petrochemicals are used, cosmetics, soaps, electricity, construction sector, feed industry, oil making, as well as in asphalt and road construction (Ulaş, 2018).

In 1964, the area harvested for hempseed in Turkey was 10,000 hectares with 3,500 tonnes; this rate dropped dramatically to 6 hectares and a total of 3 tonnes in 2018. The harvested area for hempseed is 32,140 ha and 142,883 tonnes worldwide (FAOSTAT, 2020c) (Figure 20).

A regulation numbered 29842 and known as "Kenevir Yetiştiriciliği ve Kontrolü Hakkinda Yönetmelik" (Hemp Cultivation and Control of Regulations, published in 2016) aims at determining "the procedures and principles regarding permissible cannabis cultivation and unauthorized cannabis cultivation in order to prevent the production of cannabis-related drugs". There are a total of 19 cities and districts in Turkey that are allowed to grow cannabis[4] (Kenevir Yetiştiriciliği ve Kontrolü Hakkında Yönetmelik (Hemp Cultivation and Control of Regulations, 2016).

[4] The first regulation for cannabis/hemp was put in place in 1930. Regulation 1609 generalizes about marihuana preparations sold in pharmacies and pharmaceutical warehouses (Tamim (Circular), 1930). Regulation 4895, which passed in 1943, defined the exchange of cannabis quotas between Turkey and Germany (Kanunlar (Laws), 1943). In regulation 20672, which passed in 1990, there is clarification that hemp cultivation for fiber, seed or both purposes is permitted in a total of 18 provinces and districts in Turkey. Apart from these provinces and districts, cannabis cultivation for whatever purpose is prohibited (Kenevir Ekimi ve Kontrolü Hakkında Yönetmelik (Regulation on Hemp Cultivation and Control), 1990).
Cannabis is cultivated in the following cities and their all districts: Amasya, Antalya, Bartın, Burdur, Çorum, İzmir (Tire–Ödemiş), Karabük, Kastamonu (Taşköprü), Kayseri, Kütahya, Malatya, Ordu (Fatsa-Ünye), Rize, Samsun, Sinop, Tokat, Uşak, Yozgat ve Zonguldak (Kenevir Yetiştiriciliği ve Kontrolü Hakkında Yönetmelik (Hemp Cultivation and Control of Regulations, 2016)

DOI: 10.15320/ICONARP.2021.153

In the Black Sea region, fiber plants (flax, hemp, and nettle) have been cultivated for many years; however, such cultivation is relatively small compared to the widespread production of cotton in other parts of Turkey[5]. Weaving is a traditional and widespread handicraft in the eastern Black Sea region. One unique fabric in the region, which is mainly used in clothing, is called feretiko (Rize fabric), which is a kind of cloth made of hemp and cotton grown in the Black Sea and woven on hand looms in the Trabzon and Rize regions (Usta, 2017).

In Turkey, raw materials that can be evaluated in architectural construction include, in addition to hemp, everything from straw to sunflowers and canola stalks to corn, and the options depend on their geographical distribution. Turkey has a suitable climate and soil structure for industrial hemp cultivation, and the Black Sea is a very suitable breeding area, especially in terms of climate and soil demand (Gül, 2008). After 2016, hemp was produced on a total of only 70 decares of land with the permission of the Ministry of Food, Agriculture and Livestock in the Black Sea region (Tarım, 2018). Within these constraints, the ASAM Kendir Institute (ASAM Cannabis Institute), which was founded in 2018, functions as an organization within the Eurasian Center for Strategic Studies under the Eurasia Foundation (Avrasya Stratejik Araştırmalar Merkezi). The Institute aims to cultivate, produce, and commercialize hemp in Anatolia for medicinal and scientific research purposes, such as in agriculture, food, textiles, pharmaceuticals, paper, cardboard, automobiles, natural and oil-free plastic materials, construction materials, biodiesel, biomass energy, and cosmetics. It is estimated that THC-free and CBD-rich, dust-free hemp plants, which can be easily grown, will make a major contribution to the soil and development of Turkey. Today, in addition to other industries, hemp is evaluated in Turkey in terms of the building and construction industry, such as its applications in roofs, floors, insulation materials, frames, pipes, mortar additives, and wood-plastic composites (Ulaş, 2018).

[5] Hemp is used in ropemaking in Kastamonu and in thread and cloth in Rize; however, feretiko production is not suitable for rapid or substantial production in the textile industry.

HEMP FOR A SUSTAINABLE WORLD

Since the processing of hemp is not complicated and has the advantages of low labor costs and low energy consumption, “hemp can play a central role in the transition from a hydrocarbon-based economy to an ecologically sustainable carbohydrate-based economy” (Danenberg, 2002). On the other hand, although hemp is also a renewable agricultural feedstock, its use in architecture may also shift to an intense material advertisement. This case would be similar to the commercialization of bioplastics in the middle of the nineteenth century, as Smith mentions (Smith, 2009).

The fact that hemp does not require any pesticides makes it a suitable plant for permaculture. Hemp can be used to purify water in a sustainable system (Tallarico, n.d.). Hemp can help us achieve more sustainable building practices that are cost effective. Hemp and

ICONARP – Volume 9, Issue 1 / Published: 21.06.2021

environmentally friendly binders can replace wood panels to a certain extent (Réh & Barbu, 2017). However, the testing, evaluation and analysis of the long-term sustainability and characteristics of hemp products in the construction industry are very new (Danenberg, 2002). In addition to life cycle assessment (LCA), the land use and environmental impacts need to be observed (Suttie *et al*., 2017).

When we consider hemp production as a tool for our endless consumption practices, nature is seen as a raw material that is used for human consumption and needs and is ready to be engineered, as we have seen with green plastics or bioplastics. Similarly, the emergence of bioplastics derived from natural raw agricultural waste has led to the mass production of bioplastics instead of serving niche markets; this has, in turn, meant that the cost of analyzing and testing bioplastics for their mass production instead of serving the niche market is challenging.

The fact that adobe, a material made from soil, is similar to other derivative building materials that have been used in various societies and especially in rural areas throughout the existence of humankind, has not received as much attention as "contemporary hemp" is another thought-provoking point. Time will show how strong the effects of hemp will be on architecture. Another point of discussion is the evaluation of these natural plants being produced as ecological materials in Turkey.

CONCLUSIONS AND RECOMMENDATIONS

As a sustainable raw material, hemp very gradually increased in the construction sector in Turkey due to it being perceived as a new material. Another fact is that with the recent lifting of the bans, the potential for the use of hemp in the field of protection will be discovered in the near future.

Regarding public policies on the use of hemp, the growing interest and its economic and commercial impacts need to be evaluated in Turkey by the construction sector. With the current partial lifting of the ban on industrial hemp production, which came to a standstill in the 2010s, hemp is attracting more interest as an economic raw material the construction industry.

With the help of the research on hemp architecture, this paper will be able to pave the way for a series of studies on its use both in traditional production forms and as industrial architectural materials, thanks to the necessary permissions. Following this, the acquisition of the necessary production permits in Turkey's industrial hemp recently started to be addressed in architecture and industrial design also.

To increase the interest in sustainable materials in architecture, design and engineering education, the exploration of hemp and the materials derived from it and implementation of practical practices will gain importance for the future of energy efficient buildings. Hemp production can be carried out with low and high technology. Considering the possibilities of hemp materials in terms of the handmade process,

DOI: 10.15320/ICONARP.2021.153

applied workshops, mock-up models, prototype buildings and applications from cultivated raw hemp obtained from local agriculture can be applied in architecture, design and civil engineering education. Because permaculture is gaining more importance in Turkey, the education of hemp construction and educational facilities can be implemented in already existing permaculture and areas.

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LEGAL PUBLIC/PRIVATE PERMISSIONS

In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions and organizations) during the survey, in-depth interview, focus group interview, observation or experiment.

REFERENCES

Allegret, S. (2013). The History of Hemp. In P. Bouloc, S. Allegret, & L. Arnaud (Eds.), *Hemp: Industrial Production and Uses* (pp. 4–26). Cabi.

Allin, S. (2005). *Building with Hemp* (1st ed.). Seed Press.

Anon. (2016). *Werner Aisslinger: Hemp Chair*. Designboom. https://www.designboom.com/design/werner-aisslinger-hemp-chair/

Arnaud, L., Boyeux, B., & Hustache, Y. (2013). Hemp and the Construction Industry. In P. Bouloc, S. Allegret, & L. Arnaud (Eds.), *Hemp: Industrial Production and Uses* (pp. 239–259). Cabi.

Baytop, T. (1995). Esrar. In *İslam Ansiklopedisi* (pp. 431–432). Türk Diyanet Vakfı. https://cdn.islamansiklopedisi.org.tr/dosya/11/C11004267.pdf

Baytop, T. (1999). Türkiye'de Bitkiler ile Tedavi, Geçmişte ve Bugün. In *Türkiye'de Bitkiler ile Tedavi, Geçmişte ve Bugün* (2nd ed). Nobel Tıp Kitapevleri.

Bouloc, P. (2013). Hemp: A Plant with a Worldwide Distribution. In P. Bouloc, S. Allegret, & L. Arnaud (Eds.), *Hemp: Industrial Production and Uses* (pp. 1–3). Cabi.

Cannabric. (2012). *Towards a Hemp Architecture*. Architizer News. http://www.cannabric.com/media/documentos/eb60a_Architizermarch2012.pdf

Cannabric. (2019a). *Catalogue*. http://www.cannabric.com/catalogo/

Cannabric. (2019b). *Hempbrick (insulating + loadbearing)*.

http://www.cannabric.com/catalogo/cannabric_bloque_de_canamo_aislante_y_estructural_/

Cannalore. (2018). *Bridge Over Troubled Waters, 500 AD.* The Canna Chronicles. https://www.thecannachronicles.com/bridge-over-troubled-waters-500-ad/

Carus, M. (2013). *Market data on Industrial Hemp – fibres, shivs and seeds*. http://www.fibrafp7.net/Portals/0/Michael_Carus_Day_1.pdf

Chevreuil, C. (1966). La Maison de la Turque. *Les Amis de Flaubert, Bulletin*, *28*, 24. https://www.amis-flaubert-maupassant.fr/article-bulletins/028_024/

Danenberg, J. (2002). Hemp Architecture. In J. Birkeland (Ed.), *Design for Sustainability: A Sourcebook of Integrated Ecological Solutions* (pp. 205–208). Earthscan Publications.

Deitch, R. (2003). *Hemp-American History Revisited: Vital Resource to Contentious Weed*. Algora Pub.

Eddy, M. (2011). Medical Marijuana: Review and Analysis of Federal and State Policies. In E. L. Clark (Ed.), *Cannabis Sativa for Health and Hemp* (pp. 1–50). Nova Science Publishers.

EIHA (The European Industrial Hemp Association). (2009). *European Hemp fibres for diverse Biobased products*. http://news.bio-based.eu/media/news-images/20090715-02/hempfibresgreenproducts.pdf

EIHA (The European Industrial Hemp Association). (2010, April). *Biowerkstoff-Report Report on Bio-based Plastics and Composites*. Biowerkstoff-Report Report on Bio-Based Plastics and Composites. http://nova-institut.de/pdf/bwr_april_2010.pdf

FAOSTAT. (2020a). *Production share of Hempseed by region, 1961-2000*. www.fao.org/faostat/en/#data/QC/visualize

FAOSTAT. (2020b). *Production share of Hempseed by region, 2000-2018*. www.fao.org/faostat/en/#data/QC/visualize

FAOSTAT. (2020c). *Production/Yield quantities of Hempseed in World + (Total), 1961-2018*. www.fao.org/faostat/en/#data/QC/visualize

FAOSTAT. (2020d). *Image*. http://www.fao.org/faostat/en/#data/QC/visualize

Gołębiewski, M. (2017). Hemp-Lime Composites in Architectural Design. *KNUV (Kwartalnik Naukowy Uczelni Vistula)*, 4(54), 162–171. http://cejsh.icm.edu.pl/cejsh/element/bwmeta1.element.desklight-1a023548-e108-40d4-ad1e-a0b89b1fe392

Google Map. (2019). *Map*. https://www.google.com.tr/maps

Gruber, P. (2011). *Biomimetics in Architecture of Life and Buildings*. Springer-Verlag.

Gül, V. (2008). *Karadeniz bölgesindeki bazı kenevir (Cannabis sativa L.) tohumlarının fiziksel ve kimyasal özelliklerinin belirlenmesi (Determination of physical and chemical characteristics of some hemp (Cannabis sativa L. seeds in the black sea region)* [Ordu Üniversitesi]. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

DOI: 10.15320/ICONARP.2021.153

Haydaroğlu, M. (2004). *Ben Mehmed Siyah Kalem, İnsanlar ve Cinlerin Ustası (I, Mehmed Siyah Kalem Master of Humans and Demons)* (M. Haydaroğlu (ed.)). Yapı Kredi Yayınları.

Hemp Edification. (2015, July 15). *Hempcrete*. http://hempedification.blogspot.com/2015/07/hempcrete.html

Hemp Edification. (2016, August 27). *Hemp Production Around the World*. https://hempedification.wordpress.com/2016/08/27/hemp-production-around-the-world/

Hemp Straw Pellet Mill. (n.d.). *Abc Machinery*. http://www.gcmec.com/hemp-straw-pellet-mill.html

Hemptechglobal. (2019). *Hemp Building, USA*. https://hemptechglobal.com/page14/page38/page38.html

Herer, J. (2010). *The Emperor Wears No Clothes*. Hemp Publishing.

Hillig, K. W., & Mahlberg, P. G. (2004). A chemotaxonomic analysis of cannabinoid variation in Cannabis (Cannabaceae). *American Journal of Botany*, 91(6), 966–975. https://doi.org/10.3732/ajb.91.6.966

Hodder, I. (2013). *2013 Season Review, Çatalhöyük 2013 Archive Report, Çatalhöyük Research Project*. http://www.catalhoyuk.com/sites/default/files/media/pdf/Archive_Report_2013.pdf

James, P. (2019). *Top 6 Hemp Growing Countries: USA Now Ranks Number 3!* https://ministryofhemp.com/hemp/countries/

Kafesçioğlu, R. (2017). *Çağdaş Yapı Malzemesi: Toprak ve Alker*. İTÜ Vakfı Yayınları.

Kahya, E. (2017). *İbn-i Sina, El Kanun Fi't-tıbb, v. 2*. Atatürk Kültür Merkezi Yayınları.

Kanunlar (Laws). (1943, April 21). *T.C. Resmi Gazete (Turkish Official Gazette) (Number: 5387)*. http://www.resmigazete.gov.tr/arsiv/5387.pdf

Kayılı, M. (1988). Mimar Sinan'ın Camilerindeki Akustik Verilerin Değerlendirilmesi. In S. Bayram (Ed.), *Mimarbaşı Koca Sinan: Yaşadığı Çağ ve Eserleri, 1* (pp. 545–555). Vakıflar Genel Müdürlüğü. http://isamveri.org/pdfdrg/D106709/1988/1988_KAYILIM.pdf

Kenevir Ekimi ve Kontrolü Hakkında Yönetmelik (Regulation on Hemp Cultivation and Control). (1990, October 21). *T.C. Resmi Gazete (Turkish Official Gazette) (Number: 20672)*. http://www.resmigazete.gov.tr/arsiv/20672.pdf

Kenevir Yetiştiriciliği ve Kontrolü Hakkında Yönetmelik (Hemp Cultivation and Control of Regulations. (2016, September 29). *T.C. Resmi Gazete (Turkish Official Gazette) (Number: 29842)*. http://www.resmigazete.gov.tr/eskiler/2016/09/20160929-3.htm

Kılıç, N. (2017). Tekstil Sektörü ve Hedefleri. In A. K. Ayan, F. Arslanoğlu, S. Aytaç, & H. A. Şahin (Eds.), *Karadeniz'in Lif Bitkileri Çalıştayı, Keten–Kenevir–Isırgan* (pp. 17–20). OnDokuz Mayıs Üniversitesi. https://www.researchgate.net/profile/Selim_Aytac2/publication/323541469_karadenizin_lif_bitkileri_calistayi_Keten-Kenevir-

Isirgan/links/5a9b01cd45851586a2ac23bd/karadenizin-lif-bitkileri-calistayi-Keten-Kenevir-Isirgan.pdf

Koçu, R. E. (1971a). Esrar, Esrarkeşlik, Esrarkeşler. In *İstanbul Ansiklopedisi* (pp. 5352–5361). Koçu Yayınları.

Koçu, R. E. (1971b). Esrar, Esrarkeş Turistler. In *İstanbul Ansiklopedisi* (pp. 5351–5365). Koçu Yayınları.

Layer. (2015). *Scale Woven*. https://layerdesign.com/project/scale/#top-page

Leafscience. (2017, October 16). *Indica vs. Sativa: What's The Difference?* https://www.leafscience.com/2017/10/16/indica-vs-sativa-whats-difference/

Levey, M. (1979). Hashish. In *The Encyclopaedia of Islam* (pp. 266–267). E. J. Brill-Luzac & Co.

Limetec. (2019). *Hydraulic Lime Binder*. https://www.limetec.co.uk/hydraulic-lime-mortars/lime-binder-1/

Maher, J. B. (2014, October 10). *Hempcrete: Sustainability & Superior Performance, 2014 NW EcoBuilding Guild Retreat*. http://archive.ecobuilding.org/summit/previous-years/presentation-files/2014-presentations/EB2014Hempcrete.pdf

Miasa village. (2019). *Building with Hemp. Miasa Village: Hemp House*. http://www.japanhemp.org/en/miasahouse.htm

Mougin, G. (2013). Hemp and Plastics. In P. Bouloc, S. Allegret, & L. Arnaud (Eds.), *Hemp: Industrial Production and Uses* (pp. 209–221). Cabi.

Novozhilova, M. (2017, June 04). *5 Surprising Products Made from Hemp. Inhabitat*. Inhabitat. https://inhabitat.com/5-surprising-products-made-from-hemp

O'Connell, K. (2017, May 22). *Hemp Makes Great Plastic, So Why Isn't Hemp Plastic Everywhere?* Drew's Space. https://drews419.blogspot.com/2018/01/hemp-based-plastics.html

Pecenko, K., Garrett, N., & Garrett, S. (2014). Building with hemp: Pioneering new uses for an old material. *ReNew: Technology for a Sustainable Future*, 129, 22–25. https://www.jstor.org/stable/renetechsustfutu.129.22

Peev, P. I. (2012). *Is industrial hemp a sustainable construction material? 7th semester elective assignment, Via University College, Horsens Denmark*. https://limeworks.us/wp-content/uploads/2017/07/Report_on_Hemp.pdf

Plainshemp. (2019). *Hemp Hurd Products*. Plainshemp. http://plainshemp.com/products/hemp-hurd-products/

Réh, R., & Barbu, M. C. (2017). Hemp. In D. Jones & C. Brischke (Eds.), *Performance of Bio-based Building Materials* (pp. 105–112). Woodhead Publishing.

Smith, T. (2009). *Billion Dollar Green: Profit from the Eco Revolution* (1st ed.). Wiley.

Stanwix, W., & Sparrow, A. (2014). *The Hempcrete Book: Designing and*

DOI: 10.15320/ICONARP.2021.153

Building with Hemp-lime (1st ed.). Green Books.

Studioaisslinger. (2016). *Hemp Chair & Hemp House*. http://www.aisslinger.de/1847-2/

Sultanahmet Cami. (2018). *Keten*. http://www.sultanahmetcami.org/tarihce_h10.html

Sultanahmetcamii. (2019). *Image Gallery*. http://www.sultanahmetcamii.org/image-gallery/

Suttie, E., Hill, C., Sandin, G., Kutnar, A., Ganne-Chédeville, C., Lowres, F., & Dias, A. C. (2017). Environmental assessment of bio-based building materials. In D. Jones & C. Brischke (Eds.), *Performance of Bio-based Building Materials* (1st ed., pp. 547–591). Elsevier. https://doi.org/10.1016/B978-0-08-100982-6.00009-4

Tallarico, G. (n.d.). *Hemp: It's own Purification System.* World Permaculture Association. https://worldpermacultureassociation.com/hemp-its-own-purification-system/

Tamim (Circular). (1930, September 30). *T.C. Resmi Gazete (Turkish Official Gazette) (Number: 1609)*. http://www.resmigazete.gov.tr/arsiv/1609.pdf

Tarım. (2018, January 31). *Kenevir Yasaları Değişiyor*. http://www.tarim.com.tr/Kenevir-Yasalari-Degisiyor, 38815h

The International Hemp Building Association (IHBA). (2019). *About*. https://internationalhempbuilding.org/about/

The International Hemp Building Association (IHBA). (2020). *Mission Statement*. https://internationalhempbuilding.org/

TMMOB Ziraat Mühendisleri Odası. (2019, January 21). *ZMO'dan Kenevir ve Üretimi Üzerine Bir Değerlendirme.* http://www.tmmob.org.tr/icerik/zmodan-kenevir-ve-uretimi-uzerine-bir-degerlendirme

Ulaş, E. (2018). *Mucize Bitki Kenevir* (1st ed.). Hiperyayın.

Usta, B. (2017). Trabzon Feretİkosu "Doğu Karadenİz Bölgesİ Feretİko Bezİ Çaykara Proje Örneği". In A. K. Ayan, F. Arslanoğlu, S. Aytaç, & H. A. Şahin (Eds.), *Karadenİz'in Lif Bİtkİlerİ Çalıştayı, Keten–Kenevir–Isırgan* (pp. 67–76). https://www.researchgate.net/profile/Selim_Aytac2/publication/323541469_karadenizin_lif_bitkileri_calistayi_Keten-Kenevir-Isirgan/links/5a9b01cd45851586a2ac23bd/karadenizin-lif-bitkileri-calistayi-Keten-Kenevir-Isirgan.pdf.

Velasco, G., Sánchez, C., & Guzmán, M. (2012). Towards the use of cannabinoids as antitumour agents. *Nature Reviews Cancer*, 12(6), 436–444. https://doi.org/10.1038/nrc3247

Yörükan Karamağaralı, B. (1982). İslam Sanatı'nda Haşhaş ve Hint Keneviri Motifleri. *Ankara Üniversitesi İslamî İlimler Enstitüsü Dergisi*, 5, 463–484. https://doi.org/10.1501/Ilhfak1_0000000098

Resume

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The Effect of Environmental Factors on Children from The Viewpoint of Parents

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Abstract

Purpose

The main purpose of this case study is to investigate the effect of increasing negative risk factors on children in outdoor playgrounds. There is a close relationship between children's playgrounds and children's health and safety in the open green areas that are gradually decreasing in the urban landscape. Children are faced with increasing parental concerns (abduction, harassment, self-harm, and inability to socialize), attention deficit in children, obesity and depression diseases. For this reason, the quality and livability of the environment we live in appear as factors that affect the decisions of parents on their children.

Design/Methodology/Approach

In this study, environmental factors and the quality of the environment were examined and the study questioning the concerns of parents about the use of children's playgrounds was discussed in three parts. The first part of the study consists of (i) the examination of children's playgrounds by the parents, the second part consists of (ii) the socio-demographic characteristics of the parents and the third part consists of (iii) the evaluation of the park criteria.

Findings

The findings obtained show that that parents with young children (2-4 years) (r =-,191*; r =,214**) prefer shopping malls suitable for all weather conditions (r =,261**) if there is not a playground in the garden of the house lived, but in some cases, the shopping mall is not preferred due to the risk of disease transmission and it brings a serious financial burden to families (r =-,163*), and if the parents are given a chance to prefer, they prefer a natural playground made of natural materials (r =-,220*). However, fathers did not prefer to wait at a very close distance for a well-groomed (r =,176*) control (r =,228*) where their children can spend time with their friends (r=,247**) on weekends alone (r =,166*), but it was determined that they were worried about their children being excluded and harmed by their friends (r =,249**).

Research Limitations/Implications

Children are faced with increasing parental concerns (abduction, harassment, self-harm, and inability to socialize), attention deficit in children, obesity and depression diseases.

Originality/Value

These data show that "play" has positive effects on children's health, and provides benefit in exploring children's creativity, sharpening their thinking skills and environmental awareness. Based on the results of the article, suggestions were developed on how designers, planners and park managers can implement the results in order to eliminate parents' fears and increase their motivation to take their children to children's playgrounds.

Keywords: *Parents, children's playgrounds, nature, game*

INTRODUCTION

Children's playgrounds and public spaces create opportunities for individuals to interact and socialize (Smoyer-Tomic et. al., 2004; Belknap & Hazler, 2014). These opportunities offer individuals to be self-sufficient, strengthen their individual lifestyles with social ties, and even allow them to restructure neighborly relations (Blackford, 2004). In child rights conventions adopted by the United Nations in 1989, play and relaxation concepts are defined as a right for children (UNICEF TURKEY, 2019). Playing in the open area positively affects not only a child's physical development but also his/her personal development. Many studies on children's playgrounds emphasize that spaces with nature or natural elements help children learn by contributing to their psychological, cognitive, sensory, physical, social and motor development, and also emphasize that they develop their imagination and creativity (Acar, 2013). Farley (2008) and his colleagues stated that play equipment has a strong effect on children's playgrounds, and activities have a moderate effect. For this reason, in order to maximize physical activity in children, activity and variety of game equipment in children's playgrounds are emphasized. Especially in cases where there is no or limited access to open green areas or playgrounds in city centers, the games of children of different age groups should be designed separately so that they do not interfere with each other (Acar, 2016). With this management style, management models are developed for children's playgrounds that are needed in open areas. Considering how important it is to play "games" for today's children, modeling should be established within certain standards.

Exercises performed with games provide opportunities for children to socialize by reacting to their peers while providing them with healthy development (Norton, et. al., 2004). Contrary to the widespread opinion of the society that playing games is a meaningless activity, a game that develops freely, spontaneously and by itself is very important in terms of contributing to the positive development of the cognitive, social and physical health of the child (Frost, 2010; Gray, 2011). Considering that mothers in the working class idealized house games in the middle of the 19th century (Stansell, 1982), the development and widespread use of children's playgrounds today is considered as a major reform movement. Gagen (2000), on the other hand, defines children's playground reformers as designers who teach children skills appropriate to their gender through activities and gain the habit of cleaning. Also, Ginsburg (2007) mentioned that the concept of "game" in the reports of American Pediatrics academics is necessary for the welfare of all children of the world. According to this report, it is recommended that children play for 90 minutes, provided they are outside. Although this situation is difficult for parents, educators and school counselors in terms of safety concerns, it has been observed that the participation of children in active play positively affects their primary health (Bjorkland & Brown, 1998). Outdoor games and green space activities will also cause a decrease in

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stress levels. Researchers have suggested that the time spent in green spaces can make a difference even 5 minutes a day (Kuo & Faber Tayler, 2004).

Playgrounds are designed for children to play and offer opportunities for both physical and social activities (Prellwitz & Akar, 2007; Yılmaz and Bulut, 2007). In each of the playgrounds, children can both develop awareness of their environment and learn social names and values while playing (Stagnetti, 2004). While playing contributes to the psychological development and socialization of the child, it also positively affects their problem-solving skills and creativity and prepares them for life (Hamilton et al, 2001; White & Stoecklin, 1998). While Gibson (1966) interpreted the environment and actions in children's playgrounds as primary perception objects, Heft (1988) emphasized the necessity of an ecological approach to children's behavior. Considering this situation, we should interpret games not as a cognitive state but as a form of behavior and action. Studies conducted in recent years have focused on the use of the environment as well as its accessibility. Usability is interpreted as the necessity for people to act on equal terms with others, to experience efficiency and to use the environment (Carlsson, 2004). The main thing is not what the child will do while playing, but how he/she will develop his/her intelligence. For this reason, the physical environments presented to the child are as important as the opportunities that develop their attitudes and addictions (Loebach, 2004). Children who cannot regularly interact with nature and grow away from natural environments are also at risk of being unable to develop environmental literacy skills (Bixler, et. al., 1994; Disigner & Roth, 1992; Montessori, 1966). It is extremely important for children to interact with animals, plants and soil in terms of both getting to know the environment and gaining sensitivity to protect the environment. Environmental education practices made with games complete the education process by enabling children to interact with the environment regularly (Gülay, 2011). Any area that does not require a special design approach can be considered as a playground for children. For children, the garden of the house they live in, alleys and even empty plots are used as playgrounds where they can showcase their creativity. Val Plumwood, an environmental philosopher, (2002) interpreted this situation best as “He does not keep nature very separate from man, he thinks that man is a part of nature and he does not care about the use of nature for his own benefit”.

When we look at public spaces, playgrounds are the places which families with small children prefer and where spend time most. These places, which are extremely important for families with children, are neglected due to the fact that the demands are not conveyed correctly and there are not enough green spaces in our cities. However, the quality and quantity of children's playgrounds is a criterion that determines the quality of life. Regular physical activities during childhood and adolescence also help the development of individuals' physiological and psychological health (Timmons, et. al., 2012). Despite increasing awareness of these benefits, there is a decrease in children's physical activity levels (Dollman, et. al., 2005). Many studies have indicated that preschool children are not active

enough (Pate & O'Neill, 2012). Considering that a school-age child needs at least 60 minutes or more of moderate-intensity activity every day, public health should be a priority to encourage regular physical activities (Broekhuizen, et.al., 2014). It has been proved by experts that a playground designed in integration with nature removes the psychological wear and tear of the child (Hamilton et al., 2001; Louv, 2012; Kytta, 2004), increases attention span by supporting attention tools (Wells & Evans, 2003), gives a sense of calmness to children who are suffering from Attention Deficit Hyperactivity Disorder (ADHD) (Taylor et al., 2002) and increases social and physical skills (Barbour, 1999). While encouraging improvements are observed in peer engagement for children with Autism Spectrum Disorder (ASD) in play practices with peer participation in playgrounds (Kretzmann, et. al, 2015), it is also shown that the time they spend in playgrounds helps them socialize by healing their aggressive personality (Pepler, et. al., 1998).

Children born in a rapidly changing environment are more likely to face the negative effects of urban life. Early childhood education is an important factor in eliminating these negativities. The play movements that are made to have fun without thinking about the result provide opportunities for the child to learn the subjects that no one can teach with their own experiences (Gür, 2002). Playing games, which is the first step of education, also contributes positively to socialization and development. The most important criteria affecting the quality and quality of the design are the use of factors such as complex, connected, social, flexibility, challenging, improvable and security in children's playgrounds to be designed with the cooperation of designers and educators (Beckwith, 1985). In addition to this, it has been observed that with the right designs, children play longer in the field, exhibit calm behaviors share and increase their individual development (Koçyiğit et al., 2007). Therefore, movement is very important for a child's physical development. Today, adhering to the technological developments, adopting a sedentary lifestyle negatively affects the participation in physical activities and decreases the quality of life. The biggest age group affected by this lifestyle is children. Children's playgrounds that support the growth and development of children, provide active lifestyles, and prevent excessive weight gain by reducing the risk of diseases are seen as physical activity areas that are important for the physical development of children (Çelik, 2013).

The study is based on the fears that parents face while raising their children (kidnapping, harassment, self-harm, harming someone else, being excluded by their friends) and the main material of the study consists of the child and parents. In the study, children's playgrounds and users in the city of Rize were examined by associating children and games. The adequacy of children's playgrounds, which are offered as a temporary solution proposal in the city, and the concerns of parents when choosing these areas were also discussed. The study focused on the

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negativities faced by children who cannot play freely and by revealing their creativity under the pressure of their parents in children's playgrounds which positively affect the quality of urban spaces.

RESEARCH METHOD

Sampled Areas

Different professional disciplines, especially landscape architects, need to be sensitive to children's playground design, which support child development, which are sensitive to child health and psychology, and which include design approaches suitable for physical education. The inadequacy in the children's playgrounds also coincides with the lack of green space in the city. The quality of playgrounds as well as the playground planning per capita is very important in our cities which have limited space. Children's playgrounds have to be large enough to be used by different groups of ages, including different activities, with spatial and functional analyzes parallel to the city's green space system.

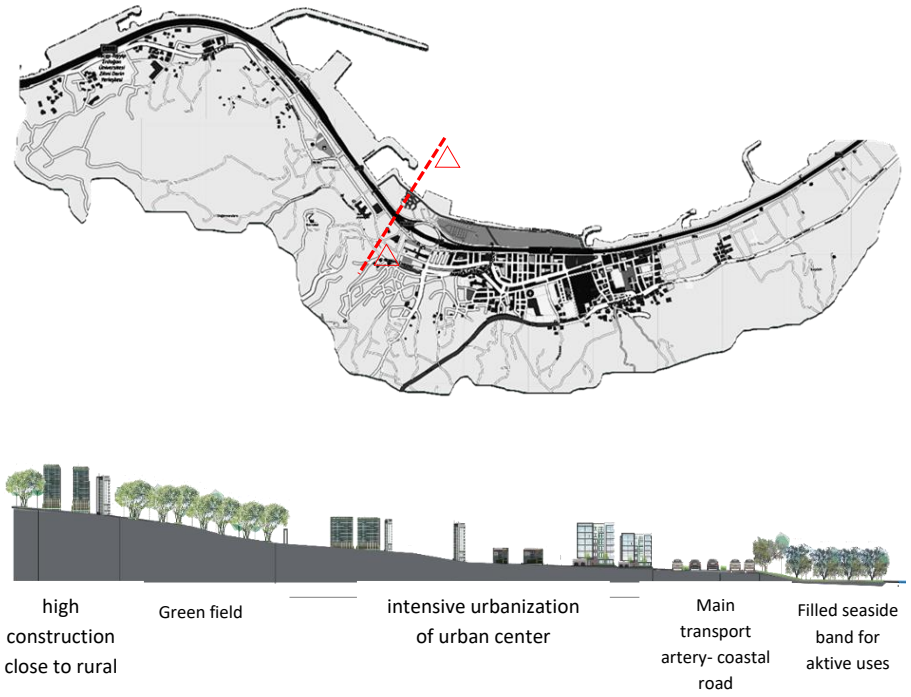

Figure 1. A selected sample of workspace in Turkey city (Example of Rize City).

Although children's playground design approach criteria show variatior and cahnage over time, accessibility, security, diversity and charm, mixed use, correct material, socialization and user demand's criteria for landscape are still valid nowadays by what Friedberg (1982) has developed for children's playgrounds. When the criteria developed by Friedberg are evaluated at Rize urban scale (Figure 1), the importance given to the quality of life in the city of Rize is understood from the play areas per person.

ICONARP – Volume 9, Issue 1 / Published: 21.06.2021

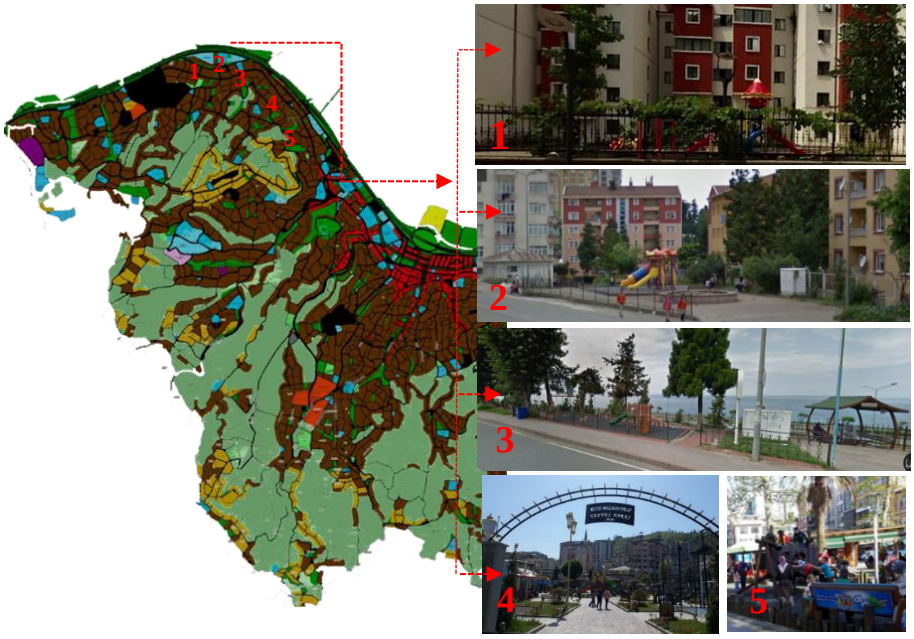

Figure 2. Children playgrounds selected from Rize city center (Rize city center- Fener District)

There are 5 children's playgrounds within the pedestrian and vehicle corridor extending from the Rize Fener District, which has developed as a new residential area, to the city center (Figure 2). The number of playgrounds on this route, which consists of approximately 10 neighborhoods, is very few. Spatial characteristics of the selected field to reveal the condition of the children's playground in Turkey show similarities with each other. These playgrounds were examined with Friedberg's evaluation criteria. It is found that these parks do not offer the diversity or even appeal to the users because of their proximity to the motorway. Also, they are preferred in a limited time period because they are located in unsafe, urban void areas. Besides, they have become neglected over time due to the choice of standard materials that comply with regional standards.

Data Collection and Evaluation

The study examined the concerns of parents on their children and the effect of environmental factors on children. In this study where environmental factors in children's play areas are questioned, (*i*) Examination of children's play areas by parents, (*ii*) Parents' socio-demographic characteristics and usage preferences for children's playgrounds and (*iii*) three different parameters are used to examine the parking criteria. In the first parameter, to be able to analyze the situation of parents in children's play areas. In Friedberg (1982), using the planning criteria developed for children's playgrounds (user demand criteria for accessibility, security, diversity and charm, mixed use, right materials, socialization and landscape) questions were prepared. The questionnaire questions are based on the environment where the child lives, the preferences and concerns of the parents, the desire of the child and the dependencies of the children. In the second parameter, the socio-demographic characteristics of the parents and their use preferences in

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children's play areas were examined and in the third parameter, the quality criteria (sociability, comfort and image, accessibility, usage and activities) that Altman and Zube (1989) developed were questioned on children's playgrounds. Two different forms were used in the evaluation of these three parameters: (1) questionnaire and (2) interviews.

Surveys conducted to reveal parents' concerns about children's playgrounds were conducted in the period between September and December 2018 and care was taken to ensure that the respondents were in the 0-14 age group. The closed-ended questions used in the questionnaires were administered to 150 parents, and children were not interviewed. Closed-ended questions were used in the questionnaires. In the statistical evaluation of the data, a correlation analysis was made between the socio-demographic status of the users and the concerns of the parents and Spearman coefficients (r) and their importance were determined. Statistical Package for Social Science (SPSS) 16.01 was used for statistical analysis. In addition, some data obtained from the surveys were evaluated by using % analysis method. However, the children's playgrounds located between Rize city center and Fener district were examined by three different groups consisting of the lecturers of RTEU Faculty of Fine Arts, Design and Architecture, RTEU Administrative Staff, and RTEU Landscape Architecture Department Students using the quality criteria developed by Altman and Zube (1989). The opinions of 5 different people in each group were evaluated between 0-1 and the mean of each group was taken as a table.

RESULTS

Findings obtained in the study, which are in the context of (*i*) Examination of children's play areas by parents, and (*ii*) the socio-demographic characteristics of parents and (*iii*) their use preferences for children's playgrounds, are included in the evaluation of park criteria.

Evaluation of Children's Playgrounds by Parents

While the children's playgrounds are evaluated according to the preferences of the parent users, the socio-demographic structures of the parents are examined and the significant relationships between gender, age, education, occupation, and income levels are given in Table 2. In the survey conducted within the scope of the study, significant relationships were found between 95% confidence level ($p < 0.05$) and positive and negative questions. According to the correlation analysis results, the type of residence in which your child is living (r=,453**), how the child meets the playground needs (r=,218**; r=,380**) and how many hours a day he plays in the garden when the weather conditions are appropriate (r=,276**; r =,195*; r =,181*). In this context, it has been determined that these park areas, which are generally used as remote playgrounds, are usually four hours or more in children's playgrounds with no playgrounds in the garden (Table 1).

Table 1. Examination of children's playgrounds by parents

	b	c	d	e	f	g	h	j	k	l	m	n	o
a.Type of house which your child lives in? (1:Complex/ lodgement, 2: Detached house, 3:House in garden)	,453**	,218**	,011	-,031	,276**	,014	,073	,129	,043	,042	,011	-,101	,110
b. Is there a children's playground in the place where you live? (1: Yes, 2: Partially, 3: No)		,380**	,261**	-,070	,195*	,074	,159	-,057	,093	,076	-,191*	0,27	-,006
c. How do you supply with your children's playground needs? (1:Garden of complex.,2:Quarter's Park,3:Shopping center's park,4:upstate park)			.069	-,158	,098	-,036	,140	,135	-,104	,051	-,128	-,086	,013
d.If you prefer shopping centers, what's the reason of it? (1: Suitable for all weather conditions, 2: Being considered as safe place, 3: Families' using these areas for their own needs, 4: Socialization, 5: easy accessibility)				-,163*	,004	-,024	,012	-,220**	,086	,152	-,142	-,124	-,035
e. If you do not prefer shopping centers, what's the reason of it? (1: The risk of infection in case of crowds, 2: A serious economicall burden on families, 3:The risk of being addicted to technological products, 4: Getting children far cut from natural environments)					,181*	,168*	,006	-,174*	-,018	-,168*	-,023	,006	,018
f. How many hours a day is your child playing in the garden when weather conditions are appropriate? (1:1 hour, 2:2 hours, 3: 3 hours, 4: 4 hours, 5: More than 4 hours, 6: All day)						,008	,105	,039	-,072	-,118	,214**	,022	,011
g. How often do you take your children to the children's playground during the week when weather conditions are appropriate? (1:Everyday, 2:Some days of week, 3:Just on weekend)							,107	-,143	,000	,075	,049	,032	,061
h. What type of groups does your child prefer? (1:Individual, 2:With friends)								-,107	,032	-,064	,209*	,046	-,022
j. If you have a chance to choose, what kind of playground do you prefer? (1:Classic playground, 2: A playground consisting of educational and instructional materials, 3: A playground made of natural materials, 4:Nature)									,025	,123	,131	,187*	-,047
k.What makes you worried when your child is playing in the children's playground? (1:Kidnapping, 2:Harassment, 3:Self-Harm, 4:Harming others, 5:Being excluded by friends)													
l. what is the most important criterion for playgrounds according to you? (1:Nearness, 2: Distance to highway, 3:Safety, 4:The one with more green field, 5: Fitting the standards of the reinforcement floor, 6:All-season playgrounds, 7: Cleaning of the park)										,143	-,073	,031	,012
m.How old is your child? (1:2-4, 2:5-7, 3:7-12, 4:12-15)											-,154	,047	,060
n. How would you like the distance of the seats to be when your child is playing in the park?? (1: Suitable for instant intervention (1.20m), 2: Suitable for intervention (3.60m), 3:Suitable for control watching (7.60m), 4 Suitable for:being able to check												,372**	,041
o. Does your child's Playing with other children make you worried? (1:Yes, 2:No)													,121
													-

**Correlation is significant at the 0.01 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed)

If the house does not have a children's playground, parents who have a small child (2-4 years old) (*r*=-,191*; *r*=,214**) prefer the shopping centers that they think they are safe, suitable for all weather conditions (*r*=,261*). In the case of crowded shopping mall where the risk of infection and financial reasons take place, they do not prefer (*r* =-,163*). When the preference is offered, a natural playground consisting of natural materials is preferred (*r*=-,220*). However, it is seen in (Table 1) that children who are older want to spend time with their friends in children's play areas (*r*=,209*). Parents who prefer a classic playground wanted to be at a distance they could intervene to their children (*r*=,187*) as the age of their children increased (*r*=372**).

The Relationships between Socio-Demographic Characteristics of Parents and Children's Playground Usage Preferences

The questions directed to the users in the evaluations in Table 2 are discussed together with their socio-demographic structures. There was a positive correlation between gender and g, h, k, l, and n questions with 95% confidence level (p <0.05). Male parents only go to a children's playground where their children (*r*=,166*) are taken care of (*r*=,247*) at a children's playground (*r* =,176*) they did not prefer the distance (*r* =,228**), but they were concerned by the exclusion and harm (*r* =,249**) of their children by their friends. It was also observed that the number of dwelling houses (*r* =-,221**) of the older parents (*r* =,191*) whose children were older than others (*r* =,542**) decreased their control distances (*r* =,244**). There is a negative relationship between education level and housing type with 95% confidence level (p <0.05) (*r* = -,224 **). It was found that children of parents who prefer to live on the site are small (*r* = -,245**) clean (*r* =,161*) they preferred children's playgrounds (*r* =-,249**) more frequently and less-time use. Parents with good income

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status wanted that the shopping centers (*r* =,182*) should be easily accessible (*r* =,210**), the use of educational and instructional materials (*r* =-,172*) should be included, and not to worry that their children can be harmed by others. Besides, housewives and unemployed parents prefer the classic children's playgrounds (*r* =-,195*) because of being easily accessible (*r* =,163*).

Table 2. Parents' socio-demographic characteristics and preferences of children's playgrounds

	a	b	c	d	e	f	g	h	j	k	l	m	n	o
1.Gender? (1:Female, 2:male)	-,018	-,028	-,002	-,049	-,038	-,029	,166*	,247**	,068	,249**	,176*	,152	,228**	-,015
2. age group? (1:18-25, 2:26-30, 3:31-35, 4:36-40, 5:41-50, 6:51-60, 7:61-)	-,090	-,221**	,010	-,038	-,008	,102	,191*	,143	,119	,095	-,052	,542**	,244**	,083
3. education status? (1:Primary school , 2: Secondary education , 3:High school, 4:University, 5: MSc-PhD)	-,224**	-,146	-,101	,043	-,037	-,249**	,030	-,131	,076	,079	,161*	-,245**	-,054	-,010
4. Income status ? (1:Lower than 800TL, 2:800-1200TL, 3:1200-1600TL, 4:1600-2000TL, 5:2000-2500TL, 6: 2500-3500TL, 7: 3500TL-)	-,224**	-,060	-,199*	,210**	-,055	-,084	,107	,003	-,172*	,182*	,045	,005	,010	,004
5.Profession? (1:Jobless,Student,Housewife, 2:Retired, 3:Employee, government employee , 4: self-employed)	-,030	-,010	,005	,163*	,044	,037	,136	,151	-,195*	,046	-,025	,150	-,026	-,042

**Correlation is significant at the 0.01 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed)

The percentage analysis method was applied with questions asked in the survey conducted to parents but other questions not questioned by the correlation analysis were analysed by percentage analysis method. According to this question, the answers to the question “if you prefer shopping mall, why do you prefer?” are as follows: 25,33% of the parents likes to use these areas to meet their own needs, 18,66% of them find those areas as safe, 14,66% find those places suitable for all kinds of weather conditions, 3,33% for socialization, 3,33% for easy access. Considering the reasons for not choosing shopping mall, 26% of parents think that those places keep children from the natural environment, 23,33% of them find them expensive, 15,33% of them because of the risk of infection in cases of crowded, 14% of them due to the fact that technological products are at risk of addiction. Parents' answers to the question “What are you worried about when your child is playing in the children's playground? “are 51,33% abduction, 24,66% harassment, 13,33% self-harm, 10% others are harmed, and 0,66% exclusion by their friends. “What is the most important criterion for you in the game areas?” has the answers with 44% security, 20,66% closeness, 12% distance to vehicle road, 11,33% green area, 8% park clearance, 2% playgrounds that have been maintained in all seasons, 2% the ground in compliance with the standards. “Why would you like to be with your children?” has the answers as followings; 70% security, 10% ownership, 4,66% spending time, 3,33% control, and 1,3% needs according to their importance.

Parents' Park Criteria Preferences in Children's Playgrounds

The characteristics of the children's playgrounds located between Rize city center and Fener district were evaluated according to the criteria developed by Altman and Zube (1989) (Socialiness, comfort and image, accessibility and usage, and activities). Selected areas was evaluated with a total of 3 points considering the current situation and the children's playgrounds they want to see entertainment, socialization, visibility,

evening use, security, care, vegetable tissue, the attraction, proximity, ease of accessibility, availability of disability, permeability, recreational activities, and availability of food and beverage by RTEU, Faculty of Fine Arts, Design and Architecture, Landscape Architecture Sector, RTEU Administrative Staff and RTEU Landscape Architecture Department students (Table 3). The scoring was applied separately to faculty members in the department of Landscape Architecture, administrative staff at RTEU, and students in the department of Landscape Architecture at RTEU. In line with the children's playground design criteria, Altman and Zube's criterion was evaluated by each group as available (M) and desired (I) out of 3 points. The total (T) data in the evaluation were calculated by taking the arithmetic mean of the scoring.

Table 3. Relationships between parents' choices of park criteria's in children's playgrounds

CRITERIA	**A**		**B**		**C**	
	M:0,6	**I:2,8**	**M:1,2**	**I:2,6**	**M:0,8**	**I:2,8**
Sociability	Parents' sociality criteria, such as entertainment, socialization, visibility, evening use, etc. social values in the direction of values. The emotions gained by parents during quality times they spend with their children and their interaction with other children in the place where their children are located are very important in their personality development. The fact that children's play areas are used in the night will increase the time period that parents can spend with their children and will give positive benefits to the development of the parent child relationship. The fact that children's play areas are used at night will increase the time period that parents can spend with their children and will give positive benefits to the development of the parent child relationship.					
	M:0,2	**I:3**	**M:0,6**	**I:2,4**	**M:0,4**	**I:2,8**
Comfort and Image	Safety is the most important element of comfort and image criteria, which increases the preferability of playgrounds. Parents pay attention to the fact that they prefer the places where they feel safe for their children, and green texture. The feeling of responsibility towards the environmental sensitivity that green tissue creates on children is considered to be the most powerful achievement that parents can give their children in the family environment.					
	M:1,8	**I:2,6**	**M:1,4**	**I:2,4**	**M:2,2**	**I:2,4**
Accessibility	Children's play areas must be accessible for short-term use as long-term uses. In short-term use, the proximity of the playground to the home constitutes the most important factor determining the choice of parents. The permeability of the space increases the use of children's playground and brings together different user segments.					
	M:0,7	**I:2,4**	**M:1,2**	**I:2,2**	**M:1,5**	**I:2,4**
Usage and Activities	Usage and activities increase the preferability of children's playgrounds and the practices in our country are shaped as the opposite of this situation. Recreational activities are tried to be provided only by the children's playground elements. Different recreation activities are not included as the design spaces are small.					

(**A:** RTEU Faculty of Fine Arts, Design and Architecture Department of Landscape Architecture, **B:** RTEU Administrative staff, **C:** RTEU Landscape Architecture Department Students, **M:** current state, **I:** desired situation)

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The current status of selected children's playgrounds can be reached by all parents (Total: 5,4), but they are found insufficient in terms of comfort and image criteria (T: 1,2). However, it is not sufficient in terms of usage and activities (T: 3,4) and it is preferred by users for socializing (T: 2,6). Expectations from children's play areas are listed as sociality (T: 8,2) and comfort and image (T: 8,2) criteria, mainly as accessibility (T: 7,4) and usage and activities (T: 7). Parents want the areas where they spend time to be safe, well-maintained, rich in plant tissue (green texture amount), use in the evening and visible places.

DISCUSSION AND SUGGESTIONS

The aim of the study is to understand the concerns of parents who allow their children to play in children's playgrounds in public spaces. The study showed that the parents face concerns about kidnapping, harassment and self-harm in addition to the physical injuries of their children. It has been observed that children need a natural environment in which they can demonstrate their abilities regardless of their experiences. In addition, it has been determined how important these natural environments are in the psychological and physical development of children. Socialization in public and private spaces to be created in cities is very important in childhood education (Filipovaa, et. al., 2016). These areas where children communicate with their environment are perceived as frightening or even dangerous (cemeteries, garbage dumps and cellars) when they are under the influence of irregular settlements (Georgieva, 2018). This perception is also addressed in the context of inequality. The inequality encountered in play groups used in children's playgrounds is also felt by children in different social status (Filipovaa, et. al., 2016). However, children know that playgrounds are designed for them. These areas are sometimes shaped by the perspective of the parents and sometimes the children. However, if the order demands of society norms and financial difficulties prevail in children's playgrounds, children's playground designs are affected. In this case, it reflects negatively on children's behavior. These playgrounds, which are seen as boring by children, cause disappointment in children and cause low usage (Jansson, 2008). Concerns about the design of the ideal playground differ between children and adults. While parents prioritize safety and hygiene, and politicians place emphasis on design and image, children place emphasis on pleasure and risk (Refshauge, et. al., 2012).

Today, children have to spend a lot of time in closed spaces (Karsten, 2005). This situation supports the parents' feelings of fear of strangers, gangs and traffic accidents (Clements, 2004). Parents accompanying young children in using the parking spaces cause children not to use the parking spaces freely (Veitch, et. al., 2006). Clements (2004) defined children's watching TV and playing computer games as the number one reason why they do not play outside. Louv (2008) stated that children are worried about this situation because of the little contact with nature and even the negative changes in their lifestyles. It is important to discuss and

analyze general models in the development process in children's playgrounds. Ward's (1990) most striking comment is that every generation sacrifices street games for modern urbanization. During this period, street games have changed shape and survived to take advantage of environmental changes. However, it has been observed that today's children spend less time playing games in different areas than in the past (Wridt, 2004). This decline in time children spend in public playgrounds has created a spatial change in children. After this situation, activity places in children's playgrounds turned into indoor playgrounds such as paid game trade centers and took the form of playing games on personal computers, video games and internet environments (Wridt, 2004).

Difficulties faced by parents in supporting the social and physical development of children affect their children's active play needs and cause physical and mental disorders. The distances of the children's playgrounds used in the open green areas in our cities from the residential premises cause parents not to send their children to these points alone, therefore they cannot use the children's playgrounds together and for a long time. Although parents want to play their children in children's playgrounds designed with natural elements (*r* = -, 163 *), the absence of such a children's playground in their environment requires their children to use fixed-equipped children's playgrounds. The activities to be carried out in small and crowded spaces with fixed equipment cannot contribute to the development of the child other than physically tiring them. The frequent use of the control mechanism by the parents in young children causes the parents to prefer indoor spaces (shopping malls) instead of outdoor use. Even if parents complain about the possibility of their children getting sick and putting an extra burden on their financial budget while using these places, they use these places quite often because they consider the safety of their children (the presence of a camera system). Parents who use children's playgrounds in urban open green spaces are most concerned about their children's kidnapping, harassment, and self-harm. The fact that these concerns are frequently felt today indicates that there is a security weakness in parents.

Public playgrounds constitute an important part of the play facilities for children. Therefore, the popularity of play equipment in children's playgrounds and their frequent use in games cause parents to worry (Norton, et. al., 2004). Children's safety is a top priority in school settings. Many accidents, especially in school playgrounds, range from minor abrasions to strikes; from fractures that require quick action to serious health problems (Taylor, 2020). It is observed that the games children play in the open air in schools are also threatening. The reasons can be put forward as follows: time can be better spent on academic pursuits, playground injuries encourage litigation, higher risk of contact with strangers threatens children, teachers and volunteers are less willing to supervise play activities. The value of play for the physical and mental development of children is unquestionable, but must be balanced by the

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minimum risk condition that prevents the child from being injured (Nixon, et. al., 1981). Head trauma or severe fractures with lifelong consequences should not be considered as part of growth (Norton, et. al., 2004). Lıllıs and Jaffe (1997) stated that while child injuries are seen as an important source of illness and death in industrialized countries, many injuries also occur in children's playgrounds. The experiences and security levels of children while playing are the main points of children's playgrounds. Although these levels of control can be kept under control in schools, they cannot be controlled due to the combined use of different age groups in public children's playgrounds. Safety barriers used only in children's playgrounds cause parents to feel safe (Smith, 1998).

Should all risks in children's playgrounds be eliminated? The question is discussed by some experts. Grenn & Hart (1998) stated that school-age children cannot find entertainment in a risk-free environment and these environments are boring for them. It has been emphasized that children's playgrounds and playground equipment to be designed considering these demands of children and parents' fears are necessary for children to explore, face difficulties, acquire new skills, even see and evaluate risks (Mitchell, et.al., 2004). Children's playground designs should include planning principles that provide opportunities for children's learning as they affect physical competence, play behaviors, and even peer relationships. In research in the field of developmental psychology, the importance of social and physical environmental conditions for children to develop a healthy development is constantly emphasized. But today, with the development of communication technology, electronic tools play a decisive role in the social environment of the child. From this perspective, the tools that shape the child's life, the world of meaning, consciousness, identity and play an active role in socialization appear as television and electronic games, not child game elements. Therefore, the current environment we live in prevents our communication with nature, dragging our children to a passive life (Çukur, 2011). This situation negatively affects the quality of the social and physical environmental conditions offered especially in the preschool period and the healthy development of the individual in terms of physical, spiritual, mental and social aspects. It should not be forgotten that childhood, which is the most important period for an individual to be a healthy adult, will contribute positively to his/her development when supported by social and physical activities.

CONCLUSION

In addition to the fears of children who play in children's playgrounds, their parents have been the subject of the study in their physical and mental development. This anxious perspective towards children's playgrounds has negatively affected the use of children's playgrounds and brought a critical perspective to the regulations. The awareness of parents about children's playgrounds and this increase in the level of anxiety has brought the necessity to take into account the weakness of

security in the design of children's playgrounds. Some of the results have shown that the activities in the children's playgrounds do not fully support the socialization of children. The results show that most children need to take advantage of opportunities to play and interact with their peers. In addition to the safety needs of children, the safety concerns of their parents should also be taken into account in the new design approaches to be developed for children's playgrounds. The designed playgrounds should be designed not only as a place that allows physical play activities, but also as a meeting point where play and socialization interaction take place. For this reason, with the support of planners, designers and child psychologists, the playgrounds should be designed at social level as well as at individual level.

Although some of the results presented are the same as the information obtained in other studies, they differ in anxiety and concerns felt by the parents about the use of children's playgrounds. With globalization, the necessity for children to spend time at home in the pandemic period increases their individual use of technological devices and triggers the fear of "addiction" in parents. This situation shows us how important it is to spend time in nature. It has questioned the necessity of including children's playground designs that will improve children's health, encourage their creativity and sharpen their thinking skills in urban open green spaces. With the proposed design approaches, these areas will eliminate the concerns of parents as well as children and turn them into spaces that can be used safely over time. For future research, it has been concluded that studies should be carried out on non-users of playgrounds, drawing attention to the fact that security needs are not met sufficiently in public playgrounds.

CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

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ETHICS COMMITTEE APPROVAL

Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS

In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions, and organizations) during the survey and in-depth interviews.

REFERENCES

Acar, H. (2016). *Assessment of Children's Playgrounds in Terms of Design Approach, Physical Characteristics and User's Ideas, Environmental Sustainability and Landscape Management*, Chapter 3, ISBN: 978-954-07-4140-6, ST. Kliment Ohridski University Press, Sofia, 35-57p.

DOI: 10.15320/ICONARP.2021.154

Acar, H. (2013). *Landscape Design for Children and Their Environments In Urban Context. In: Özyavuz M. (Ed.) Advances In Landscape Architecture*, Chapter 12, INTECH, Croatia, 291-324p.

Altman I., & Zube E.H. (1989). Public places and spaces, Plenum Pub Corp.

Barbour, A. C. (1999). The impact of playground design on the play behaviors of children with differing levels of physical competence, *Early Childhood Research Quartely*, 14(1),75-98.

Beckwith J. (1985), *When Children Play, Association for childhood Education International*, US.

Belknap, E., & Hazler, R. (2014). Empty Playgrounds and Anxious Children, *Journal of Creativity in Mental Health,* (12),210-231.

Bixler, R., Carlisle, D.L., Hammitt, W.E., & Floyd, M.F. (1994). Observed Fears and Discomforts Among Urban Students on Field Trips to Wildland Areas, *The Journal of Environmental Education*, 26 (1),24-33.

Bjorkland, D., & Brown, R. (1998). Physical play and cognitive development: Integrating activity, cognition, and education, *Child Development*, (69),604–606.

Blackford, H. (2004). Playground panopticism: ring-around-the-children, a pocketful of women, *Childhood*, 11(2),227–249.

Broekhuizen, K., Scholten, A. M., & Vries, S. I. (2014). The value of (pre)school playgrounds for children's physical activity level: a systematic review, *International Journal of Behavioral Nutrition and Physical Activity*, 11(59),1-28.

Carlsson, G. (2004). Travelling by urban public transport: exploration of usability problems in a travel chain perspective, *Scandinavian Journal of Occupational Therapy*, (11),78–89.

Clements, R. (2004). An investigation of the status of outdoor play, *Contemporary Issues in Early Childhood*, (5), 68-80.

Çelik, A., & Şahin, M. (2013). Sports and child development, *Journal of Academic Social Science Studies*, (6)1,467-478.

Çukur, D. (2011). Outdoor design that promotes healthy development in early childhood, *SDU Faculty of Forestry Journal*, (12), 70-76.

Disinger, J. F., & Roth, C. E. (1992). *Environmental Literacy (ERIC Digest EDO-SE-92-1), ERIC Clearinghouse for Science, Mathematics, and Environmental Education*, [ED 351 201], Columbus, OH.

Dollman, J., Norton, K., & Norton, L. (2005). Evidence for secular trends in children's physical activity behaviour, *British Journal of Sports Medicine*, 39(12), 892-897.

Farley, T. A., Meriwether, R. A., Baker, E. T., Rice., J. C., & Webber, L. S. (2008). Where Do the Children Play? The Influence of Playground Equipment on Physical Activity of Children in Free Play, *Human Kinetics Journals*, 5(2),319-331.

Filipovaa, A. G., Syroeda, N. S., & Goncharovaa, S. V. (2016). Children's Playgrounds and Everyday City Life of Childhood, *International Journal of Environmental & Science Education*, 11(10),3406-341.

Friedberg, M. P. (1982). *Juvenile Play Areas, Chapter Seven in Handbook of speciality elements in architecture*, Edited by A. Alpern, Mcgraw-Hill Book.

Frost, J. (2010). *A history of children's play and play environments: Toward a contemporary child-saving movement*, ISBN-10:0415806208, New York, NY: Routledge. 268p.

Gagen, E.A. (2000). '*Playing the Part: Performing Gender in America's Playgrounds', in S. Holloway and G. Valentine (eds) Children's Geographies: Playing, Living, Learning*, New York: Routledge, 213p.

Georgieva, M. (2018). "The children's subculture" problem in the area of pedagogical research, *The Teacher of The Future*, 23(1),161-165.

Gibson, J. J. (1966). *The senses considered as perceptual systems, Huoghton Mifflin*

Ginsburg, K. R. (2007). The importance of play in promoting healthy child development and maintaining strong parent-child bonds, *Pediatrics*, 119(1),182–191.

Gray, P. (2011). The decline of play and the rise of psychopathology in children and adolescents, *American Journal of Play*, (3),443–463.

Green, J., & Hart, L. (1998). Children's views of accident risks and prevention: a qualitative study, *Injury Prevention*, (4),14-21.

Gülay, H. (2011). As the twig is bent, so grows the tree: The importance of environmental education in the first years of life, *Tübav Bilim Dergisi*, 4(3),240-245.

Gür, Ş. (2002). *Children's Places, Yem Yayınevi*, ISBN: 978599054, 304Pp.

Hamilton, I., Harrop, A., & Street, C. (2001). *The Value of Children's Play and Play Provision in England: A Literatura Review, New Policy Institute*, United Kingdom

Heft, H. (1988). Affordances of children's environments: A functional approach to environmental description, *Children's Environments Quarterly*, 5(3),29-37.

Jansson, M. (2008). Children's Perspectives on Public Playgrounds in Two Swedish Communities, *Children, Youth and Environment*, 18(2), 88-109.

Karsten, L. (2005). It all used to be better? Different generations on continuity and change in urban children's daily use of space, *Children's Geographies*, (3),275-290.

Kretzmann, M., Shih, W., & Kasari, C. (2015). Improving Peer Engagement of Children With Autism on the School Playground: A Randomized Controlled Trial, *Behavior Therapy*, 46(1),20-28.

Koçyiğit, S., Tuğluk, M.N., & Kök, M. (2007). *Game as an Educational Event in the Child's Development Process*, 16p.

Kuo, F. E., & Faber Taylor, A. (2004). A potential natural treatment for attention-deficit/hyperactivity disorder: Evidence from a national study, *American Journal of Public Health*, (94),1580-1586.

Kytta, M. (2004). The Extent of Children's Independent Mobility and the Number of Actualized Affordances as Criteria for Child-Friendly Environments, *Journal of Environmental Psychology*, (24),179-198.

DOI: 10.15320/ICONARP.2021.154

Lıllıs, K., & Jaffe, D. (1997). Playground injuries in children, *Pediatric Emergency Care*, 13(2),149-153.

Loebach, J. (2004). *Designing Learning Environments For Children: An Affordance-Based Approach to Providing Developmentally Appropriate Settings*. Master of Environmental Design Studies, Dalhousie University, Halifax, Nova Scotia.

Louv, R. (2012). *The Last Child in Nature, TÜBİTAK Popüler Bilim Kitapları*, ISBN: 978-975-403-512-4, Semih Ofset Matbaacılık, Ankara.

Mitchell, R., Cavanagh, M., & Eager, D. (2006). Not all risk is bad, playgrounds as a learning environment for children, *International Journal of Injury Control and Safety Promotion*, 13(2),122-124.

Montessori, M. (1966). *The Montessori Method. (Introduction by J.Mc. V. Hunt)*, seventh printing, New York.

Nixon, J., Pearn, J., & Wilkey, I. (1981). Death during play: a study of playground and recreation deaths in children, *National Library of Medicine*, 283(6288), 410.

Norton, C., Nixon, J., & Sibert, J. R. (2004). Playground injuries to children, *Disease in Childhood*, 89(2),103-108.

Pate, R. R., & O'Neill, J. R. (2012). Physical activity guidelines for young children: an emerging consensus, *Archives of Pediatrics and Adolescent Medicine*, 166(12),1095-1096.

Pepler, D.J., Craig, W. M., & Roberts, W. L. (1998). Observations of Aggressive and Nonaggressive Children on the School Playground, *Merrill-Palmer Quarterly*, 28(1),55-76.

Plumwood, V. (2002). *Environmental culture: the ecological crisis of reason*. London: Routledge.

Prellwitz, M., & Skar, L. (2007). Usability of playgrounds for children with different abilities, *Occupational Therapy International*, 14(3),144-155.

Refshauge, A. D., Stigsdotter, U. K., & Cosco, N. G. (2012). Adults' motivation for bringing their children to park playgrounds, *Urban Forestry & Urban Greening*, 11(4),396-405.

Smoyer-Tomic, K. E., Hewko, J. N., & Hodgson, M. J. (2004). Spatial accessibility and equity of playgrounds in Edmonton, Canada, *The Canadian Geographer*, 48(3),287–302.

Smith, S.J. (1998). *Risk and Our Pedagogical Relation to Children: On the Playground and Beyond.* Albany: State University of New York Press.

Stagnetti, K. (2004). Understanding play: the implications for play assessment, *Australian Occu-pational Therapy Journal,* (51), 3–12.

Stansell, C. (1982). 'Women, Children, and the Uses of the Streets: Class and Gender Conflicts in New York City, 1850–1860', *Feminist Studies*, 8(2), 309–35.

Taylor, E. (2020). Playgrounds, Injuries, and Data: Keeping Children Safe, *NASN School Nurse*, 35(5), 266-268.

Taylor, A. F., Kuo, F. E., & Sullivan, W. C. (2002). View of Nature and Self Discipline: Evidence from Inner City Children, *Journal of Environmental Psychology*, (11)54-77.

Timmons, B. W., Leblanc A. G., Carson, V., Connor Gorber, S., Dillman, C., Janssen, I., Kho, M. E., Spence, J.C., Stearns, J.A., & Tremblay, M.S. (2012). Systematic review of physical activity and health in the early years (aged 0–4 years), Applied Physiology, *Nutrition, and Metabolism*, 37(4),773-792.

Unicef Turkiye. (25.04.2019): https://www.unicefturk.org/sayfa/turkiye

Veitch, J., Bagley, S., Ball, K., & Salmon, J. (2006). Where do children usually play? A qualitative study of parents' perceptions of influences on children's active free-play, *Health & Place*, (12),383-393.

Ward, C. (1990). *The Child in the City*, ISBN:9780719912597, London: Bedford Square Press, 116p.

Wells, N. M., & Evans, G. W. (2003). Nearby Nature A Buffer of Life Stress Among Rural Children, *Environmental and Behavior*, 35(3),311-330.

White, R., & Stoecklin, V. L. (1998). *Children's Outdoor Play & Learning Environments: Returning to Nature. Early Childhood New*, White Hutchinson Leisure & Learning Group.

Wridt, P. J. (2004). An historical analysis of young people's use of public space, parks and playgrounds in New York City, *Children, Youth and Environments*, 14(1), 86-106.

Yılmaz, S., & Bulut, Z. (2007). Analysis of user's characteristics of three different playgrounds in districts with different socio-economical conditions, *Building and Environment*, 42(10),3455-3460.

Resume

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Comparative Analysis of Axial Map Drawing Methods: Elazığ Application

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Abstract

Purpose

There are three basic methods used for creating axial maps in Space Syntax studies. Manual drawing is the first and most grounded method. The second method is the production of automatic axial maps with a tool, known as the Axial Map in the Depth Map program. The third and most modern method is the use of lines named Road Center Line (RCL). The primary goal of this study is to reveal the relationship between manual drawing, which is the first method used in creating axial maps and still regarded as the most reliable one, and other methods used in drawing axial maps. The other purposes of the study are analysing the features of methods used in creating axial maps, presenting the advantages and disadvantages of these methods, and comparing the methods. Accurately analysing wide spaces such as urban settlements and supporting Space Syntax studies for preventing drawing differences resulting from users in manual drawings are the other goals of this study.

Design/Methodology/Approach

The above mentioned three methods used for creating axial maps are compared in the study in terms of the period, morphological similarity, and analysis results. Analyses are carried out in Depth MapX and the MapInfo program is used for arrangements.

Findings

The manual drawing method is the most time consuming one while the RCL maps technique is the least time-consuming. Automatic drawing creates the axial maps based on the very same rules, which makes it the closest technique to the traditional drawing method in terms of textural similarity. However, it is believed that both automatic drawing and RCL need improvement.

Research Limitations/Implications

Manuel Drawing takes a very long time. Therefore, only one application city (Elazig) could be selected in the study.

Social/Practical Implications

The practitioner who wants to decide which of these methods to choose can decide this by looking at this study. He/she can also have an idea of what to pay attention to when using the methods.

Originality/Value

In this study, three different axial map-drawing techniques were applied to a city. Besides, for the first time, three drawing techniques were compared and discussed in this study.

Keywords: *Axial map, Elazığ, road center line, space syntax, space syntax drawing methods*

INTRODUCTION

Motivation

To better understand the urban space, space syntax gives an effective way to measure the configuration (Long, Baran, and Moore, 2007, p. 2). Space Syntax analysis starts with the representation of urban texture. Space Syntax analysis is a method created for understanding the social logic that forms an urban texture; in other words, it aims at studying the potential of physical space in terms of gathering people according to the movement it involves (Çil, 2008, p.283). The goal of this analysis is to form a hierarchy of streets in a settlement from the most frequently used open spaces to the least used ones. The most frequently used streets are called "integrated" while the least used ones are called "segregated". At the end of the analysis, a new map encoded with colors ordered from the most integrated to the most segregated axis is obtained (Çil, 2006, p.224).

Axial maps are the basis of settlement spaces; they indicate the longest visibility distance of a walker on the move in a settlement when he looks around. These maps are formed by drawing the longest and shortest lines through all of the public spaces in a settlement (Özkan Özbek, 2007, p.62). Axial maps are based on the smallest set of straight axial (visual) lines that cover the urban street network. It is possible to subsequently transform axial maps into connectivity graphs, in which the axial lines and the intersections between lines look like the graph's nodes and links, respectively. After that step, the centrality of each axial line within the network is computed according to the graph connectivity attributes (Omer et al., 2017, p.100.4). The concept of axial line is the longest line drawn through an arbitrary point in the spatial configuration (Turner et al., 2005, p.426). An axial map can be defined as the minimal set of axial lines such that the set taken together fully surveils the system; on the other hand, every axial line that may connect two otherwise-unconnected lines is included (Turner et al., 2005, p.428).

Axial maps that are used as base maps in the analyses of both enclosed and urban spaces in the Space Syntax method are represented with lines in the system. There are three basic methods used in creating axial maps. Manual drawing is the first and most grounded method. The second method is the automatic axial maps produced with the tool, known as the Axial Map in Depth Map program. The third and most modern method is the use of lines named Road Center Line (RCL).

There are two important reasons for diversity in axial map-drawing techniques. Firstly, it becomes easier to analyze urban spaces with the Space Syntax technique. Secondly, the method prevents any kind of mistakes in drawing resulting from the viewpoints of two different users that draw the same space; in other words, it unifies the drawings.

The basic motivation of the study is to evaluate the ways of using the three different methods used for drawing the axial map, to compare them, and determine the advantages and disadvantages of methods.

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Purpose and Method

Firstly, it is important to mention that the study focuses on the methods used for open spaces rather than enclosed ones. The primary goal of this study is to analyze the relationship between manual drawing, which is the first method used in creating axial maps, and other methods. Analyzing wide spaces such as urban settlements, supporting Space Syntax studies for preventing drawing differences resulting from different users in manual drawings are the other purposes of this study.

"Level of the similarity between the analyses results of automatically drawn axial map and RCL maps and analyses results of manual drawing" and "The level of overlap between the results of these techniques and the actual space" are the other concerns of this study.

These three methods used in creating axial maps are compared in terms of method, time, and morphological similarity in the scope of the analysis result of this study. Morphological similarity and analysis results of automatically created axial maps and RCL maps will be compared to Manual Drawing which is regarded as the best current method.

The city of Elazığ in the Eastern Anatolia Region, Turkey, was chosen as the environment for comparing these techniques. There are three basic reasons why this city was preferred; firstly, the author of this study is familiar with the city. Secondly, it was easier to make reliable and consistent field observations.

The first step of this study was to draw a manual axial map of Elazığ. Routes of the study field were determined by using Open Street Map internet site (https://www. openstreetmap. org/#map= 6/39. 031/35. 252). Finally, an automatic axial map of Elazığ was created with the DepthMapX program.

The integrated space syntax theory can extend the capabilities of GIS for modeling spatial objects (Jiang, Claramunt and Klarqvist, 2000, p.161). There is also some other software that can be used for practicing space syntax analysis. Axwoman, Seyntax2D, Pesh, SpaceBox, NetBox, NewWave, Ovation, WebMap, Mindwalk, Place Syntax, Ajax, Confeego, and Depthmap (Atak, 2009, p.19-23-57) are some of these tools. Most of this software hasn't been currently used while some of them such as Confeego, Syntax2D, Axwoman, are integrated into other GIS programs as they are compatible with older versions.

DepthMap is the currently most frequently used program for Space Syntax Analysis. Each program analyzed in the scope of this study has different features; the DepthMap program involves all these features in addition to the advantage that it enables automatic drawing. This is why, DepthMapX, the latest version of the program, is preferred in this study.

Divided roads were drawn in the shape of two lines as inbound and outbound routes as the divided roads are mostly used in highways, which are mostly used by cars rather than walkers. Cars that use divided roads don't move according to sight, they mostly follow signs; this is why, divided roads were drawn as two-way, inbound, and outbound routes. The parts of the roads vertically cut by walkers (crosswalks on highways

used by walkers) were included in the system in the manual drawing. The same is applied in RCL and Automatic Drawing techniques.
These three methods are discussed in terms of the time for creating axes, textural similarities, and similarities in the scope of the analysis results of this study.

ANALYSIS OF AXIAL MAP CREATION METHODS

Three main axial map creation methods will be analyzed in this study. These are manual axial maps, automatically drawn (with programs) axial maps, and Road Centre Line data.

Manual Drawing Method;

Axial lines have been widely used for the urban morphological study with the space syntax theory (Sun, 2013, p.13). The axial map is an alternative representation of urban networks to measure the level of accessibility which is defined as "spatial integration" (Klarqvist,1993, p.11). Over the last 30 years, this street network representation is the one that space syntax analysis and research have been built upon; it is the fundamental premise of space syntax theory. It is seen that this analysis method functions as the spatial unit through which the interaction of society and space can be observed and understood. Hand-drawing is generally used in creating the axial map. The process of over-laying raster image maps is used to complete the process; following that step, the user draws the lines that represent the longest accessible and visible point (this process was completed by using tracing paper overlaid on a paper map with the axial line model in the early years, due to the lack of processing power; after this step, the image is scanned and redrawn in the computer) (Dhanani et al, 2012, p.7).

"Axial map" is a whole set of intersecting lines through all the spaces of an urban grid. An axial map is the minimum set of axial lines that pass through each convex space (Turner, Penn, Hillier, 2005 p.426; Liu, Jiang, 2011, p.2). The use of an algorithm in axial maps is described as: "The first step is to determine the longest axial line (the longest visibility line). The second step is to determine the second-longest axial line and these two steps are repeated until the whole space is covered with intersecting axial lines" (Jiang, Claramunt, 2002, p.297).
An axial map is drawn on a separate layer as an overlay from a chosen base map. This map consists of the longest and shortest lines. There a few rules to consider for the manual drawing procedure:
- Start with the longest and finish with the shortest line,
- Avoid "overmodeling" that can influence the results,
- The fewest possible lines should be drawn; there should be no repetition of axial lines,
- All convex space should be crossed and all rings in the system made,
- Make sure you do not stop an axial line before it connects to another one.

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It also has to be remembered that lines have to stop if they reach an obstacle or impermeable objects like a facade or wall. If a line cuts through a building or interferes with another axial line on the neck of an object, then it is simply wrong and will influence the analytical result (Czerkauer-Yamu, 2010, p. 21).

The manual drawing of the study field was carried out by a single person based on satellite images. The drawing was completed in approximately eight months. This time can be longer or shorter depending on the areas of urban spaces. Besides, the number of people drawing an area is a variable that affects time.

Although manual drawing rules are specifically mentioned, drawing a study field by a single person is mostly more correct; different individuals may perceive space differently which may cause incorrect results in a system.

RCL Method;

This method can be implemented in two ways; the first method is Open Street Map created by voluntary users (Graham, 2010, p.428) Open Street Map provides the voluntarily distributed geographic data (Haklay, Weber, 2008, p.13) and the second method is National Mapping Agency Road Network Data, which is also called Integrated Transport Network (ITN). In general, official RCL data can be obtained from different sources such as region, city, and national data repositories or private companies such as and Google or Tom Tom. These data are not open for free public use with a few exceptions (e.g. the ITN dataset in the UK or TIGER in the US) (Pezzica et al, 2019, p.4).

Today, Open Street Map is the most popular VGI service in the world and provides coverage across all continents (Jiang, 2013, p.125). The street network component of the OSM VGI data is created and supplied through Road Center Line format. The data can be downloaded through web portals where the public, can obtain an area's, country's, or continent's specific datasets at no cost (see: http:// download. geofabrik. de/osm/andhttp://downloads. cloudmade. com/) (Dhanani et al, 2012, p.4). Unlike the VGI data, ITN isn't free; it costs £400-500 (600-750 USD) per square kilometer. This price, unfortunately, puts it out of reach of many commercial entities (in the academic realm data are often supplied free of charge); the entities which aren't prepared to make the initial investment without clear beneficial financial reasons are usually unwilling to try to pay the price. An important difference between the VGI and the ITN data is that it is possible to record all of the road features in the ITN dataset (Dhanani et al, 2012, p.6).

Open Street Map data are used in the study. A series of arrangements are made and simplifications are conducted according to the Douglas-Peucker algorithm. Generalization, among cartographers, is known as the process of simplifying geographic data in order to produce a map at a certain scale in a readable way. This process contains using different techniques to achieve a required geometric simplification in data

representation. The Douglas-Peucker algorithm, one of the most popular generalization algorithms, uses an iterative fit procedure to reduce the complexity of a curve that is composed of numerous line segments and replaces it with a similar one with fewer points. This algorithm functions at different intensities; it modifies the initial geometry according to a given tolerance value corresponding to the required level of simplification (Pezzica at all., p.11). The basic rules of these simplifications are presented below:

1. Roundabouts: They are simplified with straight links between consecutive entries or exits to the roundabout. Roundabouts that involve buildings at the center can be treated like urban blocks.
2. Staggered junctions: It is possible to draw a diagonal line when two almost parallel lines can be approached by a slight change in the movement direction.
3. Squares: Connections are drawn between all "entrance" and "exit" points in a square. A straight link is drawn in between two points that are directly visible and accessible. The cartographer should attempt to draw the minimum number of lines with all possible connections.
4. Underpasses, overpasses, and bridges: This rule is the easiest to implement because RCL map lines cross but not intersect where there is a difference in level; so, the only requirement is that no unlinks layer is loaded and that the RCL map is directly converted to a segment map.
5. Parallel lanes: Different lines that are typically found in motorways and highways are represented by two parallel lines İn an RCL map. An axial map is not directional; in this map, parallel lines are drawn as single medial lines (Kolovou et al. 2017, p.5).

Automatic Creation of the Axial Map

Axial maps can be automatically formed as an alternative to manual drawing. It is possible to create these maps with the DepthmapX program. Automatic drawing can be chosen by clicking on the sign showing four axial lines in the Depth MapX program. After the automatic drawing is completed, an image showing the space full of lines is formed. These lines can be minimized by the program and the drawing can thus be completed (Al_Sayed, 2018, p.23-24).

This method is mostly used for enclosed spaces; however, it is also possible to use it for urban spaces. To implement this method for these spaces, it is necessary to regard the whole urban space as an enclosed area. The methodological steps to be followed in this process are explained below:

Firstly, a master plan of the target space should be obtained. As the scales of master plans are smaller, there are fewer details. On the other hand, as master plans present the current state, mapping the current state of space and other practices are carried out based on them (Canpolat, 2019, p.569). Lots of current settlements in a city are shown in the obtained plan. The first important issue to be taken into consideration is that lots are drawn in the shapes of polygons.

DOI: 10.15320/ICONARP.2021.155

The periphery of the study field should be drawn as a poly-line and space should be transformed into an enclosed space. The computer creates lines in the empty spaces among enclosed polygons in an automatic drawing program; it regards poly-lines as the periphery of the space and stops drawing according to these lines.
The first lines consist of thousands of lines, and it is possible to minimize them through the program. They are minimized with the Fewest Line Map tool for the study and analyses are carried out based on them.

COMPARISON RESULTS

Temporal Comparison

Among the methods analyzed in this study, manual drawing took the longest time; the user spent almost eight months manually draw the study field. Axes that were drawn using satellite images were controlled by making observations in the real field and the accuracy tests were carried out.
RCL map, on the other hand, can be created by using an internet site. Checking the accuracy of junction points and adding nodes to the roads such as bridges, viaducts, and subways take the longest time in this process. There are also some other necessities of the system; simplification of RCL is the most important one of them. In their study, Kolovouet al. simplified the RCL map by using the Douglas-Peucker Algorithm (2017, p.10). Douglas-Peuckerproved that their generalization method makes a better proxy of the human cognitive wayfinding behavior regarding human perception and how a person perceives space as continuous. In their study, Kolovou et al. mention that the obtained analysis results are more accurate than the non-simplified maps. They could complete this simplification by using the extension of the QGIS program.
Simplification depends on decreasing the nodes on axial maps according to a specific algorithm and axial edging. Thus, it is possible to bring these axes closer to the manually drawn axes. Simplification units used in the algorithm are determined by the user through the trial method and the unit closest to the manual drawing is preferred for analysis. In this context, the RCL map of Elazığ was simplified by the MapInfo program. The algorithm used in the simplification process was 200m; namely, nodes were automatically cleared at every 200m and it was determined that this method was closest to the texture in manual drawing (Figure1). On the other hand, it should be noted that the use of RCLs in Turkey may sometimes cause some errors. On the other hand, spaces with controlled access may involve the biggest errors. The University, military zone, official agencies and the field of cement factory are restricted zones in this study field. These specific places aren't used by the general public; on the other hand, students and individuals who work in the university can enter the university area while entrances to the other specific areas are controlled. However, the road systems of these places are involved in the

RCL map. In addition to this, routes in these areas can be seen in the system (Figure2).

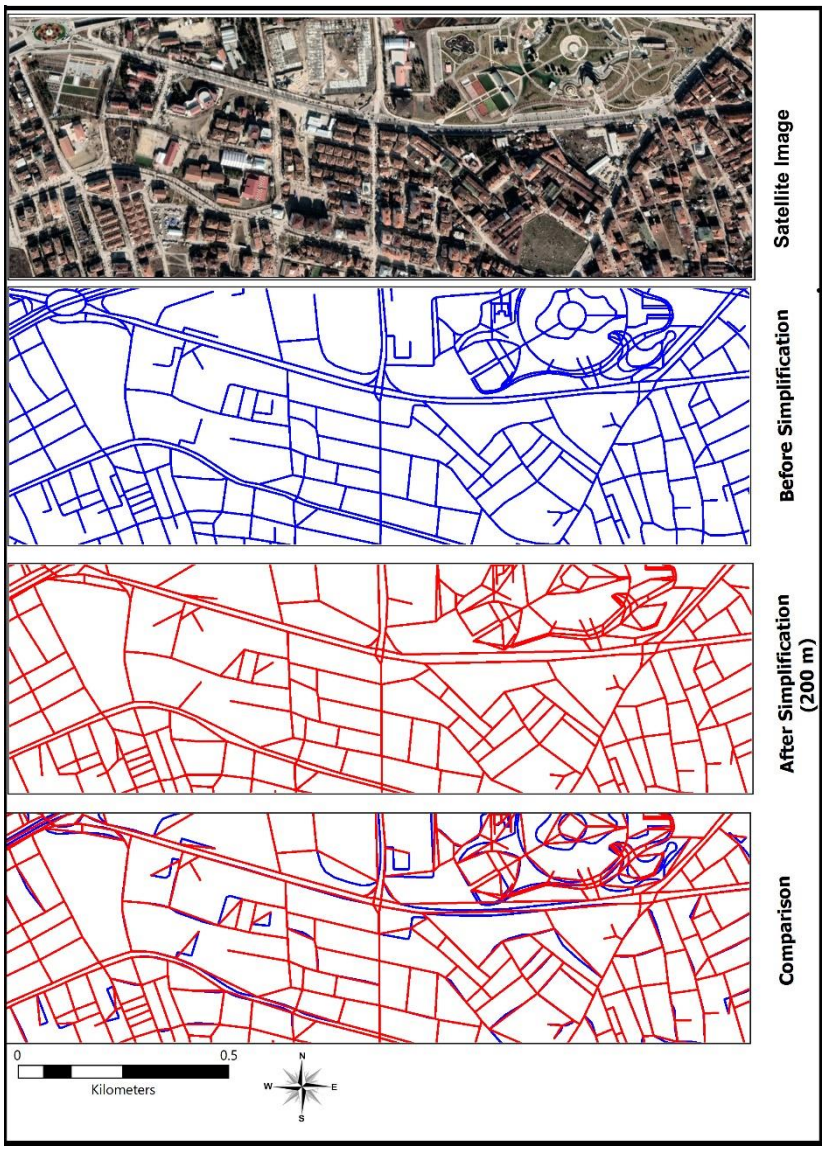

Figure 1. The Result of RCL Simplification

In this respect, it is necessary to specifically determine intersections, roads or subways and the lines that don't intersect with one another in RCL maps. Removing the axes in universities, official agencies, military zone, or areas of factories is a key requirement. Finally, it is necessary to simplify RCLs. Based on these processes, the period necessary for preparing an RCL map for analysis is approximately one week.

An automatic drawing of an axial map requires the construction plan as mentioned before. It is necessary to analyze lot and parcel polygons in construction plans and turn lot parcels drawn with lines into polygons. After that, the construction plan should be turned into an enclosed space as a whole. The creation of an axial map with the Depth Map program starts after this transformation; this process varies depending on the size of the study field. The automatic axial map transformation for Elazığ was completed in approximately 6 hours by the computer. These types of

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completed maps are named All Line Map by the program and they consist of millions of lines. These lines are minimized by the program, Fewest Line Map is created and the analysis step starts. Nodes should be added to roads such as subways, viaducts, etc. at this step, just like RCL. After that process, any kind of possible overlaps should be determined and cleared; it can take approximately one week to complete this process depending on the size of the space.

Textural Comparison

Textures of the basic three Axial Map creation methods based on the study field will be comparatively analyzed in this section of the study. After this step, textures of intersections and squares will be analyzed. Finally, the number of lines in axial maps, and the specific places of the longest lines will be evaluated.

In terms of the comparison of axial maps in study fields, it is possible to say that the texture closest to the manual drawing is generally created by the automatic drawing. Lines in RCL maps, on the other hand, are denser when compared to the other drawing methods (Figure2).

The textural similarity on a lower scale was analyzed based on Hazardağlı intersection in the study. It can be said that the textures in each of the three techniques are similar. However, lines in manual drawing and RCL are structurally more ordered and similar to each other in terms of form (Figure3).

Two different square areas were evaluated in this study. The first of these areas is Kültür Park, which consists of paths only available for walkers. Artificial pools around the paths interrupt transportation. In the automatic drawing technique, the whole area of Kültür Park is considered an empty square; this is why a different textural form is created in this method. However, it shouldn't be thought that this situation is a deficiency of the automatic drawing method. If artificial pools that interrupt connections were entered as enclosed spaces into the system, it would be possible to see shapes that are similar to the ones in manual and RCL methods. As the specific structure of them is taken into consideration in manual and RCL methods, they are more similar in terms of texture (Figure3).

Post Office Square is chosen as the second area to test the axial map drawing behaviors in homogenous spaces. This square can be regarded as a completely homogenous space. At the end of the practices, it is determined that the textures of each of the three methods were different from one another. The area of the square is empty in RCL lines while there are two intersecting lines in the north-south direction in the automatic drawing. On the other hand, lines designed according to the manual drawing technique are texturally completely different from the other drawing methods (Figure3).

When the axial map drawing methods are analyzed in terms of the number of lines and similarities on the longest line, it can be said that the number of lines in the manual drawing is close to the number of lines in

the automatic technique. However, lines in RCL are considerably higher than that of the other two methods (Table 1).

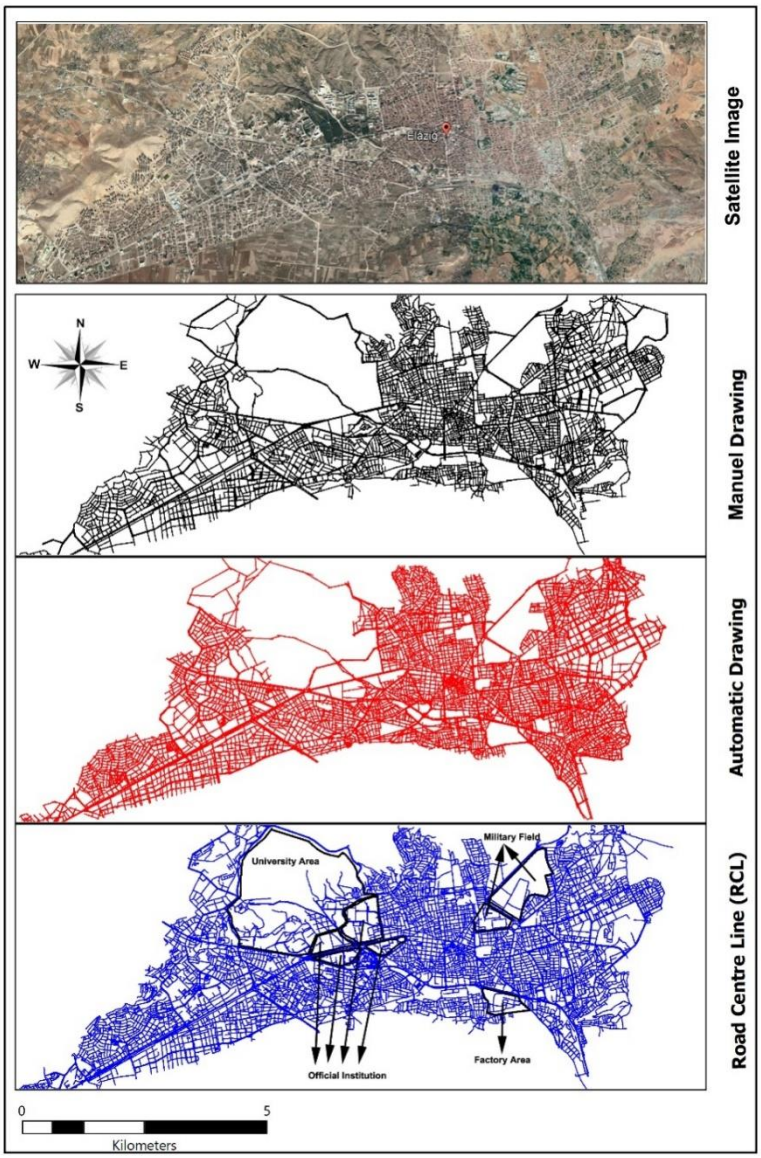

Figure 2. Textural Comparison of Maps

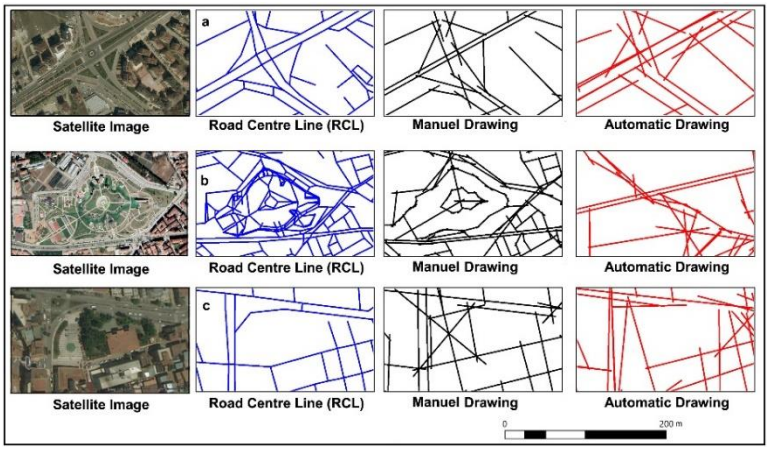

Figure 3. a) Hazar Dağlı Intersection b) Kültür Park Squares c) Post Office Squares

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Table 1: Line Numbers and Lengths of Drawing Techniques in the Study Area

Drawing Techniques	Number of Lines	Longest Line (Km)
Manual Drawing	5.093	6.56
Automatic Drawing	4.705	6.45
Road Centre Line (RCL)	14.698	1.65

Kolovou et al., (2017) used the Douglas-Peucker algorithm to transform RCL maps into axial maps. The basic purpose of the algorithm is to minimize the over-fragmentation of continuous space in a drawing method by decreasing the number of nodes in a system (Kolovou et al., 2017; p.8). A similar technique was conducted to Elazığ RCL map for this purpose. The "snap/thin" tool of the MapInfo program was used and the number of nodes in the study field was decreased according to the 200m algorithm. While the number of nodes in the RCL map before simplification was 39.815, it was decreased to 29.595 after simplification. Although it is possible to minimize the number of nodes, computers regard space between every node as a free road in RCL lines. The Road Center Line map has many more segments than the axial map. The total segment length of the Road Center Line map is shorter than the axial map, as the axial lines overhang the ends of roads (Turner, 2007, p.548). The number of lines in RCL is thus higher than that of the other methods. Because of the very same reason, while the longest route in the manual and automatic drawing is Elazığ-Malatya road, the longest route is Alparslan Türkeş Boulevard on the RCL map.

Comparison of Space Syntax Analysis Results

The change from Axial into Line-segment maps is one of the most important developments in Space Syntax analysis, both theoretically and methodologically (Hillier and Iida,2005; Hillier,1999a,1999b; 1; Steadman,2004; Dalton, 2001). Another significant development is the use of the Road Center Line for urban analysis.

The Angular Segment Analysis (ASA) has become the main alternative to the Axial map analysis and it is commonly used by Space Syntax researchers. The analysis is based on using a Line-segment map, generated either from an Axial map or from a Road-centre-line map (Stavroulaki et al., 2017, p.5). As the Road Center Line data used in this study represent vehicular networks, the quantitative analysis is constrained to vehicular road usage, although the methodology could be expanded to pedestrian networks (Turner, 2007, p.541).

The axial analysis depends on the calculation of the number of road connections in a given system; it thus makes a depth analysis of all the streets and main roads in the system and puts them into hierarchical order. In Angular Segment Analysis, the return angle of the streets and main roads are taken into consideration, and calculations are accordingly made.

ICONARP – Volume 9, Issue 1 / Published: 21.06.2021

The first calculation in this context is Integration calculation. Radius, which is represented with R, is calculated as the first step of this calculation process. Radius allows the classification of the global structure of the depth in any chosen depth statue. It is generally systemized in local and global measurements. Radius 3 analysis (different numbers can be used) is used for local measurements while Radius N analysis (Radius Infinity) is used for global measurements. In other words, Radius 3 enables us to understand the regional system while Radius N emphasizes centralization in an urban structure (Czerkauer-Yamu, 2010:18)".

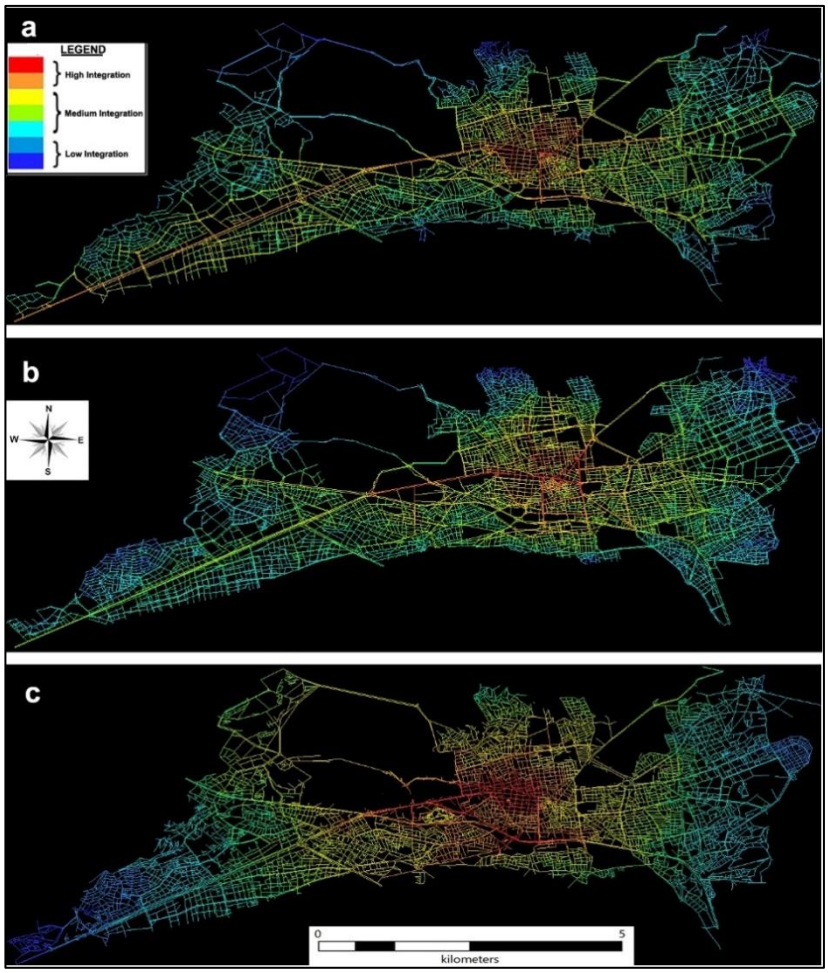

Figure 4. Axial Rn Analysis a) Manual Drawing b) Automatic Drawing c) Road Center Line

Manual, automatic drawing, and RCL maps will be analyzed with Axial and Angular Segment analysis methods and results will be compared in this section of this study. Integration values are the only ones taken into consideration in these comparisons. Axial and angular segment analyses are firstly calculated on global and local scales. Rn value is measured on a global scale in axial analyses while R15 is measured on a local scale. Rn value is measured in Angular Segment analysis on a global scale while R400m value is preferred on the local scale. More than one R analysis is completed while calculating the local measurements in the study field.

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However, R15 and R400 values are preferred as they are proper for the study field's radius and they give the most real-like result.

RCL maps do not statistically yield correct results in axial analyses, but this analysis is conducted to determine the behavior of RCL maps in axial analyses.

It can be said that manual drawing gives the best results based on field observations when it is compared with Axial Rn analysis. According to the results, automatic drawing results are closest to the manual drawing results. On the other hand, while the results of RCL maps are the same as the other methods in the main routes of the study field, the results of them in access points are incorrect (Figure4).

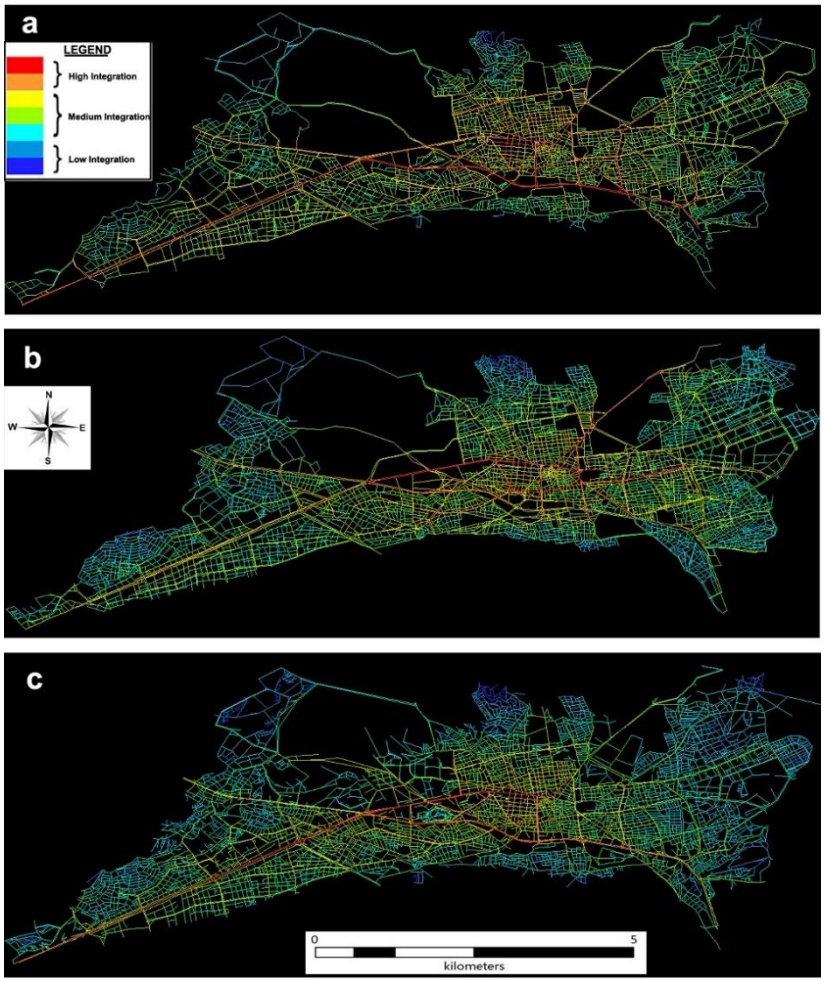

Figure 5. Angular Segment Rn Analysis a) Manual Drawing b) Automatic Drawing c) Road Center Line

It is observed that there is a total decrease in the integration value of the city in the Angular Segment Rn analysis when compared to Axial Rn analysis. When a more detailed analysis of the issue is conducted, it is possible to see that result obtained from manual drawing is almost the same as the result of the RCL map. Angular Segment analysis mostly showed highways. The map obtained by the automatic drawing method is different. The result of this method is the same as the result of the axial analysis, which indicates consistency. It is possible to say that automatic

ICONARP – Volume 9, Issue 1 / Published: 21.06.2021

drawing gave more accurate results; the lines with high integration values are the areas frequently used by walkers and automobiles (Figure5).

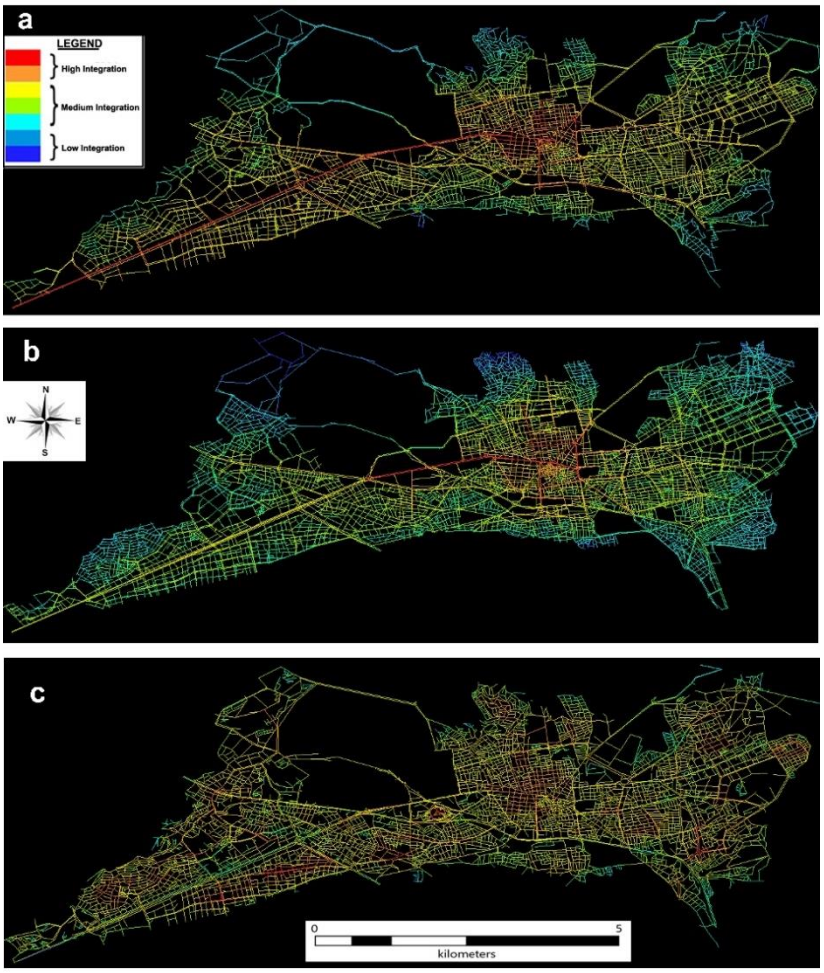

Figure 6. Axial R15 Analysis a) Manual Drawing b) Automatic Drawing c) Road Center Line

Manual and automatic drawing results are similar in Axial R15 local analysis while RCL map results in the local analysis are completely different and far from the real values. As mentioned before, the RCL map isn't expected to yield correct results because of the very system of it. Despite the similarity between manual and automatic drawing, the most accurate result is that of manual drawing. The difference between manual and automatic drawings is obvious especially in the integration of streets and roads at the center of the city (Figure6).

Angular Segment R400m local analysis results of the three methods are similar (Figure7). On the other hand, when a more detailed analysis is conducted, it is observed that manual drawing and RCL results are more similar. This similarity is based on the higher integration values of these methods. The results obtained from the automatic drawing are, in a sense, the average of the other two methods. Routes represented with brown and orange in the central areas of the city are represented mostly with orange and yellow in the RCL map. The western and southern line of the city is represented with yellow in Automatic drawing, while that line is

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red in manual and RCL maps; this is the biggest difference of automatic drawing.

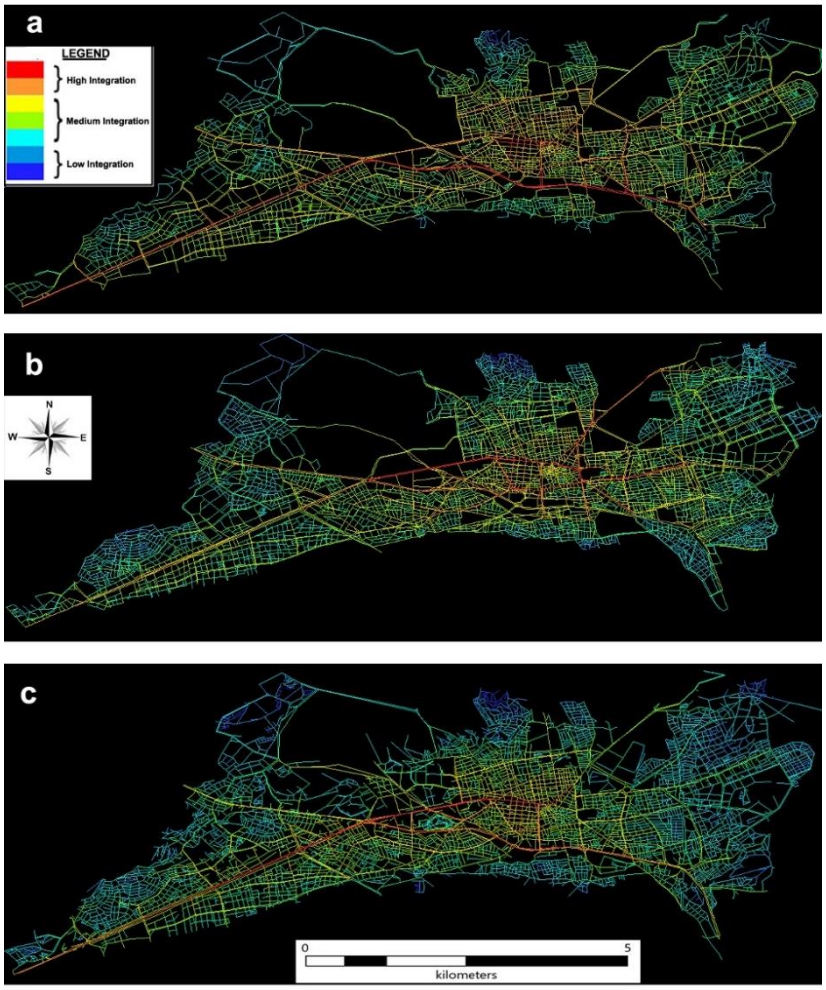

Figure 7. Angular Segment R400m Analysis a) Manual Drawing b) Automatic Drawing c) Road Center

RESULT AND EVALUATION

Manual Drawing, Automatic Drawing, and RCL maps are three different axial map creation techniques of the Space Syntax analysis. However, the use of RCL maps or Automatic Drawing has been more frequently preferred today as they diminish the drawing differences by different users and they give the chance to analyze wide spaces. There are many computer software developed for the Space Syntax method in the past. Axwoman, Seyntax2D, Pesh, SpaceBox, NetBox, NewWave, Ovation, WebMap, Mindwalk, Place Syntax, Ajax, Confeego, and Depthmap are some of these tools. Most of this software hasn't been currently used while some of them such as Confeego, Syntax2D, Axwoman, are integrated into other GIS programs as they are compatible with older versions.

Some additional processes are inevitable for automatic drawing and RCL maps. For instance, simplification of RCL maps, organization of curves in intersections, adding squares according to the drawing techniques, determining restricted zones, and eliminating them are some of these

necessary steps. Also, three basic operations can be performed on the original RCL maps. These are filtering generalization and re-modeling. filtering is the process of separating the roads on the original RCL maps by type (pedestrian, car, bicycle road, etc.). The method of generalization is another technique used in the literature to simplify OSM data. Cartographers define generalization as the process of simplifying geographic data to produce a readable map at a certain scale. This type of process involves using various techniques to achieve a required geometric simplification in data representation. The last operation step that can be done is Re-Modeling, which refers to the strategy of locally modifying the original graph, manually or automatically, in order to produce a model more coherent with a preferred interpretation of reality. The remodeling includes the arrangement of traffic islands, artificial dead-end streets, roundabouts, junctions, and roundabout mainline connections and parallel streets.

Although Fewest Line is practiced in automatic drawings, it may be necessary to determine the overlapping lines and organize the squares according to the drawing technique, that is, it is believed that both of the methods should be technically improved.

The manual drawing method is the longest procedure while the RCL method is the shortest; automatic drawing, on the other hand, consumes different times in different applications. If the polygons used in the automatic drawing method are proper, the method gives results as fast as RCL maps. If it is not created with a method suitable for automatic drawing techniques, the process takes a longer time. Lot and blocks should be drawn in parcels to be more practical; unfortunately, these lots are sometimes drawn in Polylines instead of Polygons. In such cases, it is not possible to automatically create an axial map; manual drawing is more reasonable in such processes.

As mentioned before, manual drawing is the basic method of Space Syntax. Automatic drawing enables drawing axes according to the methodological viewpoint and including pavements that ensure coherence in the system. Automatic drawing is the technique that is closest to the traditional one in terms of texture. RCL maps undergo a process of simplification to obtain the best results; a similarity between RCL maps and manual drawing texture can be ensured through some additional processes. Lines in RCL maps cannot be in coherence with the traditional technique despite these processes.

Textural similarity among all three techniques in terms of intersections in the study field increases after RCL simplification. However, manually and automatically drawn shapes are texturally most similar. RCL and Automatic Drawing techniques failed in reflecting the texture of squares. It is believed that some manual interventions after completing drawings are inevitable.

Manual drawing is the most successful method in axial analysis, on global and local scales. The automatic drawing method gave the closest results to manual drawing according to the results of both analyses.

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Although RCL and Manual drawing results are similar in Angular Segment Rn analysis, the most coherent and reliable result was obtained from the automatic drawing. RCL map analysis gave the most accurate result in terms of R400m analysis in the same system.

As a result, it can be said that each technique has some advantages and disadvantages. Analyses are carefully and objectively evaluated and methods that yield the most accurate results based on the field observation are determined in this study. Deciding on the use of a method solely based on these analyses wouldn't be a scientifically proper approach, namely, evaluation and decision making processes should be carried out by the users and readers.

CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

FINANCIAL DISCLOSURE

The authors declared that this study has received no financial support.

ETHICS COMMITTEE APPROVAL

Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS

This study did not require any special permission.

REFERENCES

Al_Sayed K. (2018). *Space Syntax Methodology*, Bartlett School of Architecture, UCL.

Atak, Ö. (2009). *Mekan Dizim ve Görünür Alan bağlamında Geleneksel Kayseri Evleri*. (Unpublished master's thesis). İTÜ Fen Bilimleri Enstitüsü, İstanbul.

Canpolat F. A. (2019). İmarPlanlarınınKentselAraştırmalardaKullanımı, *II. Uluslararası Sosyal Bilimler ve İnovasyon Kongresi*, Bildiriler Kitabı, 26-27 Nisan 2019, Elazığ.

Czerkauer-Yamu, C. (2010*). Space Syntax Understanding, Hiller's Concept of a Spatial Configuratiın and Space Syntax Analysis*, Unıversite de Franche-Comte, Unıversity College London, İngiltere.

Çil,E.(2006). Bir Kent Okuma Aracı Olarak Mekan Dizim Analizinin Kuramsal ve Yöntemsel Tartışması, *MEGARON, YTÜ mim. Fak. E-Dergisi*, Cilt 1, Sayı,4, s. 218-233, İzmir.

Çil, E. (2008). Kula Tarihsel Kentinin Yirminci Yüzyıldaki Fiziksel Dönüşümünün Mekan Dizim Analiziyle İncelenmesi, *Gazi Üniv. Müh. Mim. Fak. Dergisi*, Cilt: 23, No: 2, s. 283-293, Ankara.

Dalton, N. S. (2001). *Fractional configuration analysis and a solution to the Manhattan problem, In Peponis*,J., Wineman, J., Bafna, S. (eds.), Proceedings of the 3rd International Space Syntax Symposium, Atlanta, U.S.A.: Georgia Institute of Technology, p.26.1-26.13klay

Dhanani A., Vaughan L., Ellul C., Griffiths S. (2012). From the axial line to the walked line: evaluating the utility of commercial and user-generated

street network datasets in space syntax analysis, *Eighth International Space Syntax Symposium*, p.8211: 1-32, Santiago de Chile.

Graham, M. (2010). Neogeography and the palimpsests of placeWeb 2.0 and The Construction of Avirtual Earth. *Tijdschriftvoor Economischeen Sociale Geografie*, 101(4), 422-436.

Haklay, M., Weber, P. (2008). Open Street Map: user-generated street maps. *Pervasive Computing*, IEEE, 7(4), 12-18.

Hillier, B., and Iida, S. (2005). Network effects and psychological effects: A theory of urban movement, In Van Nes, A. (ed.), *Proceedings of the 5th International Symposium on Space Syntax*, Delft: University of Technology Vol.1, p.553-564.

Hillier, B. (1999a). Centrality as a process: accounting for attraction inequalities in deformed grids', *In Urban Design International*, vol. 4, p. 107-127.

Hillier, B. (1999b). The hidden geometry of deformed grids: Or, why space syntax works, when it looks as though it shouldn't, In *Environment and Planning B: Planning & Design*, Vol. 26, p.169-191.

Jiang, B. (2013). Volunteered geographic information and computational geography: new perspectives, in Sui, D., Elwood, S. & Goodchild, M. (eds.), *Volunteered Geographic Information in Perspective*, Springer: Berlin, 125-138.

Jiang, B., Claramunt, C.,Klarqvist, B. (2000). An integration of space syntax into GIS for modelling urban spaces. *International Journal of Applied Earth Observation and Geoinformation*, 2, 161-171.

Jiang, B., Claramunt, C. (2002). Integration of Space Syntax into GIS: New Perspectives for Urban Morphology, *Transactions in GIS*, Cilt: 6, Sayı: 3, s. 295-309, USA.

Klarqvist, B. (1993).*A Space Syntax Glossary*, Nordisk Arkitekturfoskning, 2th Edition, Norway.

Kolovou I., Gil J., Karimi K., Law S., Versluis L. (2017). Road Centre Lıne Sımplıfıcatıon Prıncıples For Angular Segment Analysıs, *Proceedings of the 11th Space Syntax Symposium*, Chapter 165: p.1-16, Lisbon.

Long, Y., Baran, P. K., Moore, R. (2007). The role of space syntax in spatial cognition: evidence from urban China. *Processing of 6th International Space Syntax Symposium*, Chapter 129: p.1-6, Istanbul.

Liu, X., Jiang, B. (2011). Defining and Generating Axial Lines from Street Center Lines for better Understanding of Urban Morphologies, Preprint, arxiv. org/abs/1009,5249.

Omer I., Kaplan N., Jiang B. (2017). Why Angular Centralities Are More Suitable For Space Syntax Modeling? ,*Proceedings of the 11th Space Syntax Symposium*, Chapter 100: p.1-12, Lisbon.

Özkan Özbek, M. (2007). Fizik Mekan KurgularınınSosyal İlişkiler Üzerinden Arnavutköy Yerleşimi Bütününde Mekan Dizimi (Space Syntax) Yöntemi İle İncelenmesi, *Mimar Sinan Güzel Sanatlar Üniversitesi, Fen Bilimleri Enstitüsü, Şehircilik Ana Bilim Dalı, DoktoraTezi*, İstanbul.

Pezicca C., Cutini V., Bleıl De Souza C. (2019), Rapid Configurational Analysis Using Osm Data:Towards the use of Space Syntax to orient post-

DOI: 10.15320/ICONARP.2021.155

disaster decision making. *Proceedings of the 12th Space Syntax Symposium*, Chapter 147: p.1-18, China.

Stavroulakı G., Marcus L., Pont M. B., Nilsson L. C. S. (2017). Representations of Street Networks in Space Syntax: Towards Flexible Maps and Multiple Graphs, *Proceedings of the 11th Space Syntax Symposium*, Chapter 175: p.1-16, Lisbon.

Steadman P. (2004). Developments in space syntax, In *Environment and Planning B: Planning and Design*, Vol31, p.483- 486.

Sun X. (2013). Comparative Analysis of Urban Morphology: Evaluating Space Syntax and Traditional Morphological Methods, *Faculty of Engineering and Sustainable Development, Department of Industrial Development, IT and Land Management, Degree project thesis, Master*, Gavle, Sweden.

Turner A., Penn A. İ., Hillier B. (2005). An Algorithmic Definition Of The Axial Map, *Environment and Planning B: Planning and Design*, volume 32, pages 425-444.

Turner, A. (2007). From axial to Road Center Line: A new representation for Space Syntax and a new model of route choice for transport network analysis. *Environment and Planning B: Planning and Design*, volume 34(3):539–555.

Resume

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Research Article

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The Re-Evaluation of Existing School Buildings in Turkey within the Context of 'Green School'

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Abstract

Purpose

It is seen that major repairs and refurbishments in existing school buildings in Turkey are mostly intended for structural reinforcement and physical facilities, and the Green School design principles are not considered in the process of the new school designs and refurbishment applications in existing schools. Moreover, the participation of students, teachers and parents in "environmental decisions" in design process regarding school building and its environment is not ensured sufficiently. The purpose of the research is to determine of the knowledge, views, wishes and tendencies of the students, teachers and parents which are the three main components of the school community related to the general characteristics of the school building and its contribution to environmental education.

Design/Methodology/Approach

A questionnaire form was used as a tool. The survey was conducted in two secondary schools in Ankara in 2017-2018 academic year. Data were analyzed with SPSS 24.0 with the help of experts.

Findings

The majority of the participants believe that the open spaces in the schools do not provide enough opportunities for interaction with the natural environment, the green spaces in the schools are not sufficient in terms of quality and quantity, the noise in the classrooms is clearly disturbing, but the artificial lighting, temperature and ventilation were found to be relatively adequate.

Research Limitations/Implications

When selecting the schools, it was among the schools that are planned to be maintained and repaired in the 2018-2019 academic year by the Ministry of National Education and the schools built after 1990 taking into consideration compliance with today's conditions and the adaptability of technological systems.

Originality/Value

This research stimulates readers and stakeholders to discuss the environmental education provided to the future decision makers (children) through the school buildings.

Keywords: *Environment, environmental education, green schools, green school design criteria, school buildings*

INTRODUCTION AND LITERATURE REVIEW

Research on green buildings shows that school buildings constitute the fastest growing sector in the green building industry. A large extent of green building design principles are adopted in the construction and renovation of school buildings, and the importance given to these principles is growing around the world (Yudelson, 2008: 1-5, Kats, 2006: 2-7). The concept of 'green schools' was first introduced by the United States Green Building Council (USGBC). The Council launched the national green schools campaign in 2007, and in addition to the LEED certification system established by the Council, the LEED Schools (LEED-SCH) organization was created to measure and evaluate the environmental performance of school buildings (USGBC, 2009: 10). In 2010, the Center for Green Schools was established within the USGBC. The objective of the Center for Green Schools is to direct the transformation of all schools into sustainable and healthy places for living, learning, working and playing. In 2013, the Green Schools Project was initiated with the cooperation of the World Green Building Council (WGBC), the Center for Green Schools, and the National Green Building Councils. The Green Schools Project is defined as "an international and multi-stakeholder project to provide students with the opportunity to be educated in healthier, safer and more efficient buildings", with the aim of "educating new generations in healthier buildings to contribute to the raising of an academically more successful generation" (Green Buildings Reference Guide, 2014: 4). Within the scope of the project, the Global Coalition For Green Schools was established. In 2013, Turkey signed the green schools agreement at the World Green Buildings Council in Cape Town as a founding member along with 29 other countries.

According to Ministry of Education statistics, in 2017-2018, there were about 98 thousand school buildings in Turkey, 24 million students, and 1 million 300 thousand teachers (MEB, 2018: 18-21). In addition, statistics indicate that almost one third of the Turkish population spends a good part of their day in school buildings. Therefore, the current conditions of school buildings are important in every aspect. In Turkey, the 'Minimum Design Standards Guide for School Buildings' was published by the Ministry of National Education in 2013 with regard to constructing new school buildings and renovating existing ones. Renewed in 2015, this guide stated that approximately 50% of school buildings in Turkey are over 25-years old, and that there is a need to refurbish these buildings so that they comply with the principles of providing educational services and respond to new requirements in education and training (Avcı, 2013: VIII). Furthermore, according to 2017 Ministry of National Education statistics, the largest part of the budget is reserved for major repairs and facilities (MEB, 2017: 239-247). However, it has been observed that major repairs and renovations to existing school buildings are mostly aimed at structural strengthening and the improvement of physical facilities. Green building design

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principles and certification systems are not considered important input in new school designs and when existing schools are renewed, there is no obligation to comply with these principles. In addition, it is observed that the participation of students, teachers and parents in "environmental decisions" regarding the design processes of school buildings and their surroundings.

In this context, participation is the process of communication between the population living in an area being planned and the experts doing the planning, where the target groups use the current situation to help guide and determine the factors for the analysis, planning, evaluation, and implementation necessary to solve the existing problems in that area (Saltık, 1997: 27-33). Thuswise, participation techniques are used to create successful physical environments and the data obtained is used in school designs. Accordingly, every building is constructed in a way that will address its region and residents. Thus, schools can be designed as community centers that will satisfy students, parents, managers and teachers (Özbayraktar, 2005: 101-108).

Economic insufficiencies lead to the development and implementation of typical projects pertaining to school buildings and these practices cause various physical and socio-cultural problems at both the individual and social aspects. It is well understood that investments made into school buildings that reflect changing educational programs and developing technology contribute to society in a versatile way and with long-term gain. In this context, there are many studies in the literature analyzing the effects of green schools on the environment, on the health and education of students, as well as the fact that green schools can be used as an effective tool in environmental education (Taylor, 2013: 3; Gelfand and Freed, 2010: 13).

For example; Cole (2013), in his study titled "The Green Building as a Medium for Environmental Education", which is among the disciplines of architecture and environmental education, focused on the contribution of the physical environment to environmental education. It emphasized that school buildings can be used as an important tool to increase environmental literacy. According to Bradley (1996) who studies the effect of architecture on education; declares as a tool that supports the curriculum and makes the teaching experience more meaningful, architectural design should serve as a textbook for students. Taylor (2013) states that investing in school buildings are a "triple win" for communities (Figure 1).

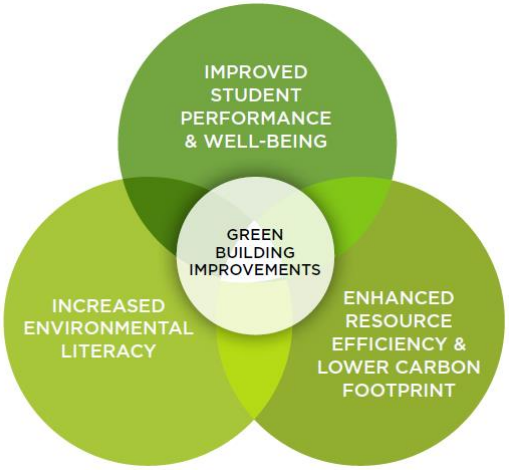

Figure 1. "Triple win" for communities (Taylor, 2013).

In his study, Hines (1996) observed the connection between the situation of school facilities, student achievement and student behavior. The results of this study show that student achievement scores were higher in schools with better building situations, and student discipline incidents were higher in schools with better building situation. Science achievement results were better in buildings with better science laboratory conditions. In conclusion, changing climate control, locker and grafitti conditions were causes which positively associated with student achievement scale scores.

Oetinger (2010), in his study titled "Green schools: Constructing and renovating school facilities with the concept of sustainability", examined the effects of green schools on the environment, students' health and education and stated that green schools have a positive effect on learning, reduce the financial costs of the school, and reduce absenteeism.

According to the study conducted by Barrett and Zhang (2013) to investigate whether school building design has any demonstrable effect on the learning speed of students in primary schools in England, school layout affects a child's development at the level of 25%, either positively or negatively. The study showed that six classroom design factors (color, preference, connectivity, complexity, flexibility, and light) were clearly correlated with grade scores.

In the studies on the benefits of implementing sustainable design features in newly constructed and renewed school facilities, the following points are underlined. Constructing and renovating school buildings based on the concepts of sustainability will:

-minimize waste and the consumption of resources and thus will reduce the overall impact on the environment,

- be effective in reducing operation and maintenance costs,

-help decrease student and staff absenteeism, increasing motivation and academic success,

-protect users' health, provide an efficient (productive) learning environment, connect students to the natural world, and increase daily

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average participation (Berry, 2002: 19; Ford, 2007: 4; Edwards, 2006: 14-29).

Many studies are conducted to examine the physical conditions of schools that are often related to the field of educational science exist in Turkey on environmental education and on the impact of student achievement regardless of green school design criteria.

In the study by Gök and Gürol (2002), in which the use of primary schools in terms of time and ergonomics, a questionnaire was applied to 110 administrators of primary schools in Elazig in the 1998-1999 academic year, and it was found that the physical units in the school were used above their capacities. It is concluded that it is used very little other segments of the society and ergonomic use of school buildings and units is not given importance. In the study, it was emphasized that the schools were inadequate in terms of ergonomics, and the most inadequate in terms of ergonomics in all units was the acoustic layout, color harmony and ventilation, and the opinion of various experts (architect, educator, child development specialist, doctor, behavioral scientist) should be taken when constructing new school buildings.

In the study of Özdemir and Çorakçı (2011), it was aimed to develop environmental awareness in children as well as to examine the effects of school gardens on child development and healthy life, and by conducting surveys with 1729 students in 5 schools in Ankara, teachers' opinions were taken and school gardens were redesigned accordingly. As a result of the research, it was found that children who were active during the break were healthier, some students spent their recess time in the school due to the short break time and the lack of gardens for activities, most of the students liked schools with large gardens and were not satisfied with school gardens with low landscape values. The results of this study show that greener and well-maintained school gardens will support physical activity by changing students' view of the environment and playing habits, and that sustainable school environments can be created with the participation of students.

In the study conducted by Seven and Engin (2008) to determine the factors affecting learning, it was observed that, according to the results of the questionnaire they applied to students, the most important negative factors affecting learning were external factors, and these factors were the physical condition of the school and the students' inability to receive as much support from their families economically. Some of the students participating in the questionnaire stated that the primary education institutions they study at are not getting heated enough, their schools are located in a very noisy place due to their location, and they cannot benefit from places such as workshops or laboratories as much as they need.

Atasoy and Ertürk (2008), in their study to determine the environmental attitudes and knowledge of primary school 6th, 7th and 8th grade students, showed that primary school students were not at a sufficient level in terms of both environmental knowledge and

environmental attitude, the quality, scope and depth of environmental education provided in primary education. They stated that the reasons such as negative and insufficient content of the curriculum, the inadequacy of the textbooks for education for the environment, the education environment, the quality of the teachers, the less environmentalization of the lessons are the main reasons for the low environmental knowledge.

In the study conducted by Karatekin and Çetinkaya (2013) in order to evaluate the primary school gardens in the city center of Manisa in terms of environmental education, an evaluation form measuring the adequacy of school gardens were developed by the researchers. As a result of the evaluation, the usage areas of the primary school gardens in the city center of Manisa are far below the standards in developed countries and the area of the school gardens included in the study is covered with concrete or asphalt, so the amount of green space per student is very low. It was stated that there were no bushy areas with few trees and flowering areas in the area, there were either no or insufficient equipment in a school yard for environmental education, and 32 primary schools included in the study were insufficient in terms of environmental education.

It is clear that many existing school buildings in Turkey are not consistent with the concept of green schools and that society is not sufficiently aware of the individual, social, and economic contributions of green schools. Additionally, although the number of school buildings with green building certificates has been increasing, it is seen that certified school buildings are mostly higher education buildings and/or private education institutions within universities. Considering the fact that children are easily affected by their environment in terms of health as well as the importance of environmental education at an early age, green building design benchmarks should be developed, implemented, and made obligatory not only for private educational institutions but also for pre-school, primary and secondary school buildings. To create successful physical environments, it is also important to consult users, as their opinions will be guiding and determining factors.

METHODOLOGY

In the research, a comprehensive “survey” was conducted to re-evaluate school buildings and the concept of “green schools” was assessed based on the selected schools. Firstly, the current status and general characteristics of the selected schools were examined, and their negative/positive aspects were determined. Data was collected through a survey prepared according to a review of the literature on the concept of “green schools”. The questionnaire consisted of seven sections:

- The first section included questions about general and demographic characteristics,
- The second section was about the relationship between the school and the environment, and also about environmental education,

DOI: 10.15320/ICONARP.2021.156

- The third section had questions about the general characteristics of the school building and its contribution to environmental education,
- The fourth section focused on general opinions about classrooms,
- The fifth, sixth and seventh sections had open-ended questions aimed at identifying wishes and tendencies regarding the positive/negative characteristics of environmental education in and around the school building.

The data was analyzed using the SPSS 24.0 program and the results were evaluated at 95% confidence level. Construct validity and reliability analyses were performed in order to determine the factor structure and reliability level of the scales. The construct validity of the scale was determined according to Exploratory Factor Analysis (EFA), and Cronbach's alpha reliability coefficients were calculated to determine its reliability. The scale scores in the study were calculated based on the following metric:

- I have no idea/I do not know: 0
- I strongly disagree: 1
- I do not agree: 2
- I am undecided: 3
- I agree: 4
- I strongly agree: 5

Accordingly, the lowest score that can be obtained from the scale is 0, and the highest score is 5. Using this scale, the difference between the scores of the students, teachers and parents were analyzed using the ANOVA test. Since classrooms are the places where education, training, and learning activities are carried out, and thus most of the time is spent in classrooms, the questionnaire included general opinions about classrooms as well. In this regard, this study is a statistical evaluation. In line with the data analysis in the questionnaire, tables were prepared to indicate the distribution of answers regarding the positive and negative opinions of the students, teachers, and parents about certain features of the building as well as the distribution of answers given to questions regarding the comfort conditions of the classrooms.

In the 2017-2018 academic year, a total of 143 students, 7 teachers and 117 parents from two secondary schools (The article will be referred to as X Secondary School and Y Secondary School) in Yenimahalle District of Ankara Province were surveyed and the general characteristics and current situations of the schools were examined. According to the findings of international studies on environmental education, the education level at which individuals can receive environmental education in the most efficient way is secondary education (Ünal and Dımışkı 1999; IEEP, 1994). Considering the awareness level and age of the students, the survey was conducted with 8th grade students in secondary schools. When examining education programs in Turkey; there are units with titles as "Human and Environment", "Creatures and Life", "Energy Conversions and Environmental Science" etc. in the science lessons of primary and secondary school 3,4,5,6,7 and 8th

grades. Depending on the education program, an awareness and perception of the concept of environment occurs in students. Students constitute the majority of the user group in school buildings. For this reason, it was not necessary to explain the questions as they were expected to respond to the questions in the questionnaire with the students' perception of the school building and its surroundings and their perspective. In the process of selecting the schools; first of all, by contacting the Provincial Directorate of National Education Construction Real Estate Branch, information was obtained about the secondary schools that are planned to be maintained and repaired in the 2018-2019 academic year. Secondly, among these secondary schools those with wide / developable land conditions and those constructed after the year of 1990 were determined, considering the adaptation to today's conditions and the adaptability of technological systems. Afterwards, 2 secondary schools that met these conditions were selected. In order to minimize the variables related to physical environmental conditions, the selected schools are in the same neighborhood.

CONSEPT AND DESIGN PRINCIPLES OF GREEN SCHOOLS

Edwards (2006) states that there are four important characteristics to define a green school:

-Resource efficient,

-Physically and psychologically healthy,

-Comfortable, adaptable/sensitive and flexible,

-Based on ecological principles.

Earthman (2009) defines green schools as mechanisms that are saving energy and water and designed from materials that do not harm the environment. According to Earthman (2009), green schools support their natural environment. Additionally, the outside world is included in building design. When someone walks down the corridors, they'll feel as if nature is responsible for the design. The green school program of the USA, Global Green USA, which works to build and develop healthier and energy efficient school buildings, identifies a green school as a facility that is designed, renovated, operated or reused in an ecological and resource-efficient way.

Center for Green Schools, defines green schools as a school building or facility that creates a healthy environment conducive to learning while saving energy, resources and money. Also, According to WGBC (2013), the quality of the green schools are:

-Less energy consumption during operation with the energy-saving building design,

-High indoor air quality providing improved learning outcomes,

-Removal of toxic materials from learning environments and playgrounds,

-Using daylight strategies,

-Improving classroom acustics,

-Preservation of fresh dirinking water and collecting rainwater,

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-Reducing the wastewater management of municipality through water recycling and water efficiency devices and equipment,
-Supporting wastewater management efforts and recycling through decomposition opportunities to reduce the demand for local storage and take advantage of the local community and region.

Green schools are buildings that do not produce waste hazardous to the environment during the processes of design, production, use (operation), reuse, dismantling, demolition and/or destruction. They offer users healthy and comfortable environments, ensuring the efficient use of natural and artificial resources, and contributing to environmental education; thus having a positive effect on the overall quality of education. The difference between green schools and other green buildings is that the field of education emphasizes sustainability and resource conservation and contributes to interactive environmental education. Analyzing studies in the literature (WGBC, 2013: 3-6; Baker and Bernstein, 2012: 1-4; Çakır, 2017: 180-185), it can be observed that the features green schools emphasize the most are the efficient use of resources, protecting the environment, and creating healthy and comfortable environments, as well as seeing the entire school as a learning tool and planning accordingly. In addition, the majority of the user group consists of developmental age children, and it is often underlined that their healthy development is affected by the quality and structural features of their school buildings. Within the scope of green school designing principles, it is also important to create compatible/sensitive and flexible spaces that are adaptable to the quality of education, changes in educational programs, and developing technological innovations.

Scientific studies show that there is a relationship between the physical environment of a school and the performance of students and teachers. According to Baker and Bernstein (2012: 4):

- Studies show that when deprived of natural light, melatonin cycles in children are impaired, which affect levels of attention at school (Figueiro & Rea, 2010).
- Teachers report that they are more comfortable in classrooms where they have access to temperature controls, be it thermostats or even opening windows (Heschong & Mahone, 2003; Lackney, 2001).
- Researchers at the Lawrence Berkeley National Laboratories state that when ventilation rates are at or below minimum standards (roughly 15 cfm=cubic feet per minute per student), a relative reduction of 5 to 10% occurs in certain aspects of student performance tests.
- Recent studies have shown that when ventilation rates were reduced from 17 cfm to 10 cfm per person, symptom prevalence for Sick Building Syndrome decreased by 15%.

In addition, it is reported that in green schools:

- Daylight and landscaping improve performance,
- High indoor air quality enhances health and concentration,
- Good acoustics increase learning potential,

- Comfortable indoor temperatures enhance user satisfaction, thus both students and teachers benefit from learning and working in green schools. (WGBC, 2013: 3-6).

With increasing research on green buildings around the world as well as enhanced understanding of their importance, national green building certification systems have been established by green building councils in many countries. In various countries, these green building certification systems also separately specify criteria for schools. Furthermore, some countries have different systems and guidelines regulating criteria that is specific only to schools, in addition to the green building certification systems. Within the scope of green school design principles, Figure 2 shows the respective criteria given in the Turkish guide on school buildings, green school building guides, and green school building certification systems. This classification is an implication made in line with the data obtained from the sources examined and the literature review regarding green school design criteria.

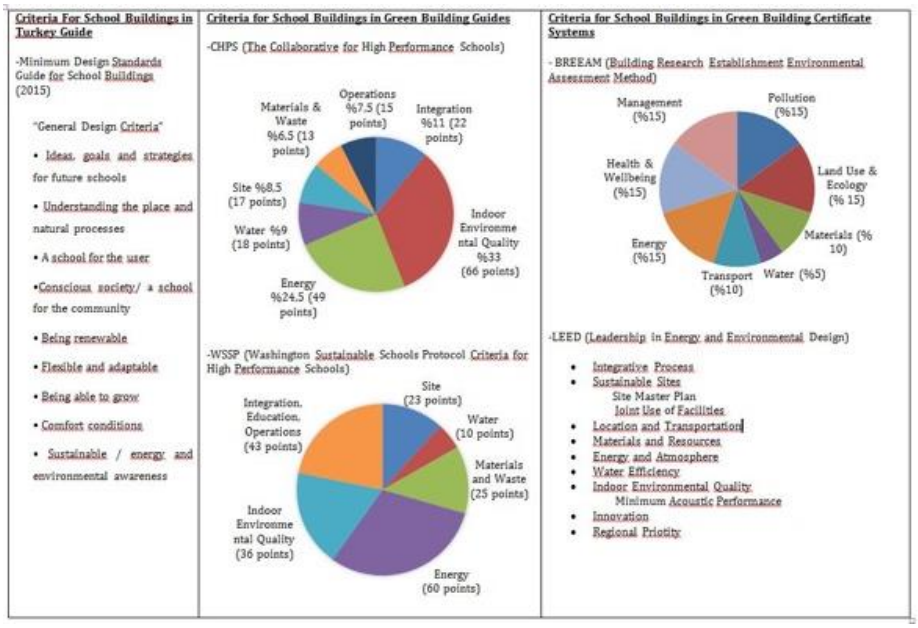

Figure 2. Criteria Guide in Turkey, Criteria on School Buildings in Green Building Guides and Criteria on School Buildings in Green Building Certification Systems (from complied URL1, URL2, URL3, URL4).

These criteria are presented under the heading "general design criteria" in the "Minimum Design Standards Guide for School Buildings" (2015) in Turkey. The Leadership in Energy and Environmental Design (LEED) certification method, on the other hand, discusses prerequisites and credits over 9 chapters and the criteria for schools are presented in the 'site master plan' and 'joint use of facilities' sections under the heading "sustainable sites". Additionally, minimum acoustic performances for schools are regulated under the heading "indoor environmental quality". Figure 1 also shows the criteria and score weights given in the Building Research Establishment Environmental Assessment Method (BREEAM), the green school design guides Washington Sustainable Schools Protocol Criteria for High Performance Schools (WSSP), and The Collaborative for

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High Performance Schools (CHPS). In line with this data, green school design principles are categorized as resource conservation, comfort conditions and use of technology (Figure 3).

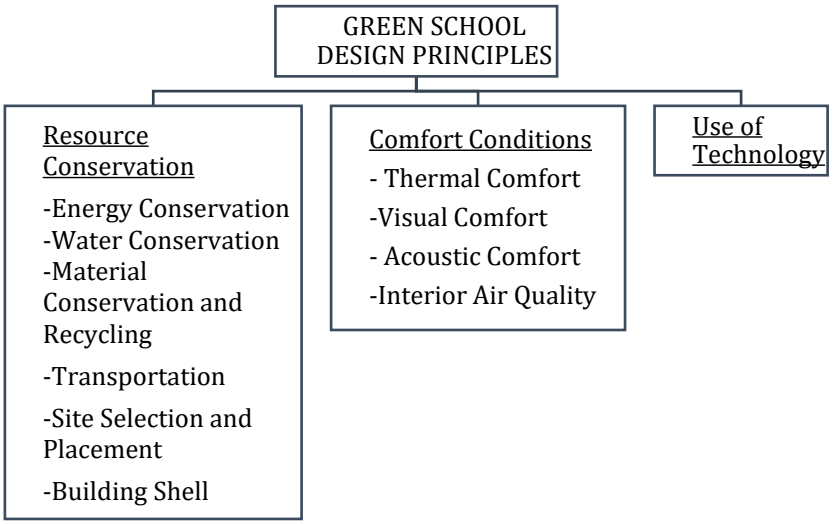

Figure 3. Green School Design Principles

Resource Conservation

The main purpose of resource conservation is to minimize both waste generation and the consumption of natural and artificial resources throughout the life cycle of the building. Energy and water consumption in school buildings depends on the building's year of construction, its maintenance and repair conditions, occupancy rate and usage hours, and the amount and type of equipment used. It is known that the highest amount of energy consumed by school buildings are in heating and artificial lighting as provided by fossil fuels, thus generating the highest consumption cost (Carbon Trust, 2012:4). In this regard, land selection as well as settlement and transportation planning in line with the climatic characteristics of the region where the school building is located are important inputs that will contribute to energy, water and material conservation, recycling, and cost reduction. By selecting the right land, school buildings can be designed to benefit from the natural conditions of the land such as water, wind, daylight, etc. to minimize the energy used for lighting and ventilation. Other important factors in resource conservation include the correct design of building exteriors, the use of high-quality materials in the building (production, transportation, use, destruction, recycling, etc.), taking advantage of technologies that enable the use of renewable energy resources such as sunlight, wind, etc., and the use of building automation systems.

Transportation planning for the school building and its environment is also important for resource conservation. Thus, consideration of public transportation routes as well as encouraging the use of public transportation will reduce the number of vehicles used and facilitate pedestrian safety. A proper transportation arrangement will reduce waste generation as well as health care expenditures due to air

pollution. Moreover, the negative consequences of noise pollution will be reduced as the density of vehicles will decrease.

Comfort Conditions

It is known that the time, space, infrastructure and socio-psychological dimensions of the learning environment affect student and teacher performances to a great extent. In this context, the physical conditions of classrooms are important in terms of supporting the education and learning activities that happen inside them. Hence, in addition to characteristics such as classroom size, the number of students, the cleanliness, the layout of materials in the classroom, and the compatibility and ergonomics of the equipment with student age and the nature of the learning activities; it is also essential to analyze other variables in-depth such as temperature, light, noise, color and appearance, landscaping, and access to natural daylight and air-conditioning. Consequently, comfort conditions are important and necessary for healthy and productive learning and educational activities.

Use of Technology

Technologies generally used in green school designs are as follows:

- Technologies for effective use of renewable energy sources,
- Technologies used in HVAC systems,
- Building automation systems,
- Technologies for innovative construction techniques and the use of nano-technological materials.

In the "List of Suggestions for an Environmentally Responsible Design for School Buildings", Karabey (2014:27-29) suggested the following in terms of the use of technology: Foundation-to-roof insulation, the ability to withstand natural disasters such as earthquakes, storms, etc., minimizing artificial heating-cooling-ventilation systems, selecting technologies that use natural light and natural air, full building automation, the use of solar panels in water heating and energy generation, water storage and treatment, waste management, installation grouping and the use of shaft systems.

THE SCHOOLS EXAMINED WITHIN SCOPE OF THE RESEARCH

X Secondary School General Features and Current Situation:

The general information regarding X Secondary School is given in Table 1. The school was built in 1993 in the Yenimahalle District of Ankara. The school was designed and built as a single building with a basement, ground floor and two floors, with 24 classrooms, 2 kindergartens, 1 painting workshop, 1 music classroom, 2 information technology classrooms, 1 technology design classroom, 1 science laboratory, and 1 library.

DOI: 10.15320/ICONARP.2021.156

Table 1. X secondary school general features

School Name	X Secondary School
Construction Site- Construction Year	Ankara/Yenimahalle- 1993
Number of Student-Teacher	1447 Student- 78 Teacher
Number of Classroom	47

In 2006, construction of an additional building with 24 more classrooms was started at the place allocated as a green area, and upon completion of the additional building, enrolled students for the 2007-2008 academic year. This additional building, called Block B, has 24 classrooms, 1 multi-purpose hall, 2 administration rooms, 1 teachers' room, 1 science and technology laboratory, 1 archive and 1 guidance and counselling services room. In 2013, a sports hall was built in the school yard. The layout of Blocks A and B as well as the sports hall of X Secondary School and their property boundaries are given in Figure 4. Block B is located along the north-south axis and Block A is on the east-west axis. The schoolyard is covered with asphalt and there are only a few trees.

Figure 4. X Secondary School A and B Blocks and Sports Hall placement in the parcel

Positive characteristics of the school include its central location with easy access, its indoor sports hall, a multi-purpose hall for various activities, a separate entrance to the kindergarten, and some green areas around the school.

On the other hand, negative characteristics of the school include the presence of roads open to traffic around the school, insufficient environmental safety, a lack of an adequate and quality playground for

kindergarten in the school yard, a schoolyard covered with asphalt, and insufficient schoolyard walls for student security.

Y Secondary School General Features and Current Situation

General information about the Y Secondary School is given in Table 2. The school was built in 1995 in the Yenimahalle District of Ankara. The school was designed and built as a single building with a basement, ground floor, two floors with 24 classrooms, 1 kindergarten, 1 painting workshop, 1 music classroom, 1 information technology classroom, 2 technology design classrooms, 1 science laboratory and 1 library.

Table 2. Y secondary school general features

School Name	Y Secondary School
Construction Site- Construction Year	Ankara/Yenimahalle- 1995
Number of Student-Teacher	484 Student- 49 Teacher
Number of Classroom	24

The school is located in a large garden. A part of the school yard is covered with trees, and part of it is not in use. Figure 5 shows the layout and boundary of the property of the Y Secondary School building.

Figure 5. Y Secondary School placement in the parcel

Positive characteristics of the school include its central location with easy access, its indoor sports hall, a multi-purpose hall for various school activities, and a separate entrance to the kindergarten.

Negative characteristics of the school include the presence of roads open to traffic around the school, insufficient environmental safety, lack of an adequate and quality playground for kindergarten in the school yard, a schoolyard covered with asphalt, insufficient schoolyard walls for student security, and a part of the school that is not actively used.

DOI: 10.15320/ICONARP.2021.156

DATA ANALYSIS AND FINDINGS

In the survey study, descriptive characteristics of the sample group are shown in Tables 3, 4 and 5. Accordingly, of the 267 participants, 53.6% were students, 43.8% were parents and 2.6% were teachers. 58.7% of the students, 85.7% of the teachers and 69.8% of the parents were females. The average age of the students was 13, the teachers was 35 and the parents was 42.

Table 3. Distribution of participants

	n	%
Student	143	53,6
Teacher	7	2,6
Parents	117	43,8
Total	267	100,0

Table 4. Gender Distribution of Students, Teachers and Parents

		Student		Teacher		Parents	
		n	%	n	%	n	%
Gender	Female	84	58,7	6	85,7	81	69,8
	Male	59	41,3	1	14,3	35	30,2

Table 5. Age Distribution of Students, Teachers and Parents

	Student		Teacher		Parents	
	Av.	sd	Av.	sd	Av.	sd
Age	13,25	1,14	35,00	-	41,59	6,77

In the schools where the survey was conducted:
41.3% of the students, 57.1% of the teachers and 34.2% of the parents stated that they strongly agree with the statement, "The opinions of students, teachers and parents should be taken into consideration in the design of the school" (Table 6).

Table 6. The distribution of the answers given to the statement "The opinions of students, teachers and parents should be taken into consideration in the design of the school."

		Student		Teacher		Parents	
		n	%	n	%	n	%
The opinions of students, teachers and parents should be taken into consideration in the design of the school	I strongly disagree	5	3,5	0	0,0	5	4,3
	I do not agree	5	3,5	0	0,0	8	6,8
	I am undecided	11	7,7	0	0,0	6	5,1
	I agree	60	42,0	3	42,9	55	47,0
	I strongly agree	59	41,3	4	57,1	40	34,2
	I have no idea/I do not know	3	2,1	0	0,0	3	2,6

It is understood that most students, teachers and parents care about being able to voice their opinions during the design of the school building. On the other hand, the majority of students, teachers and parents replied that they disagree or strongly disagree with the statement, "School social facilities should be open to use by the local public" (Table 7). It is thought that the school social facilities are not used sufficiently by the local public.

Table 7. The distribution of the answers given to the statement "School social facilities should be open to use by the local public."

		Student		Teacher		Parents	
		n	%	n	%	n	%
School social facilities should be open to use by the local public	I strongly disagree	33	23,1	2	28,6	21	17,9
	I do not agree	48	33,6	2	28,6	44	37,6
	I am undecided	23	16,1	1	14,3	18	15,4
	I agree	11	7,7	2	28,6	16	13,7
	I strongly agree	6	4,2	0	0,0	3	2,6
	I have no idea/I do not know	22	15,4	0	0,0	15	12,8

29.4% of the students, 28.6% of the teachers and 27.4% of the parents said that they disagree with the statement, "Open spaces in the school allow for interaction with the natural environment" (Table 8). In addition, 35% of the students, 28.6% of the teachers and 36.8% of the parents said that they disagree with the statement, "The school has sufficient green spaces" (Table 9).

Table 8. The distribution of the answers given to the statement "Open spaces in the school allow for interaction with the natural environment."

		Student		Teacher		Parents	
		n	%	n	%	n	%
Open spaces in the school allow for interaction with the natural environment.	I strongly disagree	30	21,0	2	28,6	20	17,1
	I do not agree	42	29,4	2	28,6	32	27,4
	I am undecided	22	15,4	1	14,3	16	13,7
	I agree	29	20,3	1	14,3	37	31,6
	I strongly agree	12	8,4	1	14,3	4	3,4
	I have no idea/I do not know	8	5,6	0	0,0	8	6,8

DOI: 10.15320/ICONARP.2021.156

Moreover, in the responses given to the questions asking for "suggestions regarding deficiencies in the school building and its surroundings in order to improve the efficiency of environmental education", it is observed that the participants mostly referred to the green areas and their arrangement, the size of the school yard, the trees, etc. In this context, it is understood that the schools' open spaces do not provide sufficient opportunities for interaction with the natural environment, while the schools' green spaces are also not sufficient in terms of quality or quantity.

Table 9. The distribution of the answers given to the statement "The school has sufficient green spaces"

		Student		Teacher		Parents	
		n	%	n	%	n	%
The school has sufficient green spaces.	I strongly disagree	46	32,2	3	42,9	46	39,3
	I do not agree	50	35,0	2	28,6	43	36,8
	I am undecided	24	16,8	2	28,6	5	4,3
	I agree	13	9,1	0	0,0	16	13,7
	I strongly agree	6	4,2	0	0,0	6	5,1
	I have no idea/I do not know	4	2,8	0	0,0	1	0,9

25.2% of the students, 14.3% of the teachers and 34.2% of the parents stated that they agree with the statement, "Noise pollution is quite high in the school environment" (Table 10). In addition, 16.8% of the students, 28.6% of the teachers and 30.8% of the parents agreed with the statement, "The noise level in the classrooms is disturbing" (Table 11). In this line, it is seen that a majority of the participants think that the environment in which the school is located is noisy and that the noise in the classrooms is disturbing.

Table 10. The distribution of the answers given to the statement "Noise pollution is quite high in the school environment"

		Student		Teacher		Parents	
		n	%	n	%	n	%
Noise pollution is quite high in the school environment.	I strongly disagree	8	5,6	1	14,3	8	6,8
	I do not agree	41	28,7	4	57,1	39	33,3
	I am undecided	27	18,9	0	0,0	13	11,1
	I agree	36	25,2	1	14,3	40	34,2
	I strongly agree	29	20,3	1	14,3	17	14,5
	I have no idea/I do not know	2	1,4	0	0,0	0	0,0

Table 11. The distribution of the answers given to the statement "The noise level in the classrooms is disturbing"

		Student		Teacher		Parents	
		n	%	n	%	n	%
The noise level in the classrooms is disturbing	I strongly disagree	12	8,4	0	0,0	6	5,1
	I do not agree	29	20,3	2	28,6	23	19,7
	I am undecided	43	30,1	0	0,0	24	20,5
	I agree	24	16,8	2	28,6	36	30,8
	I strongly agree	28	19,6	2	28,6	15	12,8
	I have no idea/I do not know	7	4,9	1	14,3	13	11,1

43.4% of the students, 71.4% of the teachers and 44.4% of the parents agreed with the statement, "Lighting levels in classrooms are adequate" (Table 12).

Table 12. The distribution of the answers given to the statement "Lighting levels in classrooms are adequate"

		Student		Teacher		Parents	
		n	%	n	%	n	%
Lighting levels in classrooms are adequate	I strongly disagree	12	8,4	0	0,0	6	5,1
	I do not agree	29	20,3	2	28,6	23	19,7
	I am undecided	43	30,1	0	0,0	24	20,5
	I agree	24	16,8	2	28,6	36	30,8
	I strongly agree	28	19,6	2	28,6	15	12,8
	I have no idea/I do not know	7	4,9	1	14,3	13	11,1

29.4% of students, 42.9% of teachers and 35.9% of parents responded that they agreed with the statement, "The temperature of the classrooms is adequate" (Table 13).

Table 13. The distribution of the answers given to the statement "The temperature of the classrooms is adequate"

		Student		Teacher		Parents	
		n	%	n	%	n	%
The temperature of the classrooms is adequate	I strongly disagree	28	19,6	0	0,0	17	14,5
	I do not agree	26	18,2	1	14,3	25	21,4
	I am undecided	30	21,0	2	28,6	20	17,1
	I agree	42	29,4	3	42,9	42	35,9
	I strongly agree	10	7,0	1	14,3	5	4,3
	I have no idea/I do not know	7	4,9	0	0,0	8	6,8

DOI: 10.15320/ICONARP.2021.156

28% of the students, 42.9% of the teachers and 37.6% of the parents stated that they agreed with the statement, "Ventilation is adequate in the classrooms" (Table 14). Thus, it is understood that the lighting, temperature and ventilation in the classrooms are relatively adequate.

Table 14. The distribution of the answers given to the statement "Ventilation is adequate in the classrooms"

		Student		Teacher		Parents	
		n	%	n	%	n	%
Ventilation is adequate in the classrooms.	I strongly disagree	26	18,2	1	14,3	16	13,7
	I do not agree	34	23,8	2	28,6	25	21,4
	I am undecided	31	21,7	1	14,3	15	12,8
	I agree	40	28,0	3	42,9	44	37,6
	I strongly agree	5	3,5	0	0,0	5	4,3
	I have no idea/I do not know	7	4,9	0	0,0	12	10,3

According to the results of the analyses, a comparison of the scores of students, teachers and parents (Table 15) showed that there was no statistically significant difference between the opinions of students, teachers and parents about the positive relationship between school, the environment, and environmental education ($p>0.05$). Although it is not statistically significant, teachers thought that the positive relationship between school, the environment, and environmental education is stronger as compared with students and parents.

There was no statistically significant difference between the opinions of students, teachers and parents about the negative relationship between school, the environment, and environmental education ($p>0.05$). Although it is not statistically significant, students and parents thought that the negative relationship between school, the environment, and environmental education is stronger as compared with teachers.

There was no statistically significant difference between the opinions of students, teachers and parents about the physical properties of the school building ($p>0.05$). Although it is not statistically significant, teachers thought that the physical properties of the school building are better as compared with students and parents.

There was no statistically significant difference between the opinions of students, teachers and parents about the transportation characteristics around the school building ($p>0.05$). Although it is not statistically significant, teachers thought that the transportation facilities around the school building are better as compared with students and parents.

There was no statistically significant difference between the opinions of students, teachers and parents about classrooms ($p>0.05$). Although it is not statistically significant, teachers thought that classrooms are better as compared with students and parents.

Table 15. Comparison of the Scale Scores of Students, Teachers and Parents

		n	Av.	sd	F	p
Between School and Environment and Environmental Education Positive Relationship	Student	143	2,35	0,76	2,505	0,084
	Teacher	7	2,95	0,54		
	Parents	117	2,28	0,81		
Between School and Environment and Environmental Education Negative Relationship	Student	143	3,08	0,80	0,188	0,829
	Teacher	7	2,89	0,80		
	Parents	117	3,07	0,81		
Physical Properties of School Building	Student	143	2,09	0,54	1,376	0,254
	Teacher	7	2,48	0,50		
	Parents	117	2,12	0,66		
Trabsportation Properties of School Building	Student	143	3,57	0,98	2,377	0,095
	Teacher	7	4,38	0,71		
	Parents	117	3,63	0,95		
Opinions About Classrooms	Student	143	2,71	0,74	1,014	0,364
	Teacher	7	3,02	0,91		
	Parents	117	2,61	0,95		

According to the answers given to the other statements in the survey, most of the participants thought that the characteristics of the school building did not affect academic achievement positively and that the schools did not have an aesthetically qualified appearance, that they were not always clean and well-maintained, and that solutions for the disabled were insufficient in the school buildings. In addition, the distribution of the answers given to the expressions about the transportation characteristics of the school indicated that the schools are easily accessible by foot, public transportation or bicycle, but that the bicycle park is insufficient.

On the other hand, the majority of participants responded that 'they have no idea/do not know' to the following statements in the survey:

“The school building itself supports environmental education.”

“Temperature and heating measurements in the school can be observed by students.”

“The school’s energy consumption can be monitored by students.”

“Students are informed about the school’s water consumption.”

“Water and energy savings can be achieved through the active participation of students.”

“The materials used in the school building do not have any harmful effects on health.”

“Renewable energy resources are used in the school.”

“The type of fuel used in the school creates hazardous waste to the environment.”

“The smell of the materials used in the school building is disturbing.”

Although many studies (Cole, 2013; Taylor, 2013; Bradley, 1996) emphasized that school buildings can be used as an important tool to educate individuals about the environment and increase environmental literacy, the majority of the participants answered these statements as 'I

DOI: 10.15320/ICONARP.2021.156

have no idea / I do not know' shows that school buildings do not have the qualifications that can be used as a tool for learning by living in environmental education. In addition, it was observed that there was not enough awareness among the participants regarding these features of the school building, and the participants are not questioning the issues such as energy consumption of the school, the type of fuel used, the type of waste generated and its impact on the environment, etc. As Atasoy and Ertürk (2008) stated in their study; these findings show that the quality, scope and depth of environmental education is negative and insufficient, and that the educational environment and courses are not sufficiently environmentalized.

Participants' opinion that open spaces in schools do not provide enough opportunities for interaction with the natural environment, green spaces in schools are not sufficient in terms of quality and quantity, and the answers to the "suggestions that are thought to be lacking in the school building and its surroundings, which will increase efficiency in environmental education activities", green areas and the arrangement of these areas, the size of the school garden, afforestation, etc. is in line with the findings of Özdemir and Çorakçı's (2011) study that "gardens are insufficient for activities, most of the students like schools with large gardens and they are not satisfied with school gardens with low landscape values".

Regarding the noise level, which is one of the most important factors affecting learning in classrooms, most of the participants think that the environment where the school is located is noisy and the noise in the classrooms is at a disturbing level. In the study of Seven and Engin (2008), the participants stated that their school was located in a very noisy place due to its location. Küçükoğlu and Özerbaş (2004) stated that noise is a factor that hinders the success of students and teachers because it reduces attention and makes concentration on the subject difficult, and that a 19% increase in energy consumption has been demonstrated experimentally as a result of comparing studies in loud environments with studies in a quiet environment. They stated that noise slows down and dulls mental processes, shadows reasoning power, and reduces the success of students and teachers.

According to Kayıhan and Tönük, (2011), besides the central location of the education building, its transportation network with the surrounding settlements is also very important. Establishing the connection of the school with the surrounding residential areas through various pedestrian and bicycle paths, isolating these roads from vehicle roads as much as possible, providing sufficient lighting for night use, etc. such criteria directly affect the quality of educational building-society interaction. It is also important that the school building's sports facilities, open spaces, library, meeting hall and classroom spaces are designed to be used jointly with the society at appropriate times (Kayıhan & Tönük, 2011). Nevertheless among the answers given to the statements in the questionnaire, the thought that the social facilities of

schools cannot be used sufficiently by the immediate environment is considered as a negative feature in this sense, while the distribution of the answers given to the statements about the transportation feature of the school is considered as a positive feature.

CONCLUSIONS AND RECOMMENDATIONS

It is clear that some of the recommendations for re-evaluating school buildings within the scope of the green school concept are easily applicable as they require low intervention levels, yet there is a need to use technology in most of them and this requires a sufficient budget. In this regard, even though the initial investment costs of the arrangements, renovations and technological systems to be integrated in these schools will be high, resource conservation will be provided to a great extent as operation and maintenance costs will be lowered. Re-evaluating existing school buildings within the scope of "green schools" and designing new school buildings as "green schools" will ensure the efficient use of resources, environmental protection, healthy and comfortable environments as well as reinterpreting the school as a learning tool. This research and future analyses in this area are significant both in terms of improving the situation of existing school buildings and providing input on the design of new green school buildings in line with user opinions and experiences. Furthermore, the idea that schools are important tools for creating sustainable environmental awareness in future generations should always be taken into consideration. Thus, investments must be increased, and green schools must be supported along the lines of viewing school buildings themselves as learning tools.

Construction of new school buildings according to green school design principles requires a large set of criteria starting from the pre-design process and extending to land selection and planning, analyzing natural environmental characteristics and potential climate data, designing building exteriors accordingly, transportation planning, and building material selection among many other factors. Recommendations for the re-evaluation of existing school buildings as green schools within the limits of the research are as follows:

- Schools should cooperate more closely with voluntary organizations and local authorities on environmental education.
- Within the scope of the "green schools project", pilot schools should be identified, the necessary implementations applied, and awareness of students, teachers and parents should be increased.
- User participation should be ensured in school designs and renovation work, and experts from various disciplines should

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be consulted (architects, engineers, educators, sociologists, etc.).

- Schools should be designed in such a way as to enable interaction with the natural environment and to contribute positively to the environment in which they are located.
- The social facilities of schools should be made available for use by the local community and educational structures should be intertwined with society.
- Strengths and weaknesses of schools should be analyzed; physical problems and potentials that affect educational performance positively/negatively should be identified, and the problems should be eliminated while opportunities are improved.
- Schools should have visual and audio warning tools for environmental education.

Recommendations on resource conservation:

- In maintenance, repair, and renovation work to improve physical conditions in schools, solutions should enable the use of natural lighting and natural air conditioning as much as possible.
- Negative characteristics of schools that cause heat loss should be identified and the necessary insulation work should be completed to provide energy conservation.
- Water consumption of schools should be determined, water installation systems should be reviewed, and photocell taps should be installed in sinks to save water.
- Photovoltaic solar panels should be installed to ensure that solar energy is utilized, and students should see how these systems work.
- Rainwater should be collected and used, and gray water should be treated and reused in suitable areas.
- Bicycle stands should be provided at schools where bicycle transportation is safe and convenient, but with limited parking.

Recommendations on comfort conditions:

- Visual comfort and indoor air quality should be improved with solutions where natural lighting and natural air conditioning can be used in order for resource conservation.
- Acoustic problems should be identified especially in classrooms, and sound absorbers or reflective materials should be used where necessary to improve auditory comfort.
- Building materials and products used in schools that emit pollutant gases into the environment and cause harmful

health effects should be identified and replaced with new ones that are not harmful to the environment and are easy to maintain and repair. In addition, cleaning materials that do not contain any harmful ingredients should be preferred for the maintenance and cleaning of schools.

- In order to actively use the open spaces in schools, floor covering materials, green areas, playgrounds, etc. should be rearranged and renovated relevant to students' ages, and the nature of the activities performed.
- School interiors should be designed to develop students' discovery skills, and the layout of furniture and equipment (such as the position, angle, layout, etc.) should be rearranged suitably.
- Spaces in schools should be organized in a way that allows for flexibility of use with developing technology and changing education theories.

Recommendations on the use of technology:

- Visual comfort should be provided by using artificial lighting systems sensitive to daylight and motion sensor artificial lighting in places where natural lighting is not available.
- HVAC (heating-ventilation-air-conditioning) systems that improve indoor air quality should be used in places where natural ventilation is not sufficient.

Noise sources should be determined by creating a noise map around the school and products related to wall and wall opening (facade claddings, doors, windows, transparent surfaces, etc.) should be renewed accordingly.

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CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

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REFERENCES

Avcı, N. (2013). Minimum Design Standards Guide for School Buildings 2013. *First Word.* (p.VIII). Ministry of Education Department of Construction and Real Estate.

Atasoy, E. and Ertürk, H., (2008). A Field Study About Environmental Knowledge and Attitudes of Elementary School Students, *Erzincan University Journal of Education Faculty*, 10(1):105-122.

Baker, L., Bernstein, H. (2012). "The impact of school buildings on student health and performance", McGraw-Hill Research Foundation, The Center for Green Schools at USGBC, p. 1-4, http://www.usgbc.org/Docs/Archive/General/Docs18534.pdf. (E.T. 05.11.2015).

Barrett, P., Zhang, Y., Moffat, J., Kobbacy, K., (2013). A holistic, multi-level analysis identifying the impact of classroom design on pupils learning, *Building and Environment*, 59:678-689.

Berry, M.A., (2002). "Healthy School Environment and Enhanced Educational Performance The Case Of Charles Young Elementary School Washington DC", p.19. https://files.eric.ed.gov/fulltext/ED473985.pdf. (E.T.15.10.2019).

Bradley, W. S., (1996). Perceptions About the role of Architecture in Education. Doctoral Dissertation, University of Virginia, USA, p.105.

Carbon Trust, (2012). "Schools", Sector Overview, London, UK, p.4. https://www.carbontrust.com/media/39232/ctv019_schools.pdf. (E.T. 06.12.2015).

Cole, L. B., (2013). The Teaching Green School Building: Exploring the Contributions of School Design to Informal Environmental Education. A Dissertation Submitted in Partial Fulfillment of The Requirements for The Degree of Doctor of Philosophy, Architecture and Natural Resources and Environment, University of Michigan.

Çakır, S. (2017). Examination of green school design criteria: sampling on existing school buildings in Turkey. Master Thesis, Yıldız Technical University Institute of Science, Istanbul, p.180-185.

Earthman, G. (2009). *Planning Educational Facilities*. (3th Ed.) Lanham, United States. Rowman and Littlefield Education.

Edwards, B. W., (2006). Environmental Design and Educational Performance with Particular Reference to 'Green' Schools in Hampshire and Essex, *Research in Education*, 76, p. 14–32.

Figueiro, M., & Rea, M. S. (2010). Lack of shortwavelength light during the school day delays dim light melatonin onset (DLMO) in middle school students, *Neuroendocrinology Letters*, 31(1).

Ford, A. (2008). *Designing the Sustainable School.* Bastow: Images Publishing.

Gelder, J. (1998). Teaching Environmentally Sustainable Design in Schools. PEB Exchange, Programme on Educational Building, 1998/09, OECD Publishing, p.14-16.

Gelfand, L. and Freed, E. C. (2010). *Sustainable School Architecture: Design for Elementary and Secondary School*. USA: John Wiley and Sons Inc.

Gök H. and Gürol M., (2002). In Primary Education Usage Structural of School's Building About Ergonomics and Time (Sample of Elazığ Country), *Fırat University, Journal of International Social Sciences*, 12 (2):263-273.

Green Buildings Reference Guide, (2014). Certified Green Building and Contributors in Turkey. Green schools project, XXI, Green Buildings Reference Guide, p.4.

Heschong, L., & Mahone, D. (2003). "Daylighting in Schools: Reanalysis Report". California Energy Commission.

Hines, E. W., (1996). Building Condition and Student Achievement and Behavior. Dissertation Submitted to the Faculty of The Virginia Polytechnic Institute and State University in Partial Fulfillment of The Requirements for The Degree of Doctor of Education, p.48-55.

IEEP, (1994). "An Environmental Education Curriculum for Pre-service Education of Secondary Level Teachers", UNESCO-UNEP- IEEP: Environmental Education Series, (43).

Karabey, H., (2014). List of recommendations for environmentally friendly design in educational facilities, *Journal of Ege Mimarlık*, 87: 27-2.

Karatekin, K. and Çetinkaya, G., (2013). Evaluation of School Gardens in terms of Environmental Education (Manisa Province Sample), *Journal of International Social Research*, 6(27): 307-315.

Kats, G. (2006). "Greening America's Schools Costs and Benefits", A Capital E Report. https://www.usgbc.org/sites/default/files/Greening_Americas_Schools.pdf. (E.T. 14.10.2019).

Kayıhan K. S. and Tönük, S., (2011). Elementary School Buildings with the Direction of Sustainability Awareness Construction, *Journal of Polytechnic*, 14 (2), 163-171.

Küçükoğlu, A. and Özerbaş, M. A., (2004). Eğitim Ergonomisi ve Sınıf İçi Fiziksel Değişkenlerin Organizasyonu (Educational Ergonomics and the Organization of in-class Physical Variables), *Atatürk University Journal of Social Sciences Institute*, 4 (2):121-134.

Lackney J. A. (2001). The State of Post-Occupancy Evaluation in the Practice of Educational Design, Paper presented at the Environmental Design Research Association, EDRA 32, Edinburgh, Scotland, Jul 05, 2001.

MEB, (2017). "National Education Statistics Formal Education 2016/'17. Ministry of National Education Strategy Development Directorate Official Statistics Program Publication", MEB, p.239-247.

DOI: 10.15320/ICONARP.2021.156

MEB, (2018). "National Education Statistics Formal Education 2017/'18. Ministry of National Education Strategy Development Directorate Official Statistics Program Publication", MEB, p. 18-21.

Oetinger, J. W. (2010). Green schools: Constructing and Renovating School Facilities with the Concept of Sustainability. Doctoral thesis, Lindenwood University: USA, p.15-33.

Özbayraktar, M., (2005). Effects of Information Technologies on Learning Space Planning-in the case of Classrooms and Library Spaces of Primary Schools, *The Turkish Online Journal of Educational Technology*, 4: 101-108, Turkey.

Özdemir, A., and Çorakçı, M., (2011). Renovation of Ankara's Schoolyards by Participatory Approaches, *Journal of National Education*, 189:7-20.

Saltık A. (1997). Sustainable Management of Natural Resources: A Conceptual Approach, Implementation of Sustainable Development, Discussion Meeting, 11-12 December 1997, Turkey Environment Foundation Publications, Turkey, p. 27-33.

Seven, M. A and Engin, A. O., (2008). Öğrenmeyi Etkileyen Faktörler (Factors Affecting Learning), *Atatürk University Journal of Social Sciences Institute*, 12(2):189-212.

Taylor, Z., (2013). "Green Schools Investment Guide: for healthy, effcient and inspiring learning spaces", The Center for Green Schools at USGBC, p.3-4.

Ünal, S. and Dımışkı, E., (1999). UNESCO-UNEP Himayesinde Çevre Eğitiminin Gelişimi ve Türkiye'de Ortaöğretim Çevre Eğitimi (Development of Environmental Education in the UNESCO-UNEP auspices and Secondary Environmental Education in Turkey), *Hacettepe University Journal of Education*, 16-17: 142 – 154.

URL-1. Retrieved from https://iedb.meb.gov.tr/meb_iys_dosyalar/2015_08/17032245_2015asgaritasarmklavuzu.pdf (14.10.2019)

URL-2. Retrieved from https://chps.net/sites/default/files/CHPS%20Core%20Criteria%20v3%20Final%206.14.19%20protected.pdf. (11.08.2019)

URL-3. Retrieved from https://www.k12.wa.us/sites/default/files/public/schfacilities/programs/highperformanceschools/2018wssp.pdf (02.01.2020)

URL-4. Retrieved from https://www.fgould.com/media/resources/files/schools_for_the_future.pdf

USGBC (United States Green Building Council), (2009). Leed 2009 for Schools New Construction and Major Renovations Rating System. p.10, https://www.usgbc.org/sites/default/files/LEED%202009%20RS_SCHOOLS_07.01.16_clean.pdf (E.T. 09.10.2019).

WGBC (World Green Building Council), (2013). Global snapshot: the greening of schools ınfluencing the built environment. WGBC, p.3-6 http://www.worldgbc.org/files/5913/6740/8939/WorldGBC_Global_Snapshot_-_Green_Schools_ONLINE-043013_1.pdf (E.T.11.11.2015).

Yudelson, J. (2008). The Green Building Revolution. Washington: Island Press.

Resume

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One More Coincide Between Architects and Laypersons on The Aesthetics of Zaha Hadid's Buildings

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Abstract

Purpose

This study focuses on the subject of environmental aesthetics and aims to identify the differences and similarities that emerge in the general aesthetic evaluations toward the individual style, particularly examining the physical and connotative meanings in the buildings by Zaha Hadid. The study further seeks to understand how individual style fosters aesthetic awareness or common perceptions on a universal level without causing a cultural difference.

Design/Methodology/Approach

A survey was conducted to understand the visual aesthetic evaluations of architects and laypersons over 16 buildings of Hadid—an architect who managed to develop her own individual style. The visual images created were evaluated in terms of sensorial and physical concepts in order to understand whether there was a common language by evaluating the aesthetic perceptions of subjects with different backgrounds, and to reveal the effect of individual style in forming a universal tongue. Descriptive statics, correlation analysis and independent t test were performed to conduct the evaluations.

Findings

According to analysis results, the rhythm and organic lines of a building are the most significant elements for building façades and masses in aesthetic evaluations. In addition, no significant differences regarding the dimensions of "liking", "ornate", "attractive", "meaningful" and "warm" were found between the groups.

Research Limitations/Implications

The survey was conducted between two different subject groups; architects and laypersons. Specific parameters related to the sensorial concepts of the buildings were used. These parameters included the concepts of liking, pleasant, complex, familiar, meaningful, ornate and warm, while for the physical characteristics of the buildings, the concepts of regular/ irregular, full/ empty, rhythmic/ arrhythmic, soft/ hard, meaningful/ meaningless and symmetric/asymmetric were used.

Originality/Value

This study is significant insofar as it is among the rare research studies that found there to be no differences between architects and laypersons but rather, similarities between them.

Keywords: *Architect, experimental aesthetic, individual style, layperson, , Zaha Hadid*

INTRODUCTION

The concept of aesthetics, which evokes intellectual, artistic and/or spiritual fascination, is a social necessity. Aesthetic needs are categorized under two groups, namely, beauty and individual expression. The expectations people have of an architectural structure include sheltering, security, comfort, socialization, self-expression and aesthetics, and they desire the building of spaces that they can admire, both physically and aesthetically, and where they can feel sense of peace and happiness. Therefore, a thorough analysis of the target audience should be performed in order to arrive at solutions that are capable of meeting the intended audience's needs and of being visually appealing. In addition, aesthetic differences are the qualities that separate architectural building from one another and serve to ensure that the spaces are easily remembered. Aesthetic criteria vary by personal factors, such as culture and education. However, the aesthetic criteria to be considered in the formation of the internal and external atmosphere of a structure include different factors such as form (holistic form, form of components), detail, axis, structure (structural solution of the form), materials, color, scale, rhythm emphasis, light, harmony, green areas, environmental areas, urban aesthetics, height and density of buildings, their stylistic compatibilities, and landscape.

The human brain is a mechanism of perception, cognition and behavior. The main theme of human-environment studies involves all the behavioral components of the subject, which are formed by receiving stimuli through the senses in the perception process, processing these stimuli during the cognitive process, making sense of them through evaluation and understanding, and then directing the behaviors accordingly by creating images. These studies, which are interdisciplinary in nature, aim to systematically review the complex relationships between human nature and environmental variables and to assess their mutual interaction (Rapoport, 1977). From this point of view, environmental-behavioral research, which deals with the relationships between human nature and environmental variables, involves the working area of architects, who design the living environment, as this type of research examines and details human-environment interaction, behaviors, harmony and disharmony. In addition, environmental aesthetics, defined as the perceived quality of the environment, is considered an important component of environmental quality. Aesthetic evaluation of the environment gains importance as an element that affects the environmental preferences of individuals and shapes spatial behavior and has an inclusive feature as it deals with different scales of field (Nasar, 2008; Nasar, 1989a). In this sense, the research is used in aesthetic evaluations to see the meanings and effects of the products created by designers.

Meaning is a critical concept for environmental perception. It is one of the most significant determinants of behavior, and as such, concerns emotions (Abercrombie, 1984). An architectural structure should carry

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meaning within the environment it is located. Research in the fields of environmental psychology, sociology and environmental aesthetics indicates that architectural meaning has gained significance in creating an environment that can be perceived, felt and used satisfactorily, and that meaning is integrated with usage and style (Aydınlı, 1993). In the field of architecture, meaning is expressed both cognitively and affectively, with their mutual interaction with the buildings being described as knowing, understanding and liking/disliking, respectively.

The first realization of the world occurs through perception (Schulz, 1965), and sensation and perception of beauty, or the formation of aesthetic sense, requires visual perception first. The components have to first be perceived before they are organized and evaluated in designs (Rapoport, 1980). The product of perception at the sensory level, the form in any sensory environment (smell, spiritual sensation, sound, etc.), and the consciousness of these forms are always charged with a meaning. However, this meaning does not need to be found with a word in mind (Erzen, 2006). Architectural meaning has two different dimensions, depending on the interpretation of the relationships between the people who form, use, live and assess the architectural environment. In the first dimension, the architectural product exists with the meaning assigned by the architect, and it is interpreted through his/her style. In the second dimension, once the architectural product is created and revealed, it is now open to interpretation and that they gain meanings through the interpreters. The evaluation, which can be either positive or negative as a result of the interaction between architecture and the environment, is subjective, as it is subject-based and individual. However, it also reveals a structure that is naturally obtained and objectified, partially through the partnerships seen in the separate, specific decisions and experiences effectuated as a result of coexistence. Therefore, unchangeable objective values and decisions emerge against these subjective characteristics of evaluation (Şentürer, 1995). Architecturally-designed products can be evaluated from many aspects, including economic, technological, climatic and ethical. As these perceptions are insufficient in terms of reaching the essence of architecture, that is, the content of the architectural product, they should be evaluated from an aesthetic point of view in order to understand the relationship between the architectural values and meanings, and nature. New modes, styles, trends and manners have emerged for the purpose of creating better stylistic and aesthetic forms (Şentürer, 1995).

Style and Meaning

Style is a way of expressing artistic works and is used to characterize different people, times and regions (Greene, 1940). The elements constituting the external appearance of an object are generally judged by the internal structure of the same object. In this sense, style can be viewed as a concept, rather than as an object. Moreover, style is the recognition

of the quality shared among many elements; quality, on the other hand, is related to a structure on a scale smaller than that of the elements of different qualities (Smith, 1981).

A style is historically determined on the basis of the distinct characteristics of products manufactured by an individual (individual style, e.g. Van Gogh style) or a group (group style, e.g. Prairie style) in certain geographical areas (regional style) or certain periods (era style, e.g. Renaissance style). If there is a series of common characteristics in many objects designed by the same person, that series then represents an individual style (Chan, 2000), while if there is series of common characteristics seen in objects designed by a group of designers, that series then represents a group style. Similarly, a collection of series symbolizes regional and periodical styles (Jencks 1977, 1980). According to Beardsley, the group characteristics of a product should include a particular set of stylistic features (Beardsley, 1979). If a group of characteristics is repeated in a group of products, a style emerges. In other words, common characteristics of a product group characterize a style (Ackerman, 1963). Schapiro states that individual style is an unchangeable form, with invariant elements, characteristics and expressions, which means that style emerges from the features and forms of architectural products characterized by repetitive elements, qualities and expressions. In addition, common characteristics are also related to form elements, form relations and form properties (Schapiro, 1961). Basically, in interpreting the characteristics of products, research has focused on exploring vernacular and temporal styles and group or region-related styles in order to understand how these products have been developed, and to identify the development of their function from social, cultural, political and psychological aspects (Erdoğan, 2010). Put more simply, researchers have interpreted how style is defined and manifested in periodic, regional and vernacular dimensions.

A style emerges in many different ways and is characterized by many factors, including culture, tradition, social life, technology and physical environment. Design and production phases form style, while human cognition creates and influences it (Erdoğan et al., 2010a, 2010b). Aesthetic perception within and among society's changes over time. However, there has always been an aesthetic approach that has been dominant in certain periods and environments (Şentürer, 1995). Architects or designers are influenced by the aesthetic aspect of their culture when creating styles that are capable of meeting usage-related requirements by utilizing the technical opportunities and materials of the era. Therefore, it is possible to see the same aesthetic approach in the structures of a certain period and society, even if they were designed by different architects and designers (Şentürer, 1995). The works of Zaha Hadid, who changed this concept and pushed its boundaries, belong to no specific time (timelessness), have fluent forms, use free forms, reflect costly designs requiring advanced technology and utilizes the virtual

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environment in designs. With these works, Zaha Hadid has created her own "individual style".

The detection of a style by an observer reflects denotative meaning, while liking a style reflects connotative meaning. The denotative and connotative meaning of a style varies by individual experiences (frequency of realizing that style) and building type (Schulz, 1965). This study aims to uncover the denotative meanings in the works by Zaha Hadid, an architect with a dominant individual style, and to present the connotative meanings generated by the subjects. In short, it aims to specify the denotative features of Zaha Hadid's buildings and their effects on subjects. The similarities and differences in perception between architects and the public in terms of the aesthetic evaluation (architectural evaluation criteria) performed will be presented. In this way, it can be observed what kind of aesthetic difference or similarity will be occurred by an individual style without cultural differences on a universal level.

LITERATURE REVIEW

Environmental aesthetics constitute the sub-branch of environmental psychology. Studies on experimental aesthetics were initiated by Gudmund Smithed in 1967 (Sandström, 1973) and continued to be carried out by Krampen (1978), Maalqe (1973) and Sanoff (1974). The studies in this field were later compiled and popularized by Rapoport (1980) and Nasar (1989a, 1989b). The aims behind environment-behavior studies are to form spaces based on user preferences and to increase user satisfaction. Architects' creation of designs that met users' spatial expectations would help to generate a common language. Lang (1987) argued that the implementation of an approach that examines the aesthetic values adopted and enjoyed by users, where these values from both the artistic community and the public would merge at certain points, would be highly significant. Many types of research about experimental aesthetics have been conducted to investigate various aspects of buildings and cities to ensure user satisfaction Sánchez-Pantoja, Vidal and Pastor (2018), Amer and Attia (2019) (Stanislav and Chin, 2019). Although the literature includes many studies examining the different views and perceptions of architects and laypersons (Hershberger, 1969, 1988; Canter, 1969; Kaplan, 1974; İmamoglu, 1979; Groat, 1982; Devlin and Nasar, 1989; Erdogan et al., 2010a; Erdogan et al., 2010b; Nasar, 1989; Nasar and Kang, 1989; Devlin, 1990; Nasar and Purcell, 1990; Purcell, 1995; Hubbard, 1996; Purcell et al., 1998; Imamoglu, 2000; Gifford et al., 2000; Gifford et al., 2002; Brown and Gifford, 2001; Fawcett et al., 2008), only a limited number of studies have indicated there to be similar views between these two groups (Kunawong, 1986; Kuller, 1973; Özbudak et al., 2015). A number of studies have evaluated whether the meanings imposed by the architects and laypersons on to buildings matched with the names assigned to buildings and have assessed the spatial elements, regulations and power factors of various buildings

(Hersberger 1969, 1988). Other studies have examined this difference in meaning with regard to the concepts and style perceptions in architecture (Groat, 1982). Sadalla & Sheets (1993), in their study, discussed the symbolism concept in conjunction with the use of materials applied to the external layer of a building (Sadalla & Sheets 1993). Nasar aimed to determine how laypersons arrived at the connotative meanings from different building styles and how these meanings changed in relation to socio-demographic qualities. In Nasar's study, the concepts of sincerity and status were used to perform the evaluation, and users were asked about these concepts after a scenario was formed (Nasar, 1989). For example, certain characteristics, such as height, rectangularity and color, can be easily measured (Benedikt, 1979), but features like complexity, protection, compatibility and style are more abstract parameters and operate at a higher level (Gifford et al., 2000). The results of these studies have been translated into general designing principles for architects and designers (Weber et al., 2002). There is a practice often studied by architects but rarely examined from a psychological perspective that has a potentially significant impact on the architectural design process. Architectural elements, such as walls, ceilings, roofs, columns and ladders, are variables that are specific to architectural design and as such, are simultaneously organized to ensure functional and aesthetic harmony. The assumption here is that certain geometric combinations of these elements captivate the attention of the spectators in a way that agrees with the architects' intentions (Weber et al., 2002).

In the study by Kunawong (1986), architects and laypersons were compared with regards to their views toward architecture environments, and the nature of the difference between the two groups was examined. As part of this said study, a model involving five dimensions, namely, order, simplicity, uncertainty, innovation and power, all of which are based on visual stimulation and evaluation, was developed to predict and explain visual satisfaction. The results from the application of this model showed there to be no differences between architecture students and laypersons. Designs formed by taking into consideration the related variables could be adopted and understood by the public. In the study by Kuller (1973), comparisons were made between groups with different levels of prior knowledge; 8-factor (expensive, simple style, satisfaction, open, picturesque, mixed colors, masculine and normal) evaluation was found to be similar between the groups. Another study discusses how associative meaning, an input to the design, is perceived by architects and laypersons. This study was conducted in two phases. The study was carried out in two phases. In the first phase the mean values of the groups were calculated. The images that had matching views and meaning were determined, and the data related to these images were obtained. In the second stage, the method observed in the Lens Model was used to identify the overlapping images and data in order to reveal the common interpretations regarding the overlapping. The main objective of this study is to contribute to the efforts made to create lasting environments

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by exploring the similarities in perception between architects and laypersons and the points at which these perceptions intersect, as opposed to determining one-sided satisfaction, where architects alone must ensure that the public accepts their ideas. The feature of the study indicating that "common interpretations were made in the overlap between the images and meanings", is highly significant insofar as it facilitated determination of a common cognitive concept between both groups for the first time as well as insight into which physical components this cognitive concept is based (Özbudak Akça et al., 2015). In addition to these studies, there are also studies investigating the causable relationship of visual perception in parametric designs. In the study conducted by Basu and Ghosh (2018), it was investigated how some characteristic formal expressions that create striking visual interest affect visual perception, in designs made using parametric modeling techniques. This study, by combining parametric design and visual perception in a holistic way, offers a direction to the future framework that makes the design process more efficient, effective, optimum, rational and resource-saving, making the world a better place to live.

One of the main reasons behind the research on architects and laypersons is that the information obtained can be used by architects to predict public response, and in turn, public satisfaction with the creative products of architects will be increased (Hershberger and Cass, 1988). This study examined environmental aesthetics and aimed to identify the differences and similarities that emerge in the general aesthetic evaluation toward individual style, and to reveal the visual-aesthetic evaluations of the participants (architects-laypersons) in terms of the buildings created by an architect.

METHOD

A survey was administered to determine the participants' views and visual-aesthetic evaluations on the buildings created by Zaha Hadid and to understand what kind of aesthetic difference or similarity will be formed with an individual style at the universal level.

Participants

The survey was conducted with two different subject groups, one including architects educated in designs, and the other including laypersons with a bachelor's degree (with no design-related courses). A total of 98 surveys, equally divided between the two groups, were administered. The participants were randomly selected, and efforts were made to interview an equal number of men and women. Of the participants, 59.2% (n=58) were female and 40.8% (n=40) were male, 61.2% (n=60) were between the ages of 20 and 27, 7.1% (n=7) between the ages of 35 and 40, and 11.2% (n=11) 41 years of age and over.

Survey Design

The survey included three phases. The first phase included questions on the participants' demographic information. The second phase included questions related to the participants' general aesthetic evaluations of Zaha Hadid's buildings. In the third phase, the sensory effects of Hadid's buildings were asked. Specific parameters related to the sensory effects of the buildings were used. These parameters included the concepts of liking, pleasant, complex, familiar, meaningful, ornate and warm, while for the physical characteristics of the buildings, the concepts of regular/ irregular, full/ empty, rhythmic/ arrhythmic, soft/ hard, meaningful /meaningless and symmetric/asymmetric were used. The participants were asked to rate each building on a 7-point Likert type scale (7 as the highest score, 1 as the lowest) according to the standards they personally applied for general aesthetic evaluations and understanding of the sensory effects of buildings. The two participating groups were informed about how to perform evaluations for each image, and any questions they had were answered accordingly.

Images Used in the Study

The subjects were shown 16 different images of Zaha Hadid buildings. Hundreds of building samples were compiled from different architecture journals, books and internet sites for the purpose of determining the visuals to be used in the survey, and an image bank was formed. The images selected for the study were not limited by their functions but rather, formed according to the parameters related to the emotional and physical effects of the building and to the criteria that they had no different architectural styles and showed no similarities. The images were all presented in the same sizes on A5 paper with good quality in order to prevent the presentation of the images from affecting the participants' preferences. The images used in the study were shown in Figure 1 below.

1 Aquatics Center, London, England

2 Phaeno Science Center, Germany

3 Vilnius Modern Art Museum, Lithuania

4 Eli and Edythe Broad Art Museum, USA

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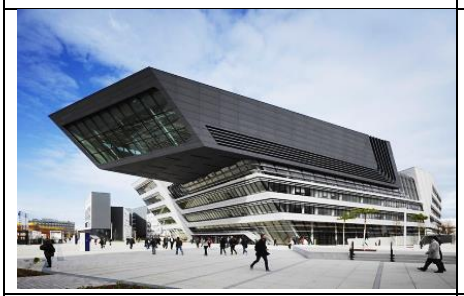
5 Dominion Office Building, Moscow, Russia

6 Evelyn Grace Academy, London, England



7 Vienna University of Economics Library, Vienna, Austria

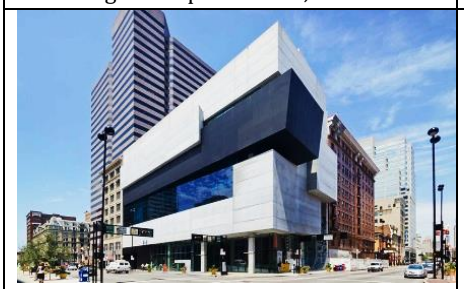
8 Haydar Aliyev Culture Center, Baku, Azerbaijan

9 Vitra Fire Station, Germany

10 Art Gallery, London, England

11 Guangzhou Opera House, China

12 Beko Masterplan, Belgrade



13 Rosenthal Center for Modern Arts, USA

14 Riverside Museum, Glasgow, Scotland

15 MAXXI Museum, Italy

16 Cagliari Contemporary Arts Center, Italy

Figure 1 continued Images of Zaha Hadid's Designs Used in the Survey

EVALUATION

The SPSS program was used to perform analysis on the participants' ideas and visual aesthetic evaluations regarding Zaha Hadid's buildings. Descriptive statics, correlation analysis and independent t test were performed to conduct the evaluations. Regarding the sensory concept dimension, Cronbach's alpha coefficient was found to be 0.89, while it was 0.81 for the physical characteristics. The participants' judgements toward Hadid's buildings (whether they liked or not) and their physical and sensory evaluations were determined. According to the analysis results, the participants liked the following images the most, in descending order: Image 8 (X_{arch}= 6.0; X_{lay}=6.27), Image 12 (X_{arch}= 5.9; X_{lay}=6.02), and Image 1. (X_{arch}= 6.27; X_{lay}=5.80). They liked the following images the least: Image 13 (X_{arch}= 3.90; X_{lay}=3.86), Image 9 (X_{arch}= 4.0; X_{lay}=4.22), and Image 2. (X_{arch}= 4.24; X_{lay}=4.24) (Table1) (Figure 2).

Table 1. Liking rankings of Architects and Laypersons in Zaha Hadid's Buildings

Architect	N	Mean	Layperson	N	Mean
liking8	48	6.00	liking8	49	6.27
liking12	49	5.90	liking12	49	6.02
liking1	49	5.67	liking1	49	5.80
liking16	49	5.49	liking3	48	5.38
liking3	49	5.43	liking14	49	5.37
liking6	49	5.35	liking16	49	5.29
liking14	49	5.22	liking6	49	5.04
liking6	49	5.18	liking11	49	4.90
liking15	49	4.98	liking5	49	4.80
liking10	49	4.78	liking10	49	4.69
liking4	48	4.77	liking4	48	4.69
liking5	49	4.73	liking6	49	4.67
liking11	48	4.60	liking15	49	4.31
liking2	49	4.24	liking13	49	4.24
liking9	49	4.00	liking2	49	4.22
liking13	48	3.90	liking9	49	3.86
Valid N (listwise)	46		Valid N (listwise)	47	

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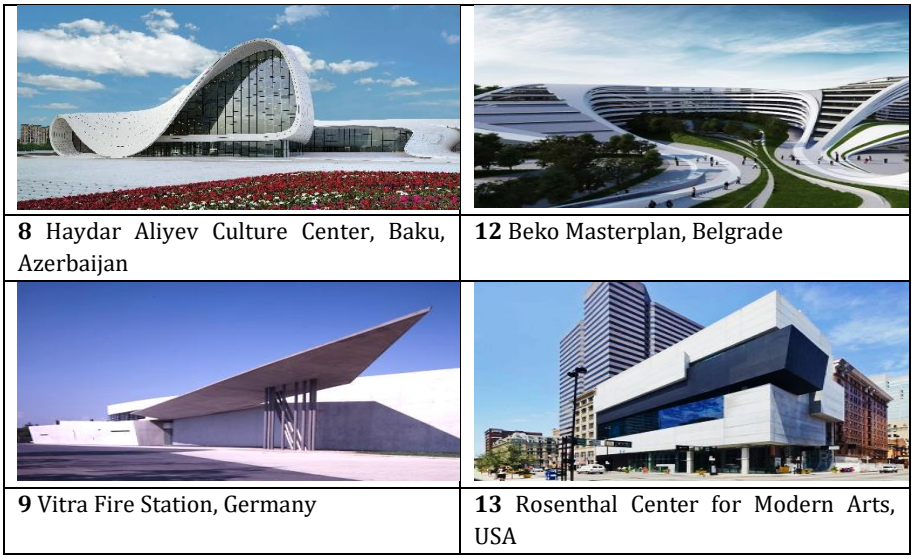

8 Haydar Aliyev Culture Center, Baku, Azerbaijan | **12** Beko Masterplan, Belgrade

9 Vitra Fire Station, Germany | **13** Rosenthal Center for Modern Arts, USA

Figure 2. The Zaha Hadid Designs Approved the Most (top) or Least (bottom) by Architects and Laypersons

Independent t test was performed to understand the liking levels of architects and laypersons regarding Hadid's buildings. The mean scores of both groups regarding liking for each image (excluding Image 15) (Table 2) were found to be quite close. The t values regarding the mean scores of both groups indicated that no significant differences were found between the two groups at the 0.05 significance level. Regarding Image 15, the t value (t=1.997) for the mean scores of both groups indicated a significant difference between them at the 0.05 significance level (p= 0.049).

Table 2. The Independent T-Test Results Regarding Liking Judgements of Architects and Laypersons

		N	Mean	Std. Deviation	F	t	p
Liking1	Architect	49	5.67	1.144	0.014	-0.540	0.590
	Layperson	49	5.80	1.099			
Liking2	Architect	49	4.24	1.665	1.319	0.056	0.955
	Layperson	49	4.22	1.918			
Liking3	Architect	49	5.43	1.258	2.155	0.186	0.853
	Layperson	48	5.38	1.566			
Liking4	Architect	49	4.76	1.507	3.375	0.188	0.851
	Layperson	48	4.69	2.002			
Liking5	Architect	49	4.73	1.879	1.298	-0.172	0.864
	Layperson	49	4.80	1.633			
Liking6	Architect	49	5.35	1.480	4.304	0.861	0.391
	Layperson	49	5.04	2.000			
Liking7	Architect	49	5.18	1.467	4.623	1.458	0.148
	Layperson	49	4.67	1.962			
Liking8	Architect	48	6.00	1.399	2.005	-1.102	0.273
	Layperson	49	6.27	0.930			

Liking9	Architect	49	4.00	1.646	6.260	0.377	0.707
	Layperson	49	3.86	2.082			
Liking10	Architect	49	4.78	1.558	0.062	0.245	0.807
	Layperson	49	4.69	1.735			
Liking11	Architect	48	4.60	1.455	2.700	-0.914	0.363
	Layperson	49	4.90	1.699			
Liking12	Architect	49	5.90	1.388	0.002	-0.441	0.660
	Layperson	49	6.02	1.362			
Liking13	Architect	48	3.90	1.403	4.588	-1.013	0.314
	Layperson	49	4.24	1.942			
Liking14	Architect	49	5.22	1.723	0.002	-0.419	0.676
	Layperson	49	5.37	1.654			
Liking15	Architect	49	4.98	1.561	0.561	1.997	**0.049**
	Layperson	49	4.31	1.770			
Liking16	Architect	49	5.49	1.757	0.001	0.591	0.556
	Layperson	49	5.29	1.658			

The levels of warmth the participants felt towards the buildings were determined in the survey. According to the data obtained from analysis results, the buildings reported as the warmest (Image 8 and 12) and coldest (Image 2 and 9) by the architects and laypersons were the same (Table 3).

Table 3. Warmth Rankings of Architects and Laypersons in Zaha Hadid's Designs

Architect	N	Mean	Layperson	N	Mean
warm12	49	5.82	warm8	49	5.86
warm8	49	5.65	warm12	49	5.49
warm16	49	5.14	warm14	49	4.86
warm14	49	4.41	warm16	49	4.82
warm1	49	4.39	warm1	48	4.54
warm6	49	4.37	warm5	49	4.33
warm3	49	4.37	warm6	45	4.27
warm5	48	4.10	warm3	49	4.24
warm15	49	4.06	warm7	47	4.21
warm10	49	4.04	warm10	49	3.96
warm7	49	3.80	warm13	49	3.92
warm11	49	3.73	warm11	49	3.80
warm4	49	3.71	warm15	47	3.79
warm13	49	3.18	warm4	49	3.57
warm9	49	3.02	warm2	48	3.10
warm2	49	2.88	warm9	49	2.86
Valid N (listwise)	48		Valid N (listwise)	43	

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Independent t test was performed to understand the sensorial concepts of the architects and laypersons regarding Zaha Hadid's buildings. In terms of the complexity, the mean score of the architects was found to be 68.41+-10.427, while the mean score of the laypersons was 74.00+-12.116 (Table 4). The t value (t=0.186) of the mean scores for both groups indicated a significant difference between them at the 0.05 significance level (p= 0.020). A significant difference was found between the scores of the architects and laypersons in complexity dimension. Similarly, the t values ($t_{familiar}$= 0.188; t_{ornate}=0.301) calculated to test the significance of the difference between the mean scores of the architects and laypersons in the familiarity and ornate dimension indicated that the difference between the two groups ($p_{familiar}$= 0.011; p_{ornate}= 0.012) was significant in these dimensions at the 0.05 significance level.

However, the t values calculated to test the significance of the difference between the two groups in the liking, pleasant, attractive, meaningful and warm dimensions (t_{liking}= 0.165; $t_{pleasant}$= 0.834; $t_{attractive}$= 0.575; $t_{meaningful}$= 0.575; t_{warm}= 0.372) indicated no significant difference between them regarding these dimensions (p_{liking}= 0.568; $p_{pleasant}$= 0.998; $p_{attractive}$= 0.634; $p_{meaningful}$= 0.418; p_{warm}= 0.950) at the 0.05 significance level. In other words, no significant difference was found between the architects and laypersons regarding the liking, pleasant, attractive, meaningful and warm dimensions.

Table 4. Results of Independent t test for Sensorial Concepts of Architects and Laypersons in Zaha Hadid's Buildings

	Section	N	Mean	Std. Deviation	F	t	p
Liking	Architect	47	81.00	12.003			
	Layperson	47	79.38	15.150	1.956	0.165	0.568
Pleasant	Architect	47	80.29	13.639			
	Layperson	49	80.30	14.208	0.044	0.834	0.998
Complex	Architect	46	68.41	10.427			
	Layperson	46	74.00	12.116	2.155	0.186	0.020
Familiar	Architect	49	62.81	14.932			
	Layperson	46	54.67	15.490	3.375	0.188	0.011
Attractive	Architect	47	74.42	12.051			
	Layperson	48	75.68	13.597	0.317	0.575	0.634
Meaningful	Architect	46	71.08	14.206			
	Layperson	47	68.61	15.045	0.317	0.575	0.418
Warm	Architect	48	66.97	10.982			
	Layperson	43	66.81	13.903	0.806	0.372	0.950
Ornate	Architect	46	63.78	14.167			
	Layperson	46	71.10	13.313	1.083	0.301	0.012

Correlation values were examined to evaluate the relationships between the sensorial (liking, pleasant/unpleasant, complex/simple, attractive/unattractive, meaningful/meaningless, ornate/pure,

warm/cold) and physical (regular/irregular, curvilinear, full-bulky/empty-massless, rhythmic/arrhythmic, soft/hard, symmetric/asymmetric) characteristics. The r values calculated for that purpose indicated a significant relationship between sensory concepts and physical characteristics at the 0.05 significance level. Regarding symmetric, no significant relationship was found between any of the sensory concepts. In addition, an inverse relationship was present between complexity and regularity, but no significant relationship with fullness was found. Moreover, no significant relationship was present between familiarity and curvilinearity, and ornate, warm and regularity. Analysis results further indicated that almost all of the sensory concepts were most related to rhythmic and soft concepts. Overall, it was revealed that the rhythmic and soft (organic) lines of a building were the most significant elements for facades and buildings in the aesthetic evaluation (Table5).

Table 5. The Correlation Values Between the Sensorial and Physical Characteristics of Zaha Hadid's Buildings

			REG.	CURV.	FULL	RHYT.	SOFT	SYM.
ARCHITECTS	**APPROVAL**	Pearson Correlation	0.578*	0.844**	0.839***	0.943**	0.872**	0.337
		Sig. (2-tailed)	0.019	0.000	0.000	0.000	0.000	0.202
		N	16	16	16	16	16	16
	PLEASANT	Pearson Correlation	0.525*	0.825**	0.798**	0.950**	0.848**	0.341
		Sig. (2-tailed)	0.037	0.000	0.000	0.000	0.000	0.197
		N	16	16	16	16	16	16
	COMPLEX	Pearson Correlation	-0.119	0.649**	0.460*	0.624**	0.558*	0.193
		Sig. (2-tailed)	0.660	0.006	0.073	0.010	0.025	0.474
		N	16	16	16	16	16	16
	FAMILIAR	Pearson Correlation	0.701**	0.341	0.533*	0.580*	0.616*	0.489
		Sig. (2-tailed)	0.002	0.197	0.034	0.019	0.011	0.054
		N	16	16	16	16	16	16
	ATTRACTIVE	Pearson Correlation	0.564*	0.844**	0.824**	0.956**	0.884**	0.377
		Sig. (2-tailed)	0.023	0.000	0.000	0.000	0.000	0.149
		N	16	16	16	16	16	16
	MEANINGFUL	Pearson Correlation	0.597*	0.804**	0.784**	0.913**	0.846**	0.329
		Sig. (2-tailed)	0.015	0.000	0.000	0.000	0.000	0.214
		N	16	16	16	16	16	16
	ORNATE	Pearson Correlation	0.177	0.820**	0.710**	0.802**	0.815**	0.278
		Sig. (2-tailed)	0.512	0.000	0.002	0.000	0.000	0.296
		N	16	16	16	16	16	16
	WARM	Pearson Correlation	0.495	0.809**	0.716**	0.922**	0.911**	0.430
		Sig. (2-tailed)	0.051	0.000	0.002	0.000	0.000	0.097
		N	16	16	16	16	16	16

DOI: 10.15320/ICONARP.2021.157

NON-ARCHITECTS (LAYPERSONS)	**APPROVAL**	Pearson Correlation	0.566*	0.882**	0.820**	0.945**	0.913**	0.377
		Sig. (2-tailed)	0.022	0.000	0.000	0.000	0.000	0.150
		N	16	16	16	16	16	16
	PLEASANT	Pearson Correlation	0.675**	0.804**	0.830**	0.911**	0.878**	0.478
		Sig. (2-tailed)	0.004	0.000	0.000	0.000	0.000	0.061
		N	16	16	16	16	16	16
	COMPLEX	Pearson Correlation	0.045	0.663**	0.593*	0.735**	0.573*	0.269
		Sig. (2-tailed)	0.868	0.005	0.015	0.001	0.020	0.313
		N	16	16	16	16	16	16
	FAMILIAR	Pearson Correlation	0.530*	-0.073	0.201	0.254	0.259	0.591*
		Sig. (2-tailed)	0.035	0.788	0.456	0.342	0.332	0.016
		N	16	16	16	16	16	16
	ATTRACTIVE	Pearson Correlation	0.478	0.869**	0.820**	0.937**	0.918**	0.476
		Sig. (2-tailed)	0.061	0.000	0.000	0.000	0.000	0.062
		N	16	16	16	16	16	16
	MEANINGFUL	Pearson Correlation	0.673**	0.744**	0.880**	0.948**	0.873**	0.568*
		Sig. (2-tailed)	0.004	0.001	0.000	0.000	0.000	0.022
		N	16	16	16	16	16	16
	ORNATE	Pearson Correlation	0.333	0.801**	0.718**	0.880**	0.830**	0.504*
		Sig. (2-tailed)	0.208	0.000	0.002	0.000	0.000	0.047
		N	16	16	16	16	16	16
	WARM	Pearson Correlation	0.544*	0.739**	0.710**	0.899**	0.862**	0.493
		Sig. (2-tailed)	0.029	0.001	0.002	0.000	0.000	0.053
		N	16	16	16	16	16	16

To summarize the assessments of all the analysis made, in the aesthetics evaluations carried out on Zaha Hadid designs;

• The first three images that architects and laypersons like and dislike were the same.

• With the exception of the MAXXI Museum, there was no significant difference in liking dimension between architects and laypersons.

• Two images that architects and laypersons found the warmest and the coldest were the same (Table 4). The architects and laypersons arrived at a consensus on the images of Haydar Aliyev Cultural Center and Beko Building as the warmest and on the images of Phaeno Science Center and Vitra Fire Station as the coldest.

• There was a significant difference between architects and laypersons in terms of familiarity, ornateness and complexity.

• There was no significant difference between architects and laypersons in terms of liking, pleasant, attractive, meaningful and warm.

• When the relation between the sensory and physical characteristics of the buildings are examined, it is seen that almost all sensory concepts are associated with rhythmic and soft concepts at the highest level. In other

words, it has been determined that the rhythmic and soft (organic) lines of a building were the most substantial facts for facades and masses in the general aesthetic evaluation.

DISCUSSION AND CONCLUSION

The concept of dynamism, which is intensively used in modern architecture discourse, is one of the most basic elements of the "new architecture" language based on scientific information. Dynamism is used as one of the main concepts defining the basic characteristics of the modern world with regard to the ideas of complexity, chaos and heterogeneity and social, cultural and economic aspects. Studies examining the dynamism of the new world in architecture should be conducted. Patrick Schumacher of Zaha Hadid Architects stated that Hadid made efforts to inject a new dynamism into architecture with the recent designs of multi-story buildings, and according to him, these efforts aimed to form an architecture language with fluent and applicable characteristics that would solve the increasing social and urban complexity. Schumacher said that the organic and inorganic natural systems were the inspiration of this new architectural language. Investigations of the abstraction in architecture indicate that both geometric and non-geometric abstraction types were applied in Zaha Hadid's designs. In this sense, when looking at today's designs, it is seen that Zaha Hadid's designs stand out from the others with their distinctive features.

The question of the meaning an architectural building has in terms of its location is significant for creating environments that can be regarded as satisfactory by all people of today. This is the case, because the conceptual satisfaction approaches toward building and the perception and interpretation styles that people have vary according to the current identity and language of all buildings. This study evaluated whether there is a common language in evaluating the perception and satisfaction of subjects with different backgrounds (educational statuses) and analyzed the impacts of this language in forming a universal language by examining Zaha Hadid's buildings/designs.

Independent t test was performed to understand the sensory concept levels of the architects and laypersons regarding Zaha Hadid's buildings. According to the analysis results, a significant difference was found between the architect and layperson groups in the "complexity", "familiarity" and "ornate" dimensions, in parallel with the studies in the literature (Venturi, 1966; Purcell et al., 1998; Jeffrey et al., 1999; Imamoglu, 2000; Akalin et al., 2009; Akalin et al., 2010). However, the t values calculated to test the significance of the difference between the two groups regarding the "liking", "pleasant", "attractive", "meaningful", and "warm" dimensions indicated there to be no significant difference. Two buildings (Image 8 and 12) found to be the warmest and most pleasant by the architects and laypersons were the same. Both groups

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liked the buildings they regarded as warm. The buildings (excluding Image 15) liked and disliked by both groups were found to match. Few studies find similarities between architects and laypersons. While Kunawong (1986) used LISREL (Linear Structural Relationships) analysis in his study, Küller (1973) used the "agent analysis". The results obtained did not go beyond some adjective similarities. This study supports those studies also showing there to be no differences between architect-layperson groups (Kunawong, 1986; Küller, 1973; Özbudak Akça et al., 2015). These results indicate that the individual style in Hadid's designs play a key role in aesthetic decisions, and that individual style may include efforts to achieve a common language. Contributing to studies on environmental aesthetics on how subjects with different backgrounds of this finding perceive their physical environment in terms of semantics, in addition to studies that try to reveal the ground of the relation of visual perception with parametric design in buildings built with the parametric design approach (Basu and Ghosh, 2018) would also provide a different perspective. Thus, the design process of the study is expected to guide the future framework that makes the world a better place to live with a more efficient, effective, optimum and rational intellection.

Correlation values were examined to evaluate the relationships between the sensory (liking, pleasant/unpleasant, complex/simple, attractive/unattractive, meaningful/meaningless, ornate/pure, warm/cold) and physical (regular/irregular, curvilinear, full-bulky/empty-massless, rhythmic/arrhythmic, soft/hard, symmetric/asymmetric) characteristics. According to analysis results, no significant relationship was found between any of the sensory concepts in terms of being symmetric. Almost all of the sensory concepts were most related to rhythmic and soft concepts. The results further showed that the rhythmic and soft (organic) lines of a building were the most meaningful elements for facades and masses in the aesthetic evaluation. Such data can be used to constitute criteria for the production of high-quality outdoors or indoors. This study is important due to providing a framework for establishing building quality criteria.

One of the most significant results of the concretization performed to understand which physical characteristics were involved in perceiving facades is that the subject can be learned and taught through the acquired state of objectivity. This paves the way for education and training, which are the main paths to personal development. Architect candidates who know these qualities and keep them in mind will be able to create high quality architectonic environments that are visually enjoyed by many once the architecture and society are improved. Designers should be aware of the psychological states, personalities, perceptions, cognitions and behaviors of the users of spaces and environments, and students should be taught about this awareness as part of their educational curriculum.

Architectural meaning should be considered as whole together with usage and style. In its period of emergence and inception as a criticism object in designing, architecture has been one of the critical factors affecting the spaces as the actual products, the spatial users, and the locations of the spaces. Contemporary architecture exhibits a variety of styles that can be achieved through new materials, rapid technological development and static possibilities. Buildings constructed without observing the environmental compatibility have led to reactions against contemporary architecture. There is growing discontent with the fact that technology has become a goal, to the neglect of symbolic and regional values. The works of Zaha Hadid, who changed this concept, pushing it beyond its boundaries, indicate that they belong to no specific time (timelessness), have fluent forms, use free forms, reflect costly designs requiring advanced technology, parametric designs and utilize the virtual environment in designs. With these works, Zaha Hadid has formed her own "individual style". As a result, it is only natural that changes made to a country's architecture will be under the influence of new architectural theories based on the ever-changing technology. If the architecture of a society can be connected with certain features from time to time, despite the external factors, then the architecture can become original to that society. For example, if the chain is not broken, a common preserved aspect remains intact, despite the differences in the rings. It is possible to see this in Hadid's structures. This study is significant insofar as it is among the rare studies that found there to be no differences between architects and laypersons, revealing instead that they had primarily similar aesthetic evaluations. The findings from this study can serve as a guide to achieving common (liking-related) evaluations through a building's physical characteristics and to forming the buildings to be designed in the future, and furthermore, the findings will contribute to future environmental aesthetic studies in terms of how subjects with different background perceive environmental conditions.

CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

FINANCIAL DISCLOSURE

The authors declared that this study has received no financial support.

ETHICS COMMITTEE APPROVAL

Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS

In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions and organizations) during the survey, in-depth interview, focus group interview, observation or experiment.

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REFERENCES

Abercrombie, S. (1984). *Architecture as art: an aesthetic analysis*. Newyork: Van Nostrand Reinhold Company.

Ackerman, J.S. (1963). *"Style", Art and Archaelogy.* Prentice, Englewood Cliffs, NJ, 174-186.

Amer, M., Attia, S. (2019). Identification of sustainable criteria for decision-making on roof stacking construction method. *Sustainable Cities and Society*, 47 (February), 101456.

https://doi.org/10.1016/j.scs.2019.101456.

Aydınlı, S. (1993). *Aesthetic values in architecture*. First Edition. Istanbul: İ.T.Ü. Faculty of Architecture Printing Studio.

Basu, T, Ghosh, M. (2018). Visual perception of space and parametric design: A brief discussion, *GSTF Journal of Engineering Technology*, pp 1-11. DOI: 10.5176/2251-3701_4.2.185,

Benedikt, M.L. (1979). To take hold of space: Isovists and isovist fields. *Environment and Planning B: Planning and Design.* 6(1):47-65.

Brown, G., Gifford, R. (2001). Architects predict lay evaluations of large contemporary buildings: whose conceptual properties?. *Journal of Environmental Psychology,* (21) 93-9.

Canter, D. (1969). An intergroup comparison of connotative dimensions in architecture. *Environment and Behavior*, (1) 27-28.

Chan, C. S. (2000). Can style be measured?. *Design Studies*, 21(3), 277–291.

Devlin, K., Nasar, J.L. (1989). The beauty and the beast: some preliminary comparisions of 'high' versus 'popular' residential architecture and public versus architect judgements of same. *Journal of Environmental Psychology*, (9), 333-44.

Devlin, K. (1990). An examination of architectural interpretation: architects versus nonarchitects*. Journal of Architectural and Planning Research* (7), 235-43.

Erdoğan, E. (2010). Stil ve Tasarım Eğitimi. İstanbul: *Yapı Dergisi*, 342, 62-65.

Erdogan, E., Akalin, A., Yıldırım, K., Erdoğan, H.A. (2010a). Aesthetic differences between freshmen and pre-architects. *Gazi University Journal of Science*, 23 (4), 5011-50.

Erdogan E, Akalin A, Yildirim K, Erdogan H. A. (2010b). Students' evaluations of different architectural styles. *Procedia Social and Behavioral Sciences*, WCPCG-2010, 5, 875-881.

Erzen, J.N. (2006). *Çevre Estetiği*. Ankara: Odtü Geliştirme Vakfı publishing, İletişim publication.

Fawcett, W., Ellingham, T., Platt, S. (2008). Reconciling the Architectural Preferences of Architects and the Public. *Environment and Behavior*, Vol.40, No.5, 599-618.

Greene, T.M. (1940). *The Arts and the Art of Critisism*. Princeton: Princeton University Press, 5-12.

Groat, L. (1982). Meaning in Post-Modern architecture: An examination using the multiple sorting task. *Journal of Environmental Psychology*, (2), 3- 22.

Gifford, R., Hine, D., Clemm, W., Shaw, K. (2000). Decoding Modern Architecture: A Lens Approach for Understanding the Aesthetics Differences of Architects and Laypersons. *Environment and Behaviour,* 32 (2), 163-87.

Gifford, R., Hine, D., Clemm, W., Shaw, K. (2002). Why Architects and Laypersons Judge Building Differently: Cognitive Properties and Physical Bases. *Journal of Architectural and Planning Research*, 19 (2), 131-48.

Hershberger, R. C. (1969). *A study of meaning in architecture*, Proceedings of the Environmental Design Research Association, ed. H. Sanoff, S. Cohn, Raleigh, ABD:NC: North Carolina State University.

Hersberger, G. R. (1988). *A Study of Meaning And Architecture*, Environmental Aesthetics Theory Research and Applications, Cambridge University Press, New York, 175-94.

Hershberger, R. G., Cass, R. C. (1988). *Predicting user responses to buildings*, in J. L. Nasar, (Eds.), *Environmental aesthetics: Theory, research, and applications*, New York: Cambridge University Press., 195-211.

Hubbard, P. (1996). Conflicting Interpretations of Architecture: An Empirical Investigation, *Journal of Environmental Psychology*, (16), 75-92.

İmamoğlu, V. (1979). Assessment of living rooms by households and architects, *Proceedings of the 4th Conference of the International Association for the People and Their Physical Environment,* Louvain le Neuve, Belgium, 65-85.

İmamoğlu, Ç. (2000). Complexity, liking and familiarity: architecture and non-architecture Turkish students' assessments of traditional and modern house facades. *Journal of Environmental Psychology,* 20, 5-16.

Jenks, C. (1977). *The Language of Post-modern architecture.* New York: Rizzoli.

Jencks, C. (1980). *The architectural sign, sign-symbols and architecture*. pp. 71-118, Eds. Broadbent, G.,Bunt, R.,Jencks, C., New York: John Wileyand Sons Ltd.

Kaplan, R. (1974). Predictors of environmental preference: Designers and 'clients', in F.E. Wolfgang, (Eds.), *Proceedings of the 4th Conference of the Environmental Design and Research Association.* Stroudsburg: Dowden, Hutchinson and Ross, 265-274.

Krampen, M., Öztürk, K., Saltik, H., Özek, V. (1978). Eski ve yeni görünüşlerin öznel izlenimleri ve nesnel ölçümleri, *KTU Mimarlık Bölümü Mimarlık Bülteni*.

Kunawong, C. (1986). *The Study of Responses to Architectural Exteriors by Architectural and Non-Architectural Students*, Unpublished Phd. Thesis, Ohio State University, ABD.

Kuller, R. (1973). Beyond Semantic Measurement, Architectural Psychology, ed. R. Küller. Lund Procedings of 2. International

DOI: 10.15320/ICONARP.2021.157

Architectural Psychology Conference, Stroudsburg, Pa., Dowden, Hutchinson & Ross, 181-97.

Larue, J. (1970). *Guidelines for Style Analysis*. New York: *W.W. Norton,* ix.

Lang, J. (1987). Fundamental Processes of Human Behaviour Creating architectural Theory, The Role of theBehavioural Science Environmantal Design, Van Nostrand Reinhold.

Maalqe, E. (1973). *The Aesthetic Joyand Repetition of the Ever Unpredictable*, ed. R.

Küller, Dowden, Hutchinson and Ross. Inc., Stroudsburg, Penn.

Nasar, J.L., Kang, J. (1989). A post-jury evaluation, *Environment and Behavior*. (21), 464- 84.

Nasar, J.L. (1989a). Perception, cognition and evaluation of urban places. In I. Altman, & E.H. Zube (Eds), *Public Places and Spaces: Human Behaviour and Environment***,** vol.10, 31-56.

Nasar, J.L. (1989b). Symbolic meanings of house styles. *Environment and Behaviour***,** 21, 235-257.

Nasar, J.L., Purcell, A. T. (1990). Beauty and the beast extended: Knowledge structure and evaluation of houses by Australian architect and non architect students. *Culture, Space, History: Proceedings of the 11th Conference of the International Association for the People and Their Physical Environment 1*, ed. H.Pamir, V. İmamoğlu, N. Teymur, 1, ODTÜ, Ankara, 169-71.

Nasar, J.L., (2008). Assessing Perceptions of Environments for Active Living, *American Journal of Preventive Medicine*, 34 (4): 357–363.

Özbudak Akça, B., Erdoğan, E., Akalın, A., (2015). A Study of Architects' Understanding of Laypersons' Language; Similarity of Architect and Layperson. *METU Journal of the Faculty of Architecture*, 32(2):171-189.

Purcell, A.T. (1995). Experiencing American and Australian high and popular-style houses. *Environment and Behavior*, (27), 771- 801.

Purcell, A.T., Peron, E., Sanchez, C. (1998). Subcultural and cross-cultural effects on the experience of detached houses: An examination of two models of affective experience of the environment. *Environment and Behavior*, (30) 348-77.

Rapoport, A. (1977). *Human Aspects of Urban Form*. Oxford: Pergamon.

Rapoport, A. (1980). *Human Aspects of Urban Form*, *Towards a Man-Environment Approach to Urban Form and Design*. Pergamon Press, Oxford, New York, Toronto, Sydney, Paris, Frankfurt.

Sadalla, E.K., Sheets, V.L. (1993). Symbolism in building materials: self-presentational and cognitive components. *Environment and Behavior,* vol.25 no.2, 155-180.

Sánchez-Pantoja, N., Vidal, R., & Pastor, M. C. (2018). Aesthetic perception of photovoltaic integration within new proposals for ecological architecture. *Sustainable Cities and Society*, 39(February), 203–214. https://doi.org/10.1016/j.scs.2018.02.027.

Sandstrom, S. (1973). Socio- cultural theory of aesthetic visual estimation and use. *Architectural Psychology*, ed. R. Küller, Dowden, Hutchinson and Ross. Inc., Stroudsburg, Penn.

Sanoff, H. (1974). Measuring Attributes of the Visual Environment. *Designing For Human Behavior Architecture and Behavioral Sciences*, ed. J. Lang, Dowden Hutchinson and Ross. Inc., Stroudsburg, Penn.

Schapiro, M. (1961). *Style, In: M. P. Philipson (Ed), Aesthetics Today*. World Publishing, Cleveland, OH, 81-113.

Schulz, N. C. (1965*). Intentions in Architecture*. London: *M.I.T., Press*, Cambridge Studio Vista.

Smith, C.S. (1981). *A search for structure: selected essays on science, art and history*. London: MIT Press, Cambridge, MA, 359.

Stanislav, A., & Chin, J. T. (2019). Evaluating livability and perceived values of sustainable neighborhood design: New Urbanism and original urban suburbs. *Sustainable Cities and Society*, 47, 101517.

Şentürer, A. (1995). Aesthetic fact in Architecture. Istanbul: İ.T.Ü. Faculty of Architecture Printing Studio.

Weber, R., Choi, Y., Stark, L. (2002). The impact of formal properties on eye movement during the perception of architecture. *Journal of Architectural and Planning Research,* 19(1), 57-69.

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An Awareness Experience by Empathic Design Method in Architectural Design Education

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Abstract

Purpose

In architectural education, the most important outcome aimed for architect candidates to acquire is the ability to show empathy. This study focuses on designing for users who have special physical needs while addressing the concept of establishing empathy together with universal designing principles in architectural education.

Design/Methodology/Approach

The empathic design method has been selected as the method of this study. As part of the study, it is aimed for students to offer a design solution in which they would fictionalize a universal design concept together with the empathic design which grounds on universal design principles.

Findings

As a result of the study, it was observed that when given a key method during the design process, students could approach the design with different points of view and interpret the datum with different approaches.

Research Limitations/Implications

This study, as part of the Çukurova University Department of Architecture Interior Design class, students were asked to implement interior design projects using the empathic design method with user groups of their choice in terms of characteristic and age range following the empathic design process.

Social/Practical Implications

It is to develop the awareness of architecture students in the creation process and such studies with different approaches and models to develop their perspectives.

Originality/Value

To increase the prevalence of accessibility and the participation of the disabled in society, the empathic design method can be foreseen to be a key method in other studies in architectural education.

Keywords: *Accessibility, design education, empathic design, universal design.*

INTRODUCTION

In architecture, all users and problems are unique and a special design solution for each problem should be found. Trying to perceive users with an average standard requirements list does not go well together with the perception of a design that produces correct/utilitarian solutions. All users are different from each other and have different requirements. In this context, designs developed/created empathizing with user groups that have different anthropometric and/or cognitive characteristics from the majority of its group become more necessary and important at this point. In design approaches, it is necessary to adopt a subject-oriented apprehension that involves users in the design and accordingly to reflect solution suggestions to the design while empathizing with the users.

Sometimes, empathy is defined as trying to walk in somebody else's shoes or seeing the world through someone else's eyes. Showing empathy, which is the main skill that a designer needs to have, is the ability to define and understand someone else's condition, emotions and point of view (Curadale, 2012, p.384). In terms of meeting the spatial needs, it is rather important to actualize universal design principles which are necessary to be carried out in all design fields from product design to urban design, and from architectural design to landscape design empathizing with real users. Hence in this study, in architectural education, it is aimed for students to apply universal accessible design principles using empathic design methods in the design process.

Basis of the Study

Equipping the architecture candidate with awareness and sensitivity for subjects of universality in design and design for everyone is a concept that starts in the process of architectural design and goes on throughout the whole career. Awareness is also one of the fundamental acquisitions of architectural education and the most important factor in its acquisition is being able to empathize. In architectural education, improving the skills of identifying user groups, empathizing with these groups, and producing designs as a result of acquired analyses are some of the most important aims.

Accordingly, with this experimental study carried out with the students of the department of architecture, it was aimed for students to;

- Collect data about users who have different spatial needs physically or mentally
- Research accessibility in design, universal design principles, and spatial needs of special users
- Acquire user experiences through empathy
- Produce designs that create awareness combining accessibility principles with the acquired knowledge. Thus, it was aimed to create an experimental design using an empathic design approach for accessibility in space.

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LITERATURE REVIEW

Users Who have Different Spatial Needs Physically or Mentally

World Health Organization (WHO) makes the definition of disability as deficiency or limitedness in the development expected from the body functions of individuals or as a whole and in fulfilling the functions of the body (WHO, 2001, p.12). Another definition is made by the International Labor Organization as " an individual whose prospects of securing, returning to, retaining and advancing in suitable employment are substantially reduced as a result of a duly recognized physical, sensory, intellectual or mental impairment" (ILO, 2011 p.6). In the first article of the "Declaration on the Rights of Disabled Persons" dated 9 December 1975 and annexed to the Universal Declaration of Human Rights adopted by the United Nations General Assembly, *"any person unable to ensure by himself or herself, wholly or partly, the necessities of a normal individual and/or social life, as a result of deficiency, either congenital or not, in his or her physical or mental capabilities"* is stated as disabled (UN, 1975). Finally, considering the concept of disability in the architectural literature, the disabled person defined as *"people suffering from obstacles due to the lack of suitable facilities for using buildings designed for general needs due to physical deficiencies"* (Goldsmith, 1997, p.174-179).

On the other hand, every person may have a permanent or temporary disability in a certain period of their life. For example; elders, pregnant women, parents who use prams or carry children in their arms, boxes, suitcases etc. People carrying goods can be considered as a temporary disability. Due to the different types of disability owned, classifications on disability are made. Republic of Turkey Ministry of Family and Social Policy defines disability with a reference to legal arrangements under seven headings plus with Psychologically and/or Emotionally ill;

- Orthopedically impaired,
- Vision impaired,
- Language and speech impaired,
- Hearing impaired,
- Mentally disabled,
- Chronic disease.

According to the statistical data prepared by the General Directorate of Disabled and Elderly Services of the Labour, Social Services and Family Ministry, the number of individuals with orthopedic disabilities is higher in our country. For this reason, it is seen that there are regulations for users with physical disabilities inaccessibility in the built environment (buildings, open areas, etc.) (URL1).

Accessibility in Design, Universal Design Principals

Accessibility is the characteristic of having some predetermined accessibility necessities. The concept of accessibility can be described as being able to reach or access all places for every individual who can move on his own or by using a vehicle (Olguntürk, 2007, p. 10-17). While accessible design only covers the design of products for the use of only disabled individuals; the universal design is the design of the place, product and outfit for all people including disabled individuals (Hacıhasanoğlu, 2003, pp. 93-101). The concept of "accessibility", which has a very recent past and *"making the design for everyone, that is,*

without excluding any part of the society" are closely related. Accessibility is defined most commonly: *"everyone can reach and use everywhere / place they want"* (Gümüş, 2009, p. 36).

The concept of accessibility aims to be able to enter, navigate and use the places where people with disabilities live. In other words, with the arrangements adapted to the disabled in the spaces, it is aimed that they can feel their environment. Therefore, accessibility is a user-centered approach that recognizes that all spaces must be available.

The concept of accessibility emerged for the first time through experimental rehabilitation training, mostly war veteran students at the University of Illinois, Champaign and Urbana twin towns' campus. The majority of disabled students enrolled in the faculty at the end of the 1940s are people who have become disabled due to the war. As a result of the studies that can be continued with the support of the American Veteran's Federation and similar institutions, the *"rehabilitation education"* study conducted by Timothy Nugent has resulted in an echo. The basis of this study of Tim Nugent is the belief that people who have a wheelchair should have the educational opportunities other people have and that no matter how badly disabled, people with disabilities will be able to see their jobs with education and motivation (Güngör, 2007, p.74).

As a result of his work from 1959 to 1961, Tim Nugent created the product that the American government and other countries will adapt to them. American standard no: 117.1 are standards for making buildings and interiors accessible and usable by physically disabled people. This first study will be the beginning of the developments that will lead to the establishment of the social rights law and the American Disability Law for the disabled in America. In the process that resulted in the emergence of legal regulations on the rights of the disabled and finally the adoption of the American Disability Law (1990), the laws for the protection of disabled citizens from injustice constitute an important turning point. Thanks to these laws, legal barriers have begun to emerge even though disabled people are falling apart or reduced from the general structure of the society (Goldsmith, 1997, p.174-179).

The universal design offers a solution without distinguishing between people. Accordingly, designs that would meet the needs of men, women, old, young, left-handed, right-handed and people with or without a disability should be created. To realize the universal design, its principles should be specified and no concessions should be made. It is presumed that universal design will enable people with disabilities to use the same objects and spaces as those used by people without disabilities, both increasing the prevalence of accessibility and enhancing opportunities for the integration and participation of people with disabilities in society (Steinfeld and Danford, 1999, p. 35-57).

Universal design has the power to lift the human spirit, especially when environments are designed to truly meet the needs of people who use them (Preiser, 2007, p.11). Although many people with reduced functionality will special aids and solutions tailored to their specific needs, the principle of universal design provides a constructive basis for integrating (Bringa, 2007, p.98). Therefore, the basic concepts determined as universal design principles are; equitable use abilities, flexibility in use, simple and intuitive use, perceptible information, tolerance for error, size and space for approach and use, providing

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suitable space and dimensions for approach and use (Iwarsson and Stahl, 2003, p.57-66).

Teaching Universal Design

Universal design has become a worldwide movement since the 1990s and has taken its place in design education as the social responsibility of architecture. The basics of the universal design taking place in architectural practice are revealed by its presence in the educational process. At this point, since the universal design lessons can be found at universities all over the world, architectural educators have developed various methods and conducted academic studies for this. (Christophersen, 2002, p.7-17).

The existence of universal design in design education should not be limited to teaching students a set of technical standards, but also should include a sense of social dimension, approach and attitudes. The goal of inclusive and universal design education should be a holistic perspective that focuses not only on the scale of design but also on the dimensions of user relationships. And ways to convey this holistic approach should be sought in the architecture departments of universities through courses (Sungur, 2015, p. 1397-1403).

In this context, besides the technical dimension of the universal design, the concept of empathy was emphasized in transferring the emotional and social dimensions to the designer candidate. Within the scope of the study, universal design education was integrated with the concept of empathy in design, the empathic design method was applied.

Empathy

The word 'empathy' comes from the root of the Greek word 'empathia' and when it is examined etymologically, it is seen that 'em' means 'inside of, within'; and 'pathia' means 'to feel' (Ersoy and Köşger, 2016, p.9-16). Empathy, which means 'to feel inside' when the two roots come together, is a matter that is discussed in many fields such as philosophy, education, psychology and design, it has more than one definitions that belong to different disciplines. The educational dictionary meaning of the means 'understanding and feeling from the point of view of the other person' (Shukla, 2005, p. 75). In Cambridge Philosophy Dictionary, 'empathy' takes place with three basic definitions (Audi, 1999, p. 261);

•Firstly, imaginative projection into another person's situation, especially for vicarious capture of its emotional and motivational qualities,

•Secondly, it may mean mimicry of gaze (i.e., transfer of attention from the other's response to its cause).

•Thirdly, it denotes role-taking, which reconstructs in the imagination aspects of the other's situation as the other "perceive" it. When we talk about empathy, we refer to the third of these meanings: "empathy" is an imaginative projection into another person's situation (Mattelmäki, Vaajakallio and at al., 2014, p. 67-77).

Empathy, which was originally a sub-term of sympathy, has been discussed by Hume, Adam Smith and other Scottish philosophers. The term came into existence with the translation of the German word 'einfühlung' (which was used by Theodore Lipps who is identified with esthetic thinking, widely) into English by English psychologist E. G. Titchener (Wang & Hwang, 2010).

Ickes (1997, p. 352) points out that empathy is a complicated psychological deduction from that observation, memory, information and reasoning bring together to acquire insights about others' thoughts and emotions. The term empathy, which is discussed in different scientific fields such as philosophy, esthetics and psychology, was studied comprehensively by phenomenologists such as Husserl, Sartre, Brunswik and Heider who were interested in the matter at the beginning of the 20th century (Wang & Hwang, 2010).

What is Empathic Design?

Empathy is a fact that is involved in work and study life and human relations in life. Empathy, as a subject area in the field of design, came into existence with the term 'emphatic design' that contains concepts such as empathy in design, universality, and involving the user. Empathy transforms into a design tool with an emphatic design method. The concept of 'emphatic design' is a concept that includes not only architecture but also all other design fields (E. Mediastika, 2016, p.1).

The empathic design which emphasizes listening to the voice that comes from the heart of the user and turns it into the design is an innovative design strategy to understand the relationships between the user and the designer (Wang & Hwang, 2014). Empathy in the field of design existed before being called emphatic design. Design exists with empathy by nature. In emphatic design strategy, even though user experiences are handled in a more technically regarding their transfer into the project; in the past as well, architects, planners and designers constructed for a more general user by predicting the needs, wishes and skills of the users who would use their designs. However, today, advanced research is required to determine functional and ergonomic necessities in design correctly (Postma, Zwartkruis-Pelgrim and at al., 2012, p. 59-70).

Empathy in the field of design includes these researches that will make it possible to understand user experiences and use them as design data and means a positive relationship between the users and built environment, in other words, the harmony between them (Banerji, 2016, p. 8-17). The most distinct character of the emphatic design is that the designer reaches the experiences of a known user. While design methods in traditional design processes rely on the personal experiences of the designer, emphatic design understands how the user sees, experiences and feels the object, environment or service in the circumstance he uses the design product (Koskinen & Mattelmäki, 2003, p.168), (Figure 1).

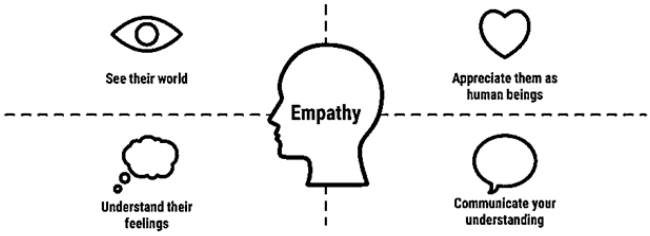

Figure 1. Empathize with the users in the design process (URL 2).

Under the name of the emphatic design, a design method that tries to explain how users define their potential requirements first brought forward by Leonard and Rayport (1997, p.102-113). The empathic design was presented as a process that involved observation, data

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collection and analysis, and iterative prototyping. Most significantly, the discipline was identified as a way to uncover people's unspoken latent needs and then address them through design. The key to the emphatic design is to understand how the user looks at, experiences and feels some of the objects, the environment or the service when he is using the object (Koskinen, Mattelmäki and at al., 2003, p.168). Thereby, empathic design involves a series of methods that are put forward for designers to transfer user experiences to the design systematically.

Method: Empathic Design

Empathy, which is a concept that exists in the essence of architecture, offers a different point of view to user-oriented approaches with the empathic design method. In this study, the empathic design method is conceptualized with the empathic design process. Leonard and Rayport (1997, p.102-113) identify five key steps in the empathic design process as: observation, capturing data, reflection and analysis, brainstorming for solutions, and developing a design model or mockup of possible solutions. Designers keep the user in mind in all steps of the design process and take place in every step of the empathic design. However, reaching the user perspective becomes even more important for the designer in concept search and concept development steps which are the pre-design steps in the design process. To make conscious predictions about which alternatives to explore and where to go in developing the design product, it is vital to understand how the user sees his world (Koskinen, Mattelmäki and at al., 2003, p.168), (Figure 2).

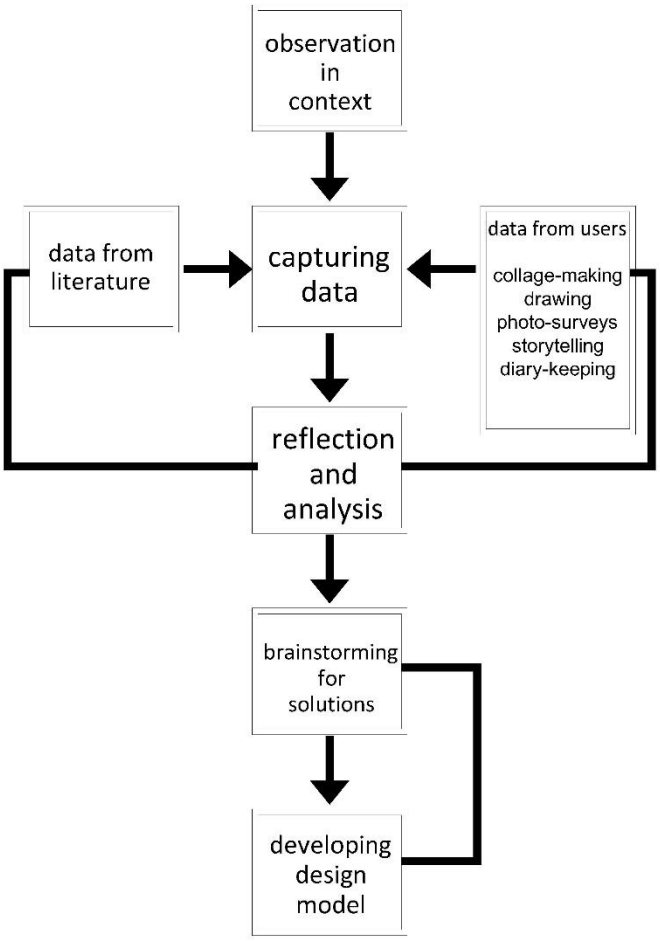

Figure 2. Conceptual model of the empathic design process (prepared by authors)

At this point, different methods can be applied to examine user experiences. To determine the experiences in traditional design methods, what people say is taken into consideration by using questionnaire and interview technique that is practiced on a determined group, besides applying observational research methods. As for participant design methods, tools for involving user experiences in the design are produced. In this method that focuses on producing tools to enable people to express their dreams, thoughts and emotions for a design, it is argued that empathy that is shown towards users' influences on reaching the correct result (Frascara, 2002).

In user centered design methods, cognitive and emotional tools, maps, 3D models, function diagrams, and the datum in which users express their dreams are used for users to reveal their experiences. Activities such as collage-making, drawing, photo-surveys, storytelling or diary-keeping are especially valuable in situations in which people may find it difficult to articulate or reveal attitudes and thought-processes verbally. The user design process which is taken form by making use of created tools consists of pre-examination interview, field analysis meeting, forming a study book, home-research sessions, user analysis workshop and design finalization workshop session (Sanders, Elizabeth and at al., 2013, p.72-86).

In this study, the user participation practices mentioned took place as a research technique based on the empathic design process. The empathic design process scheme shown in figure 2 in the empathic design application carried out with students has been a guide throughout the studio process as a road map.

Discussion: Empathic Design Experience in Architectural Education Design Studios

With the aim of raising awareness in the design process of the empathic design method, empathic design practice was conducted with students as part of the Çukurova University Department of Architecture Interior Design class. In the study that continued for ten weeks, primarily studies done using participant design methods were analyzed; cognitive and emotional tools necessary for empathic design were introduced throughout 4-hour lessons each week. By creating student study groups consisting of three or four people, students were first asked to choose a specific user group and secondly to state the age-range of the said group. They were expected to create an interior design whose function they establish themselves in accordance with the determined user group. The aim for leaving the choice of function and user description to the students was to ensure that the student constructs the tools of empathy himself while creating his design for the group he chooses. Accordingly, user groups chosen by students were determined as children with autism, hearing-impaired adults, adolescents with down syndrome, and children with cerebral palsy; and a model that involves the steps of the empathic design process and process actors (Tabel 1) (Figure 3).

DOI: 10.15320/ICONARP.2021.158

Table 1. User groups of the study

Group	Project Type	Special User Group
1	Playground	Autistic Children
2	Dance School	The Hearing Impaired
3	Cafeteria	Young People With Down Syndrome
4	Rehabilitation Center	Children With Cerebral Palsy

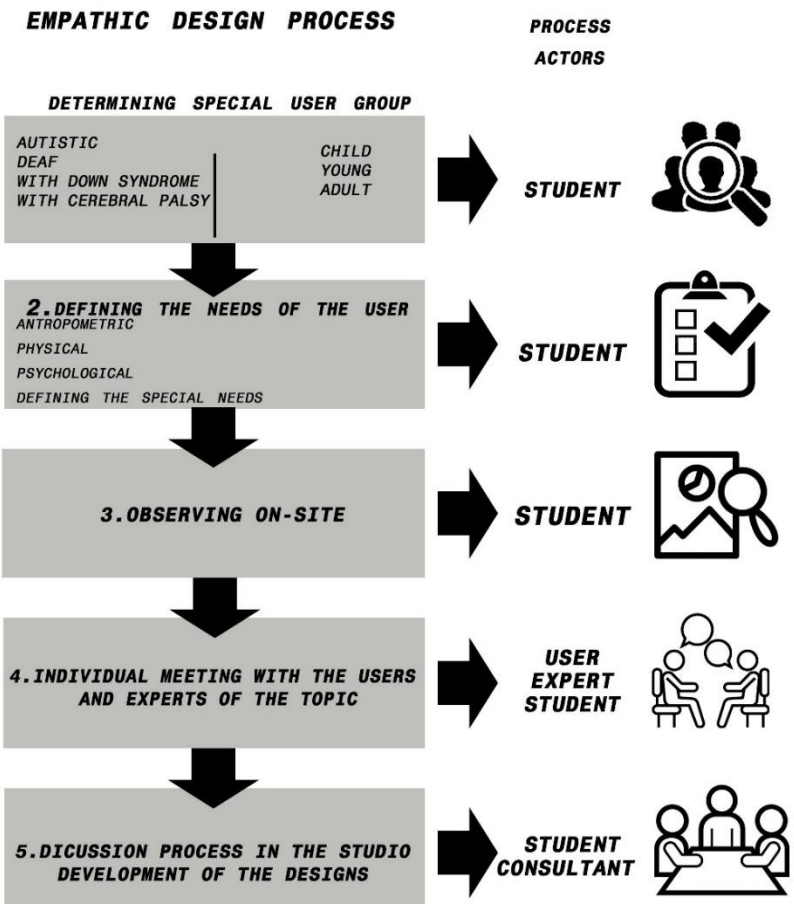

Figure 3. Conceptual model of applying empathic design (prepared by authors)

1nd Group: Design of Outdoor Playground for Autistic Children

In the design, firstly research on children with autism was made and spatial needs of autistic individuals were determined. The term was first used by Kanner and Asperger to describe a group of children, seemingly living in their private worlds and combining a great ingenuousness with a fundamental lack of knowledge about social interaction (Kinnaer, Baumers and at al, 2016, p.179–195)

Autism is a disorder that is defined by behavioral symptoms associated with high cortical brain functions that affect lifelong socialization, language, communication, and many other areas of interest and activity, making it difficult and preventing communication with other individuals. In addition to this autism is a common developmental disorder in which verbal and non-verbal communication, social relationships, imagination and problem-solving abilities are impaired. Autism disorder is referred to as autism spectrum disorder (ASD) in the literature (Şensoy, 2017, p. 115-128).

In the studies made, "Sensory Design Model" (Mostafa, 2014, p.143-158) which focuses on sensory reactions that autistic individuals give to the characteristics of the physical space was referenced. According to the model, it is aimed that the inclusion of space acoustics, ventilation, color, tissue, orientation and closedness, which are also defined as stimulant inputs that stem from the physical environment, into the design will create a positive effect on autistic individuals. Design principles of the model, spatial sequencing, escape space, compartmentalization, transition zones, sensory zoning played a significant role in the design process (Mostafa, 2014, p. 143-158). Besides the literature researches, the opportunity of a face-to-face interview with the user was provided and a mother who has an autistic child and a student group who will create the design had a series of interviews. It was obtained from the user experiences that autistic children who do systematic and rhythmic movements want to go to places always from the same route and need a certain rotation in the design. As a result of the interviews, a design of a playground to put into practice in the backyard of a private education establishment where autistic children go to school was agreed upon (Table 2).

Table 2. Group 1-playground for autistic children

Keywords	**Design Decisions**
Acoustics Spatial Sequencing Escape Space Transition Zones Sensory Zoning	Characteristics of individuals with autism against activities or games: • They focus on the parts unusually. • They only deal with certain issues. • They want to go the same way to their destination (Mostafa, 2014). In the light of the design data, beginning from the exit of the playground, a play area in sections in a rhythmic layout was designed. In the design, a secret playground which was stated as an area that children with autism need was designed. Different materials and tissues that are intended for the tactual sense in a manner that would contribute to the sensorial development of the children with autism were used; and playgrounds that create different sounds intended for the sense of hearing were organized. To prevent the distraction that colors create, as neutral colors black and white were preferred.
Photos	
	

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2nd Group: Design of the Dance School for the Hearing Impaired

For the hearing impaired, which is a group in which an architectural design example is not commonly encountered among disabled individuals, a special research process was followed. To dance, it is necessary to hear the music and synchronize the movements. In this context, the most important problem of the design is the creation of an appropriate atmosphere for the hearing-impaired dancers to sense the music.

As a result of the research stage which was the first step of the design process, the 'Deaf Space' study was referenced. Architects of the Gallaudet University, which is the only university that offers social sciences education to hearing impaired students, defined the concept 'Deaf Space'. In 'Deaf Space' studies, known -but hadn't been coded until then- sensitivities of hearing-impaired people were determined and some sort of key principles list was created. At the beginning of the study, suggestions intended for completing the absence of hearing with sight were developed. However, afterward it was stated that the 'Deaf space' concept is a concept of defined spaces that are so open to feeling that it cannot be supported with sight and facilitate movement. In the study, five basic design principles for the spaces designed for hearing impaired people are determined as space and closeness, sensory accessibility, mobility and closeness, light and color, and acoustics (URL 3), (Figure 4).

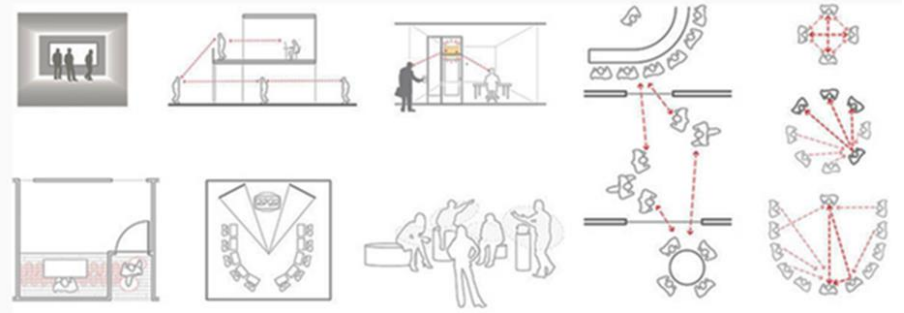


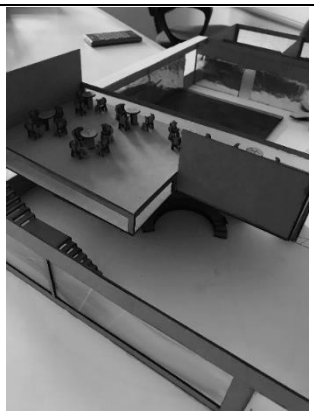
Figure 4. Deaf Space (URL 3)

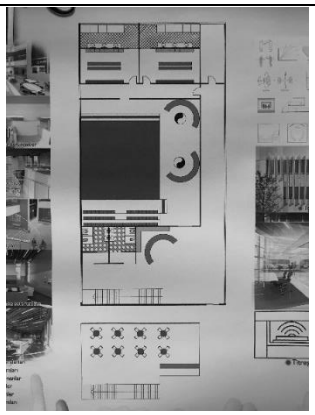
It was stated that spatial orientation for the environment and awareness are basic necessities for a person to feel good. Hearing-impaired people, too, can sense activities around via visual and tactile datum such as shadows, vibrations, small movements of the people around. In this concept, the 'Deaf Space' concept suggested that the built environment should be designed in a manner that allows for this spatial awareness utterly and facilitates spatial orientation. These principles were also taken into consideration in the design of dance school for the hearing impaired, sign language was made clearer and more understandable by choosing contrast colors in color choices.

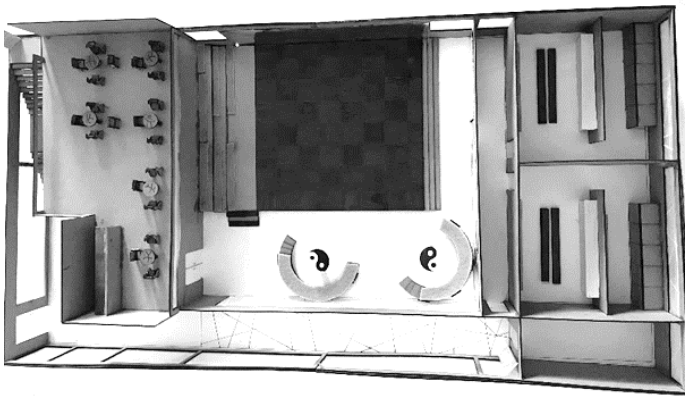
Additionally, mechanical characteristics as necessities that stem from function in design were involved in the design. It was ensured that they transmit music notes to the dancer on the dance floor, which is the main area of the dance school, as vibrations. By this means, to compensate for the absence of hearing, sight besides tactual sense is made use of. In the design process, to empathize with the users, students practiced being able to sense the space as if they lacked the ability to see.

Table 3. Group 2- The dancing school for hearing imparied

Keywords	Design Decisions
Space and closeness Sensorial accessibility Mobility and closeness Light, color and acoustics	Special attention was given to ensure that the visual perceptibility of the dance ground that takes place in the center of the design is high. Instead of closed walls, transparent surfaces were preferred in the design. Mirrors taking place in the corner solutions are placed in a way that enables people to see people coming in the opposite direction and to prevent any collision. A mechanical system that vibrates in sync with the music on the dance floor was created.
Photos	







3nd Group: Cafe for Young People with Down-Syndrome

Down-syndrome is the most commonly encountered chromosomal genetic abnormality among humans. Recently, a series of applications are becoming widespread to integrate people with downsyndrome into society (Patterson and D., Costa, 2005, p. 137–147). One of them is the cafeteria enterprises in which adolescents with Down-syndrome work. The main aim of the students from the 3rd group was to offer a suggestion for the design of these cafeterias. Firstly, research was made

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by examining the physical characteristics of individuals with down-syndrome to involve them in the design. Having small hands and feet, being shorter compared to other children, having weak and loose muscle structures can be counted as some of the physical characteristics of children with down-syndrome. For this reason, one of the most important characteristics of space design for individuals with down-syndrome is organizing the spatial factors to prevent tripping dangers and, also, safety should be ensured as an important parameter. Additionally, because a complicated layout can be difficult for a person who has down-syndrome, space should have a simple layout. For this reason, walls and wall colors were chosen as simple and undetailed as possible in order not to create a disorder for individuals with weak sight (Table 4).

Table 4. Group 3- Cafe for young people with downsyndrome

Keywords	Design Decisions
Safety Open space Simplicity and perceptibility Suitability for the anthropometric measurements	The design was created taking anthropometric measurements of the individuals with downsyndrome into consideration. In order not to experience any kind of accident for these individuals experiencing balance difficulties, cornered surfaces were avoided. An open space layout was implemented. Colors used in the space were chosen as simple and outfits were chosen as undetailed.
Photos	
	

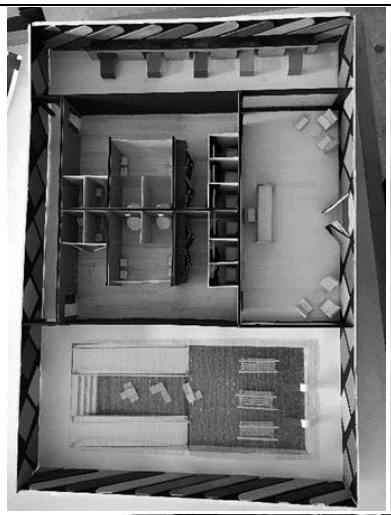
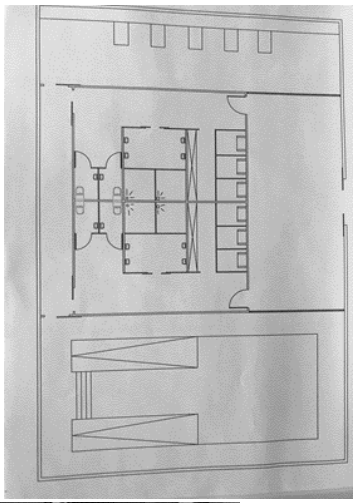
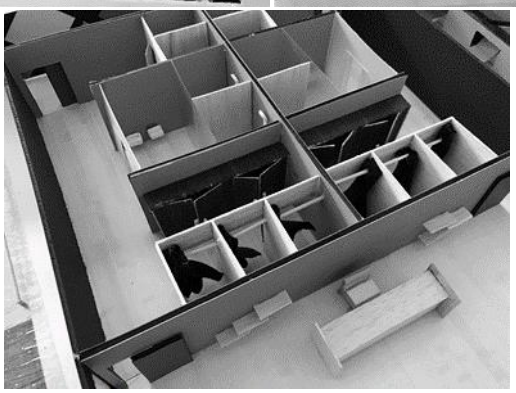
4nd Group: Swimming Pool for Children with Cerebral Palsy

With the 4th group students, a rehabilitation center and a swimming pool project was designed for children with cerebral palsy. In cerebral palsy patients, muscle weakness, reactional irregularities in body and balance reactions, and muscle tone changes such as spasticity and distony prevent the control of movements and causes balance loss. Therefore, children with the sickness should be in the process of physiotherapy (El, Peker and at al., 2007, p.75 – 80). In this project, empathizing with the children who spent most of their lives in rehabilitation and physiotherapy centers, 'What can be done to make the process more fun?' was the first design question asked. A design, which not only is an appropriate space for children with cerebral palsy in terms of accessibility but also understands the users' psychology and

ICONARP – Volume 9, Issue 1 / Published: 21.06.2021

empathizes with it, was developed. Aquariums and swimming pools that children can watch throughout their long physiotherapy sessions constitute the core of the design. Additionally, space was dynamized by the color utilization in the space and different surfaces created with wall panels. The four studies are evaluated in the table below in terms of main design ideas and design approaches (Table 5).

Table 5. Group 4- Swimming pool for children with cerebral palsy

Keywords	Design Decisions
Walking disabled standards Accessibility Color and dynamism	The main starting point of the design is to make space more fun for children. It was designed not as a closed room where the physiotherapy would take place but as a common area that displays an aquarium where children would get treatment while communicating with others. On the other hand, a swimming pool was designed to ensure that children can not only have a fun time but also can do their muscle exercises.
Photos	
  	

CONCLUSIONS AND RECOMMENDATIONS

Methods such as observation on-site, one-on-one interviews with the users and experiencing user characteristics were used in the process of empathizing with the users of these four groups that study within the context of interior design lesson. Throughout the studio term, the importance of developing empathizing skills for students and the designer's ability to think together with the user was discussed. At the

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same time, the importance of the steps of students' research and data collection in the design process for the design scenario especially for a different user was highlighted.

In this regard, this study addresses the perception of empathic design in architecture together with the concepts of universal design. As part of the study, it is aimed for students to offer a design solution in which they would fictionalize a universal design concept together with the empathic design which grounds on universal design principles. On one hand, as empathic design fiction, they are expected to define specific users and create special solutions for them; on the other hand, they are anticipated to design physical space that takes universal design principles in mind.

As a result of student feedbacks and the products of the study that was created using an empathic design approach made with students of the department of architecture in studio term, it was observed that the following goals were reached:

- The student can easily evaluate the data that he collected via cognitive and sensorial tools,
- The student can develop his ability to interpret the data that he collected throughout the design process with different approaches,
- Awareness in terms of design was raised for everyone.,
- As a designer candidate, the student is aware of special user groups and gained research and solution development experience,
- The student learned the approaches in architectural literature such as 'deaf space' and 'the sensory design model' for private users and experienced the reflections of these approaches to practice in the studio,
- Universal design principles were made a holistic process using the empathic design method, and accordingly, designs that raise awareness were created.

These sorts of studies made with different approaches to develop the awareness, and hence the point of view, of the students of the department of architecture, show that students can evaluate the data that he collected in a formal and speculative order. Therefore, as a result of this study, it was observed that student can approach the design with different points of view and interpret the data with different approaches when provided with a key method during the design process. In consequence, as a result of the data collected, it was seen that efforts to create a design using the empathy design method raise awareness in education and strengthen the empathy in students. Finally, the study aimed to contribute to new academic studies on the application of empathic design method in design education by addressing architectural design education and universal design studies with the concept of empathy.

ICONARP – Volume 9, Issue 1 / Published: 21.06.2021

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No conflict of interest was declared by the authors.

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Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS
In this research, the necessary permissions were obtained from the relevant participants.

REFERENCES

Audi, R. (Ed.). (1999). The Cambridge dictionary of philosophy, (4TH ed.). Cambridge University Press.

Banerji H. (2016). An attempt to explore components of empathic architecture in hospitals: a study of indian hospitals. Journal of Architecture and Urbanism, 40(1), 8-17. https://doi.org/10.3846/20297955.2016.1150220

Bringa, O. R. (2007). Making universal design work in zoning and regional planning: A Scandinavian approach. Nasar, J. L. & Evans-Cowley, J. (Ed.). Universal design and visitability: from accessibility to zoning. (p.98). The John Glenn School of Public Affairs.

Christophersen, J. (Ed.). (2002). Universal design: 17 ways of thinking and teaching. Husbanken.

Curadale, R. (2012). Design methods 1: 200 ways to apply design thinking. Design Community College Inc.

E. Mediastika, C. (2016). Understanding empathic architecture. Journal of Architecture and Urbanism, 40(1), 1. https://doi.org/10.3846/20297955.2016.1165385

El, Ö., Peker, Ö., Bozan, Ö., Berk, H., & Koşay, C. (2007). General characteristics of cerebral palsy patients. DEÜ Tip Fakültesi Dergisi, 21(2), 75-80. https://dergipark.org.tr/tr/download/article-file/53424

Ersoy E. G. & Köşger F. (2016). Empathy: definition and its importance. Osmangazi Journal of Medicine, 38 (2), 9-17. https://doi.org/10.20515/otd.33993

Frascara J. (Ed.). (2002). Design and the social sciences: making connections. Taylor & Francis.

Goldsmith, S. (1997). Designing for the disabled: The new paradigm. Taylor & Francis. https://doi.org/10.4324/9780080572802

DOI: 10.15320/ICONARP.2021.158

Gümüş, D. Ç. (2009). İngiltere, Japonya ve Türkiye'de özürlülük ve erişilebilirlik. Mimarlık Dergisi, 347, 36. http://www.mimarlikdergisi.com/index.cfm?sayfa=mimarlik&DergiSayi=361&RecID=2065

Güngör, C. (2007). Alışveriş merkezlerinin engelliler için erişebilirlik standartları kapsamında irdelenmesi (Doktora Tezi). Gazi Üniversitesi Fen Bilimleri Enstitüsü, Ankara.

Hacıhasanoğlu, I. (2003). Evrensel Tasarım. Tasarım Kuram Dergisi, 2(3), 93-101. https://jag.journalagent.com/tasarimkuram/pdfs/DTJ_2_3_93_101.pdf

Ickes W. (1997) (Ed.). Empathic Accuracy. Guilford Press.

ILO, (2011). Disability in the workplace: employers' organizations and business networks. https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---ifp_skills/documents/publication/wcms_167204.pdf

Iwarsson S., & Ståhl A. (2003). Accessibility, usability and universal design: positioning and definition of concepts describing person-environment relationships. Disability and Rehabilitation, 25(2), 57-66. https://doi.org/10.1080/dre.25.2.57.66

Kinnaer M., Baumers S., & Heylighen A. (2016). Autism-friendly architecture from the outside in and the inside out: an explorative study based on autobiographies of autistic people. Journal of Housing and the Built Environment. 31(2), 179-195. https://doi.org/10.1007/s10901-015-9451-8

Koskinen I., Mattelmäki T., & Battarbee K. (2003). Empathic design-user experiance in product design. IT Press.

Leonard, D. & Rayport, J. F. (1997). Spark innovation through empathic design. Harvard Business Review.

Mattelmäki T., Vaajakallio K. & Koskinen I. (2014). What happened to empathic design? Design Issues 30(1), 67-77. https://doi.org/10.1162/DESI_a_00249

Mostafa M. (2014). Architecture for autism: autism aspects in school design. Archnet-IJAR: International Journal of Architectural Research. 8(1), 143-158. https://doi.org/10.26687/archnet-ijar.v8i1.314

Olguntürk N., (2007). Evrensel tasarım: tüm yaşlar, farklı yetenekler ve çeşitli insanlık durumları için tasarım. TMMOB Ankara Şubesi Dosya 4: Tasarım ve Özgürlük; Engelli İnsanlar ve Herkes İçin Tasarım. 46,10-17.

Patterson, D., & Costa, A. (2005). Down syndrome and genetics: a case of linked histories. Nature Reviews Genetics. 6, 137-147. https://doi.org/10.1038/nrg1525

Postma, C. E., Zwartkruis-Pelgrim, E., Daemen, E., & Du, J. (2012). Challenges of doing empathic design: experiences from industry.

International Journal of Design, 6 (1), 59-70. http://www.ijdesign.org/index.php/IJDesign/article/view/1008/403

Preiser, F. E. W. (2007). The seven principles of universal design into planning practice. Nasar, J. L. & Evans-Cowley, J. (Ed.). Universal design and visitability: from accessibility to zoning. (p.11). The John Glenn School of Public Affairs.

Sanders, L. Liem, A., & Elizabeth, B. (2013). Human-Centred design workshops in collaborative strategic design projects: an educational and professional comparison. Design and Technology Education: AnInternational Journal. 18(1), 72-86. https://ojs.lboro.ac.uk/DATE/article/view/1801

Şensoy, N. (2017). Otizm spektrum bozukluğu olan bireyler için duyu bahçesi tasarımı. Inonu University Journal of Arts and Design. 7(15), 115-128. https://doi.org/10.16950/inustd.286842

Shukla R. (2005). Dictionary of education. APH Publishing Corporation.

Steinfeld E., & Danford G.S. (Ed.). (1999). Enabling environments. plenum series in rehabilitation and health. Springer. https://doi.org/10.1007/978-1-4615-4841-6

Sungur, Asli. (2015). Universal design teaching in architectural education. Procedia - Social and Behavioral Sciences. 174, 1397-1403. https://doi.org/10.1016/j.sbspro.2015.01.766

UN (1975). Declaration on the Rights of Disabled Persons. https://www.ohchr.org/en/professionalinterest/pages/rightsofdisabledpersons.aspx

Wang, S., & Hwang, S. (2010). A Case study of empathic design. 17th International Conference on Learning / Creative and Imaginative Futures for Schooling. Loughborough, UK.

Wang, S., & Hwang, S. (2014). Empathic design: cases study of designers creating empathic phenomenons and the dimensions of empathic design. Journal of Literature and Art Studies. 4 (12), 1093-1102. https://doi.org/10.17265/2159-5836/2014.12.008

WHO (2001). International classification of impairments, disabilities and handicaps.p.12 https://apps.who.int/iris/bitstream/handle/10665/42407/9241545429.pdf

URL 1 https://ailevecalisma.gov.tr/media/42250/istatistik-bulteni-2020-mart.pdf Access Date: 09.06.2020

URL 2 https://www.interaction-design.org/literature/article/stage-1-in-the-design-thinking-process-empathise-with-your-users / Access Date: 09.06.2020

URL 3 https://www.gallaudet.edu/campus-design-and-planning/deafspace / Access Date: 09.06.2020

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Interpreting the Factors in Forming the Sense of Place: The Case of Kuzguncuk Neighbourhood, Istanbul

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Abstract

Purpose

Over the past few decades, cities have been subject to dramatic interventions such as rapid developments, increased modernization and capitalist production of spaces. These changes, occurring in parallel with globalization, have changed the long-lasting environmental perception and damaged the sense of attachment by transforming urban spaces into unidentified areas. In this regard, the main purpose of this paper is to explore the components of the sense of place and identifying its factors under the changing conditions. This conception aims to develop an integrated proposal that provides a better understanding of fluxional urban areas.

Design/Methodology/Approach

The methodology of this study consists of two parts; literature review and, field survey which adopts a qualitative approach through a web-based survey and semi-structured short interviews with locals. Within this scope, by chronologically reviewing the literature, the first part of the article questions how the sense of place can be defined and what components can serve to define its perception. In the second part, Kuzguncuk, which is one of the historical and most liveable neighbourhoods of Istanbul, is examined as the case study of this research. Due to its recent designation as an urban transformation area, the study focuses on to reinterpret Kuzguncuk according to its residents' sense of place.

Findings

After the findings are obtained and evaluated with a five-point Likert scale, the effect levels of the components on the quality of urban areas and the satisfaction of the people in the neighbourhood are determined.

Research Limitations/Implications

Due to the pandemic measures, the survey conducted to the residents of Kuzguncuk was carried out digitally, and the interviews were realized by taking into account social distance.

Originality/Value

This paper foresees to contribute to the literature by developing an empirical study on the concept of sense of place with its descriptive and interpretive approach. Further studies, which can utilize the results of this article, may answer questions about how the components related to sense of place sought out and reinterprets these factors over historical places.

Keywords: *Environmental perception, Kuzguncuk, sense of place, urban identity*

INTRODUCTION

The formation and sustainability of urban identity is embedded in daily life and social values created by people who have lived together in settlements for many years. The development and enrichment of collective identity depends on the readability and perceptibility of ongoing social and cultural symbols, as well as the long-lasting tangible-intangible values of these settlements. However, interventions, such as rapid developments in cities and the production of capitalist spaces, cause the loss of values of public spaces and daily life, which are the main actors of the interaction between individuals and urban space (Sennett, 1978) (Sorkin, 1992) (Mitchell, 1995) (Kayden, 2000). With regard to this gradual change, individuals, on the other hand, are drawn into an urban system where they have become alienated and/or isolated over time. Correspondingly, the city moves away from community-minded use and designs with its decreasing open green areas and public spaces offering limited activities under over-monitoring. Such urban decisions and practices that deeply affect the formation of the modern city offer individuals limited memories and experiences about the city and urban spaces. In parallel, urban areas have become vague with the increase of wasted, neglected and undefined areas (Trancik, 1986) (Cupers & Miessen, 2006) (Aral, 2009) (Villagomez, 2010).

This study, which aims to explore the tangible and intangible elements that make up and embody qualified urban spaces, reinterprets them by questioning the concept of the sense of place. In this context, the factors that make up this sense have been questioned to provide an alternative perspective to the multifaceted urban problems highlighted. In order to achieve this goal, Kuzguncuk neighbourhood, which still maintains its local characteristics despite a changing urban texture with regard to its designation as an urban transformation and development area, was chosen as the study area of this article. Besides its historical value and architectural features, its integrative structure showing semantic and imaginary features has been a factor in the selection of this neighbourhood as the study area.

The case study, which adopts a mixed methodological approach in data collection and analysis on the sense of place, was completed by analysing the data obtained from residents living in the neighbourhood. In the last part of the study, where the data are assessed using by the Likert scale, evaluations are made regarding the variations of the residents' sense of place.

THEORETICAL FRAMEWORK

"They are all spaces which people have made meaningful. They are all spaces people are attached to in one way or another. This is the most straightforward and common definition of place – a meaningful location."
(Cresswell, 2004)

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Cities of the 20th century are shaped in accordance with the design approaches such as standardization, functionality and zoning implemented within the framework of the early conditions of modernism. Such cities were organized with an approach that ignores the human dimension, mostly because of the material and human relations. During this period when the modernist approach was dominant, instead of personal experiences of individuals, universal and functional concerns shaped in line with economic and technical needs were prioritized in the shaping of the space (Asiliskender, 2004). Indeed, many cities designed in the light of the planning principles of the modernist period were organized in a hierarchical order, and the production of building blocks with poor environmental context caused the urban space to be in a regular fiction (Jacobs, 2009) (Trancik, 1986).

Criticisms about such rationalist approaches, which bring about problems such as the derivation of unidentified spaces in cities, have led researchers to work much more on the development of the individual's life experiences and the identification of the place itself. In this context, over the years, studies have been carried out by researchers about what constitutes urban quality and sense of place, and many different theoretical approaches have been developed in this direction. Indeed, the researchers, who studied architecture through environmental relations between the years 1960-80, developed various studies by focusing on topics such as geometrical forms and shaping of urban spaces (Krier, 1979), evaluation of formations suitable for human scale through movement and perception (Cullen, 1971), eclectic integration of objects and addressing the city with dialectical associations (Rowe & Koetter, 1978), and the identifiability of areas depending on the boundaries and the sense of enclosure (Alexander et al., 1977). Eventually, such objective studies based on principles fed from the physical characteristics of urban space have been followed by studies on the particular aspect of urban design based on ground psychology, senses and the experience of individuals.

Kevin Lynch is one of the earliest researchers who developed a perceptual and sensory study alongside the physical attributes of place. According to Lynch, people have their own images connected to the urban environment and a workable image requires three components: “identity”, “structure” and “meaning”. He states that an environmental image may be analysed firstly by its identity, which implies the distinction from other things, its recognition as a separable entity. Second, the image must include the spatial or pattern relation to other objects. Finally, this image must have some practical and/or emotional meaning for the observer (Lynch, 1960). Therefore, images not only with physical features, but also with their perceptual features should come together to create an environmental image. Further, his work entitled “The Image of the City” (1960) provides an alternative way of thinking about the sense of place. In this context, Lynch underlines that

urban images depend on an efficient interrelation between the elements of five groups: paths, districts, edges, nodes and landmarks.

Following the study of Lynch, theorists, such as Relph (1976), Canter (1977) and Punter (1991), developed further views of the components of place with various abstract diagrams. According to Relph's comprehensive study (1976), vitality and diversity of activities as well as individual and public meanings attached to urban space are also fundamental concerns about any place. Accordingly, he focuses on the concept of identity of place and describes it in terms of three components: “social activities”, “physical setting” and “personal and shared meanings”. Created through people’s experiences and intentions, a clearly identifiable and imageable place may therefore enhance the depth of experience of the users (Seamon & Sowers, 2008).

Canter (1977), with a similar thought, considers place as the combination of images and human conception. Canter’s metaphor combines the physical attributes of place with activities and perceptual experiences. He suggests that not only the “activity” and “physical attributes”, but also the “conceptions” give a place its meaning. Punter also adopted a similar approach to Relph and Canter and even elaborated these views by including in his model a number of sub-headings. In his model, "activity", "physical setting" and "meaning" are involved in the creation of a sense of place. According to Punter, the sense of place, as a narrative that covers the past, present and future, and is a continuity, is the most important feature of the historical urban area.

By pointing out the subjective and objective distinctions of the approaches, Montgomery (1998) presented a similar model again including three elements: “activity”, “form” and “image”. In line with the conceptual framework of Canter and Punter, he stated that urban quality should be handled much more broadly than the physical characteristics. In this context, he emphasized that the concept of urban quality is of great importance in terms of activity and image as well as form of place.

Within the scope of his work carried out in 2010, Schultz put emphasis on the principles related to place and its formed mental image that creates the meaning and sense of place. According to Schultz, “typology”, “topology” and “morphology” that define a sense of place and support its ongoing evolution are as important factors of place-making as the links between human and space in ensuring the quality of urban space. Therefore, in order to create a sense of place, these four components should intermingle with each other.

In one of the current studies on this subject, Project for Public Spaces (PPS) (2013) divides the components creating a great place into four: “uses & activities”, “sociability”, “comfort & image” and “access & linkages”. According to this latest method created by a group of experts from different disciplines, each of the four categories specified contains a number of factors, dedicated to creating and sustaining successful

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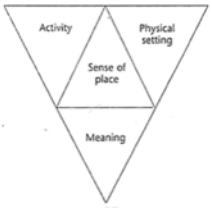
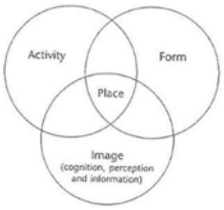
places that build stronger communities. Hence, an effective sense of attachment can only be achieved through the provision of these elements together.

It can be seen in Table 1 that the theories listed chronologically describe the components of the sense of place. This table further shows that there are patterns of agreement between different researchers with regard to their image of places, and the ways of evaluating this image. With reference to this holistic research, it is possible to say that the social and psychological dimensions of this relationship have started to come to the fore, while the relationship between human and space was based on the physical and cognitive space reading approaches of urban space in the middle of the 20th century.

Table 1. Descriptive components of the sense of place

Theorist (s)	**Theory and Diagrams**	**Components of the Sense of Place**		
Lynch (1960)	"Environmental image"	**Structure**	**Identity**	**Meaning**
Relph (1976)	"Identity of place"	**Social activities**	**Physical setting/ form**	**Personal and shared meanings**
Canter (1977)	 "Nature of place"	**Activity**	**Physical Attributes**	**Conceptions**
Punter (1991)	 "Sense of place"	**Activity** Land uses Pedestrian flow Behaviour Patterns Noise and smell Vehicle flow	**Physical setting** Townscape Built form Permeability Landscape Furniture	**Meaning** Legibility Cultural associations Perceived functions, attractions Qualitative assessments
Montgomery (1998)	 "Urban sense of place"	**Activity** Diversity Vitality Street life People watching Cafe culture Events and local traditions/pastimes Opening hours Flow Attractors Transaction base Fine grain economy	**Form** Scale Intensity Permeability Landmarks Space to building ratios Stock (adaptability and range) Vertical grain Public realm (space systems)	**Image (cognition, perception &information)** Symbolism and memory Imageability and legibility Sensory experience Knowledgeability Receptivity psychological access Cosmopolitan/ sophistication Fear

Schulz (2010)	"Sense of place"	**Typology** Moods Perception and Understanding of the Environment Dialog and Discussion Being with others	**Topology** Landscape (natural entities) Built Complexes (natural entities)	**Morphology** Space and Character	
+			+		
Project for Public Space (PPS) (2013)	 "Great place"	**Uses & Activities** Fun Active Vital Special Real Useful Indigenous Celebratory Sustainable	**Sociability** Diverse Stewardship Cooperative Neighbourly Pride Friendly Interactive Welcoming	**Comfort & Image** Safe Clean Green Walkable Sittable Spiritual Charming Attractive Historic	**Access & Linkages** Continuity Proximity Connected Readable Walkable Convenient Accessible

Table 2. The holistic theoretical framework proposed as a result of the evaluation of the data in Table 1

Theorists	**Components of the sense of place**	**Factors**
Canter (1977) Punter (1991) Schulz (1980) Montgomery (1998)	**Physical Attributes**	Built form Permeability Landscape Furniture Scale Intensity Landmarks Public realm
Canter (1977) Punter (1991) Schulz (1980) Montgomery (1998)	**Social Activities**	Behaviour Noise and smell Diversity Vitality Street life People watching Cafe culture Events and local traditions/pastimes Pedestrian/vehicle flow Attractors Being with others Perception and understanding of the environment
Relph (1976) Canter (1977) Punter (1991) Montgomery (1998) PPS (2013)	**Personal and Shared Meanings**	Cultural associations Perceived functions Qualitative assessments Symbolism and memory Imageability and legibility Sensory experience Knowledgeability Receptivity Cosmopolitan/sophistication Safety/fear Cleanliness

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Accordingly, a sense of place can be explained as a concept consisting of the three intertwined components: a specific landscape including **physical attributes**, a pattern of **social activities**, and a set of **personal and shared meanings**. This in-depth literature review is presented through a sample case study by conducting a questionnaire to collect empirical data, within the scope of the three components and their related factors determined for the sense of place and shown in Table 2.

INVESTIGATING KUZGUNCUK NEIGHBOURHOOD THROUGH THE SENSE OF PLACE

Methodology

The qualitative research method of this study, which focuses on the interpretation of the components of the sense of place through the Kuzguncuk neighbourhood, consists of two parts: a web-based questionnaire and semi-structured short interviews. The sample group of the study are composed of 60 randomly selected locals in Kuzguncuk neighbourhood. The web-based survey includes twenty questions. The first part of the survey determines the demographic profiles of the participants. Four of the twenty questions included in the survey are about designating the levels of satisfaction of residents in the context of the factors of the sense of place. The next two questions are aimed at understanding how neighbourhood residents define Kuzguncuk, and what factors affect their desire to live in Kuzguncuk. The other two questions are aimed at identifying the changes observed from the perspective of the residents in the neighbourhood texture as a result of the urban transformation studies that took place in Kuzguncuk. All the remaining questions are open-ended, requested to understand the level of knowledge, belonging and neighbour-relations, as well as to convey their problems and suggestions about the district.

Following the evaluation of the data obtained as a result of the survey conducted, the physical attributes, social activities and personal and shared meanings of the sense of place are examined through the views of the residents of the neighbourhood. The survey results question which of these criteria is more effective in giving the neighbourhood a sense of place. All the data obtained as a result of this phase conducted with residents living in Kuzguncuk are interpreted and digitized through graphs and tables with the help of the Likert scale.

A Transforming Historical Neighbourhood: 'Kuzguncuk'

Kuzguncuk is a small neighbourhood on the Anatolian side of Istanbul that stretches in the northwest-southeast direction between Üsküdar and Beylerbeyi. Located in a valley between the two hills where Fethi Pasha Grove and Nakkaştepe Cemetery lie, it is one of the historical settlements that continues to show the characteristics of traditional Bosporus villages (Figure 1).

Figure 1. Kuzguncuk's location and boundaries in Istanbul (Renderings prepared by authors, 2020)

According to Evliya Çelebi, the name Kuzguncuk, meaning "little raven" in Turkish, was believed to originate from a guardian named "Kuzgun Baba" who settled here in the time of Mehmed II (1451-1481). Another belief is that the old name of Kuzguncuk was “Hrisokeramos”, and this name, which means “Golden Tile”, came from a church whose roof was covered with gilded tiles built by Iustinos II (565-578 AD). In fact, the recorded history of the neighbourhood stretches back to the 17th century. The coastal settlement of Kuzguncuk has defined an area where Muslim, Jewish, Armenian and Greek populations were greatly present, between the 17th and 19th centuries. This harmonious existence of different ethnic and religious groups is an indication of the cultural richness of the area. Indeed, the coexistence of two synagogues (Bet Yaakov Synagogue and Bet Nisim Synagogue), two Greek Orthodox churches (Ayios Yeorgios Church and Iglesia de San Pantaleon Church), an Armenian church (Surp Krikor Lusavoriç Church) and a mosque (Kuzguncuk Mosque) that rise side by side is an important indicator of the designated cultural mosaic (Figure 2).

The general settlement layout of Kuzguncuk, which can be said to be one of the rare districts that preserves the common life culture, consists mainly of historical wooden or masonry civil architecture and colourful

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row houses built in the early 19th and 20th centuries. The busiest area of this historical neighbourhood is Icadiye Avenue, which lies as a linear commercial axis across the urban pattern (Figure 3). Other transportation axes that make up the road texture of the district consist of long narrow streets or colourful stairs connecting the building blocks.

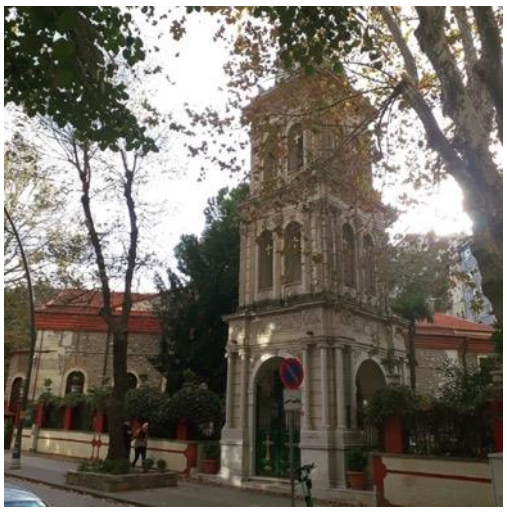

Figure 2. Religious buildings that are symbols of Kuzguncuk's multiculturalism (Kuzguncuk Mosque and Surp Krikor Lusavoriç Church from top to bottom) (Personal archive of authors, 2020)

Figure 3. Historical wooden row houses of Kuzguncuk (Personal archive of authors, 2019)

Kuzguncuk has also been the setting for a number of books, films and tv series. A few examples of such include “Ekmek Teknesi”, “Perihan Abla”, “Kara Sevda”, “Fazilet Hanım ve Kızları”, “Hayat Bilgisi” and “Kumral Ada Mavi Tuna”. Some other common names known to be related with the neighborhood are Ohannes Minasyan - an Armenian doctor who worked in Kuzguncuk, Rıfat Ilgaz - a Turkish poet, novelist and story writer who was known to live in Kuzguncuk for a long time and Can Yücel - a Turkish poet who lived in Kuzguncuk and has written poems about it.
Another feature that makes the settlement special is the Kuzguncuk Urban Garden (Kuzguncuk Bostan). This greenery, set back a few meters from the road, promises a country life in the middle of the city. As a recreation area consisting of small planting gardens where vegetable and fruit cultivation is continued, it further defines a public area within the boundaries of the district that is open to everyone (Figure 4).

Figure 4. Kuzguncuk Bostan (Personal archive of authors, 2020)

Kuzguncuk appears within the “front-view area” determined by Bosporus Development Law No. 2960 enacted in 1983. With regard to this very specific legislation, the existing skyline and urban pattern could be preserved. The number of people and tourists visiting the neighbourhood is increasing day by day. However, as the area attracted more attention, Kuzguncuk started to show interest in the artistic scene. In fact, it has become a preferred settlement by architects, writers and artists since Turkish architect and poet Cengiz Bektaş bought an old Kuzguncuk house into which he moved after making upgrades during the 1980s. With this wave, the settlement has become a kind of fashion hot spot. As a result of this trend, art galleries, cafes and small restaurants, antique stores, boutiques as well as workshop studios including the culinary atelier of Refika Birgül within the district have increased in number. While these new developments contribute to

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Kuzguncuk on the one hand, it also poses a threat for the neighbourhood in terms of the sense of place.

This situation that started with the gentrification process and resulted in the perception of the settlement as a type of attraction by the investors continued after the district was declared an "Urban Transformation and Development Area" in 2018. Just after the transformation label was attached, Kuzguncuk became popular, and the demand for the neighbourhood from those located in other districts of Istanbul has increased (Figure 5). Over time, the large-scale projects carried out in connection with the urban transformation started to drag this neighbourhood under its influence, as in many districts of Istanbul. As a matter of fact, new buildings, which have caused a noticeable increase in property prices, started to dull the urban memory of Kuzguncuk, negatively affecting the urban images acquired by the settlement over many years.

Figure 5. Urban transformation activities and cafe culture in Kuzguncuk (Personal archive of authors, 2019)

FINDINGS

This study aims to identify attributes of the sense of place and determine the factors that form it. In accordance with this purpose, it was questioned which of the factors related to the sense of place are more effective in this neighbourhood and the satisfaction level of the residents with the factors.

Itemization of the answers was arranged by the authors in accordance with the evaluation flow of the article, unlike the questionnaire directed to the participants. The questionnaire was not presented to participants in this way, it was only used for visualization in the article.

Table 3. Demographic characteristics of the participants

	n	%
Gender		
Female	32	53.3
Male	28	46.6
Age		
18-25	1	1.7
26-35	13	21.7
36-49	24	40
50 >	22	36.7
Educational Status		
Primary school graduate	2	3.3
High school graduate	8	13.3
University graduate	30	50
Post-graduate	20	33.3
Years lived in Istanbul		
1-9 years	7	11.7
10-19 years	7	11.7
20-29 years	10	16.7
30-39 years	9	15
40 years >	27	45
Work status		
Unemployed	10	16.7
Self-employed	14	23.3
Civil servant	14	23.3
Private sector employee	22	36.7

Table 3, in which the frequency distribution of the demographic profiles of the residents is shown, indicates that 32 (53.3%) of the participants are female, and 28 (46.6%) are male. Of the participants, 47 (77%) are over 35, 1 (1.7%) are 18-25 years old, 13 (21.7%) are 26-35 years old, 24 (40%) are 36-49 years old, 22 (36.7%) are over 50. Of them, 2 (3.3%) are primary school graduates, 8 (13.3%) are high school graduates, 30 (50%) are university graduates, and 20 (33.3%) had post-graduate education. Of them, 10 (16.7%) are unemployed, 14 (23.3%) are self-employed, 14 (23.3%) are civil servants, and 22 (36.7%) are private sector employees. Of the participants, 7 (11.7%) have been living in Istanbul for 1-9 years, 8 (13.3%) for 10-19 years, 10 (16.7%) for 20-29 years, 9 (15%) for 30-39 years, and 27 (45%) for more than 40 years. In addition, 31 (51.7%) were born in Istanbul, 8 (13.3%) were born in Ankara. Other participants stated that they were born in various cities.

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Table 4 shows that 29 (48.3%) of the participants have been living in Kuzguncuk for more than 20 years. Of the participants, 2 (3.3%) have just moved in, 12 (20%) have been living there for 1-5 years, 8 (13.3%) have been living there for 6-9 years, and 9 (15%) for 10-19 years. Of the participants, 23 (38.3%) are tenants, 13 (21.6%) are owners, and 24 (40%) are staying in family/relative's property. In addition, 11 (18.3%) participants' residences are in the area indicated as No. 1, 4 (6.7%) of them in the area indicated as No. 2, 22 (36.7%) of them in the area indicated as No. 4, 15 (25%) in the area indicated as No. 5, 5 (8.3%) in the area indicated as No. 8. Other data in Table 4 are on relations in the neighbourhood. Of the participants, 20 (33.3%) marked the frequency of meeting with their neighbours as "every day", 15 (25%) marked it as "once a week", 15 (25%) marked it as "2-3 times a week", 7 (11.7%) marked it as "once a month", 3 (5%) marked it as "once a year/never".

Table 4. Descriptive components of the sense of place

	n	%
		
Place of residence		
1	11	18.3
2	4	6.7
3	1	1.7
4	22	36.7
5	15	25
6	1	1.7
7	1	1.7
8	5	8.3
9	-	-
Years lived in Kuzguncuk		
1-5	12	20
6-9	8	13.3
10-19	9	15
20 >	29	48.3
Ownership status for housing		
Tenants	23	38.3
Owners	13	21.6
Family/Relative's property	24	40
The frequency of meeting with neighbours		
Every day	20	33.3
Once a week	15	25
2-3 times a week	15	25
Once a month	7	11.7
Once a year/never	3	5

First, two questions are prepared confirming the participants' knowledge of their neighbourhood. Following the answers given to these questions, 27 (45%) of the participants correctly marked their neighbourhood borders. In addition, according to the answers given about which of the public characters/movie plots of Kuzguncuk they remember, over 45 participants are familiar with the television series shot (Ekmek Teknesi, Perihan Abla) here. Also, of the participants, almost 40 remembered Cengiz Bektaş and Can Yücel. On the question of items related to this neighbourhood, 8 (13.3%) indicated "Golden Tile", 18 (30%) marked "Kuzgun Baba", 24 (40%) "Dr. Ohannes Minasyan", 31 (51.7%) checked "Refika's Cuisine", 10 (16.7%) marked "Kumral Ada Mavi Tuna".

As stated in Table 5, the residents are asked to rate the 12 factors (determined in the context of the theoretical framework) they thought appropriate to describe the neighbourhood. When the answers given to the factors related to *'social activities'* are evaluated, it was found that 5 (8.3%) of the participants find the relation between the cafe culture, one of the factors of sense of place, and the neighbourhood excellent. 18 (30%) of them find it poor, and the other 18 (30%) find it good. 19 (31.7%) of the participants find the relation between street life and the neighbourhood good. 23 (38.3%) of the participants find the relation between the noise-smell factor and the neighbourhood good. 19 (31.7%) find events and local traditions of the neighbourhood very good.

When the answers to the relevant factors on *'physical attributes'* are examined, it is found that 19 (31.7%) of the participants find the public realm of the neighbourhood very good, while 8 (13.3%) find it poor. Of the participants, 34 (56.7%) find the landscape qualification of the neighbourhood excellent, 28 (46.7%) find the landmarks of the neighbourhood excellent, 27 (45%) find the neighbourhood's-built form very good.

When the answers given to the factors related to *'personal and shared meanings'* are evaluated, Table 5 shows that 23 (38.3%) of the participants find cultural associations very good, 27 (45%) of them find the qualification of the neighbourhood's symbolism and memory excellent. Of the participants, 24 (40%) find sensory experience of the neighbourhood excellent, 32 (53.3%) find the neighbourhood cosmopolitan and sophisticated at an excellent level.

Table 5. Factors defining the neighbourhood according to residents

Components	Factors / Average	Poor	Fair	Good	Very Good	Excellent
Physical Attributes	Public realm (3,4)	13.3% (8)	10% (6)	25% (15)	31.7% (19)	20% (12)
	Landscape (4,4)	1.7% (1)	1.7% (1)	11.7% (7)	28.3% (17)	56.7% (34)
	Built form (3,8)	5% (3)	3.3% (2)	21.7% (13)	45% (27)	25% (15)
	Landmarks (4)	3.3% (2)	8.3% (5)	13.3% (8)	28.3% (17)	46.7% (28)

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Social Activities	Cafe culture (2,45)	30% (18)	21.7% (13)	30% (18)	10% (6)	8.3% (5)
	Street life (3,4)	%11.7 (7)	6.7% (4)	31.7% (19)	30% (18)	20% (12)
	Noise and smell (2,9)	16.7% (10)	16.7% (10)	38.3% (23)	13.3% (8)	15% (9)
	Events and local traditions (3,3)	8.3% (5)	16.7% (10)	28.3% (17)	31.7% (19)	15% (9)
Personal and Shared Meanings	Cultural associations (3,2)	11.7% (7)	15% (9)	38.3% (23)	11.7% (7)	23.3% (14)
	Symbolism and memory (3,9)	6.7% (4)	8.3% (5)	15% (9)	25% (15)	45% (27)
	Sensory experience (4)	1.7% (1)	8.3% (5)	18.3% (11)	31.7% (19)	40% (24)
	Cosmopolitan/ Sophistication (4,1)	5% (3)	8.3% (5)	11.7% (7)	21.7% (13)	53.3% (32)

Table 6. The reasons of the residents' choice of the neighbourhood

Components	Factors / Average	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Physical Attributes	Architectural style of the houses (4,2)	5% (3)	5% (3)	6.7% (4)	33.3% (20)	50% (30)
	Many places to see in the neighbourhood (1,3)	11.7% (7)	10% (6)	26.7% (16)	23.3% (14)	28.3% (17)
	Landscape (4,4)	1.7% (1)	5% (3)	5% (3)	33.3% (20)	55% (33)
Social Activities	Street life, pedestrian and vehicle flow (2,3)	36.7% (22)	23.3% (14)	16.7% (10)	16.7% (10)	6.7% (4)
	Café culture (1,8)	50% (30)	28.3% (17)	13.3% (8)	5% (3)	3.3% (2)
	Events and local traditions (3,7)	3.3% (2)	13.3% (8)	16.7% (10)	41.7% (25)	25% (15)
Personal and Shared Meanings	Preserved neighbourhood culture (4,3)	3.3% (2)	1.7% (1)	16.7% (10)	20% (12)	58.3% (35)
	Tolerance and religious unity (4,3)	3.3% (2)	3.3% (2)	8.3% (5)	28.3% (17)	56.7% (34)
	Cosmopolitan/ sophistication (4,3)	3.3% (2)	1.7% (1)	8.3% (5)	31.7% (19)	55% (33)

Another question based on five-point Likert scale was prepared on the rating of the factors reflecting the reasons of the residents' choice of Kuzguncuk as a neighbourhood. The question asks whether residents agree with these factors of the sense of place.

When the factors related to *'social activities'* are evaluated, Table 6 shows that 22 (36.7%) of the participants strongly disagree with the factors of street life, pedestrian and vehicle flow as reasons to choose this neighbourhood. Of the participants, 30 (50%) also strongly disagree with the café culture factor. Despite that, 25 (41.7%) of them agree with the factor of events and local traditions. When the factors related to 'physical attributes' are evaluated; of the participants, 30 (50%) strongly agree with the architectural style of the neighbourhood, 17 (28.3%) strongly agree with attractors and 33 (55%) strongly agree with the landscape of the neighbourhood. When the factors related to 'personal and shared meanings' are evaluated; of the participants, 35 (58.3%) strongly agree with preserved neighbourhood culture, 34 (56.7%) strongly agree with tolerance and religious unity, and 33 (55%) strongly agree with the cosmopolitan factor.

Similarly, according to the answers to the question addressed on how often residents use the newly opened cafés, of the participants, 25 (41.7%) stated that they had never been to new cafés and pastry shops, 20 (33.3%) said it is once a month, 11 (18.3%) said once a week, 4 (6.7%) said it is 3-4 times a week. Of the participants, 13 (21.7%) stated that they prefer to meet with neighbours in the square next to the pier, 9 (15%) prefer to meet in cafés, 3 (5%) prefer to meet in Fethi Pasha Grove, 6 (10%) prefer to meet in open spaces in front of the apartments, 3 (5%) prefer to meet in public gardens, and 5 (8.3%) prefer to meet in the Kuzguncuk Bostan. In addition, despite the negative approach to newly opened cafes and pastry shops, according to the answers received from other questions about the public realm in the neighbourhood, of the participants, 42 (68.3%) indicated that they prefer Kuzguncuk Bostan as an open public space, 37 (61.7%) stated that they use Çınaraltı Café and the square next to it, 36 (60%) stated that they go to the pier, 20 (33.3%) stated that they use areas in front of the apartment buildings, 18 (30%) specified that they prefer Fethi Pasha Grove, and 15 (25%) stated that they use sidewalks and open public spaces belonging to cafés. Only one person stated that he preferred to sit in his own garden.

When the answers given to the questions related to the Kuzguncuk Bostan, the majority of residents who prefer it as an open public space are evaluated. Of the participants, 24 (40%) stated that they go to the Bostan 2-4 times a week, 19 (31.7%) said they go 2-4 times a month, 12 (20%) indicated that they go 1-3 times a year, 5 (8.3%) stated that they go every day. Of the participants, 10 (16.7%) marked the purpose of visiting the Bostan as "I have my own vegetable garden here", 48 (80%) marked it as "to get fresh air", 23 (38.3%) marked it as "to go for open-air cinemas", 28 (46.7%) marked it as "to go to attend various events",

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13 (21.7%) marked it as "to go to spend time here with my kids" (Figure 6). According to the short interviews with residents, the factor of 'personal and shared meanings' of Kuzguncuk comes to the fore among these three components. Of the participants, 40 (66.7%) defined Kuzguncuk as a place to be seen with its symbolic values and multiculturalism that appeal to the senses, 17 (28.3%) defined the neighbourhood as a place to be seen with its landscape, built form and scale and 3 (5%) defined it as a place for its social activities and street life.

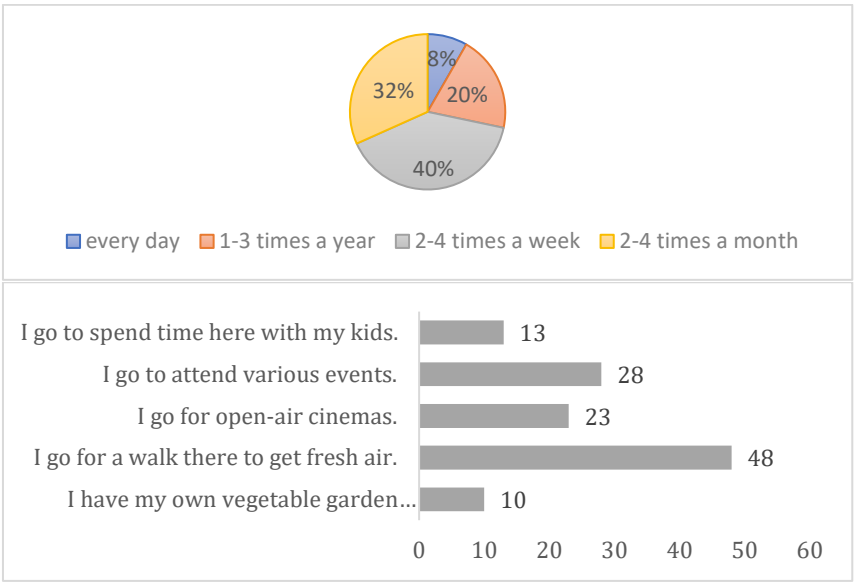

Figure 6. Answers to the questions "How often (top) and for what reason (bottom) do you go to the Kuzguncuk Bostan?"

The opinions of the residents about the negativities in Kuzguncuk as a result of the developments regarding urban transformation are also among the variables that are questioned within the questionnaire (Table 7). In this context, when the factors related to *'physical attributes'* are evaluated, of the participants, 43 (71.7%) strongly agree with the idea that "TV series crews, wedding photographers disturb the public realm of the neighbourhood" and 42 (70%) strongly agree with this viewpoint that "New applications will adversely affect the scale and density of the neighbourhood". When the factors related to *'social activities'* are evaluated, of the participants, 40 (66.7%) strongly agree with the view "The crowd of people coming from outside to disturb the peace", 47 (78.3%) strongly agree with the view "Vehicle traffic and sounds on Pasha Limanı Avenue and Icadiye Street are disturbing", 49 (81.7%) strongly agree with the view "Many sidewalks are used as open spaces for cafés, which prevents pedestrians from walking comfortably", 51 (85%) strongly agree with the view "There is a parking problem in the neighbourhood; the occupation of trucks on the streets is disturbing". When the factors related to *'personal and shared meanings'* are evaluated; of the participants, 40 (66.7%) strongly agree with the view "Rapid changes will damage the neighbourhood's memory and traditional values".

Table 7. Negative views about the developments of the urban transformation in Kuzguncuk

Components	Opinions / Average	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Physical Attributes	New applications will adversely affect the scale and density of the neighbourhood (4,5)	3.3% (2)	3.3% (2)	8.3% (5)	15% (9)	70% (42)
	TV series crews, wedding photographers disturb the public realm of the neighbourhood (4.5)	1.7% (1)	5% (3)	6.7% (4)	15% (9)	71.7% (43)
	Kuzguncuk's relationship with the sea is weak (4.1)	5% (3)	6.7% (4)	8.3% (5)	31.7% (19)	48.3% (29)
	Urban furniture (benches, resting areas) in the public spaces of the neighbourhood is insufficient (3,8)	5% (3)	10% (6)	28.3% (17)	18.3% (11)	38.3% (23)
	Antennas on roofs, items in front of the apartment, etc. create visual pollution (3,9)	5% (3)	5% (3)	25% (15)	16.7% (10)	48.3% (29)
Social Activities	The crowd of people coming from outside to disturb the peace (4,4)	3.3% (2)	5% (3)	5% (3)	20% (12)	66.7% (40)
	Traffic and noise on Pasha Limanı and Icadiye Streets are disturbing (4,7)	1.7% (1)	0	6.7% (4)	13.3% (8)	78.3% (47)
	There is a parking problem in the neighbourhood; the occupation of trucks on the streets is disturbing (4.8)	1.7% (1)	0	1.7% (1)	11.7% (7)	85% (51)
	Many sidewalks are used by cafés, which prevent pedestrians from walking comfortably (4,6)	5% (3)	3.3% (2)	5% (3)	5% (3)	81.7% (49)
Personal and Shared Meanings	A problem of safety due to new people coming to the neighbourhood (3,6)	11.7% (7)	21.7% (13)	8.3% (5)	13.3% (8)	45% (27)
	Beggars create a problem of safety (3)	20% (12)	20% (12)	23.3% (14)	10% (6)	26.7% (16)
	Rapid changes will damage the neighbourhood's memory and traditional values (4,5)	0	5% (3)	11.7% (7)	16.7% (10)	66.7% (40)

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In addition to such negative views, it was questioned whether the residents agree with the positive views emerging as a result of the urban transformation experienced in Kuzguncuk (Table 8). When the factors related to *'physical attributes'* are evaluated; of the participants, 37 (61.7%) strongly disagree with the view, "There are leftover spaces where vehicles will be parked", 37 (61.7%) strongly agree with the view, "Objects in front of the apartments, flowers and pots, etc. reflect the colourful identity of Kuzguncuk", 31 (51.7%) strongly disagree with the view, "As long as the existing old houses are preserved, urban transformation in the leftover spaces will increase the value of the neighbourhood". When the factors related to *'social activities'* are evaluated, of the participants, 22 (36.7%) strongly disagree with the view, "The cafés/pastry shops on the streets offer a variety of activities, the flow on the street keeps the neighbourhood alive". When the factors related to *'personal and shared meanings'* are evaluated, of the participants, 32 (53.3%) strongly disagree with the view that the "TV series, movies and wedding photo shootings provide vibrant open spaces and public realm for the neighbourhood" and 26 (43.3%) strongly disagree with the view "New transformation developments will improve Kuzguncuk's sophistication".

Table 8. Positive views about the developments of the urban transformation in Kuzguncuk

Components	Opinions / Average	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Physical Attributes	There are leftover spaces where vehicles will be parked (1.85)	61.7% (37)	15% (9)	8.3% (5)	6.7% (4)	8.3% (5)
	Objects in front of the apartments, flowers and pots, etc. reflect the colourful identity of Kuzguncuk (4.43)	1.7% (1)	1.7% (1)	10% (6)	25% (15)	61.7% (37)
	As long as the existing old houses are preserved, urban transformation in the leftover spaces will increase the value of the neighbourhood (2.1)	51.7% (31)	13.3% (8)	16.7% (10)	10% (6)	8.3% (5)
Social Activities	The cafés/pastry shops on the streets offer a variety of activities, the flow on the street keeps the neighbourhood alive (2.2)	36.7% (22)	25% (15)	23.3% (14)	8.3% (5)	6.7% (4)

	Public realm in the neighbourhood is kept alive with vibrant open spaces and various activities (3.33)	11.7% (7)	8.3% (5)	33.3% (20)	28.3% (17)	18.3% (11)
	TV series, movies and wedding photo shootings provide vibrant open spaces and public realm for the neighbourhood (2.05)	53.3% (32)	15% (9)	15% (9)	6.7% (4)	10% (6)
Personal and Shared Meanings	New developments that improve the neighbourhood increase the quality of urban spaces (2.3)	33.3% (20)	25% (15)	26.7% (16)	5% (3)	10% (6)
	Families and children can spend time safely outside (3)	16.7% (10)	16.7% (10)	28.3% (17)	23.3% (14)	15% (9)
	Cats and dogs breathe life into the neighbourhood (4.2)	6.7% (4)	5% (3)	8.3% (5)	20% (12)	60% (36)
	New transformation developments will improve Kuzguncuk's sophisticated and cosmopolitan structure (2.13)	43.3% (26)	23.3% (14)	21.7% (13)	0	11.7% (7)
	Cultural associations, non-profit organizations preserve the local traditions of the neighbourhood (3.33)	16.7% (10)	10% (6)	25% (15)	20% (12)	28.3% (17)
	The neighbourhood is clean and safe (4.08)	1.7% (1)	1.7% (1)	18.3% (11)	43.4% (26)	35% (21)

RESULTS AND DISCUSSION

When the findings of the study are examined, it can be said that a vast majority of the residents of Kuzguncuk have a high level of neighbourly relations in terms of getting to know each other by name. They want to keep visitors who have a temporary familiarity with the physical environment of the neighbourhood, clients to the newly opened cafes, TV series crews and foreigners such as photographers away from them and from the neighbourhood. In a way to confirm this situation, it has been observed that the places where the neighbourhood relations of the residents are established and maintained are the Çınaraltı Café, the

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coastal side and the Kuzguncuk Bostan, which have appeared among the prominent urban images of the neighbourhood. Considering residents' ratings of relationships between neighbourhood and the attributes of the sense of place, the factors with the highest average values are identified as *landscape* and *landmarks* components from the **physical attributes**, and *sensory experience* and *cosmopolitan/sophistication* from the **personal and shared meanings** component of the sense of place. Accordingly, it is possible to say that **physical attributes** and **personal and shared meanings** are the most effective constituents among the components that the residents of the neighbourhood find appropriate to define Kuzguncuk. In contrast, the least effective factors that residents use to define the neighbourhood are the *café culture* and *noise-smell* components of **social activities**. Looking at the average values of the factors that reflect the reasons for the residents to choose Kuzguncuk as their neighbourhood, the factors of *built form* and *landmarks* from the **physical attributes**, and *symbolism and memory* and *cosmopolitan/sophistication* from the **personal and shared meanings** component of the sense of place are the most effective ones. The least effective factor used by residents to choose the neighbourhood is *pedestrian/vehicle flow* and *café culture,* among the component of **social activities**. Therefore, it is seen that the most effective component is again **physical attributes** and **personal and shared meanings** for residents to choose Kuzguncuk as their neighbourhood (Table 9).

Table 9. Three intertwined components and their most and least effective factors on Kuzguncuk

Components of the Sense of Place	**Factors and their levels of effect**	
	Most effective	***Least effective***
Physical Attributes	*-Landscape* *-Landmarks* *-Built form*	*-Permeability* *-Furniture*
Social Activities	*-Events and local traditions/pastimes*	*-Pedestrian/vehicle flow* *-Behaviour* *-Café culture* *-Noise-smell*
Personal and Shared Meanings	*-Sensory experience* *-Cosmopolitan/sophistication* *-Symbolism and memory* *-Cleanliness*	*-Safety/fear*

Similar to these average values, **physical attributes** and **personal and shared meanings** components, together with the factors of *landscape*, *landmarks*, *symbolic values and the multiculturalism*, come to the fore in semi-structured interviews made with the residents of Kuzguncuk. As a matter of fact, residents of Kuzguncuk have mentioned suggestions such as reducing traffic and closing the cafes in order to keep this peaceful and calm neighbourhood as it is. There are also prominent opinions stating that the busy and noisy vehicle traffic observed recently in

Kuzguncuk divides social life in terms of the functioning of daily activities. Some of the notable comments such as remarks, "*Don't touch Kuzguncuk*", "*Kuzguncuk's existing tissue should be preserved, that's all I want*", "*Kuzguncuk must remain as it is, new construction must stop*" support this inference. With reference to these offerings, it is seen that the residents of the neighbourhood are against the groups that they think are disrupting the social order of Kuzguncuk and urban transformation practices that transform the space into physically wasted, neglected and unidentified areas. The main reason behind this idea is that they think that fast and uncontrolled transformation practices will damage the memory of the neighbourhood and the strong relationships between the residents.

CONCLUSION

The concept of sense of place plays an important role in understanding and evaluating urban places. Qualified urban places that have meanings and belongings can only be produced by defining the sense of place related to the urban space. As can be seen from the literature review, there are three basic components that form the sense of place: physical attributes, social activities, and personal and shared meanings. In fact, many studies conducted in this context up to the present have emphasized that physical and functional components contribute to increasing environmental quality. Another fact to be emphasized at this point is that the component of personal and shared meanings, which has been ignored for many years, is important in the process of creating qualified urban spaces.

In fact, this study presented a kind of experiment on interpreting the components of the sense of place through Kuzguncuk, which defines a historical settlement undergoing urban transformation. This methodology can be seen from the inferences made from the questionnaire and short interviews conducted with the residents of Kuzguncuk. In this context, the tables prepared as a result of the holistic evaluation of the obtained data with the Likert Scale show that the neighbourhood is mostly defined by **physical attributes** and **personal and shared meanings** for Kuzguncuk residents, mostly because of their fear and anxiety about transformation. Indeed, based on the answers given by the residents, this spatial and emotional commitment, which can be said to be determined in factors *landscape*, *landmarks* and *built form* from **physical attributes** component and *sensory experience*, *cosmopolitan/sophistication*, *symbolism and memory*, *cleanliness* from **personal and shared meanings** component shows that they accept Kuzguncuk as a part of their existence, since they have deeply connected to it in an imaginary sense.

If handled over the case of Kuzguncuk, today, on an ongoing basis, urban transformation in Turkey should be considered with long-term policies and planning strategies. It is essential to transfer the urban spaces and inner quarters of the city to the future without changing/damaging a

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sense of place and the unique identity. Urban transformation projects not only in Kuzguncuk but in the whole of Istanbul have emerged as a new kind of development. In recent years, these projects have become a turning point in the existing planning system.

In fact, the residents of the neighbourhood have also shown a great effort to prevent this transformation through various institutions and organizations. The transformation project subject to various media was met by massive disapproval from professionals including environmentalists, historians, city planners, architects, artists and academics. As a result, Kuzguncuk, at present, can easily be explained as an example of both conservation and transformation, with its well-preserved historical building stock on the one hand, and new developing structures on the other.

However, given the results determined in this article, the concept of urban transformation should remind us of the concept and importance of the spirit of the place. The urban transformation process should be carried out not only economically based on physical and functional components, but also by considering the perceptual components. In this way, despite all the negativities experienced, it is still possible to say that the transformation process of Kuzguncuk has resulted in an increased awareness of the people. Therefore, demands and preferences of local users should be included in the urban transformation process by way of participatory approaches, and the components of the sense of place should have been taken into consideration in the long-term planning process. Otherwise, the urban identity of the settlements may be lost, and the sustainable existence of residents living in the settlements may be threatened.

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CONFLICT OF INTEREST

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Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS

In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions and organizations)

during the survey, in-depth interview, focus group interview, observation or experiment.

REFERENCES

Alexander, C., Silverstein, M., & Ishikawa, S. (1977). *A pattern language: Towns, buildings, construction*. Oxford university press.

Aral, E. A. (2009). *Redefining Leftover Space: Value and Potentiality for the City*. VDM Publishing.

Asiliskender, B. (2004). Kimlik, mekan ve yer deneyimi. *Kültür ve İletişim*, *7*(2), 73–94.

Canter, D. (1977). *The psychology of place*. London: Architectural Press.

Cresswell, T. (2004). *Place: A Short Introduction*. Oxford: Blackwell.

Cullen, G. (1971). *The Concise Townscape*. The Architectural Press.

Cupers, K., & Miessen, M. (2006). Spaces of Uncertainty. *Edit-Revue*, *3* (Territoires), 4. https://doi.org/10.1016/S0262-4079(14)60921-0

Jacobs, J. (2009). *Büyük Amerikan Şehirlerinin Ölümü ve Yaşamı* (B. Doğan (ed.); (Orijinal). Metis Yayınları.

Kayden, J. S. (2000). *Privately Owned Public Space: The New York Experience*. John Wiley & Sons.

Krier, R. (1979). *Urban Space*. Academy Editions.

Lynch, K. (1960). *The Image of the City*. MIT Press.

Mitchell, D. (1995). The End of Public Space? People's Park, Definitions of the Public, and Democracy. *Annals of the Association of American Geographers*, *85*(1), 108–133.

Montgomery, J. (1998). Making a city: Urbanity, vitality and urban design. *Journal of Urban Design*, *3*(1), 93–116. https://doi.org/10.1080/13574809808724418

PPS. (2013). *What Makes a Successful Place?* Project for Public Spaces. https://www.pps.org/article/grplacefeat

Punter, J. (1991). Participation in the design of urban space. *Landscape Design*, *200*(1), 24–27.

Relph, E. (1976). *Place and Placelessness*. London: Pion.

Rowe, C., & Koetter, F. (1978). *Collage City*. MIT Press.

Schulz, C. N. (1980). *Genius loci: Towards a phenomenology of architecture*. Academy Editions.

Seamon, D., & Sowers, J. (2008). Place and Placelessness, Edward Relph. In & G. V. P. Hubbard, R. Kitchen (Ed.), *Key Texts in Human Geography* (pp. 43–51).

Sennett, R. (1978). *The Fall of Public Man: On the Social Psychology of*

DOI: 10.15320/ICONARP.2021.159

Capitalism. New York: Vintage Books.

Sorkin, M. (1992). *Variations on a Theme Park: The New American City and the End of Public Space*. New York: Hill and Wang.

Trancik, R. (1986). *Finding Lost Space: Theories of urban design*. John Wiley & Sons.

Villagomez, E. (2010). Claiming residual spaces in the heterogeneous city. In *Insurgent Public Space* (pp. 93–108). Routledge.

Resume

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A Structural Evaluation of Urban Design Guidelines in Turkey and The Performance-Based Approach for Sustainability

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Abstract

Purpose

Urban design guidelines (UDGs) provide comprehensive documents that lead to sustainable implementations in the local context. The aim and content of a UDG can differ according to the vision, aim, and associated urban plans. The most common UDG approaches in the world are prescriptive, advisory, and performance-based in order of their appearance in time. The UDGs have been applied in the United States and the United Kingdom since the beginning of the 20th century with the ultimate goal of architectural coherence a nd environmental sustainability. However, their use is relatively very recent in developing countries, including Turkey. Therefore, this study aims to investigate three common types of UDGs in the context of Turkey and provide a deeper understanding their role in achieving urban sustainability from a country-specific perspective.

Design/Methodology/Approach

Seven UDGs have been found that provides a complete process and an extensive content. Three examples, Izmir Kemeraltı Prescriptive UDG, Rize Advisory UDG, and Gaziantep Bizimşehir Performance-based UDG met the selection criteria of comprehensive content, data accessibility, complete process, and comparability and examined in detail. The examples were evaluated and compared according to their integration into the urban planning system and evaluated based on aggregated sustainability criteria. Sustainability criteria set aggregated based on three sustainability frameworks - European Green City Tool, Urban Sustainability Indicators, and Leadership in Energy and Environmental Design Neighborhood Development (LEED-ND) – applicable to Turkey. Two out of seven UDG examples from Turkey and 11 out of 23 sustainability frameworks from the World could not be investigated further as a result of inaccessible data.

Findings

As a result, Gaziantep Bizimsehir Performance-based UDG achieved the highest score in the overall criteria aggregated from existing and common frameworks in the world.

Research Limitations/Implications

It is important to validate the findings by an evaluation of locally defined sustainability criteria for Turkey. However, there is a lack of well-defined publicly available data.

Originality/Value

The results provided the first comprehensive evaluation of three common types of UDGs in the Turkish context. This study presents a detailed framework for future applications not only in Turkey but also in other regions with the similar context.

Keywords: *Urban design guidelines, prescriptive, advisory, performance-based, urban sustainability*

INTRODUCTION

In the early 20th century, the dominant urban planning approach was the harmonizing structures and functions associated with physical forms and aesthetics (Symes and Pauwels, 1999; Hall,1996). After the shift from physical urban planning to sustainable urban development in the late 20th century, this approach evolved into an integrated and holistic urban development strategy. This new approach increased the importance of contextuality, and the planning process became more related to the local values such as social equality, identity, risks, and resources. The applications of such a holistic process stand in between users, decision-makers, socio-economic policies, and environmental strategies. Urban Design Guidelines (UDGs) help manage the complexity of this process as complementary documents that integrated into urban planning. These documents provide a process-oriented, multidisciplinary framework that is coherent with local geographical conditions, strategic frameworks, and urban plans (Gürler, 2018; Kenttam, 2016a). UDGs support local strategies and enhance contextual implementations by guiding the preparation and implementation of urban design projects (Kenttam, 2016a). They include a comprehensive framework of principles and measurements that can increase the sustainability performance of the designated area. Preparation and implementation of UDGs can be required by law or local regulations. The integration of urban design guidelines into the urban planning process primarily took place in the 1970s in the United Kingdom (Punter, 1996) and was followed by the United States in the 1990s (Punter, 1999). However, the first applications in Turkey did not occur until the last decade. The first steps were taken in Turkey in the early 2000s by additional articles to existing laws and regulations. These were followed by extensive government funded projects for the preparation of UDGs (Kenttam, 2016a, 2016b, 2016c), the definition of national spatial standards (Kenttam, 2017), and preparation of performance-based UDGs (HT-TTM, 2018c).

Today, Turkey still has an important position regarding the urbanization and construction sector in the Middle East and Northern Asian countries. On the other hand, to the best of the authors' knowledge, no study has been done specifically for Turkey that explores the UDGs and their implementations in Turkish cities. Therefore, this study aims to develop a thorough understanding of the essential role of UDGs in an urban planning process and its impact on achieving sustainability in the local context. The study provides a detailed review of the existing UDG applications in Turkey and evaluates different approaches to explore their input into sustainable urban development. The study contributes to the literature by answering the following questions. How did UDGs evolve in the Turkish context? How do different UDG types contribute to the sustainable urban development? What is the level of integration for different types of UDGs into the urban planning processes? By answering these questions, this study; 1) fills the gap in the literature by providing the first extensive UDG study in the context of Turkish urban planning

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system and sustainable urban development vision 2) provides a systematic framework that will guide future applications for the selection of coherent UDG approach based on the local sustainability targets not only in Turkey but also in other similar contexts.

The following chapter, the evolution of UDG approaches in relation to sustainable urban development is reviewed from a historical perspective, and the research methodology is presented. Examples for each UDG approach are examined in detail in the third chapter. In the fourth chapter, the results are discussed based on the evaluation and comparison of the selected UDGs according to sustainability criteria. This is followed by the conclusion and recommendations for future UDG applications in the fifth chapter.

BACKGROUND AND METHODOLOGY

Urban design shapes the urban environment by utilizing innovative tools and methodologies that integrate social diversity, environmental responsibility, and economic vitality. An effective urban design process bridges the gap between urban planning and architecture and integrates spatial quality with local characteristics. In this process, UDGs create a common platform for all stakeholders by defining innovative tools, contextual measurements, and inter-scale principles that guide efficient and sustainable development. They can differ depending upon intended deliverables (Shirvani, 1990; Hall, 1996, Karaman, 1999). In this scope, UDGs can provide prescriptive codes that aim to maintain certain characteristics of a designated area. The prescriptive approach involves strict rules and measurements. These documents support urban planning by defining the necessary principles and tools to achieve coherence in architectural design elements such as building materials, colors, height, and volume (Hakim, 2008; Kenttam, 2016a; Lang, 1996). The prescriptive UDGs were firstly applied in the United States and the United Kingdom in the early 20th century, and they provided the most common examples of UDGs. However, the approach became insufficient to provide inclusive principles of sustainability with the rise of the concept. In the late 90s, the advisory UDG approach relieved the strict framework of the prescriptive UDGs. Advisory UDGs were applied as a separate document that briefly introduces sustainability and its applications within the local context. This approach mainly aimed to inform various stakeholders about the principles, tools, and examples of sustainability and guide local implementations (Hakim, 2008; Kenttam, 2016a). These UDGs can focus on a thematic scenario such as a coastal plan or emphasize a particular pillar of sustainable development such as environmental quality (Kenttam, 2016a; Lang, 1996).

Different from the first two types of UDGs, the performance-based approach was developed to gain a comprehensive framework. Therefore, the performance-based UDGs were developed to encompass all environmental, social, and economic aspects of sustainability. These UDGs provide detailed information about appropriate methods and

necessary measurements to achieve sustainable development at architectural, regional, and urban scales coherently with the urban development vision. The preparation of performance-based UDGs requires a multürlerdisciplinary and inclusive approach. In this way, the aesthetic-oriented urban design approach in the preliminary UDGs shifted to integrated applications that aim to outperform sustainability criteria including local identity, protected biodiversity, increased energy efficiency, and pollution control (Dogan, 2020; Gürler, 2018; Symes & Pauwels, 1999; Yalçıner Ercoşkun & Karaaslan, 2011).

The background research reveals that UDGs are often associated with urban planning trends and used as a tool to achieve sustainability to different extend. For example, the prescriptive approach is applied to sustain the architectural character of a region, the advisory UDG approach emphasizes a particular pillar of sustainability within a specified urban development theme such as an eco-city, and the performance-based approach is applied to bring social, economic, and environmental aspects of urban sustainability together. UDGs have become a tool for urban planning practices in developing countries, including Turkey. However, there is a lack of studies in the literature, which focuses on the evolution and implementation of three main approaches from a country-specific perspective.

Methodology

This study aims to develop a thorough understanding of the essential role of UDGs in achieving urban sustainability in the local context of Turkey. Therefore, it intends to bridge the gap in the literature by providing a new contextual perspective for the evolution and implementation of UDGs. In this framework, this study is structured in two phases (see Fig. 1). In the first phase, the UDG framework in Turkey is discussed regarding national strategies and current approaches. Three examples are explored in detail to provide a better understanding of the UDG context in Turkey. UDG applications are still only a few, and accessibility to these documents is limited. Thus, examples from each UDG approach were selected among the existing applications and within data availability. After structural research on the existing UDGs which are integrated into an urban planning process, seven examples were found and evaluated in terms of the accessibility of complete and extensive documentation, best representation (relation to the urban planning process and involvement of the local planning authorities) of the local use case, and comparability of scale (see Table 1). Two examples were eliminated because of the lack of accessibility of materials, and two provided only limited content which was not comparable with the sustainability framework. The overall review validated the scarcity of UDG applications in Turkey as a part of the urban planning practice. It was also observed that the change in the UDG approach over time paralleled the participation in the developed countries. As a result of the review of existing examples, Izmir Kemeraltı prescriptive UDG, Rize Urban Design Vision (as known as Rize advisory

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UDG), and Gaziantep Bizimşehir performance-based UDG were selected for further exploration (see Table 1).

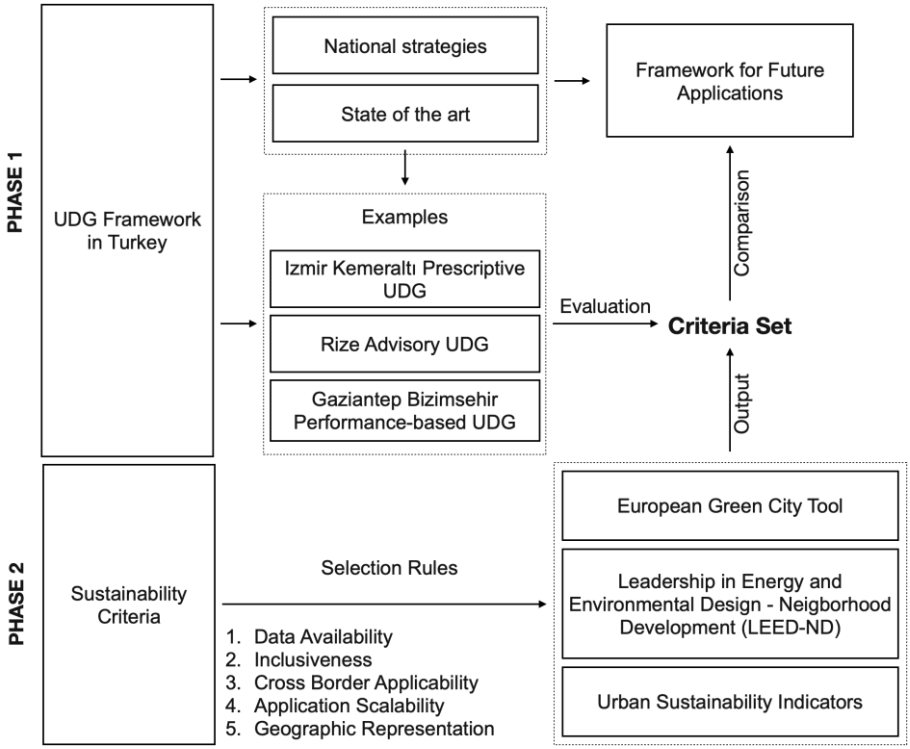

Figure 1. Workflow
The paper is structured in two phases: a review of urban design guideline applications in Turkey and their evaluation according to the sustainability criteria.

In the second phase of the study, the selected examples were evaluated according to urban sustainability criteria. The criteria set was determined based on common sustainability assessment frameworks. 26 common sustainability indicator frameworks (European Commission, 2018) were reviewed according to data availability, their inclusiveness of sustainability dimensions, cross-border applicability, application scalability, and geographic representation (see Fig. 1, Table 2) to obtain a criteria set applicable to Turkey.

As a result, three frameworks - European Green City Tool (European Commission, 2020), Urban Sustainability Indicators (Mega & Pedersen, 1998), Leadership in Energy and Environmental Design Neighborhood Development (LEED-ND) (CNU et al., 2011) - were selected for further evaluation. Each framework provided common and contextual categories and criteria. The categories in the local context were included in the evaluation table as subcategories (see Table 3). For example, character and identity are only covered by Urban Sustainability Indicators (Mega & Pedersen, 1998), thus it was considered as the subcategory of the urban design quality. The criteria of the selected frameworks provided seven categories, 'urban planning, urban design quality, mobility, security, environmental quality, green growth and innovation, and governance'. These were later divided into seven subcategories where necessary. The matrix involve 91 criteria in total (see Table 3).

Table 1. The review of existing UDGs in Turkey that are implemented as a part of an urban planning process and/or by the involvement of a responsible local planning authority. Rows in Gray show the selected examples (Created by the authors for this paper)

UDGs (integrated to the urban planning process)	Year	Type	Content	Accessibility of the document	Completeness	Scale
İzmir Kemeraltı Kentsel Tasarım Rehberi (Izmir Kemeraltı UDG)	2002	Prescriptive	Architectural sustainability / conservation	Accessible	Completed	Urban region
Tarsus Tarihi Ticaret Merkezi Kentsel Tasarım Projesi Yapılaşma Rehberi (Tarsus Historical Commercial Center Urban Design Project Settlement Guideline)	2006	Prescriptive	1/5000 and 1/1000 urban plan notes	Accessible	Completed	Urban region
Fatih Belediyesi Kentsel Tasarım rehberi (Fatih Municipality UDG)	2012	Prescriptive	Transportation	Accessible	Completed	Urban region
Galata Bölgesi Kentsel Tasarım Rehberi (Galata Region UDG)	2013	Prescriptive	Architectural sustainability / conservation	Not accessible	Completed	Urban region
Sürdürülebilir İstanbul Kentsel Tasarım Rehberi (Sustainable Istanbul UDG)	2017	Advisory	Social, economic, environmental sustainability	Partially accessible	NA	Metropoliten region
Rize Kentsel Tasarım Vizyonu (Rize Urban Design Vision)	2017	Advisory	Environmental sustainability	Accessible	Completed	Urban region
Gaziantep Bizimşehir Kentsel Tasarım Rehberi (Gaziantep Bizimşehir UDG)	2018	Performance-based	Social, economic, environmental sustainability	Accessible	Completed	Urban region

Table 2. Review of Urban Sustainability Indicator Frameworks (The list of frameworks obtained from European Commission, in-depth report: Indicators for sustainable cities (2018)). Rows in Gray show the selected examples (This table created by the authors for this paper)

Urban Sustainability Framework	Data accessibility	Inclusiveness of indicators	Cross-border applicability	Application scalability	Geographic representation
China Urban Sustainability Index	-	Environment	NA	√	Asia
City Blueprints	√	Water management	√	-	Global
EEA Urban Metabolism Framework	-	Environment	-	√	Europe
European Green Capital Award	√	Environment, Governance	-	√	Europe
European Green City Tool	√	Environmental, Social, Economic, Governance	√	√	Global
European Green City Index	-	Environment	-	√	Europe
European Green Leaf Award	-	Environment	-	√	Europe
Global City Indicators Facility	-	Environmental, Social, Economic, Governance	√	√	Global
Reference Framework for Sustainable Cities	√	Environmental, Social, Economic, Governance	-	√	Europe
STAR Community Rating System	-	Environmental, Social, Economic, Governance	-	√	United States
Urban Audit Cities Statistics	√	Environmental, Social, Economic, Governance	-	√	European Union
Urban Ecosystem Europe	-	Environment	-	√	Europe
Urban Sustainability Indicators	√	Environmental, Social, Economic, Governance	√	√	Global
BREEAM Communities	√	Environmental, Social, Economic, Governance	√	√	Europe
Climate Positive Development Programme	√	Climate	√	√	Global
Covenant of Mayors	-	Climate, Energy	-	√	Europe
DGNB Certification Scheme	√	Environmental, Social, Economic, Governance	-	√	Europe
The Eco2 Cities Initiative	-	Environmental, Social, Economic, Governance	√	√	Global
Eurostat Sustainable Development Indicators	√	Environmental, Social, Economic, Governance	NA	NA	Global
Green Cities Programme (OECD)	-	NA	NA	NA	Global
Green Star	√	Environmental, Social, Economic, Governance	-	√	Australia, New Zealand
LEED-ND	√	Environmental, Social, Economic, Governance	√	√	Global
NABERS	√	Environment	-	√	Australia
SDEWES Index	√	Environment	√	√	Global
SynCity	-	Environment	NA	NA	NA
Urban Indicators Guidelines	√	Environmental, Social, Economic, Governance	NA	NA	Global

The selected examples are discussed in detail in the next section. This follows by the evaluation and comparision of the examples according to the aggragated criteria set.

URBAN DESIGN GUIDELINES IN TURKEY

The term urban design indirectly takes part in several laws and regulations, and it is institutionalized by only a few municipalities in Turkey. The integration of the urban design process into the urban planning system was defined for the first time in 2009 in the Integrated

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Urban Development Strategy and Action Plan 2010-2023 (Republic of Turkey, Ministry of Environment and Urbanisation, 2010a). In this scope, urban design is considered together with urban heritage, conservation, and spatial quality. It is stated in the document that urban design is a separate profession that should be integrated into the urban planning process and work together with the other disciplines. Preparation of a UDG booklet and presenting related urban design standards were defined as necessary actions for achieving this integration (Kenttam, 2016c; Republic of Turkey, Ministry of Environment and Urbanisation, 2010b). This approach encouraged local governments to prepare UDGs. In 2016 the emphasis was given to the importance of UDGs in an urban planning process. This was strengthened by the 'Preparation of Urban Design Guidelines' project (Kenttam, 2016a, 2016b, 2016c) which was funded by the Republic of Turkey, Ministry of Environment and Urbanisation.

As described in the previous section, the early applications of UDGs have prescriptive features with a rule-based framework. These prescriptive UDGs are generally used for the restoration and planning of historical areas. These type of UDGs illustrates essential architectural details that cannot be included in master plans. In Turkey, the prescriptive approach constitutes the most common UDG method and is occasionally prepared by local governments as a necessary attachment of conservation plans. İzmir Kemeraltı UDG (Dokuz Eylül University Department of City and Regional Planning, 2002, 2009) is a complete and extensive example for the implementation of prescriptive UDGs. The UDG was prepared in two stages as complementary documents of Kemeraltı first and second stage conservation plans. These documents consisted of detailed architectural measurements and design rules. The content reflects the existing authentic elements in architecture and aims to protect and sustain physical characteristics. The documents are a result of a collaborative process between university and the municipality.

Rize Urban Design Vision was prepared with the university – local government collaboration and openly published by the municipality a year after the government actions towards enhanced and integrated urban design processes in the planning system (Kenttam, 2016a, 2016b, 2016c). The document provided a preliminary example for advisory UDGs in Turkey that guides sustainable regeneration of the city's coastline. The UDG involves the illustrations of existing implementations from similar cases, region-specific conceptual diagrams, and recommendations.

Since 2015, the urban design practice in Turkey is under influence of a performance-based urban planning approach towards urban sustainability. The approach has occurred as a way to achieve sustainability through effective monitoring and assessment (Dogan, 2020). The applications of the performance-based approach started to expand at the beginning of the 2000s. However, its influence in Turkey was not occur until the increasing trend of sustainability certification (e.g. in LEED (CNU et al., 2011)). UDGs are recognized as an essential element

in this approach for the translation of sustainability criteria into urban design principles. Bizimşehir Gaziantep UDG (HT-TTM, 2018c) is one of the first examples in Turkey that achieves this role. The UDG provides a detailed framework for the local design principles, necessary tools, and alternative solutions for smart and sustainable development. It was prepared as a part of the urban planning process and according to national and local sustainability targets. In the following section, these three UDG examples are explored more in detail to provide a better understanding of the implementation of three dominant approaches in the Turkish context.

İzmir Kemeraltı Conservation Plan 1st and 2nd Stage Prescriptive UDGs

İzmir Kemeraltı UDG was prepared in two stages attached to the 1:5000 and 1:1000 Conservation Plan Revisions by İzmir Konak Municipality in 2002 and 2009. The UDG was developed in collaboration with the municipality and the Dokuz Eylül University, City and Regional Planning Department. Both plans and UDGs aimed to protect the historical patterns of the conservation site and to sustain its local character in the future (Dokuz Eylül University Department of City and Regional Planning, 2002). An extensive building survey was conducted for the UDG to determine the unique architectural elements in the region. The document is structured in five main chapters, 'commercial buildings, typical residential buildings, structures with Turkish architectural style, early republican period buildings, and building components within the area'.

Commercial buildings were analysed as single commercial units, inns with inner passages and courtyards, and mixed-use buildings. They were examined related to the number of floors and their land uses. The representations were supported by interior plans. As part of the traditional Anatolian architectural unit, inns are introduced according to types of courtyards and inner passages (see Fig 2). Building typologies for commercial buildings were examined and represented with detailed hand-drawn visualizations.

In chapter two, the residential buildings in the urban conservation site are represented with 1:100 scale detailed floor plans presenting the plot and building compositions and measurements (see Fig. 2). Material and building form information has been given in the text. Façades that represent the local characteristics are imprinted into the drawings at the single building scale (see Fig. 3).

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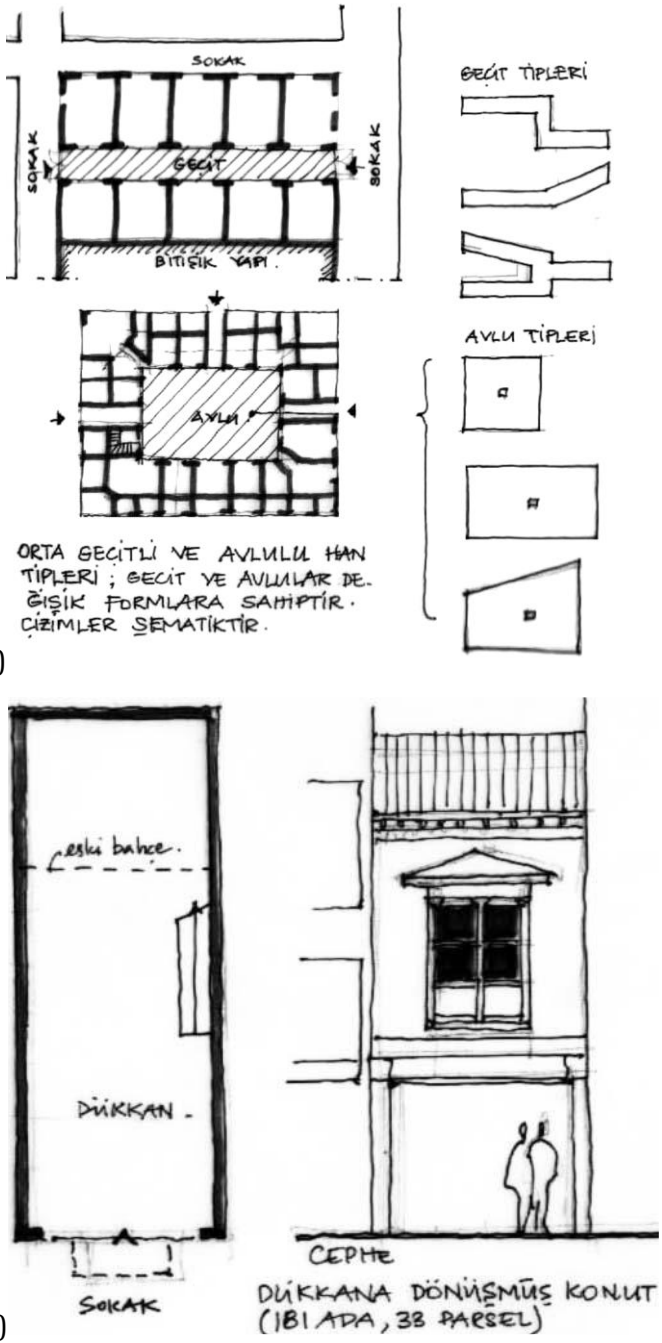

Figure 2. Examples from the analysis of local building typologies a) Typology of inner passages and courtyards for inns b) Typology of commercial building converted from a residential building (Dokuz Eylül University Department of City and Regional Planning, 2002). For the translations see appx. 1.

The features of the traditional Turkish residential building style are described in the third chapter of the document. According to the site surveys, narrow streets and cul-de-sacs in an organic pattern represent the neighbourhood morphology. Streets are surrounded by timber buildings that directly opens to streets without a passage through a courtyard.

The fourth chapter involves the building typologies for the early Republican Period. This chapter mainly focuses on the structural details that characterize the architectural epoch and its visualizations (see Fig. 4a). The fifth chapter introduces the individual architectural elements in detail, including doors and windows, balconies, shutters, street furniture,

signs, and colours. The architectural details are given in the 1:20 scale drawings in this section. Each element is classified according to its specific typology, material, and location-based information in the urban conservation site. Individual elements such as shutters are schematized according to aesthetic rules and display. For example, building entrances are examined according to different typologies, height, ornaments, and their relation to the street (see Fig. 4b).

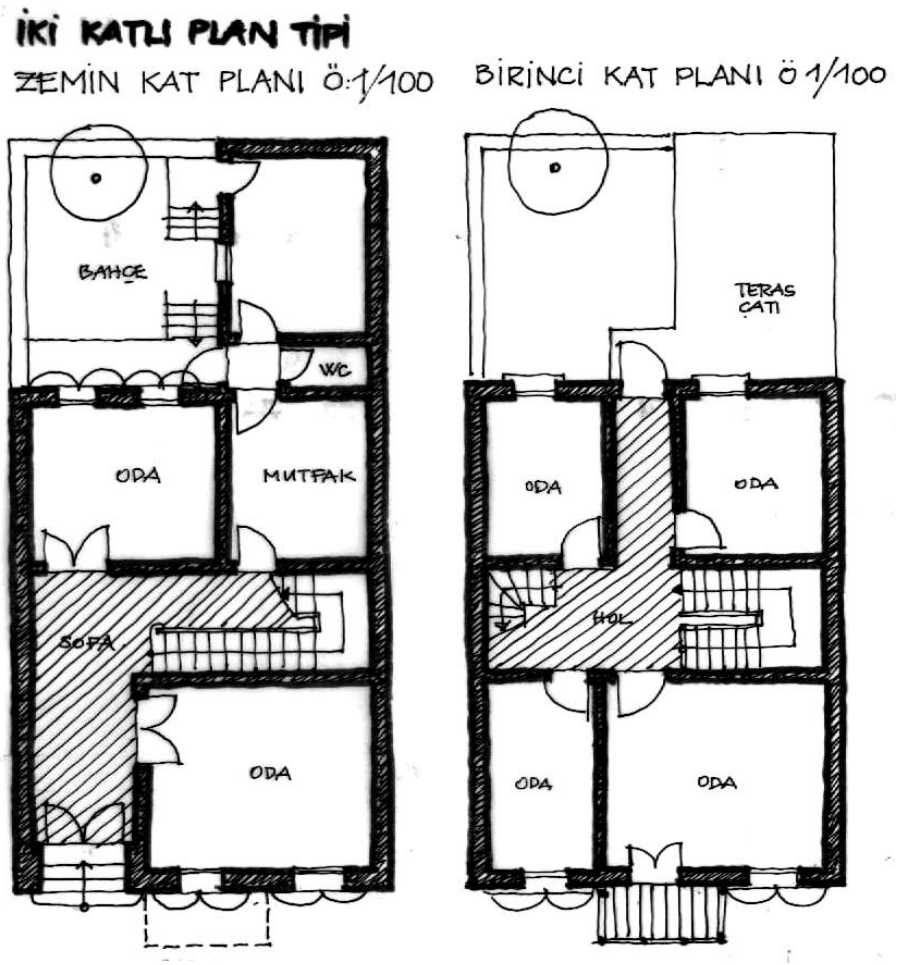

Figure 3. Examples from the analysis of local building typologies for ground and first floor plans of residential building (Dokuz Eylül University Department of City and Regional Planning, 2002). For the translations see appx. 1.

Building and garden entrance doors, railings, jambs, decorative horizontal profiles, chimneys, birdhouses, and other decorative elements such as sculpture niche, forehead walls, flower beds, and ridge tiles are described in detail. A 28-color palette is given based on their appearances on the building exteriors to be used in future applications for visual order and harmony of the structures and space. The schemas and views are given at a 1:10 scale for common materials and forms of eaves and awnings on the buildings. The alternatives for street furniture including pergolas, billboards, signs for streets and shops, benches, light poles,

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waste containers, flowerpots, water elements are given in detail with measurements (see Fig. 5 and 6).

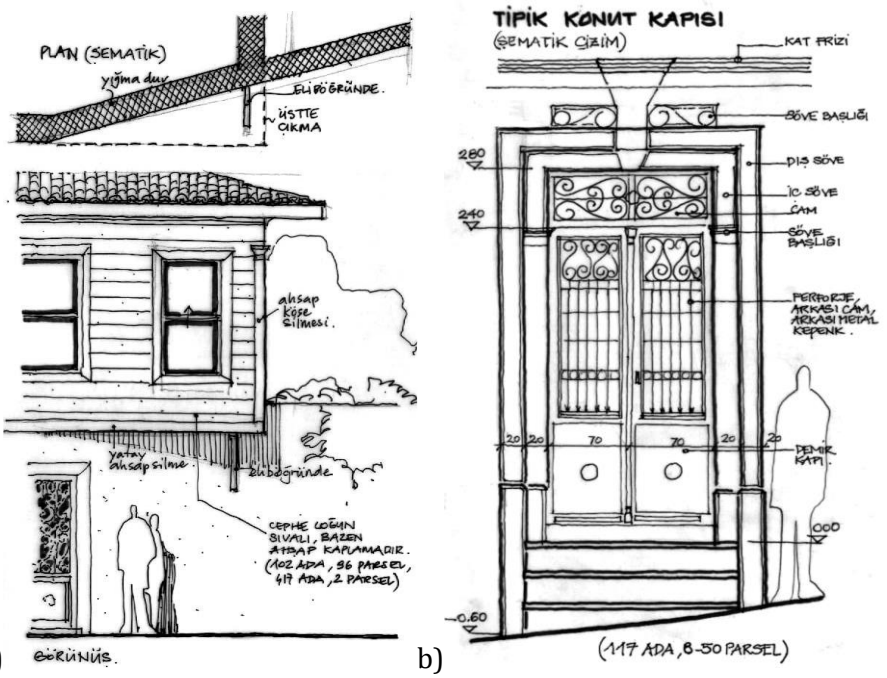


Figure 4. Examples from authentic building details on materials and structure a) Street-building relation for traditional Turkish residential buildings b) building entrance door. (Dokuz Eylül University Department of City and Regional Planning, 2002). For the translations see appx. 1.

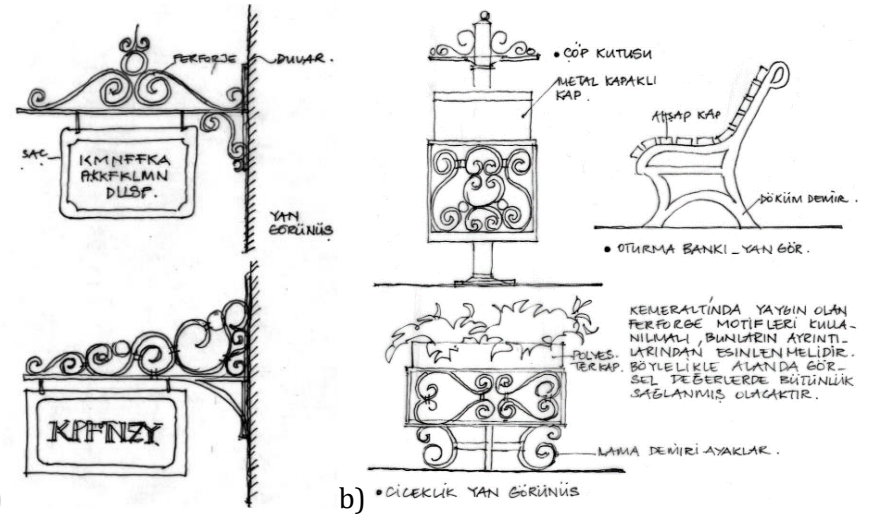


Figure 5. Examples, details, and measurements of a) horizontal signs b) bench, garbage bins, and flowerpots (Dokuz Eylül University Department of City and Regional Planning, 2002). For the translations see appx. 1.

The alternative design principles in İzmir Kemeraltı 1st stage UDG were emphasized in the 2nd UDG (Dokuz Eylül University Department of City and Regional Planning, 2009). Greek and Levantine style structures were added in the second document. Different from the first UDG the visualizations are supported by photographs and digital drawings in the 2nd stage (see Fig. 7).

İzmir Kemeraltı prescriptive UDGs were prepared based on analyzes and typological studies of civil architectural examples. They revealed existing features as alternative design components to guide future applications. These documents are important to sustain the same architectural approach throughout the designated area, especially in conservation sites. However, socio-economic and environmental factors are very limited as in the example. Although these two documents provided

extensive information over the physical structure to guide future constructions and were prepared by a group of planners, the focus was kept on the building scale and comprehensive sustainability was not mentioned or aimed. Despite the prescriptive UDGs are common, they became insufficient to meet the increasing focus on sustainable urban development in Turkey especially since 2009. In this scope, next-generation advisory and performance-based UDGs provide more integrated and interdisciplinary processes to fulfill this gap between the urban sustainability targets and urban design applications.

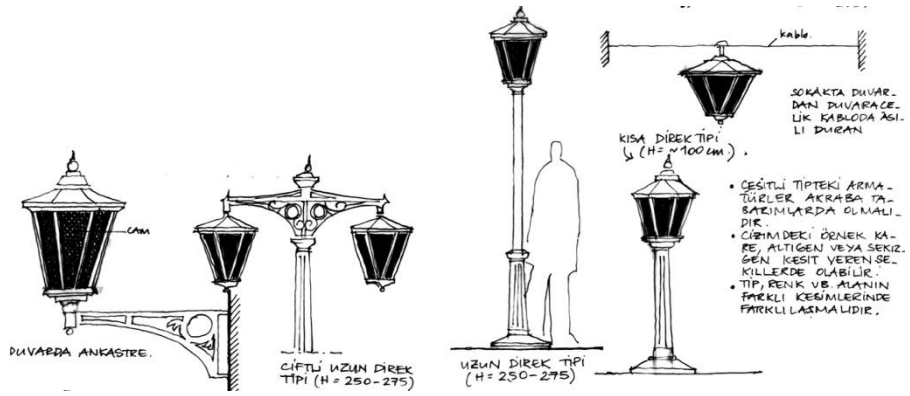


Figure 6. Examples, details, and measurements of different type of lightening. (Dokuz Eylül University Department of City and Regional Planning, 2002). For the translations see appx. 1.

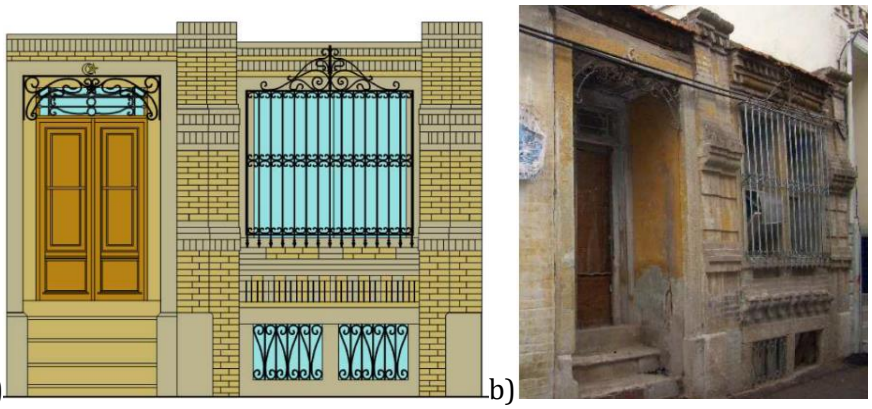


Figure 7. a) The model and b) the original of Greek and Levantine style façade (Dokuz Eylül University Department of City and Regional Planning, 2009).

Rize Advisory UDG

Rize Advisory UDG was prepared in 2017 (MSGSÜ, 2017) by a multidisciplinary team from Mimar Sinan Fine Arts University upon the request of Rize Municipality. The project team included urban designers and architects. The Rize advisory UDG targeted the urban design projects in the city's coastal area (see Fig. 8) by focusing on the New Coastline Urban Design Project. The document aims to provide a better understanding of necessary strategies, procedures, and tools for the preparation of design projects. It includes brief information, conceptual schemas, and project examples. Although the guideline is not binding nor a part of a master plan, it was prepared according to the Rize Local Environment Action Plan and aligned with its vision for Eco-city development. Therefore, the strategic vision of the city is defined as ' Rize,

DOI: 10.15320/ICONARP.2021.160

the eco-city that provides social development-oriented life, solves problems at its source, produces solutions, protects cultural values, and exists with natural environment' (MSGSÜ, 2017). In the first section of the guideline, the definitions, principles, and methods for urban design projects are given. This is followed by the evaluation of the characteristics of the city based on the built environment, natural structure, transportation, and coastline. After the definition of the method and local characteristics of the city, the strategies, tools, and procedures are defined for the Rize New Coastline Urban Design Project in the third section (MSGSÜ, 2017).

The main urban design principles are gathered under eight categories: 'identity and originality, water and accessibility, environmental sustainability, balance and integration, diversity and flexibility, economic improvement, communication and mobilization, urban design quality. General definitions, strategical principles, subsections, urban design projects, tools, and application opportunities are explained as a part of the urban design method.

The general definitions include analyzes, vision, strengths, weaknesses, and the stakeholders involved in the design process. Strategical guidance encompasses the analysis of the public spaces and identity elements based on cultural infrastructure and ecological environments, and gives abstract and concrete details about them. Subsections define necessary actions such as conceptual schemas, detailed design projects, thematic design guidelines, public participation methods, funds and financial supports, and process management towards the local framework.

In the scope of the UDG strategies and the concept for the city, the first action for an urban design process is defined as preparing a conceptual schema and definition of the vision. The detailed strategies and related actions are adopted from the Local Environment Action Plan. Therefore, the UDG strategies are built upon actions related to Eco-city Rize vision, aiming to strengthen the natural and cultural heritage, and systematical urban planning. The third section of the guideline is the main part of the document that describes the strategies and work packages to achieve this aim. The section covers definitions and goals specific to district, neighborhood, and architectural levels. Each subsection involves brief information on the actions, normative examples from the world, and supportive visualizations.

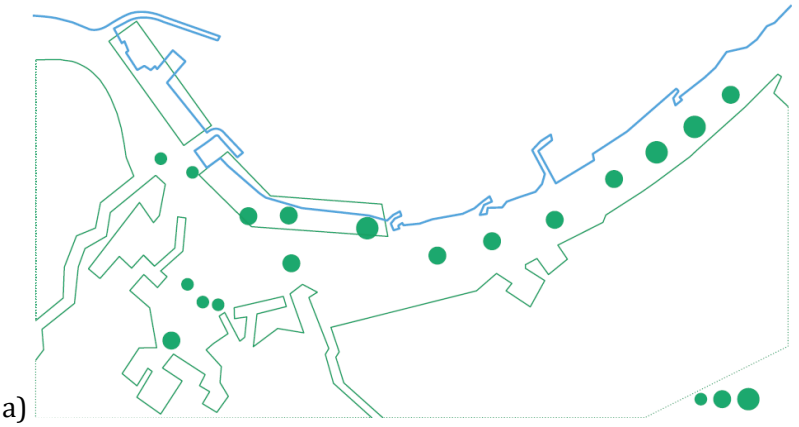
At the district level, the prestigious Rize Coastline Urban Design Project is introduced according to energy efficiency, accessibility, and permeability at the district level. The basic principles for the project are determined and visualized (see Fig. 9 and 10) as follows:

- Bringing the city and sea together
- Providing the necessary infrastructure to support tourism,
- Balancing and improving ecological restoration,
- Increasing the urban quality of life,
- Ensuring the vitality of urban life,

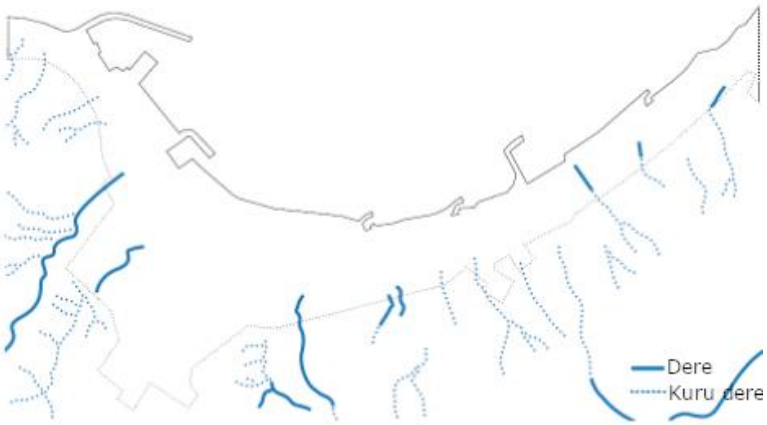
ICONARP – Volume 9, Issue 1 / Published: 21.06.2021

- Providing scientific and technological perspectives for energy and the city,
- Increasing the city's competitiveness,
- Sustaining economic vitality.

In addition to these principles, supporting innovative and creative industries is suggested for 'tea' production as the most important local agricultural product of the city.



a)



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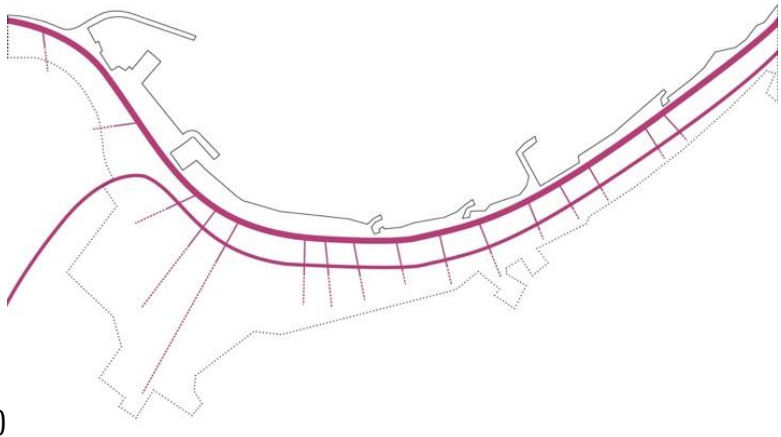

c)

Figure 8. Examples of conceptual urban analysis from Rize Advisory UDG a) Integrated open green area hierarchy b) Protected water bodies in the scope of the Eco-city vision c) Existing transportation network. (MSGSÜ, 2017) (The images are not to scale, ↑ North).

The next strategy is built upon the neighborhood design and neighborhood design guidelines that will re-evaluate the identity based

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on social and cultural infrastructure. According to the guideline, the neighborhood unit supports communication and collective actions between different socio-cultural groups and meets the basic needs of modern life by efficient public spaces. Coherent with the local action plan, the emphasis is given to renewable energy and energy efficiency, green building applications, and the historical pattern. At the neighborhood level, design projects and UDGs are emphasized as performance measures for architectural details and space hierarchies.

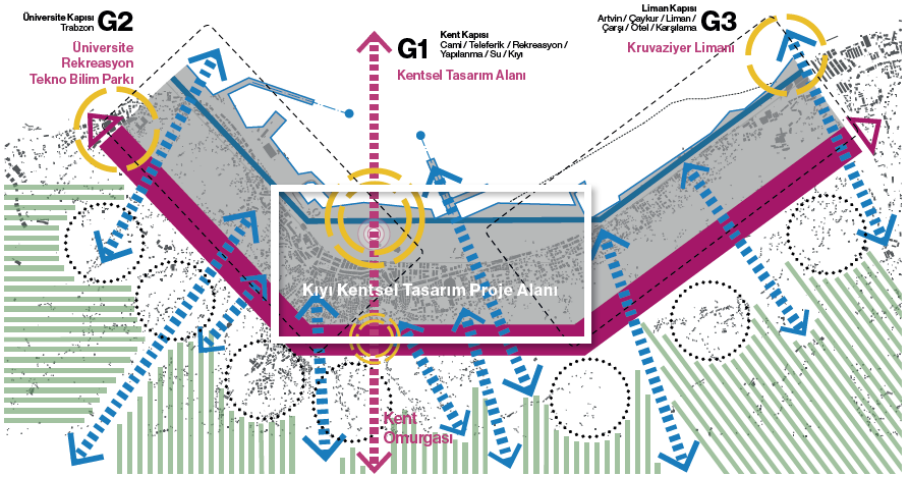


Figure 9. Rize New Coastline Urban Design Project conceptual schema, Urban Gates and integration/relation of different land uses with green areas and the sea (MSGSÜ, 2017) (The images are not to scale, ↑ North). For the translations see appx. 1.

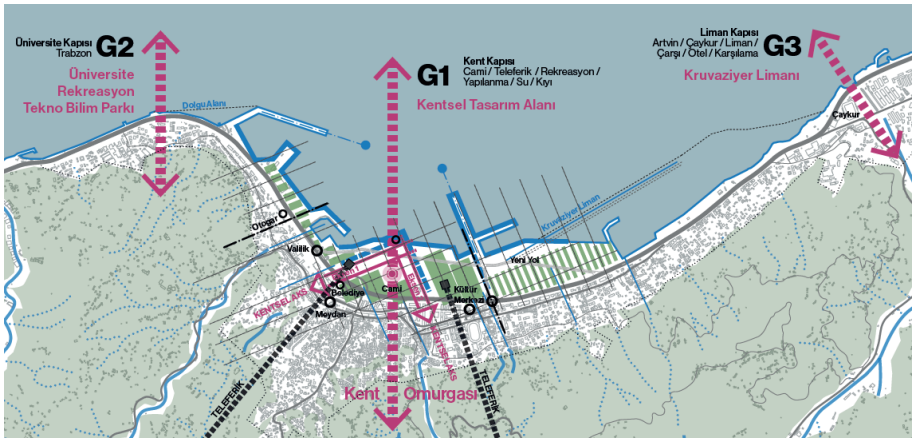


Figure 10. Rize New Coastline Urban Design Project conceptual schema, Landmarks and the main urban axis (MSGSÜ, 2017) (The images are not to scale, ↑ North).

At the architectural level, the prestigious urban axis and façade renewal project is approached within three actions defined in the local action plan. These are related to façade renewal for aesthetical harmony in the city center, contemporary art on the axis, and determination and application of façade standards. The aim of the urban axis project is defined as the revitalization of the main artery of the city for directing and synchronizing the urban development. The main urban design principles are presented as 'integrity in land uses, human-scale environments, pedestrian comfort, and green landscape'.

As a result, the Rize advisory UDG provides the main principles and suggestions for producing urban design projects specific to the region and local vision. It aimed to integrate different stakeholders with strategical spatial planning and urban design. The determination of a common vision for the city in coherence with the local strategies,

improving the environmental quality, enhancing the identity by neighborhood concept, providing ecological restoration, bringing users, city, green, and coastline together, defining innovative technologies for renewable energy, and supporting urban design as a tool for sustainable urban development defined the main targets of the UDG. These targets are explained briefly and supported by examples for guiding the process management.

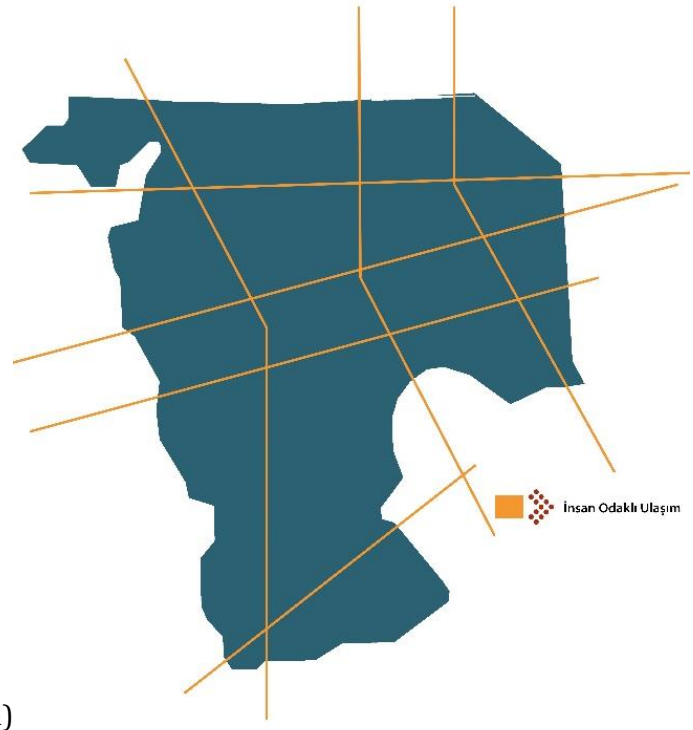
Bizimşehir Gaziantep Performance-based UDG

Bizimşehir Gaziantep Performance-based UDG was prepared in 2018 as a part of a larger project funded by The Republic of Turkey, The Ministry of Environment and Urbanisation. The overall project aimed to plan a green, secure, human-centered, local-driven, and smart settlement for the Şahinbey District in Gaziantep, in the southeast of Turkey (HT-TTM, 2018c). Seven working task forces were formed for 'urban planning and design, architecture, environmental engineering, disaster management, geoinformatics, information technologies, and local consultancy' for achieving this goal. As a part of the urban planning and design task force, the UDG was prepared in coherence with the objectives of the project, upper-scale plans, planning regulations, and related government-funded complementary projects (Kenttam, 2016a, 2016b, 2016c, 2017). The designated area is studied in the UDG within five following subjects, the human-centered city, the city with identity, smart city, green city, and the safe city (HT-TTM, 2018c).

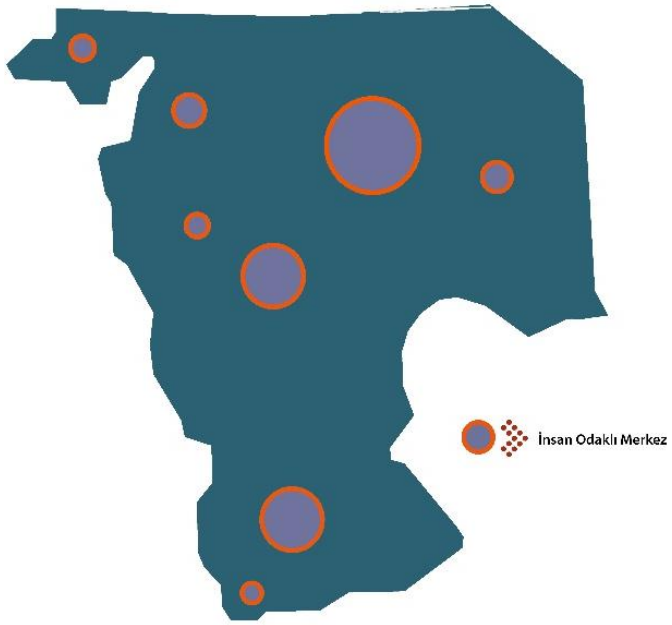
The aim of the UDG is to define urban design principles and related measures for increasing the quality of the built environment and life. The defined principles reflect a comprehensive perspective that focuses on social inclusion, environment sensitivity, economic resiliency, and unique identity. The target group involves designers, developers, local government, and other related stakeholders. The case study area is a 287-hectare infill development in Gaziantep metropolitan area planned as a group of mix-use neighborhoods (HT-TTM, 2018b, 2018a). The general approach of the UDG is structured on the reinterpretation of the Gaziantep's inherited urban morphology which is characterized by the harmony between regional topography and central commercial activities. Commercial areas have a dominant place within daily life as neighborhood centers that bring social, commercial, and religious activities together. Based on these characteristics, the urban design principles are determined as 'small urban plots, single-floor shops, natural material use, mix-use and functional relations, environment friendly manufacturing, climate control, and topography-built environment harmony'.

Within the scope of the human-centered city component (see Fig. 11), design principles and measures are elaborated according to integrated transportation, pedestrian mobility and walkability, universal design, open green areas, recreational areas, and playgrounds.

DOI: 10.15320/ICONARP.2021.160



a)



b)

Figure 11. Conceptual schemas for a) human-oriented transportation b) human-oriented center (HT-TTM, 2018c). (The images are not to scale, ↑ North). For the translations see appx. 1.

An integrated transportation system aims to increase accessibility to urban functions for every user, therefore, supports the universal design. Public transportation is prioritized throughout the area in the plans to support this aim. Bicycle and pedestrian-oriented routes are designed throughout the settlement. A tramline is also involved in the main arterial road (see Fig. 12). For an effective engagement between these modalities, a typology of proper separations and integrations are presented in the UDG based on the plantation, lineation, and concrete materials. The

pedestrian ways are supported by green areas and public squares at different scales. These design elements are also used to support the sustainability of the area. Location and the orientation of these areas are defined according to the wind corridors for climate control. The permeable landscape elements are suggested for rainwater collection, pedestrian safety, air quality, and noise reduction purposes.

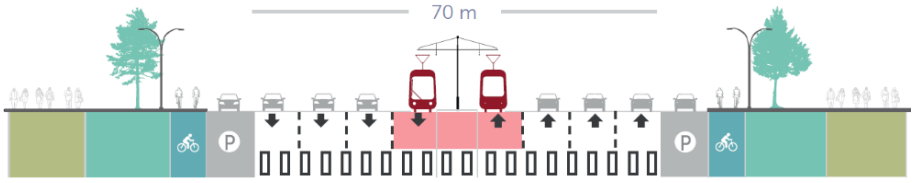


Figure 12. Section of the main arterial road. Source: (HT-TTM, 2018c)

The necessary measures and standards for the bicycle routes and parking are given in the UDG for topographic elevation, security, signage, lighting, lanes, and parking stations. Accessibility measures are considered according to the universal design principles that aim to increase mobility primarily for children, disadvantaged and senior people. Education, daycare, and health facilities are suggested within the 400m walking distance to the public transportation stops.

The human-scale building architecture is one of the essential components in the UDG and architectural design. Alternative design approaches are developed by the architectural design team for cluster housing and single-family homes. A modular approach was applied for the residential buildings (see Fig. 13). The ratio of solid and transparent surfaces, the colors, and materials on façades are brought together in the UDG to support the human-scale and climate control. Social communication and public participation between citizens and stakeholders are supported in design by facilities such as a culture, art, and public education center, exhibition areas, and open public spaces. These facilities are suggested as cultural nodes in the UDG where all parties can be informed about sustainable living and the smart qualities of the settlement.

The smart city concept is an approach that integrates urban development with technology. In the UDG, smart city components are evaluated according to building and infrastructure, disaster management, and energy management. Smart buildings require information and communication technologies (ICT) in management and use. By using ICT, it is aimed to increase the efficiency of functions such as lighting and heating and cooling. Within this definition, smart sensors are suggested for urban and architectural design, especially for efficient health services and disaster management. These sensors are used for smart lighting, irrigation, HVAC (Heating, Ventilation, Air Conditioning) systems, data collection, and tracking. Real-time distribution of information provided through smart billboards are located in transportation nodes (see Fig.14). Within the scope of smart city applications, the building infrastructure is suggested to be suitable for automated energy management tools. Design

DOI: 10.15320/ICONARP.2021.160

alternatives for lighting equipment are suggested in the UDG integrated with solar panels and motion sensors for supporting energy efficiency (see Fig. 15).

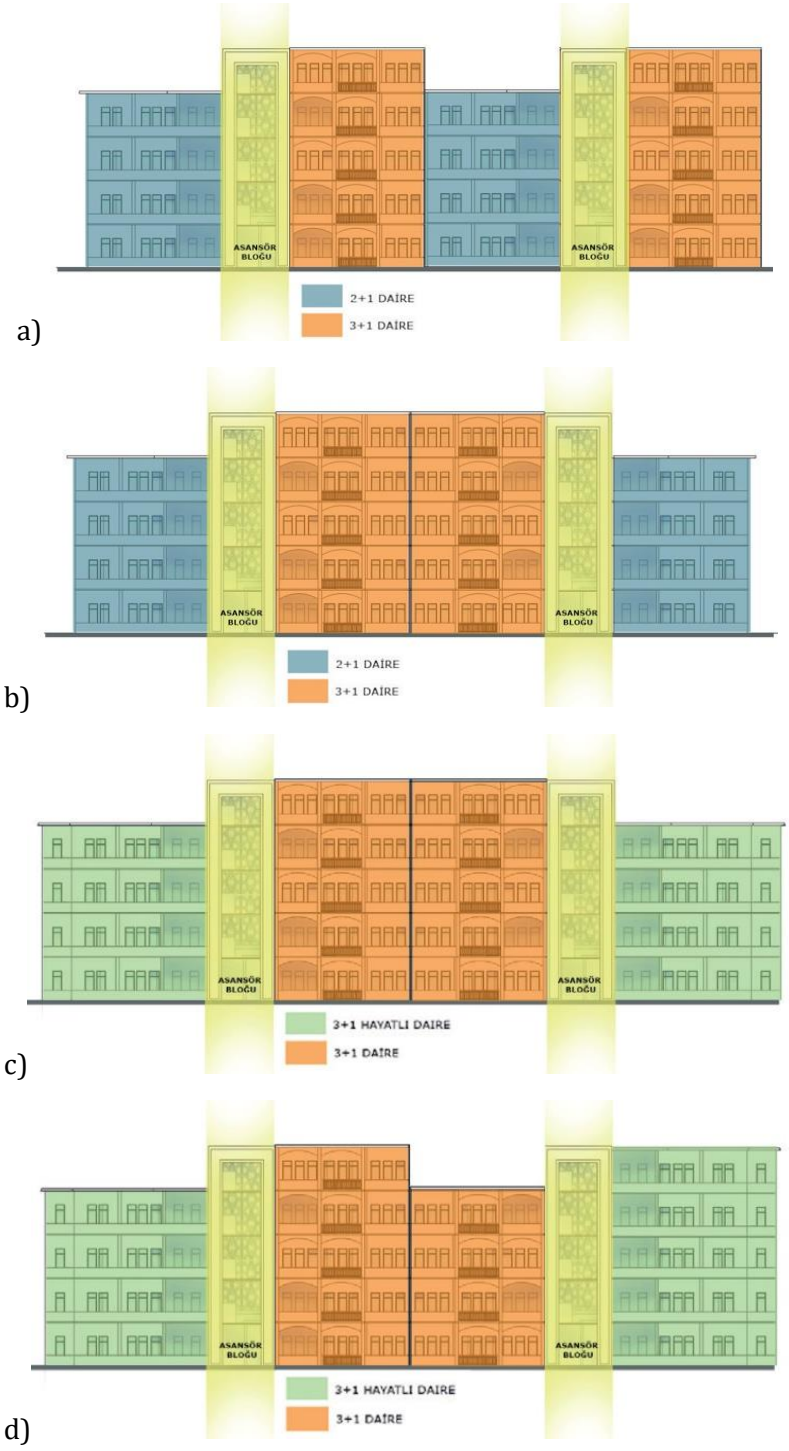


Figure 13. Modular design alternatives for cluster housing a) three (color blue) and four rooms (color orange) apartment types b) four rooms (color orange) and four rooms with patio (color green) apartment types. (HT-TTM, 2018c). For the translations see appx. 1.

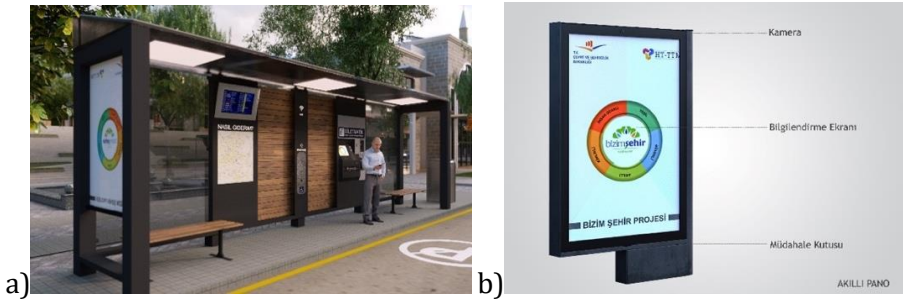


Figure 14. a) and b) Example design alternative for Public transportation stops and smart billboards (HT-TTM, 2018c). For the translations see appx. 1.

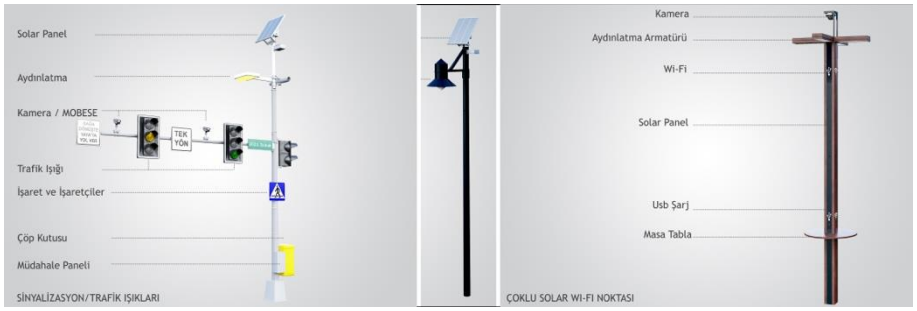


Figure 15. Example design alternatives for street signalization and traffic lights, light poles for pedestrian ways and open parking spaces, and multi solar wi-fi hotspots. (HT-TTM, 2018c). For the translations see appx. 1.

Green areas are considered as an 'open green system' that connects green belts with the inner city, open green areas, and green corridors. Landscape elements and pedestrian ways support climate control measurements (see Fig. 16). Design alternatives for these elements are created collaboratively by landscape architects, urban planners, and designers for the plans and the UDG. A list of local plants is given in the UDG for decreasing the maintenance costs in the green areas and increase sustainability throughout the settlement. Coherent with the local climate and universal design principles, the material selection for pavement is made to prevent slippery surfaces and tripping and allow rainwater to be absorbed by the soil. Green roofs and walls are suggested in the UDG to protect people from heat and cold (see Fig.16).

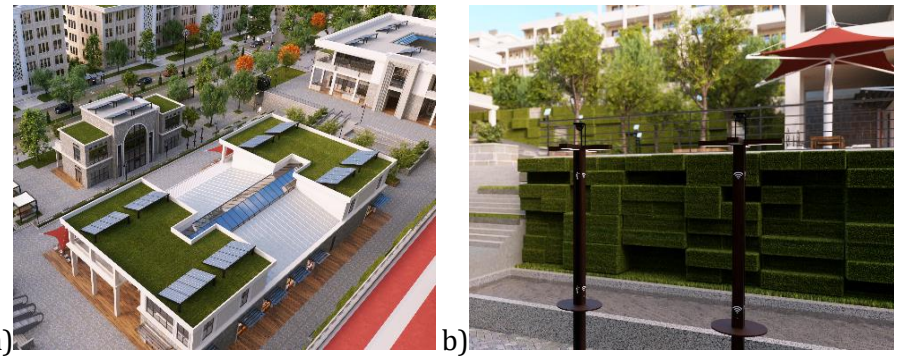
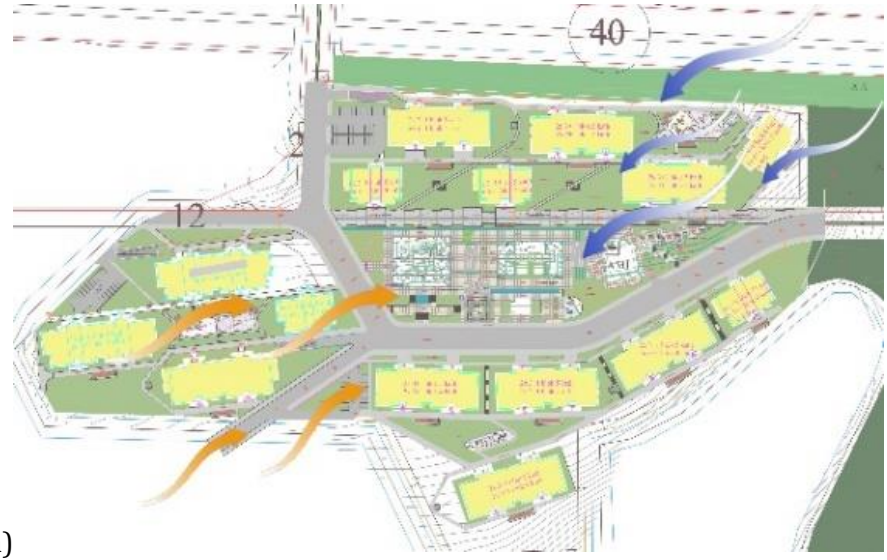


Figure 16. Example design alternatives for a) green roofs b) green walls (HT-TTM, 2018c).

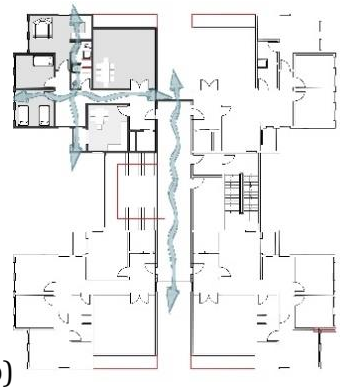
Great importance is given to the maximum benefit from daylight and control of the wind and sun. According to the dominant wind corridors and direction of the sun, buildings are oriented from northeast to southwest. Passive systems are enhanced by sunshades, openings, and sun collectors on façades. Efficient natural ventilation is suggested in the UDG at the neighborhood, urban block, and building levels instead of air conditioners (see Fig.17). Courtyards with water elements and vegetation are recommended as climate control elements in the design.

DOI: 10.15320/ICONARP.2021.160

This approach provided a connection with traditional Gaziantep houses. The existing water beds are protected by the master plan and regulations and their surroundings are designed as open green areas. A water treatment facility is located in the southwest region of the settlement in the master plan. With the UDG it is suggested to reuse the recycled water in irrigation of open green areas and gardens, and in toilet flush.



a)



b)

c)

Figure 17. Summer and winter wind corridors at a) neighbourhood scale b) urban block scale c) building scale. (HT-TTM, 2018c).

The safety of the settlement has been discussed for social and spatial measures in the UDG. According to the related measurements, lighting elements are located along the pedestrian and motorways according to the national standards. The design alternatives for the light poles are recommended to direct the light downward and to prevent light pollution and disturbance to the natural habitat. Earthquakes create an important risk for Turkish cities including Gaziantep. This condition requires an effective risk management strategy including effective spatial measurements. Hence, all spatial applications and construction activities should be according to the Building Earthquake Regulation and related disaster management regulations. Therefore, risk management measurements specific to the area were determined by a multidisciplinary team of earthquake engineers, geological engineers, and civil engineers for the UDG.

The identity of the settlement was considered by each task force separately and integrated into the UDG based on these components at architectural and urban scales. The geographical character of the area is high in elevation and surrounded by steep slopes. Therefore, the existing valleys are suggested for protection with its biodiversity. In the regions where the slope is high, low density, low rise development is recommended for the protection of urban silhouette. Local materials such as Basalt are encouraged with the concern of material and product life cycle, local economy, and sustainable environment (see Fig. 18). Gaziantep is a part of the UNESCO Creative Cities Network with its unique gastronomy culture. One of the main pedestrian public areas is designed as Gastronomy Street to support the identity of the city.

a)

b)

Figure 18. a) and b) Examples from commercial buildings (HT-TTM, 2018c).

Bizim Şehir Gaziantep performance-based UDG provides an extensive document for future applications at different scales from district to interior architecture. The overall project presents an important example of integrated urban planning and design processes by the interdisciplinary and inter-scale approach.

RESULTS AND DISCUSSION

In this section, three examples discussed are evaluated according to the sustainability criteria set. The criteria set is aggregated for this paper based on three urban sustainability frameworks that provide cross-border applicability, application scalability, and global geographic

DOI: 10.15320/ICONARP.2021.160

representation based on flexible and globally applicable indicators (see Table 1). After the evaluation, İzmir Kemeraltı met 15%, Rize advisory UDG 45% and Bizimsehir Gaziantep performance-based UDG 81% of all criteria.

The evaluation of UDGs revealed that urban design quality and governance are the common ground for all UDG approaches (see Table 3, Fig. 19). Following the detailed architectural and regulation-based characteristics of the prescriptive UDGs, Izmir Kemeraltı UDGs could not receive any scores from the categories except these two. Rize advisory UDG encapsulated all categories in brief and provided a balanced distribution in principles (see Table 3, Fig. 19). Following the advisory approach, the UDG supported urban sustainability comprehensively but briefly. Thus, the aim of the UDG was not to provide detailed urban design principles. It aimed to present a clear roadmap for sustainable urban development with a broad perspective. Special importance is given in the UDG to urban design quality and environmental quality. Bizimşehir Gaziantep performance-based UDG received the highest score in all categories except 'green growth and innovation' (see Fig. 19). The UDG exceeded the other examples remarkably in providing environmental quality by integrating social, green, and smart components. The interdisciplinary, well-integrated, and contextual approach served sustainable solutions and inclusiveness.

Each UDG example provided a completely different framework except targeting increased design quality and process management. They were integrated into the urban planning process at different levels. The preparation processes of each UDG involved local authorities and academy. The degree of multidisciplinarity changed according to the aim of the UDG.

In this scope, Izmir Kemeraltı prescriptive UDG provided obligatory, rule-based content as part of the conservation plans. On the contrary, Rize advisory UDG presented ideas, examples, and general, non-obligatory principles that define a roadmap for detailed applications. Both UDGs were prepared mainly by urban planners. Different from the two UDG approaches, Bizimsehir Gaziantep performance-based UDG required a multidisciplinary team that could provide detailed principles, tools, and methods for sustainable, smart, human-centered, and green settlement. Each principle, tool, and method described in the UDG aims to increase the sustainability performance of the designated area. They provide alternative solutions to implement for each category targeting the stakeholders. Therefore, performance-based UDGs need to achieve multidisciplinarity that will bring knowledge, experiences, and capabilities to the process.

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Table 3. Comparison of UDG examples in a compatibility matrix according to sustainable urban development criteria

Target	Criteria	Kemeraltı Prescriptive UDG	Rize Advisory UDG	Bizimşehir Gaziantep Performance-based UDG
Urban Planning	Strategies for preserving and adapting open spaces to improve quality of life			
	Minimizing urban sprawl			
	Optimizing population density			
	Connections between green areas			
	Promotion of green spaces			
	Accessibility and integrity of land uses			
	Brownfield redevelopment			
Urban Design Quality	Diversity			
	Well defined public spaces			
	Public and semi-public hierarchy			
	Façade street relations			
	Human scale urban design and architecture			
	Street art and furnitures			
	Landscape and vegetation integrated to built environment			
	Shop façades and signboards			
	Flexibility			
	Mixed-use environments			
	Smart and technology relates-solutions			
	Neighbourhood schools			
	Local food production			
Character and Identity	Protection of local heritage			
	Communication infrustracture and citizen participation			
	Neighborhood design			
	Promotion of local materials in urban design and architecture			
	Coherence with local geography			
Mobility	Integration of the different modes of transport			
	Increased accessibility for disadvantageous groups			
	Continious mobility data collection			
	Prediction of the future demand			
	Future performance measurements			
	Pedestrian an non-motorized vehicle access			
Security	Pedestrian security			
	Efficient lighting			
	Efficent separation of transportation modes			
	Slow traffic			
	Balance between day and night time			
	Risk management and mitigation for natural disasters			
Environmental Quality Nature and Biodiversity	Built and natural environment compliance			
	Measurable objectives related to biodiversity			
	Strategical approach			
	Wildlife corridors			
	Green infrastructure			
	Ecosystem services			
	Nature based solutions (green roofs, water treatment etc.)			
	Community engagement			
Air quality	Monitoring			
	Long and short term objectives for air quality			
	Community engagement			
Water	Monitoring for consumption and leaks			
	Reducing drinking water consumption			
	Adjusting urban parks and green to cope with less water			
	Sustainable gardening			
	Gray water recycling			
	Rainwater collection and use			
	Innovative measures			
	Quality and protection of surface waters			
	Flood protection management			
	Water treatment			
	Community engagement			
Climate Change	Monitoring for GHGs			
	Publicly available information			
	Coherence with national strategies and plans			
	HVAC measures to reduce CO2			
	Energy saving meaures			
	Heat island reduction			
Noise	Quality of acoustic environment			
	Noise map			
	Publicly available information			
	Noise protection in sensitive areas (schools, hospitals etc.)			

DOI: 10.15320/ICONARP.2021.160

Table 3 cont.

Target	Criteria	Kemeraltı Prescriptive UDG	Rize Advisory UDG	Bizimşehir Gaziantep Performance-based UDG
Energy	Monitoring and data collection for energy consumption			
	Projections			
	Targets for energy efficiency			
	Renewable energy sources			
Waste	Monitoring and assessment for wastes			
	Strategies for collection and treatment of waste			
	Projections			
	Waste recycling			
	Waste separation			
	Waste prevention programs			
Green Growth and Innovation	Adoption of environmentally friendly technologies			
	Creative green industry			
	Green skills and/or jobs			
	Sustainable flow of resources			
	Vital local economy, enhancement of local businesses			
	Energy efficiency in buildings and urban development			
	Affordable housing			
Governance	Integrated vision and/or policy framework			
	Links to other policy documents			
	Environmental vision reflected in different strategies and action plans			
	Citizen participation			
	Coorperation with authorities and organizations			
	Examplary practices and projects			

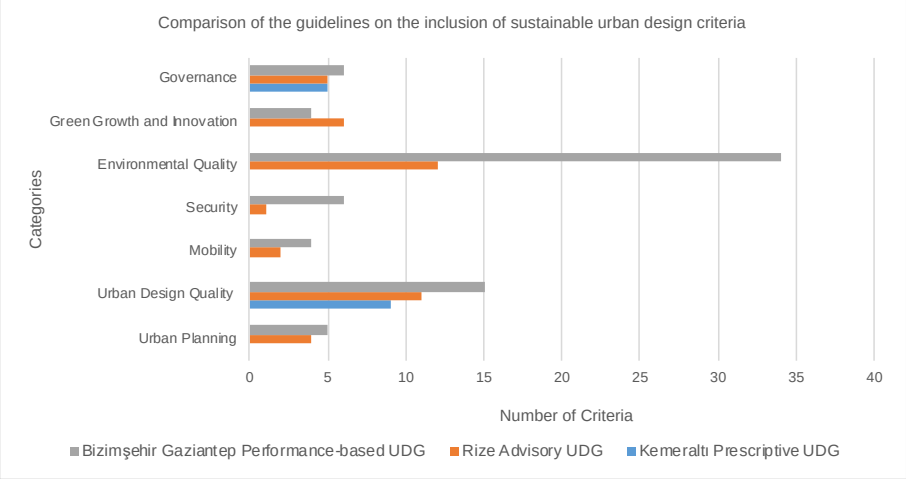

Figure 19. Comparison of the guidelines on the inclusion of sustainable urban design criteria.

The comparison of three examples from each approach validates the increasing role of UDGs in Turkey in achieving urban sustainability from a broad perspective. The results revealed an understanding of how UDGs became a part of the urban planning process in Turkey. It is observed from the study that the role and extent of UDGs changed in time according to the increasing tendencies towards sustainable development. Their content became larger while sustainable urban development became a requirement. All three approaches are applicable at the district level (involving one or more neighbourhoods). On the other hand, decreased level of detail in principles enables applications at broader scales. For example, Izmir Kemeraltı prescriptive UDG focused on the commercial center of the city region, Rize advisory UDG covered the city and surroundings with less detail in the principles, and Bizimsehir Gaziantep performance-based UDG provided an intermediate detail in the

principles and in terms of the scale (a group of mixed-use neighbourhoods). The evolution also increased the inclusiveness of various disciplines and enlarged the target groups.

CONCLUSIONS AND RECOMMENDATIONS

The integration of UDGs into the urban planning system is an evolving process in Turkey. The status quo of urban planning is insufficient to define the role of urban design and provide obligatory law enforcement towards the preparation of guidelines. On the other hand, according to the evaluation in this paper, the importance of UDGs is increasing following sustainable urban development trends. This relation between sustainability and UDGs was discussed in this paper through an extensive exploration and a structural evaluation of three examples. Therefore, the paper first introduced the existing literature, presented the current state of related applications and related processes in the context of Turkey. Based on the literature, the study focused on three common UDG approaches: prescriptive, advisory, and performance-based. Then it introduced, evaluated, and compared three successful examples from each UDG approach. The results provided a novel and contextual evaluation for the literature and a framework for similar contexts, especially in developing countries. Based on the results, the following bullet points are recommended for the selection and implementation of the appropriate UDG approach;

- Prescriptive UDGs reference directly to the implementation through detailed design alternatives at the architectural level. Therefore, these UDGs are more suitable to focus on the physical aspects of sustainability. These documents are usually provide binding and inflexible frameworks.
- Advisory UDGs should be considered when the aim is to provide general recommendations for the preparation of detailed UDGs and urban design projects specific to the region. These UDGs are the only types that are suitable for urban scale and above. Therefore, they provide a useful tool to define essential principles of urban sustainability at larger scales.
- Performance-based UDGs provide the most comprehensive framework in implementing sustainable urban development. They can be applied at various scales from the urban block, urban axis, neighbourhood, or urban region. These documents can be binding or non-binding according to the aim. Therefore, their applicability to different contexts is higher than the other two approaches. However, performance-based UDGs require multidisciplinary work and a high level of integration to the development processes (including urban planning, architectural design, and urban management).

In conclusion, UDGs should be coherent with urban plans, laws, acts, and regulations. Therefore, the content and the extent of a UDG, the diversity in the team, and the degree of integration to the urban planning process

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should be defined according to the vision in the regional context and the result aimed to be achieved with the UDG.

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CONFLICT OF INTEREST
No conflict of interest was declared by the authors.

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ETHICS COMMITTEE APPROVAL
Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS
No survey and in-depth interviews, that require legal permissions, were conducted during this research.

REFERENCES

CNU, NRDC, & USGBC. (2011). LEED 2009 for Neighborhood Development. USGBC. www.usgbc.org

Dogan, U. (2020). Assessing the Urban Design Quality of Turkish Cities. In A. Almusaed, A. Almssad, & L. Truong-Hong (Eds.), Sustainable Cities and Society (Vol. 56). IntechOpen. https://doi.org/10.5772/intechopen.89779

Dokuz Eylül University Department of City and Regional Planning. (2002). Kemeralti 1. Etap Kentsel Tasarım Rehberi.

Dokuz Eylül University Department of City and Regional Planning. (2009). Kemeralti 2.Etap 1. Bölge Kentsel Tasarım Rehberi.

European Commission. (2018). In-depth-report: Indicators for Sustainable Cities (Issue 12). https://doi.org/10.2779/121865

European Commission. (2020). European Commission Green City Tool. https://webgate.ec.europa.eu/greencitytool/home/

Gürler, E. (2018). The Performance of Relationship Between Instrument and Mechanism: The Hidden Value of Urban Design Guidelines for Sustainable Urban Development. In N. Charalambous, N. Z. Cömert, & Ş. Hoşkara (Eds.), 1st Regional Conference: Cyprus Network of Urban Morphology CyNUM 2018 Proceedings (Vol. 1, Issue 1, pp. 93–108).

Hakim, B. S. (2008). Mediterranean urban and building codes: Origins, content, impact, and lessons. Urban Design International, 13(1), 21–40. https://doi.org/10.1057/udi.2008.4

Hall, Arthur Crawshay (1996). Design Control: Towards a New Approach. Oxford: Butterworth Architecture.

HT-TTM. (2018a). Bizim Şehir Gaziantep İli Pilot Bölge Çalışması 1/1000 Uygulama İmar Planı Açıklama Raporu.

HT-TTM. (2018b). Bizim Şehir Gaziantep İli Pilot Bölge Çalışması 1/5000 Ölçekli Nazım Planı Açıklama Raporu.

HT-TTM. (2018c). Bizim Şehir Gaziantep İli Pilot Bölge Çalışması Kentsel Tasarım Rehberi (S. Özdal Oktay (ed.)). Republic of Turkey Ministry of Environment and Urbanisation.

Kenttam. (2016a). Kentsel Tasarım Rehberleri Vol.I Araştırma ve Tanımlama. Republic of Turkey Ministry of Environment and Urbanisation. https://webdosya.csb.gov.tr/db/mpgm/editordosya/file/Kentsel

Karaman, A. (1999). Bir Disiplin ve Meslek Olarak Kentsel Tasarimin Yeni Konumu ve İçeriği. 1st National Urban Design Congress, 234-239, İstanbul: Mimar Sinan Fine Arts University,Faculty of Architecture, Department of City and Regional Planning

Kenttam. (2016b). Kentsel Tasarım Rehberleri Vol.II İçerik. Republic of Turkey Ministry of Environment and Urbanisation. https://webdosya.csb.gov.tr/db/mpgm/editordosya/file/Kentsel

Kenttam. (2016c). Kentsel Tasarım Rehberleri Vol.III Mevzuat. Republic of Turkey Ministry of Environment and Urbanisation. https://webdosya.csb.gov.tr/db/mpgm/editordosya/file/Kentsel

Kenttam. (2017). Kentsel Mekansal Standartların Geliştirilmesi (1st ed., Issue 1). ReRepublic of Turkey Ministry of Environment and Urbanisation.

Lang, J. (1996). Implementing urban design in America: Project types and methodological implications. Journal of Urban Design, 1(1), 7–22. https://doi.org/10.1080/13574809608724368

Mega, V., & Pedersen, J. (1998). Urban Sustainability Indicators. European Foundation for the Improvement of Living and Working Conditions. https://www.eurofound.europa.eu/sites/default/files/ef_files/pubdocs/1998/07/en/1/ef9807en.pdf

MSGSÜ. (2017). Rize Kensel Tasarım Vizyonu. Rize Municipality. http://www.rize.bel.tr/dosyalar/Rize2053/Rize-2053-Kentsel-Tasarim-Vizyonu.pdf

DOI: 10.15320/ICONARP.2021.160

Punter, J. (1996). Urban Design Theory in Planning Practice: The British Perspective. Built Environment (1978-), 22(4), 263–277. http://www.jstor.org/stable/23288422

Punter, J. (1999). Seattle. In Design Guidelines in American Cities (pp. 31–65). Liverpool University Press. http://www.jstor.org/stable/j.ctt1gn6bsv.8

Republic of Turkey Ministry of Environment and Urbanisation. (2010a). KENTGES Bütünleşik Kentsel Gelişme Stratejisi ve Eylem Planı 2010-2023. Republic of Turkey Ministry of Environment and Urbanisation. http://www.kentges.gov.tr/_dosyalar/kentges_tr.pdf

Republic of Turkey Ministry of Environment and Urbanisation. (2010b). Urban development strategy (2010 - 2023). https://webdosya.csb.gov.tr/db/kentges/icerikler/kentges-en-20191223090807.pdf

Symes, M., & Pauwels, S. (1999). The diffusion of innovations in urban design: The case of sustainability in the Hulme development guide. Journal of Urban Design, 4(1), 97–117. https://doi.org/10.1080/13574809908724440

Shirvani, H. (1990). Beyond Public Architecture: Strategies for Design Evaluations. New York: Van Nostrand Reinhold.

Yalçıner Ercoşkun, Ö., & Karaaslan, S. (2011). Guidelines for Ecological and Technological Built Environment: A Case Study on Güdül-Ankara, Turkey. Gazi University Journal of Science, 24(3), 617–636.

APPENDIX

Appendix 1 Index of Turkish descriptions in the images used in the paper and their English translations

No.	Turkish words and descriptions used in the images *(Ascending alphabetic order)*	English translation
1	Açık otopark	Open parking space
2	Ada	Urban block
3	Ahşap kap.	Timber coating
4	Ahşap köşe silmesi	Timber corner molding
5	Akıllı pano	Smart board
6	Asansör bloğu	Elevator block
7	Artvin	A city in the Black Sea Region of Turkey
8	Avlu tipleri	Courtyard typologies
9	Aydınlatma	Lighting
10	Aydınlatma armatürü	Light fixture
11	Bahce	Garden
12	Belediye	Municipality
13	Bilgilendirme ekranı	Information monitor
14	Bitişik yapı	Contiguous building
15	Cam	Glass
16	Cami	Mosque
17	Çarşı	Bazaar
18	Çaykur	A state owned tea producing company
19	Cephe	Facade
20	Cephe çoğun sıvalı, bazen ahşap kaplamalıdır	Facade are generally coated, sometimes wood sided
21	Çeşitli tipteki armatürler akraba tasarımlarda olmalıdır	Various types of fixtures should be related in design
22	Çiçeklik yan görünüş	Flower pot side view
23	Çiftli uzun direk tipi	Double long pole type
24	Çizimdeki örnek kare, altıgen veya sekizgen kesit veren şekillerde olabilir	The square example in the figure can be in shape that has hexagon or octagon section
25	Çöp kutusu	Garbage bin
26	Demir kapı	Iron door
27	Dere	Stream
28	Dış söve	Outer door frame
29	Döküm demir	Cast iron
30	Dükkan	Shop/Store
31	Dükkana dönüşmüş konut	Commercial building converted from a residential building
32	Duvar	Wall
33	Duvarda ankastre	Wall embedded
34	Eksen	Axis

Resume

Simge Özdal Oktay is an urban designer who pursued her Master and Ph.D. studies on participatory methods in urban design and sustainabile urban development. Currently, she is a Post-Doctoral Researcher at the University of Münster, Institute for Geoinformation and continues to explore innovative solutions in community-based, sustainable urban development.

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Analysis of The Effects of Open Place Performance on Users' Satisfaction Using Post-Occupancy Evaluation

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Abstract

Purpose

The current article aimed to investigate the effects of functional, social, and perceptual performance dimensions of coastal open place environmental attributes on place satisfaction. In this context, it aimed to develop suggestions for increasing the place performance levels in order to improve the place satisfaction.

Design/Methodology/Approach

The general framework of the research design was determined by evaluating the functional, social and perceptual features of the place by the users (using post-occupancy evaluation method) and determining the place performance and place satisfaction. Survey questions within this scope; It is structured under two main headings: functional, social and perceptual features of the place and place satisfaction. Each item was measured on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). Participants were randomly selected from the Arsin coastal park users. The surveys were conducted with 243 people on weekdays and weekends.

Findings

The study findings demonstrated that there was a positive and significant correlation between the spatial performance level and place satisfaction using the developed model. It was observed that the environmental factors that affected the place satisfaction included functional, social, and perceptual factors, respectively. It was determined that socio-demographic factors did not affect place satisfaction, while the frequency of occupancy had a positive impact on place satisfaction. **Research Limitations/Implications**

The present study focused on the functional, social, and perceptual dimensions of environmental properties. Thus, considering the diversity of environmental properties, it could not be claimed that the present study methodology and findings revealed all environmental dimensions that affect satisfaction.

Social and Practical Implications

In the present study, spatial performance data were obtained with post-occupancy evaluation and the factors that affected the satisfaction levels with Arsin Coastal Park (ACP) were investigated. Thus, the present study findings could be considered as very important for urban designers, planners, and administrators.

Originality/Value

There are studies in the literature that evaluated urban open place satisfaction. However, there are no studies that investigated the effects of open place performance criteria on place satisfaction using the post-occupancy evaluation (POE) method.

Keywords: *Urban open place, place attributes, place satisfaction, post-occupancy evaluation*

INTRODUCTION

Cities consist of physical structures and defined spaces. These defined or undefined urban spaces are described as urban open places. Urban open places assume various urban functions such as environmental, social, economic, and health-related functions. According to Carmona (2010), the importance of urban open places derives from the fulfillment of individual needs and special interaction opportunities they provide for urban individuals or groups. In urban design literature, the discussions on the requirement for urban open places and their functions continue. In recent years, research focused on urban open places in coastal cities and the coastal transformation and renovations were analyzed based on the users. Especially touristic and recreational transformation and renovation projects aim to meet user requirements and create user satisfaction with their functional, social, and perceptual attributes.

Turkish cities develop and change rapidly and increasing population with and construction lead to a decrease in urban open places. Especially in coastal Turkish cities, these changes lead to an increasing number of landfills to meet urban open place requirements. Within the scope of this goal, these areas, which are designed and constructed to meet the need for open places in city centers;

- The functional, social and perceptual possibilities it offers
- Level of meeting user needs and requirements
- Open place performance level

There were issues that needed to be focused and evaluated. In this context, the design and construction process has been completed and these places, which have met with the user, should be evaluated with the post-occupancy evaluation method. At this point, the place performance level and place satisfaction, which is the level of meeting the user's needs, can be determined by evaluating the place by the users.

Fort his purpose, the present study focused on the analysis of the functional, social and perceptual attributes of the Arsin landfill area, one of the transformations and renovations conducted in Trabzon city, using the post-occupancy evaluation method and investigated the effects of these attributes on user satisfaction. Thus, urban open place properties, spatial performance, and user satisfaction concepts were discussed based on the post-occupancy evaluation method.

LITERATURE REVIEW

One of the most important urban dimensions is the “change and transformation” dimension since the construction of initial cities. Each city was affected and influenced by the changes and transformations it experienced. Studies that focused on the process of interaction in human-environment relations recently emphasized that there was a link between “place” and “place attachment,” and humans and places (Williams et al., 1992; Bonaiuto et al., 1999; Jorgensen & Stedman, 2001; Williams & Vaske, 2003; Özkan & Yılmaz, 2019). Thus, it is necessary to address the spatial properties that allow individuals to connect with urban open places and to analyze whether these properties meet the user needs. In this direction, the concepts of open place performance and place satisfaction will be explained by focusing on the success criteria offered by urban open place.

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Urban Open Place Attributes

Canter (1977) stated that the experiences in a place are a combination of both physical and social attributes. Thus, human behavior occurs in a specific physical and social environment that meets the needs of the individual and produces emotions such as satisfaction and dissatisfaction. Within the context of the urban phenomenon, these environments are the urban open places. Within the scope of human-environment interaction, the studies on the environmental properties that urban open places should offer primarily focused on human needs. The development of successful urban open places is associated with meeting human needs and requirements (Whyte; 1980; Francis, 2003; Mumcu et al., 2017). Therefore, when designing urban open places, it is necessary to focus primarily on user needs. Maslow (1954), one of the pioneers in the field of human needs, categorized human needs into 6 groups: physiological, security, belonging, respectability, self-realization, and aesthetical-emotional satisfaction. Maslow's (1954) Hierarchy of Human Needs model has been interpreted differently by different researchers, allowing them to define various environmental properties. Lang (1987) categorized human needs into three groups: basic needs, cognitive needs, and aesthetic needs. Carr et al. (1992), on the other hand, categorized human needs into 5 groups as comfort, relaxation, passive engagement, active engagement, and discovery. The above-mentioned authors, who attempted to reduce human needs to urban open places, also described urban open place attributes. Whyte (2000), who argued that recognition of user requirements in urban open places was also an indicator of the success of that place, analyzed hundreds of urban open places within the scope of "Projects for Public Place" (PPS) and categorized the criteria for success in 4 groups of uses and activities, comfort and image, access and linkages, and sociability.

Researchers, who supported human-environment interaction and investigated user needs and requirements in urban open places, emphasized that the functional, social, and perceptual attributes of places should be analyzed together. Salama and Azzali (2015), in a study conducted on urban open places, emphasized that functional, social, and perceptual attributes of open places should be analyzed together. Thus, the present study analyzed the physical and social attributes provided by the place based on the user needs in urban open places (Maslow, 1954; Whyte, 1980; Francis, 2003), the attributes of successful open places (PPS, 20,00), and urban open place attributes proposed by Salama and Azzali (2015) and Shehab and Salama (2018). The post-occupancy evaluation" method was used to determine the performance of physical and social attributes provided by the place. The place of this method in the design and construction process and its later purposes will be explained in detail, and its importance in determining place performance and place satisfaction will be emphasized.

Post-occupancy evaluation

Within the context of human-environment relations, humans have expectations from their environment due to their requirements. These requirements include facilities that could help individuals to be productive in their place and workplace. To determine these facilities, it is first necessary to focus on human behavior and environmental variables (Lang, 1994). When individual encounters the environment,

he/she assesses the environment based on his/her needs and requirements. If the environment is equipped to meet these needs and requirements, the individual develops a sense of satisfaction and occupied the environment. If the facilities provided by the environment do not adequately meet the needs of the user, that would lead to dissatisfaction and the individual occupies the environment for a short period or changes his/her environment (Özkan et al. 2015). Within the context of human-environment interactions, this process, where the facilities provided by the place is assessed to fulfill user requirements, is called the post-occupancy evaluation process (Figure 1).

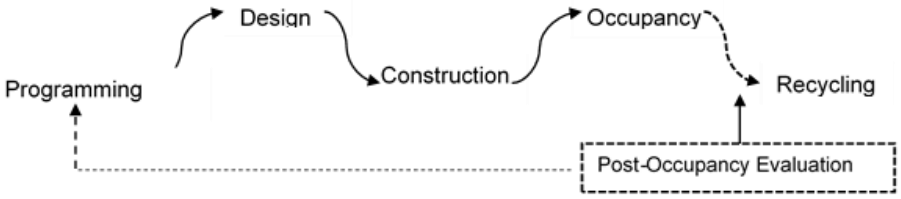

Figure1. Post-occupancy evaluation process (Preiser and Nasar, 2008).

Environmental design and landscape architecture constitute an integral part of human activities. Particularly, the decrease in the number and dysfunctional state of the open places demonstrated that the focus should be on the evaluation of the users when designing these places. POE is the process of the evaluation of the place by the users after construction and occupancy for a period of time. Thus, it focuses on the users of the place and the requirements of these users and allows the assessment of user satisfaction or dissatisfaction (Preiser & Rabinowitz, 1987; Marans & Cooper, 2000; Preiser, 2001). The objectives of the POE are summarized below:

- To conduct a systemic analysis of spatial occupancy,
- To determine spatial performance, which is the level at which place meets the user needs and requirements,
- To develop recommendations to improve spatial performance and to provide input for the programming stage (Preiser, Rabinowitz & White, 1988).

At this stage, it is necessary to focus on what the concept of "performance" is, how it is measured and its relationship with place satisfaction.

Open place performance

Performance concept, in which open place qualities and spatial uses are determinant, is one of the success criteria based on human-place interaction. The concept of performance, which is the level of fulfilling user requirements, could also be interpreted as measurable spatial behavior. The values that reflect user experiences, perceptions, measurements, and references are performance indicators. Thus, the concept of performance is used to describe the desired attributes of a material, component, or system in the fulfillment of user requirements (Sanoff, 1977, as cited in Özkan, 2011). It provides benefits in terms of evaluation of performance dimensions, determination and improvement of the qualities of the evaluated place. In this way, it becomes easier to design places that meet user needs and requirements at a high level and to ensure place satisfaction. As stated by Project Public Place (PPS, 2000), "Place Performance Evalution (PPE)" is a place-oriented improvement

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approach. Creates data for the programming process in the redesign process by determining the good and bad features of the place.
Performance is the measurable view of user needs, an abstract concept that cannot be observed (Aydın & Uysal 2009). For this reason, this research focused on the concept of "Open Place Performance". In order to evaluate the place performance, first of all, the features defining the place should be determined. In this context, Canter (1977) focused on the physical, social and perceptual features of the place, which originate from the ground theory. Salama (2018) reported that three basic elements could be used to analyze the performance of a built environment. The first included health, safety, and technical dimensions, the second included functional dimensions, and the third included psychological and social dimensions of user satisfaction. These place performance levels are an indicator of place satisfaction. In the present study, each open place attribute was analyzed as a performance indicator and the correlation between the spatial performance determined by the users and user satisfaction was tested.

Place satisfaction

Place satisfaction is described as the physical and social means that would meet the needs of individuals in a place (Stedman, 2002). The concept of satisfaction has attracted the attention of several researchers in the fields of recreation, tourism, and entertainment and was considered as the key to success in these fields (Sirgy, 2010; Ramkissoon, Smith & Weiler, 2013a). Canter and Rees (1982) defined the concept of satisfaction as the opportunities provided by a place that help users to achieve their goals. Stedman (2002) described place satisfaction as the perceived quality of a place and stated that it reflects the physical, functional, and perceptual dimensions of the place. In studies on satisfaction, the place is initially evaluated by the users. As mentioned above, in the interaction between the individual and place, the level of satisfaction created by the functional, social, and perceptual attributes offered by the place determines the satisfaction level (Stedman, 2002; Kyle, 2004; Özkan & Yılmaz, 2019). Thus, the question about the attributes of a location/place that would facilitate that would lead to satisfaction arises. The present study aimed to answer this question using the post-occupancy evaluation method and focused on the correlation between the functional, social, and perceptual attributes of the place and satisfaction (Figure 2).

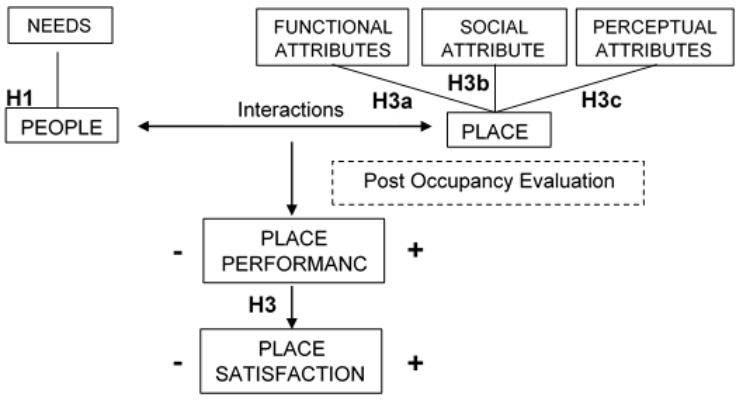

Figure 2. Research model

H1a. There is no significant difference between the sociodemographic variable of gender and functional, social, and perceptual attributes.
H1b. There is no significant difference between the sociodemographic variable of age and functional, social, and perceptual attributes.
H2. There is a significant difference between spatial occupancy characters and functional, social, and perceptual attributes.
H3. Overall spatial performance increases place satisfaction.
H3a. There is a positive correlation between place satisfaction and functional attributes.
H3b. There is a positive correlation between place satisfaction and social attributes.
H3c. There is a positive correlation between place satisfaction and perceptual attributes.

MATERIAL AND METHOD

Study Area

The present study aimed to determine the effects of functional, social, and perceptual attributes of urban open places on place performance and place satisfaction via post-occupancy evaluation. The study was conducted in the Arsin district of Trabzon province, located in the Eastern Black Sea region in Turkey (Figure 3).

Figure 3. Location of the study area (Source: Authors)

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Coastal recreation areas were built due to the increase in construction in Trabzon province and its surrounding areas and the resulting decrease in urban open places. The study area, which was designed within the context of urban transformation projects and completed in 2015, is very important in extending the potential of constantly decreasing green areas and the relationships between people and sea coast (Acar, 2015). Furthermore, Arsin Coastal Park-ACP was selected as the study area due to its diverse functional, social, and perceptual attributes, occupancy by all urban residents, and its focal location (Figure 4).

Figure 4. Variety of activities in the study area

Survey and Participants

It is expected that the spatial performance and the place satisfaction would increase as the level of fulfillment of user needs by the facilities provided by the place increases. Thus, the general framework of the present study included the determination of spatial performance and place satisfaction with the evaluation of the spatial functional, social, and perceptual attributes by the users (post-occupancy evaluation). The research design included the following main stages:

- Evaluation of the functional, social, and perceptual attributes of the selected coastal place by the users.
- Determination of the spatial performance level.
- Determination of the place satisfaction level.

- Determination of the correlations and causality between the above-mentioned factors by analyzing all collected data.

Based on the above-mentioned objectives, survey questions were constructed in two categories: functional, social, and perceptual attributes of the place, and place satisfaction. Each item was scored on a 5-point Likert-type scale (1 = strongly disagree, 5 = strongly agree). Subjects included randomly selected users of the Arsin coastal park. The questionnaires were applied to 243 individuals on weekdays and weekends. Data were entered, edited, and analyzed using the Statistical Package for Social Sciences (SPSS) Version 24.0.

Survey Instruments Used to Determine Functional, Social and Perceptual Attributes of the Coastal Place (Coastal Place Performance Evaluation)

As an area of interaction between individuals and the environment, coasts constitute an important part of the urban environment with their diverse functional, social, and perceptual attributes. People are attracted by these places based on the success of these functional, social, and perceptual attributes offered by coastal areas. This success is measured with the spatial performance which is the level that place fulfills the needs and requirements of the users.

In the first stage of the study, the functional, social, and perceptual attributes of the coastal place were analyzed and the answer to the question "which attributes are required to create places with a high-level performance" was determined. Thus, in the present study, user needs in urban open places (Maslow, 1954; Whyte, 1980; Francis, 2003), the attributes that successful open places should possess (PPS, 2000), the functional, social and perceptual analysis reported by Salama and Azzali (2015), and physical and social attributes of the place reported by Özkan and Yılmaz (2019) were used (Table 1). The indicators presented in Table 1 were analyzed with the post-occupancy evaluation method that includes the user evaluations to determine spatial performance.

Table 1. The categorization of urban open place attributes (developed based on Maslow, 1954; Whyte,1980; Francis; 2003; PPS, 2000; Salama and Azzali, 2015; Özkan & Yılmaz, 2019).

SETTING (OPEN PLACE)		
Functional attributes	**Social attributes**	**Perceptual attributes**
Diversity of use	Promoting effective user	Safety and security
Environmental	Social inclusivity	Personal place and privacy
Appropriateness of use	Diverse social group	Comfort and relaxation
Accessibility	Diverse social activities	Memorable landscape
Visibility	Interaction social group	Spatial experience
Clarity of edges and	Social accessibility	Reflecting local identity
Quality of landscape	Common uses	Attractiveness
Adaptability	Informal and formal	Legibility
Opportunity	Security (social)	Popularity of place
	Availability for daily	

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Survey Instruments for Place Satisfaction

The final stage of the research method was the determination of the place satisfaction levels of Arsin coastal area users. Stedman (2002) described place satisfaction as the perceived quality of a location and the physical and social attributes of a place that fulfills the user needs. Within the context of open places, the discussion on correlations between place, place attachment, and place satisfaction continues. However, there are no studies in the literature on the correlation between open place performance evaluation and place satisfaction. In this stage of the research methodology, the main objective was to determine the satisfaction with the place. Thus, a 3-item scale developed by Yuksel et al. (2010) and tested for validity and reliability was used.

A 5-point Likert-type scale (1 = strongly disagree, 5 = strongly agree) was utilized in both the main stages of the study. Data were entered, edited, and analyzed with SPSS Version 24 software. Descriptive statistics were used to determine individual and group means, percentages, and frequencies. To explain the place attributes and sub-dimensions, initially, KMO analyzes that demonstrate the fitness of the factor analysis were conducted. A principal component factor analysis that included varimax rotation with Kaizer normalization was run to explore the underlying environmental attribute dimensions. An eigenvalue of 1.00 or more was used to identify potential factors. Cronbach's reliability test was conducted on environmental attributes. Finally, regression analyzes were applied to test the correlation between place satisfaction and each spatial performance dimension.

RESULTS

Sociodemographic and Visitation Characteristics

Two hundred and forty-three Arsin Coastal Park users were included in the study. A total of 45.5% of the participants were female and 54.5% male and the mean participant age was 36.5 (SD = 16.08, age range: 18-70). The study was conducted in ACP on one weekday and one weekend day in May 2019. Occupancy frequency analysis demonstrated that the users mostly visited the place on weekends (38.5%, SD = 0.96, range: 1-5). Finally, occupancy duration analysis demonstrated that the users mostly spent 3-4 hours (32.4%, SD = 1.05, range = 1-5) in the park.

4.2. Coastal Place Performance Evaluation

In the study, factor analysis was conducted on 29 statements developed to assess the functional, social, and perceptual performances of the open places in ACP, and after several analyzes, the scales were finalized after various reliability tests that demonstrated the fitness in factor analysis. The principal components analysis with varimax rotation was conducted in 6 replicates. Finally, the 29-item open place performance analysis scale was reduced to 22 items that included 3 factors (Table 2). These factors explained 65.906% of the total variance. Kaiser Meyer Olkin (KMO) value

was determined as 0.906 and the Bartlett sphericity test was conducted (χ2: 4703.180, df: 236, p <0.001) to determine the fitness of the scale for factor analysis.

As a result of the exploratory factor analysis, the first factor was determined as "functional performance." This factor alone explained 43.367% of the total variance and included 8 items. The second factor was determined as "social performance." This factor explained 15.654% of the total variance and included 7 items. The third and final factor was determined as "perceptual performance." This factor explained 6.885% of the total variance and included 7 items. The analysis results revealed a three-factor, 22-item scale, and these three factors explained 65.906% of the total variance, and the reliability coefficient was determined as α:0.937.

Table 2. Principle component analysis of coastal place performance items

Construct / Indicators / Variables	Exploratory factor analysis (Varimax rotation)[a]				
	1	2	3	Mean[b]	S.D.[c]
Functional performance				3.44	1.312
3.This space allows various activities to take place	0.810	0.173	0.235	3.49	1.126
4. Suitable for architectural and landscaping elements	0.776	0.071	0.371	3.51	1.137
1. Reinforcement elements are comfortable and useful in this area	0.753	0.150	0.380	3.48	1.126
2.I can easily access this area	0.730	0.162	0.370	3.44	1.178
7.The form of the field is suitable for current uses	0.729	0.188	0.293	3.35	1.063
8.This area contains iconic elements that make it visible from a distance	0.690	0.288	0.315	3.51	1.042
6.This area has obvious boundaries / edges	0.654	0.151	0.331	3.46	1.110
5. Guidance elements are sufficient in this area.	0.642	0.308	0.071	3.30	1.152
Social performance				3.03	0.895
11. The space supports interaction and activities between people.	0.193	0.941	0.062	2.99	0.904
13.The area allows the use of many different social groups.	0.185	0.932	0.088	2.96	0.885
9. This area allows for daily encounters.	0.158	0.903	0.033	2.99	0.870
15. I can make eye contact with other people in this area.	0.102	0.871	0.016	3.14	.965
10. Various social activities take place in this area.	0.090	0.605	0.235	2.93	1.056
14. This area promotes interaction between different social groups.	0.146	0.589	0.194	2.89	.862
12. This space allows me to meet different people.	0.224	0.492	0.102	3.35	1.181
Perceptual performance				3.36	1.178
19. It gives the users a sense of security and security.	0.295	0.063	0.818	3.35	1.181
17. The physical design of the area supports the feeling of comfort and relaxation.	0.265	0.029	0.802	3.51	1.062
20. This area is fairly easy to navigate and navigate.	0.335	0.027	0.785	3.13	1.094

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16. This venue is recognized and used by local residents.	0.214	0.129	0.784	3.23	1.038
21. Spatial experience in this area is highly interesting.	0.293	0.128	0.747	3.31	1.110
22. The architectural and landscape character of this place reflects the identity of Trabzon.	0.216	0.292	0.636	3.49	1.126
18. This area constitutes an attractive area for those living in the region.	0.317	0.235	0.617	3.50	1.137
Initial eigenvalues	9.541	3.444	1.515		
% of variance	43.367	15.654	6.885		
Reliability (Cronbach alpha)	0.922	0.896	0.910		
Mean	27.53	20.87	23.14		
Variance	51.589	25.632	39.410		
Std. Deviation	7.183	5.063	6.278		
Kaiser-Meyer-Olkin (KMO): 0.906. Bartlett's Test p<0.001					

Place Satisfaction

The mean scores and standard deviations for the statements that aimed to assess the satisfaction levels of ACP users were determined. Exploratory factor analysis (EFA) was conducted on the statements that aimed to determine the place satisfaction and it was found that 3 items were included in a single factor that explained 77.049% of the total variance (Table 3). The mean spatial satisfaction level was 3.18.

Table 3. Frequency distribution for place satisfaction items and exploratory factor analysis

Construct / Indicators / Variables	Exploratory factor analysis (Varimax rotation)[a]		
Coastal Place Satisfaction	1	Mean[b]	S.D.[c]
I believe I did the right thing when I chose to visit this	0.955	3.05	0.992
Overall, I am satisfied with my decision to visit this	0.933	3.19	1.044
I am happy about my decision to visit this ACP	0.728	3.30	1.115
Initial eigenvalues	2.311		
% of variance	77.049		
Reliability (Cronbach alpha)	0.848		
Mean	3.18		
Varience	0.849		
Std. Deviation	0.9211		
Kaiser-Meyer-Olkin (KMO): 0.801. Bartlett's Test			
Note. Items coded on 5-point scales ranging from strongly disagree (1) to strongly agree (5).			

Relationships Between Place Performance, Place Satisfaction and Socio-demographics

Based on the ACP user evaluation findings, t-test and one-way analysis of variance (ANOVA) were used to determine whether spatial performance and place satisfaction levels differed based on gender, age, occupancy frequency, and duration (Table 4). Analysis results demonstrated that functional, social, and perceptual performance levels did not differ based on gender (H1a was accepted). Based on the age variable, functional and social performance perception of the place differed (H1b was rejected)

and it was determined that there was no difference between perceptual performance dimensions (H1b was accepted). There were statistically significant differences between the overall performances of spatial occupancy frequency and duration, and place satisfaction (H2 was accepted).

Table 4. Relationship between place performance, place satisfaction and socio-demographics

			Socio-demographic and visitation characteristics							
Factors			Sex		Age		Frequency of Use		Length of Use	
	Mean	SD	T	Sig.	F	Sig.	F	Sig.	F	Sig.
Functional	2.98	0.723	1.086	0.886	3.598	0.007	4.377	0.002	2.005	0.000
Social	3.44	0.897	1.335	0.249	2.737	0.030	8.253	0.000	11.787	0.000
Perceptual	3.30	0.896	0.937	0.937	1.107	0.354	2.595	0.037	18.959	0.000
Place satisfaction	3.18	0.9211	0.823	0.512	5.011	0.001	2.192	0.000	6.002	0.000
Overall Performance	3.07	1.044	0.419	0.518	1.287	0.276	4.021	0.004	3.120	0.016

Relationships Between Place Satisfaction and Place Performance Dimensions

Correlation analysis was conducted to determine the correlations between socio-demographic characteristics, spatial performance, and place satisfaction assessments of ACP users (Table 5). Correlation analysis findings demonstrated that there were no significant correlations between spatial satisfaction and performance dimensions and general performance and age and gender dimensions. There was a significant and positive correlation between overall performance and place satisfaction ($r = 0.540$ **; $p = 0.000$). The correlations between functional performance, social performance, and perceptual performance sub-dimensions of spatial performance were tested and positive and significant correlations were determined among these variables. The correlations between these variables and place satisfaction were as follows: functional performance ($r = 0.707$ **; $p = 0.000$) (H3a was accepted), social performance ($r = 0.565$ **, $r = 0.000$) (H3b was accepted), perceptual performance ($r = 0.384$ **; $p = 0.000$) (H3c was accepted).

DOI: 10.15320/ICONARP.2021.161

Table 5. Correlation analysis table

	G	A	FU	LU	FP	SP	PP	PS	OP
G	1								
A	0.072	1							
FU	0.021	-0.004	1						
LU	0.055	0.046	0.405**	1					
FP	0.075	-0.050	0.169**	0.178**	1				
SP	-0.018	-0.053	0.265**	0.402**	0.446**	1			
PP	0.026	0.062	0.155*	0.491**	0.334**	0.682**	1		
PS	0.041	-0.089	0.354**	0.364**	0.707**	0.565**	0.384**	1	
OP	0.003	-0.009	0.176**	0.216**	0.535**	0.456**	0.270**	0.540**	1

G: Gender, A: Age, FU: Frequency of Use, LU: Length of Use, FP: Functional Performance, SP: Social Performance, PP: Perceptual Performance, PS: Place Satisfaction, OP: Overall Performance

Regression analysis was conducted to determine the effects of spatial performance and its sub-dimensions on place satisfaction (Table 6). The regression analysis results revealed that 32.6% of spatial satisfaction could be predicted by functional performance, 12.4% by social performance, and 5.1% by perceptual performance. The overall performance level could predict 49.6% of place satisfaction (H3 was accepted).

Table 6. Regression analysis using place performance factors to predict place satisfaction

Model		B	Std. Hata	β (Beta)	t	p
	Constant	3.182	0.049		65.609	0.000
	Functional Performance	0.528	0.049	0.574	10.871	0.000
R=0.574; R^2=0.329; Adj. R^2=0.326; Model $F_{(1-241)}$ = 118.180; p<0.01						
	Constant	3.182	0.055		57.536	0.000
	Social Performance	0.329	0.055	0.357	5.935	0.000
R=0.357; R^2=0.128; Adj. R^2=0.124; Model $F_{(1-241)}$ = 35.222; p<0.01						
	Constant	3.182	0.058		55.287	0.000
	Perceptual Performance	0.216	0.058	0.235	3.748	0.000
R=0.235; R^2=0.055; Adj. R^2=0.051; Model $F_{(1-241)}$ = 14.047; p<0.01						
	Constant	0.692	0.167		4.153	0.000
	Overall Performance	0.724	0.047	0.706	15.454	0.000
R=0.706; R^2=0.498; Adj. R^2=0.496; Model $F_{(1-241)}$ = 238.833; p<0.01						

Regression analysis was conducted again to determine the prediction level of all variables on place satisfaction (Table 7). Regression analysis results demonstrated that it was not possible to add the occupation duration variable, which correlated with place satisfaction, to the model. In Table 6, it could be observed that all spatial performance factors predicted place satisfaction. The figures gradually increased and at the

last step, the R2 value was calculated as 0.537. The analysis was consistent with the linear model (F(4-237)= 71.002; p=0.000) and autocorrelation was not observed. Thus, it was demonstrated that spatial performance factors had significant positive effects on place satisfaction.

Table 7. Regression analysis using all independent variables to predict place satisfaction

Model		B	Std.	β (Beta)	t	p
4	Constant	2.724	0.121		22.593	0.000
	Functional Performance	0.491	0.042	0.531	11.172	0.000
	Social Performance	0.324	0.040	0.351	8.013	0.000
	Perceptual Performance	0.196	0.041	0.213	4.815	0.000
	Frequency of Use	0.174	0.043	0.183	4.005	0.000
R=0.738; R^2=0.545; Adj. R^2=0.537; Model $F_{(4-237)}$ = 71.002; p<0.01						

In conclusion, the study demonstrated the findings on the analysis of socio-demographic characteristics, spatial visit character, open place performance criteria, place satisfaction, and all of these attributes. All study findings confirmed all hypotheses except the *H2b* hypothesis.

DISCUSSION AND IMPLICATIONS

This study was examined based on place-oriented performance evaluation and it was seen that the open place performance was explained in 3 dimensions as functional, social and perceptual. Analysis of the study findings demonstrated that functional, social, and perceptual performance criteria did not differ based on the gender variable. It was found that age socio-demographic variable differed based on functional and social performance dimensions, but not based on the perceptual performance dimension. It could be suggested that the difference between functional and social performance dimensions based on age was due to the differences between the physical and social needs of the age groups. A significant difference was determined between functional, social, and perceptual performance levels based on occupancy frequency and duration. This finding was consistent with the previous study findings that the occupancy frequency and duration in a place correlated with the level that the place fulfilled user requirements (Whyte, 1980; Ali & Nawawi, 2006; Insch & Florek, 2008; Ramkissoon, 2013b).

Analysis of the study findings based on the attributes of the place revealed that the coastal place performance evaluation included a 3-dimensional structure (functional, social, and perceptual). This result supports Salama et al (2017)'s open place classification in Glasgow city center. The highest impact was observed with functional performance and the lowest impact was observed with the social performance dimension. Analysis of the spatial organization in ACP demonstrated that various activities could be conducted in that place. Therefore, the higher

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impact of the functional performance dimension was an expected outcome. The design character of the field was readable and distinguishable since its construction was linear. However, the low level of spatial social performance could be explained by the disadvantages of this linear design approach. Analysis of the locations of the seating and activity areas where users could interact (Figure 2) revealed that the socio-fugal approach was predominant. This approach prevents inter-user communication and eye contact. However, it was observed that the functional, social, and perceptual performances of the park were at medium and high levels. Today, the functionality of a place is very important in human-environment interaction. People prefer places where they can fulfill their specific needs and behaviors to fulfill these needs (Mazumdar & Mazumdar; Özkan & Yılmaz, 2019). Thus, place is experienced, leading to occupancy diversity and socialization. Gehl (2011) emphasized the importance of the functional attributes of the place by stating that humans and human activities attract other individuals to that place. Similarly, Madureira et al. (2018), who studied the preference levels in urban open places in 3 Portuguese cities, reported that structural and functional diversity positively affected the preference levels in parks. The fact that especially the diversity of parent-child activities in the ACP park was higher when compared to other parks in the area was also a determinant of the functional performance level. Analysis of the high scored statements in the functional performance dimension demonstrated that the statements "architectural and landscape elements are functional" (Item 4) and "the area included iconic elements that were visible from a distance" (Item 8) exhibited the highest score with a mean score of 3.51. This could be explained by the presence of open green areas and the diversity of activity areas such as children's playgrounds, watching the sea, fishing, sitting, resting, walking, and jogging. Furthermore, the construction of the red bridge as an iconic spatial element made the area perceptible and attracted people. The statement with the highest score in the social performance dimension was "the area allows me to meet different people" (Item 12) with a mean score of 3.35. In the perceptual performance dimension, the statement "the physical design of the place supports the feelings of comfort and relaxation" (Item 17) had the highest mean score of 3.51. The linear spatial design and the presence of open green areas led to a clear and legible place. Furthermore, avoiding elements that could prevent visual communication and affect the user's sense of safety in planting design could be associated with high perceptual performance.

Analysis of the spatial satisfaction in ACP revealed that the satisfaction level was moderate (3.18). To determine the place satisfaction level, initially, the post-occupancy evaluation process, which is the evaluation of the place by the users, was conducted. The satisfaction level, which was described as the result of the comparison between the expectations and real experiences of the users, is an important indicator in the evaluation of the activity areas in urban open places (Kyle et al., 2004; Insch, A., &

Florek, 2008; Ramkissoon et al. 2013b, Özkan et al., 2015). The present study aimed to measure the place satisfaction with spatial performance evaluation. The study findings demonstrated that overall spatial performance positively correlated with place satisfaction (r = 0.540 **; p = 0.000) and predicted 49.6% of place satisfaction. Thus, overall spatial performance would alone explain almost half of the satisfaction. Functional performance (32.6%), social performance (12.4%), and perceptual performance (5.1%) had a significant and positive impact on satisfaction.

Analysis of the effects of all variables on place satisfaction demonstrated that the variables included in the model were functional, social, perceptual performance dimensions, and occupancy frequency (54.5%). Age, gender, and occupancy duration were not included in the model. Previous studies reported that socio-demographic factors affected place satisfaction. Lee et al. (2017) reported that there was a positive correlation between age and satisfaction. In the present study, the age variable had no significant and positive effect on satisfaction. Grogan - Kaylor et al. (2006) and Lovejoy et al. (2010) reported that the age variable had no significant effect on satisfaction. The present study findings were consistent with the results of these studies in the literature. On the other hand, several studies reported that environmental character positively affected satisfaction (Amerigo & Aragones, 1997; Howley, Scott & Redmond, 2009; Kweon et al.2010; Özkan et al .; 2015; Lee et al., 2017). However, there are only a few studies in the literature that explained place satisfaction with spatial performance dimensions. The present study differed from previous studies by describing the role of environmental performance dimensions in a coastal open place in increasing place satisfaction.

CONCLUSION AND RECOMMENDATIONS

The present study focused on the analysis of functional, social, and perceptual attributes of the place with the post-occupancy evaluation (POE) method and aimed to investigate the effects of these attributes on place satisfaction. Thus, the study area was selected since it possessed various physical and social facilities, served a wide variety of users, was easily accessible coastal open place, and one of the large-scale transformation projects constructed in recent years.

One of the important contributions of this research is the evaluation of open place features within the scope of performance criteria and to investigate their effects on place satisfaction.There are studies in the literature that evaluated urban open place satisfaction. However, there are no studies that investigated the effects of open place performance criteria on place satisfaction using the post-occupancy evaluation (POE) method.

One of the most important properties of habitable and highly preferred urban environments is the facilities that place provides to serve all urban

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residents and that fulfill their needs and requirements. In this context, it is very important to investigate the environmental properties of the projects conducted with a focus on tourism and recreation and satisfy the user needs. The present study focused on the functional, social, and perceptual dimensions of environmental properties. Thus, considering the diversity of environmental properties, it could not be claimed that the present study methodology and findings revealed all environmental dimensions that affect satisfaction. In addition, this research, despite the variety of users it contains, still contains a local use. The research area can be diversified to evaluate the relationship between use of place and satisfaction in different cities or regions. These should be stated as the limitations of the research. Despite these limitations of the research, however, given that the widely studied spatial performance dimensions were investigated in public buildings, the present study, which was conducted in an urban open place, presented different findings. Factors that contribute to satisfaction with environmental properties should be taken into consideration, especially in the relationship between humans and the environment. These findings could serve as a guideline for urban administrators in improving urban open place satisfaction.

CONFLICT OF INTEREST
There is no conflict of interest within the scope of the study.

FINANCIAL DISCLOSURE
The authors declared that this study has received no financial support.

ETHICS COMMITTEE APPROVAL
Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS
In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions and organizations) during the survey, in-depth interview, focus group interview, observation or experiment.

REFERENCES

Acar, C. (2015). Kent parkları olarak kıyı dolgu alanlarının değerlendirilmesi; Arsin sahil yolu dolgu alanı çevre ve peyzaj tasarım projesi, *Plant Peyzaj ve Süs Bitkiciliği Dergisi*, 38-47.

Ali, S. M. & Nawawi, A. H. (2006). Factors that influence users' satisfaction on urban park, *Built Environment Journal*, 3(2), 42-138.

Amérigo, M. & Aragones, J. I. (1997). A theoretical and methodological approach to the study of residential satisfaction, *Journal of environmental psychology*, 17(1), 47-57.

Aydın, D. & Uysal, M. (2009). Mimari program verilerinin mekân performansının değerlendirilmesi yoluyla belirlenmesi (Eğitim Fakültesi Örneği), *Erciyes Üniversitesi Fen Bilimleri Enstitüsü Dergisi*, 25(1-2), 1-23.

Bonaiuto, M., Aiello, A., Perugini, M., Bonnes, M., & Ercolani, A. P. (1999). Multidimensional perception of residential environment quality and neighbourhood attachment in the urban environment, *Journal of environmental psychology*, 19(4), 331-352.

Canter, D. (1977). *The psychology of place* (London).

Canter, D., & Rees, K. (1982). A multivariate model of housing satisfaction, *Applied Psychology*, 31(2), 185-207.

Carr, S., Francis, M., Rivlin, L. G. & Stone, A. M. (1992). Needs in public place. na.

Francis, M. (2003). *Urban open place: Designing for user needs*. Island Press.

Gehl, J. (2011). *Life between buildings: using public place*. Island press.

Grogan-Kaylor, A., Woolley, M., Mowbray, C., Reischl, T. M., Gilster, M., Karb, R. & Alaimo, K. (2006). Predictors of neighborhood satisfaction, *Journal of Community Practice*, 14(4), 27-50.

Howley, P. Scott, M. & Redmond, D. (2009). Sustainability versus liveability: an investigation of neighbourhood satisfaction, *Journal of Environmental Planning and Management*, 52(t6), 847-864.

Insch, A. & Florek, M. (2008). A great place to live, work and play: Conceptualising place satisfaction in the case of a city's residents, *Journal of Place Management and Development*, 1(2), 138-149.

Jorgensen, B. S. & Stedman, R. C. (2001). Sense of place as an attitude: Lakeshore owners attitudes toward their properties. *Journal of Environmental Psychology*, 21(3), 233-248.

Kweon, B. S. Ellis, C. D. Leiva, P. I. & Rogers, G. O. (2010). Landscape components, land use, and neighborhood satisfaction, *Environment and Planning B: Planning and Design*, 37(3), 500-517.

Kyle, G. Graefe, A. Manning, R. & Bacon, J. (2004). Effect of activity involvement and place attachment on recreationists' perceptions of setting density, *Journal of Leisure Research*, 36(2), 209-231.

Lang, J. (1994). *Urban design: the American experience*. John Wiley & Sons.

Lang, J. T. (1987). *Creating architectural theory: The role of the behavioral sciences in environmental design (p. 205).* New York: Van Nostrand Reinhold.

Lee, S. M. Conway, T. L. Frank, L. D. Saelens, B. E. Cain, K. L. & Sallis, J. F. (2017). The relation of perceived and objective environment attributes to neighborhood satisfaction. *Environment and Behavior*, 49(2), 136-160.

DOI: 10.15320/ICONARP.2021.161

Lovejoy, K. Handy, S. & Mokhtarian, P. (2010). Neighborhood satisfaction in suburban versus traditional environments: An evaluation of contributing characteristics in eight California neighborhoods, *Landscape and Urban Planning*, 97(1), 37-48.

Madureira, H., Nunes, F., Oliveira, J. & Madureira, T. (2018). Preferences for urban green space characteristics: a comparative study in three portuguese cities, *Environments*, (5) 23.

Mazumdar, S. & Mazumdar, S. (2004). Religion and place attachment: A study of sacred places, *Journal of Environmental Psychology*, 24(3), 385-397.

Mumcu, S., Yılmaz, S. & Düzenli, T. (2017). Açık mekanlardaki oturma donatılarının ve yerlerinin tasarımına ilişkin faktörler, *İnönü Üniversitesi Sanat ve Tasarım Dergisi*, 7(15), 1-16.

Özkan, D. G. (2011). *Kentsel açık mekanlarda kullanım sonrası değerlendirme: trabzon sahil bandı örneği* (Yüksek Lisans Tezi), Karadeniz Teknik Üniversitesi Fen Bilimleri Enstitüsü, Trabzon.

Özkan, D. G. & Yilmaz, S. (2019). The effects of physical and social attributes of place on place attachment: a case study on Trabzon urban squares. *Archnet-IJAR: International Journal of Architectural Research*, 13(1), 133-150.

Özkan, D. G., Alpak, E. M., Yilmaz, S., Düzenli, T. & Ozbilen, A. (2015). post occupancy evaluation and user satisfaction in urban open place, *Fresenius Environmental Bulletin*, 24(5), 1659-1672.

Preiser, W. F. (2001). *The evolution of post-occupancy evaluation: Toward building performance and universal design evaluation, Learning from our buildings a state-of-the practice summary of post-occupancy evaluation*. National Academy Press.

Preiser, W. F. E., Rabinowitz, H. R. & White, E. T. (1988). *Post Occupation Evaluation*. Van NostrandReinhold, New York, London, Melbourne.

Preiser, W. F. & Nasar, J. L. (2008). Assessing building performance: Its evolution from post-occupancy evaluation, *International Journal of Architectural Research: ArchNet-IJAR*, 2(1), 84-99.

Project for Public Places (Ed.). (2000). *How to turn a place around: a handbook for creating successful public places*. Project for Public Places Incorporated.

Ramkissoon, H., Smith, L. D. G. & Weiler, B. (2013a). Testing the dimensionality of place attachment and its relationships with place satisfaction and pro-environmental behaviours: A structural equation modelling approach. *Tourism management*, 36, 552-566.

Ramkissoon, H., Smith, L. D. G. & Weiler, B. (2013b). Relationships between place attachment, place satisfaction and pro-environmental

behaviour in an Australian national park, *Journal of Sustainable Tourism*, 21(3), 434-457.

Salama, A. (2018). Neo-liberalism and the Architecture of the Post Professional Era. Sadri,H.(Ed.), *Post-professional Architecture and Academia*(p.271).

Salama, A. M. & Azzali, S. (2015). *Examining attributes of urban open places in Doha.* Proceedings of the Institution of Civil Engineers-Urban Design and Planning, 168(2), 75-87.

Salama, A. M., Remali, A. M. & MacLean, L. (2017). Characterisation and systematic assessment of urban open places in Glasgow city centre. *Spatium*, 22-33.

Shehab, N. & Salama, A. M. (2018). The spatiality of segregation: narratives from the everyday urban environment of Gothenburg and Glasgow, *ArchNet-IJAR: International Journal of Architectural Research*, 12(1), 71-90.

Sirgy, M. J. (2010). Toward a quality-of-life theory of leisure travel satisfaction, *Journal of Travel Research*, 49(2), 246-260.

Stedman, R. C. (2002). Toward a social psychology of place: Predicting behavior from place-based cognitions, attitude, and identity. *Environment and Behavior*, 34(5), 561-581.

Whyte, H.W. (2000). *How to Turn a Place Around, Projects for Public Place*, p. 52, New York, NY.

Whyte, W. H. (1980). *The social life of small urban places*. Project for Public Spaces.

Williams, D. R. & Vaske, J. J. (2003). The measurement of place attachment: Validity and generalizability of a psychometric approach. *Forest Science*, 49(6), 830-840.

Zorlu, F. (2008). Kentsel doku-ulaşım sistemi ilişkileri, *Metu Journal of The Faculty of Architecture,* 25(1).

Resume

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Analysis of Perceptions of Driver Abilities and Behaviors in Urban Transportation with Respect to Gender Identity

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Abstract

Purpose

Gender inequality is a significant social problem of urban transportation planning. In this context, the main purpose of this study is to determine the stereotypes about the genders of drivers in Turkey. Additionally, the study also aims to reveal the relationship between the talents and behaviors of drivers and gender perceptions.

Design/Methodology/Approach

This study used a hybrid model which allows the use of qualitative and quantitative methods together. The survey method and focus group meetings were utilized at the stage of data collection. In the study, the quota sampling method was applied. The sample consisted of 1239 participants who lived in the province of Konya in Turkey, had a driver's license, drove more than 10 minutes a day and were between 18 and 68 years old. The questionnaires presented to the participants consisted of three parts. The first part included items on the demographic structure of the sample and driving information, the second part included the female driver evaluation form, and the third part included the male driver evaluation form. These driver evaluation forms were prepared as Likert-type scales in the form of a 37-item sets of perception/bias created by benefiting from the literature and focus group interviews.

Findings

Men are perceived more positively in terms of vehicle maintenance and driving ability. It is stated that female drivers have more positive driving behaviors than male drivers. The participants who are female, university graduates or whose spouse drives the car have biases that are significantly free from gendered role attitudes.

Research Limitations/Implications

The fact that the study was conducted only in a sample from Konya and the small number of focus groups that were interviewed constituted the limitations of the study.

Social/Practical Implications

Gender inequality is a significant social problem of urban transportation planning. To achieve social integration and utilize urban services more effectively, it is needed to try to eliminate prejudices/negative perceptions towards gender in traffic.

Originality/Value

This study, where determination of stereotypes regarding the gender of drivers and driver perceptions were focused on, is significant especially in terms of the literature in Turkish and has a unique value.

Keywords: *Driver perceptions, driver stereotypes, gender differences, gender-based biases*

INTRODUCTION

Participation in urban activities, and in local transportation as a result of this, play an important role in social integration. When local transportation modes are analyzed, it is seen that the use of private vehicles is often a desired type of transportation because it provides flexibility (freedom) in terms of time and space to individuals. When urban sprawl is added to this situation, the demand for private vehicles is increasing day by day. Especially in cities where public transportation is insufficient, and urban activities are at long distances, this increase also brings traffic accidents with it. While the attitudes of drivers towards traffic safety and "being a good driver" gain importance in in-city transportation, criteria for a good driver are mostly associated with gender. Accordingly, Kose (2014) stated that automobile culture consists of a system of universal and similar rules, and being a good driver carries national and gender-related characteristics. In the literature, it is seen that, although national characteristics differ, perceptions based on the gender of drivers are mostly similar (Lajunen et al., 2004; Ozkan et al., 2006; Warner et al., 2011). For example, in most cultures, there is a cliché (stereotype) that women are careless and bad drivers (Granié & Papafava, 2011; Berger, 1986; Glendon et al., 1996; Yeung & von Hippel, 2008). On the other hand, not complying with traffic rules (high speed, not wearing seatbelt, running red lights, harassing other drivers) and performing risky behaviors are associated with masculinity. Additionally, in the literature, the dominant view is that men are agile and brave drivers, while women are held back and hesitant (Unal et al., 2017). This way, both driving talent and risk are associated with gender. Nevertheless, perceptions that men are better drivers contradict accident statistics. Accordingly, the rate of male drivers to be involved in a fatal accident is higher than that among female drivers (the Insurance Institute for Highway Safety reported that 71% of those dying in motorized vehicle accidents are male drivers (IIHS, 2017), while this rate is 76.3% in Turkey (EGM, 2016)).

In line with this information, the main purpose of this study is to determine various stereotypes towards the gender of drivers in Turkey. In this context, first of all, explicit and implicit biases were investigated. A review of the literature was utilized for explicit biases, while the focus group meetings were used for implicit biases. As a result of this research, a 37-item questionnaire form was created (Table 1). This questionnaire applied in the Konya sample revealed driver skill and behavior perceptions based on gender.

Gendered Role Attitudes towards Driver Behaviors, Traffic Safety and Risk-Taking: Explicit Biases

The mortality rate due to road traffic accidents was 18% per 100,000 people, and about 80% of these deaths occurred in middle-income countries, which make up 72.2% of the world's population (WHO, 2013). This difference between countries mainly depends on road

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infrastructure, traffic density on roads, availability of public transportation and behavioral and demographic factors. Additionally, driving speed, climate and weather conditions, driver behavior and experiences are also effective in traffic accidents (Juhnke et al., 1995). In Turkey, however, a large proportion of road traffic accidents (88.4%) are seen to be caused by driver mistakes (EGM, 2019). Several variables such as physical and social environment, personal characteristics, age, intercultural difference, gender differences and experience affect driver behavior and mistakes (Hoare, 2007; Stanton & Salmon, 2009; Teye-Kwadjo, 2011). Since this study focuses on the context of gender, it relies on skill, safety and risk-taking dimensions and female and male driver behaviors in the literature research. Regarding driving abilities, the perception that female drivers are seen as unskilled (Glendon et al., 1996), and women have more difficulty in reversing and in parking vehicles is high (Derks et al., 2011; Lawrence & Richardson, 2005; Wolf et al., 2010). Lack of driving skills for female drivers (compared to male drivers) is associated with panic, unstable and anxious moods, poor speed control and distractibility (Glendon et al., 1996; Lawrence & Richardson, 2005).

In terms of safety, on the other hand, compared to male drivers, female drivers are seen as driving safer and having less accidents involving death (Akerstedt & Kecklund, 2001; Kim et al., 2008; Ma & Yan, 2014; Massie et al., 1995; Santamarina-Rubio et al., 2014; Zhou et al., 2015). Indeed, Rosenbloom et al. (2009) found that male drivers were more dangerous in traffic than female drivers. Likewise, it is known that male drivers display behaviors that will endanger traffic like drunk driving, smoking while driving, improper passing, neglecting traffic rules, not wearing seatbelt, not complying with following distance and not giving way to other vehicles or pedestrians more frequently (Goodman et al., 1991; Massie et al., 1995; Sullman et al., 2017; Tavris et al., 2001). Another security breach is the use of mobile phones by drivers of whom most are males and the use of smartphone apps, social media and shared mobility services cause serious accidents (Caird et al., 2008; Fountas et al., 2019; Gulliver & Begg, 2004; Klauer et al., 2006; McEvoy et al., 2006; Wang et al., 2010). Examining the risk-taking behavior that has a negative impact on traffic accidents (Bamberg et al., 2003; Parker et al., 1992; Ram & Chand, 2016; Sabey & Taylor, 1980), it is seen that, again, men exhibit more aberrant driving in general (Glendon et al., 2014; Rhodes & Pivik, 2011; Rowe et al., 2015; Wang et al., 2002). Besides, according to findings in the literature, in comparison to female drivers, male drivers are more likely not to let other vehicles pass, to toot their horn frequently and to disturb others by cutting across another driver (Shinar & Compton, 2004; Stephens & Sullman, 2015).

Driver Gender in Turkey: Implicit Biases

The population with a driver's license in Turkey is 27,481,703, and among these, 76.2% are male, and 23.8% are female (EGM, 2016). The

small proportion of female drivers may be associated with the culture, patriarchal social structure and female poverty.

In comparison to developed countries, women's participation in social life by breaking the norms is a newer phenomenon for Turkey. Therefore, female drivers are also a new phenomenon (Unal et al., 2017). Factors such as imposing gender roles at a young age culturally by the family and teaching girls to do housework and boys to drive cars provide men with many years of driving experience. Women, on the other hand, in general, can get behind the wheel only after graduation (Hacisalihoglu, 2017). While this is the case in Turkey, the common perception is that women are bad drivers. Similarly, in their interviews with female drivers and engine operators working in the transportation sector in Ankara in Turkey, Ulutas et al. (2016) determined a prevalent perception that women cannot drive well. They also observed that male drivers displayed rude and belittling attitudes towards their female counterparts. Aycan and Aycan (2014) stated that women were perceived as “drivers endangering traffic”. In their study conducted in Trabzon in Turkey, Hacisalihoglu (2017) reported that women were perceived as “drivers who make mistakes”.

In the literature in Turkey, studies on the gender of drivers are highly limited. Therefore, in this study, qualitative analysis (including focus group meetings) was carried out to determine various prejudices/perceptions towards the gender of drivers in Turkey.

METHODOLOGY AND DATA COLLECTION

The study included a hybrid model which allows the use of qualitative and quantitative methods together. The purpose of using a hybrid model was to increase the reliability of the study. In this context, qualitative methods at the stage of data collection and quantitative methods at the stage of analysis were used. To determine gender perceptions regarding driver attitudes and behaviors, in addition to findings in the literature, focus group meetings were utilized. The literature review revealed explicit biases, while the focus group meetings revealed implicit biases. As a result of findings obtained from the literature and biases and perceptions revealed in the focus group meetings, questionnaires were designed (Table 1).

The questionnaires consisted of three parts. The first part included items on the demographic structure of the sample (age, gender, educational status, marital status) and driving information (how often the participant drives per week; driving time; if married, whether the spouse drives). In the second part, there was a 37-item female driver evaluation form, while the third part included a male driver evaluation form consisting of the same questions (Table 1).

With the help of these two forms in the questionnaires, the participants had the opportunity to state their perceptions about the skills and behaviors of their own gender and the opposite gender (for example, the female participants scored both the female and male driver evaluation

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forms). A 9-point Likert-type scoring system was applied in these questionnaire forms (1: absolutely disagree, 9: absolutely agree). The reason for preferring 9-point Likert-type scales was that scales consisting of 2, 3 or 4 options are considered to have "the lowest", those consisting of 5 or 6 options are considered to have "moderate", and those consisting of 7-10 options are considered to have "the highest" reliability (Preston & Colman, 2000). To prevent false readings and facilitate evaluation, only negative sentence patterns were included in the item sentences.

Table 1. Items used in the questionnaire (Women/Men are abbreviated as W/M)

Item No	Description	References	Item No	Description	References
1	W/M drive fast enough to endanger traffic	Glendon et al., 1996; Lawrence & Richardson, 2005; Brison, 1990; Mangiaracina & Palumbo, 2007	20	W/M overtake improperly	Brison, 1990; Mangiaracina & Palumbo, 2007; Brookland et al., 2010; Vanlaar & Yannis, 2006
2	W/M have difficulty driving in bad weather	Akanbi et al., 2009; Bone & Mowen, 2006; Silas et al., 2011	21	W/M have difficulty in parallel parking	Derks et al., 2011; Lawrence & Richardson, 2005; Wolf et al., 2010
3	W/M panic in case of potential danger	Glendon et al., 1996; Lawrence & Richardson, 2005	22	W/M do not give priority to cyclists	Goodman et al., 1991; Massie et al., 1995; Sullman et al., 2017; Tavris et al., 2001
4	W/M lack first-aid knowledge	Akanbi et al., 2009; Bone & Mowen, 2006; Silas et al., 2011	23	W/M drive too close to the wheel	Focus group interview
5	W/M do not know the meaning of traffic signs	Akanbi et al., 2009; Bone & Mowen, 2006; Silas et al., 2011	24	W/M toot horn very often	Shinar & Compton, 2004; Stephens & Sullman, 2015
6	W/M do not notice that their cars are malfunctioning	Focus group interview	25	W/M delay their vehicle controls	Focus group interview
7	W/M do not let pedestrians pass	Goodman et al., 1991; Massie et al., 1995; Sullman et al., 2017; Tavris et al., 2001	26	W/M have difficulty in driving in heavy traffic	Focus group interview
8	W/M's reflexes are weak while driving	Glendon et al., 1996; Lawrence & Richardson, 2005	27	W/M constantly stay on the left lane	Focus group interview
9	W/M use mobile phone while driving	Caird et al., 2008; Fountas et al., 2019; Gulliver & Begg, 2004; Klauer et al., 2006; McEvoy, et al., 2006; Wang et al., 2010	28	W/M do not give priority to other drivers	Shinar & Compton, 2004; Stephens & Sullman, 2015
10	W/M have difficulty finding directions while driving	Focus group interview	29	W/M put on the brakes suddenly and hardly	Focus group interview
11	W/M are distracted quickly while driving	Glendon et al., 1996; Lawrence & Richardson, 2005	30	W/M do not wear a seatbelt	Goodman et al., 1991; Massie et al., 1995; Sullman et al., 2017; Tavris et al., 2001
12	W/M drive slowly enough to endanger traffic	Focus group interview	31	W/M have difficulty in filling an accident report	Focus group interview

13	W/M have difficulty in driving in reverse gear	Derks et al., 2011; Lawrence & Richardson, 2005; Wolf et al., 2010	32	W/M have difficulty in parking in the right angle	Derks et al., 2011; Lawrence & Richardson, 2005; Wolf et al., 2010
14	W/M do not follow the traffic lights	Goodman et al., 1991; Massie et al., 1995; Sullman et al., 2017; Tavris et al., 2001	33	W/M insult other drivers in traffic	Shinar & Compton, 2004; Stephens & Sullman, 2015
15	W/M are often involved in crashes	Focus group interview	34	W/M smoke or drink alcohol while driving	IIHS, 2017; Brison, 1990; Mangiaracina & Palumbo, 2007
16	W/M have difficulty using vehicle mirrors	Focus group interview	35	W/M have difficulty in driving on their own lane	Focus group interview
17	W/M fight in traffic, insult other drivers	Focus group interview	36	W/M do not know the right of way	Akanbi et al., 2009; Bone & Mowen, 2006; Silas et al., 2011
18	W/M do not prepare their cars for climatic conditions	Akanbi et al., 2009; Bone & Mowen, 2006; Silas et al., 2011	37	W/M have difficulty in maintaining a safe following distance	Goodman et al., 1991; Massie et al., 1995; Sullman et al., 2017; Tavris et al., 2001
19	W/M forget to use their turn signal	Akanbi et al., 2009; Bone & Mowen, 2006; Silas et al., 2011			

In this study, 4 hypotheses were determined and evaluated for detection of perceived attitudes and behaviors (biases) related to driving in the context of gender.

Hypothesis 1. Female drivers are more positive than males while evaluating the driving skills and behaviors of their same-sex drivers.

Hypothesis 2. As age increases, positive perceptions towards female drivers increase.

Hypothesis 3. Gender discrimination towards drivers' abilities and behavior decreases as the level of education increases.

Hypothesis 4. In a driver's assessment, being married and the fact that the wife drives the car reduces gender discrimination.

Study Area and Participants

Konya, which is the largest city in terms of surface area and 7th in terms of population in Turkey, is an automobile-dependent city due to its widespread settlement pattern and inadequate public transportation systems and was therefore chosen as the case study area. According to the data received from the Konya Provincial Security Directorate, among 818,931 individuals having driving licenses in the Konya city, 76.8% are male, and 23.2% are female. Since 88.4% of the road traffic accidents in Turkey arise from automobile driver mistakes (EGM, 2019), the study is limited to drivers who use an automobile.

To achieve a balanced distribution in the questionnaires (age, education, gender, marital status, duration of driving, etc.), the quota sampling method was applied. According to the questionnaire directives (quotas), each of the interviewers was asked to conduct at least 16 questionnaires, ensure the participation of individuals aged over 18 with Class-B Driving License residing in Konya, ensure that at least 5 of

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the questionnaires shall contain the opposite sex, ensure that there were at least 2 primary, high school and university graduates in the questionnaires, ensure that at least 3 people were married, and their spouse drove, exclude drivers with 1-9 minutes of automobile travel (daily). Due to the quota to be applied, 86 volunteering pollsters conducted more than the 16 questionnaires that were asked of them in public and semi-public spaces and eliminated the forms that did not comply with the directive. The high number of pollsters made it easier to eliminate the incompliant forms. After checking 1376 forms complying with the directive, 137 forms were eliminated due to inconsistent responses. With the remaining 1239 driver forms, the error rate of the sample was determined as 2.78 (in a 95% confidence interval).

ANALYSIS AND FINDINGS

The constant comparative analysis method was utilized in the focus group meetings. The main purpose of this analysis method is to reveal the themes in the dataset.

Descriptive statistics were utilized while assessing the questionnaire data. The data were analyzed by using the SPSS 25.0 and AMOS 22.0 programs. In the study, as they would increase the value of the error variance, whether or not outliers were in the examined dataset was checked. The outliers were determined on the Box Plot and removed from the dataset. Compatibility with normal distribution was determined by looking at the Q-Q Plots (Chan, 2003) and skewness and kurtosis values. Data are accepted to have a normal distribution if the skewness and kurtosis values are in the range of ±3 (Shao & Zhou, 2002).

The data of the Likert-type scale for the female driver evaluation form of the questionnaire were normally distributed. Therefore, parametric tests were used. Independent-samples t-test was used for the difference between two groups, and one-way analysis of variance (ANOVA) was used in comparing the mean values of more than two groups. The data of the male driver evaluation form were not normally distributed. Therefore, nonparametric tests were used in the evaluations. Mann-Whitney U test was used for the difference between two groups, while Kruskal Wallis analysis was used for comparisons of more than two groups. Reliability Analysis was conducted to test the reliability of the items, while Exploratory Factor Analysis (EFA) was performed to test the construct validity, and Confirmatory Factor Analysis (CFA) was performed to test the fit of the model. In the exploratory factor analysis, Kaiser-Meyer-Olkin (KMO) test was applied to test the compatibility of the sample size for factor analysis.

Focus Group Meeting Findings

As stated in the previous sections of the study, the focus group meetings were held to reveal implicit biases/perceptions towards female and

male drivers. Additionally, the findings from the focus group interviews were utilized in questionnaire design (Table 1).

The focus group meetings were held with 13 individuals (four male traffic police officers, two female transportation planners, two male and two female driving instructors, two male bus drivers). In the interviews, it was determined that perceptions regarding drivers differed based on the group characteristics. For example, women complained of the following biases against their same-sex drivers: frequently being involved in crashes, using mirrors for putting on make-up, not being able to step on the pedals because of their short height and adjusting the seat forward and driving very close to the wheel, failure to stay on their lanes and constant improper use of the left lane. Other issues that were mentioned were: seeing women at the wheel bothers many people in the society, frequently being exposed to verbal or physical harassment, facing a cynical attitude towards their mistake, in the event of the presence of a male on the passenger seat, being criticized for the man not driving the car.

The male bus drivers and traffic instructors stated the following for female drivers: women cannot notice that their vehicles are malfunctioning, they cannot make inspection and conduct maintenance of their cars, they cannot fill the accident report (or they fill them incorrectly), they have a weak sense of direction, they fuss in heavy traffic and have difficulty driving, and therefore, they are exposed to horns, they put on the brakes unexpectedly.

Traffic police officers, on the other hand, stated that some of the listed biases were actually valid for both genders. Serious driving problems considered valid for both genders were as follows: failure to prepare vehicles for harsh climate conditions, increased accidents in bad weather, forgetting traffic signs and first aid information only memorized immediately after passing the driving license exam, not knowing the right of way rules, not using their turn signals. Unfortunately, poor road conditions, lack of vehicle maintenance and traffic culture are factors that contribute to accidents involving death (Akanbi et al., 2009; Bone & Mowen, 2006; Silas et al., 2011).

To sum up, there are many stereotypes for male and female drivers, and while these stereotypes cause various perceptions in individuals, they turn into different attitudes and behaviors in traffic.

Questionnaire Findings

With their ages varying in the range of 18-68 years, 1239 drivers participated in the questionnaire. In the assessment of the demographic data, it was observed that the majority consisted of individuals at the ages of 18-34 (68.6%), men (57.0%), high school graduates (41.0%) and single individuals (51.1%) (Table 2).

DOI: 10.15320/ICONARP.2021.162

Table 2. Distribution of participants by demographic characteristics

Variables		n	%
Age	18-24 years	450	36.3
	25-34 years	400	32.3
	35-44 years	242	19.5
	45 and older	147	11.9
Gender	Female	533	43.0
	Male	706	57.0
Educational Status	Primary	189	15.3
	High School	508	41.0
	Graduate	473	38.1
	Post-graduate / Doctorate	69	5.6
Marital Status	Single	633	51.1
	Marries	558	45.0
	Widow / Divorced	48	3.9
Spouse's Driving Status	Yes	343	61.5
	No	215	38.5
Total		**1239**	**100.0**

To determine the suitability of the sample size for exploratory factor analysis, Kaiser-Meyer-Olkin (KMO) test was conducted, and the KMO value was found as 0.961, which indicated that the sample was adequate for factor analysis. When the Bartlett's Sphericity test results were examined, it was seen that the obtained chi-squared value was acceptable ($\chi 2(528) = 39358.014$; $p<0.01$). In the exploratory factor analysis conducted to reveal the factor pattern of the driver evaluation scale, it was determined that the factor load values were above 0.40 (principal component analysis was chosen as a factoring method, while Varimax rotation, which is one of the orthogonal rotation methods, was chosen). In the analysis made for two factors, it was determined that the factor loads were on the desired level (Acaroglu, 2014). In the results of the Varimax rotations, items 12, 27, 29 and 36 were excluded from the model due to overlapping, and the remaining 33 items were collected under a total of 2 factors. These factors explained 48.081% of the total variance. In multi-factor patterns, it is considered sufficient that the explained variance is between 40% and 60% (Buyukozturk, 2018).

In studies related to the traffic safety of individuals, in general, two factors are addressed. Driver behaviors, which is the first of these factors, describe what drivers do in traffic, focusing on their individual driving styles. Driver abilities focus on what drivers can do (their potentials) (Elander et al., 1993; Parker & Stradling, 2001). In light of this information, considering the aggregation of items, these factors were named as F1: Driver Ability and Vehicle Maintenance (explained 21.824% of total variance) and F2: Driver Behaviors (explained 26.257% of total variance) (Appendix-Table 1).

When the reliability of the answers given by the participants were evaluated separately as scales and dimensions, it was found that the reliability coefficients for the female driver evaluation form indicated good reliability for the first dimension (0.928), for the second dimension

(0.886) and for the overall scale (0.931). For the male driver evaluation form, it was also found that the reliability coefficients indicated good reliability for the first dimension (0.905), for the second dimension (0.886) and for the overall scale (0.846). The fact that the Cronbach's Alpha values were greater than 0.70 showed that the scales that were used were reliable and had good internal consistency (Taber, 2018). Table 3 shows the independent-samples t-test results showing the discriminative powers of all items. The raw scores obtained from each factor were ranked in an ascending sorting, and the mean scores of the groups in the lower 27% and upper 27% were compared with the independent-samples t-test. As a result of the comparison, a significant difference was found on the level of $p<0.05$ for all items. The dimensions of the scale may be stated to be distinctive in the context of measuring the desired quality.

Table 3. Analysis results of the dimensions of the driver evaluation scale

F1: Driver Ability and Vehicle Maintenance			**F2: Driver Behaviors**		
Item Number	**t (Lower % 27**- Upper %27**)**	**p value (Lower % 27**-Upper %27**)**	**Item Number**	**t (Lower % 27**- Upper %27**)**	**p value (Lower % 27**-Upper %27**)**
26	16.142	0.000***	17	-27.212	0.000***
13	19.621	0.000***	33	-24.842	0.000***
16	13.570	0.000***	14	-19.200	0.000***
21	17.612	0.000***	1	-28.088	0.000***
23	20.219	0.000***	30	-22.250	0.000***
10	13.297	0.000***	20	-16.930	0.000***
8	11.962	0.000***	34	-23.522	0.000***
6	13.779	0.000***	28	-15.177	0.000***
2	16.309	0.000***	7	-15.972	0.000***
32	7.8690	0.000***	22	-14.993	0.000***
25	14.906	0.000***	9	-17.186	0.000***
3	15.288	0.000***	24	-9.7080	0.000***
31	8.0810	0.000***	19	-7.1770	0.000***
11	12.208	0.000***	15	-4.8230	0.000***
35	5.0540	0.000***	4	-4.3080	0.000***
18	3.4330	0.000***			
5	3.3080	0.000***			
37	3.8390	0.000***			

*** Significant values for p <0.05

In the Confirmatory Factor analysis, the scale was found to be significant on the level of $p<0.001$ by the structural equation model result, and the 33 items and two dimensions that constituted the scale were found to be related to the scale construct (Table 4). According to the first level multi-factor analysis results, looking at the goodness-of-fit indices of the driver evaluation scale, it may be stated that all values were on an acceptable level (Ozdamar, 2016).

Table 4. First-level multi-factor model confirmatory factor analysis goodness-of-fit indices of the driver evaluation scale

RMSEA	**NFI**	**CFI**	**IFI**	**GFI**	**TLI**
0.068	0.845	0.855	0.855	0.8510	0.844

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Appendix-Table 1 shows the factor loads for each factor, and Figure 1 shows the model for first-level confirmatory factor analysis of the driver evaluation scale. The factor loads were found to be over 0.30.

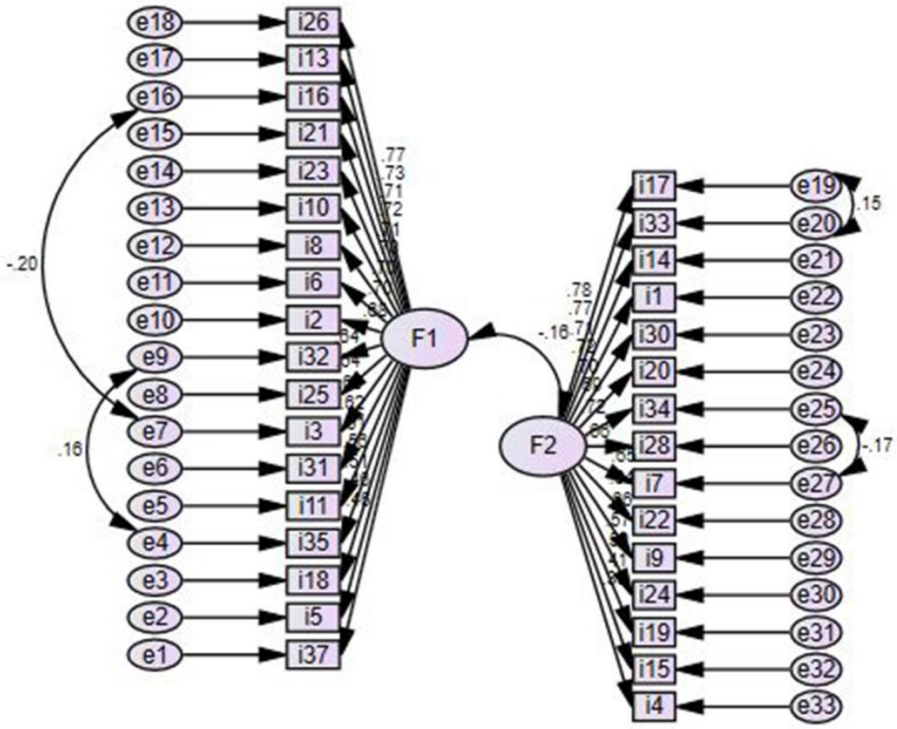

Figure 1. Model for first level multi factor confirmatory factor analysis of the driver evaluation scale (F1: Driving Ability and Vehicle Maintenance, F2: Driver Behaviors)

Table 5 shows the descriptive statistics of the driver evaluation scale and its dimensions. There were a total of 33 items in the scale.

Table 5. Descriptive statistics of the driver evaluation scale and its dimensions

Dimensions	Item No	Min	Max	Mean±Standard Deviation
Female driver evaluation form	33	33.00	297.00	133.53±44.38
Driving Ability and Vehicle Maintenance	18	18.00	162.00	84.60±29.36
Driver Behaviors	15	15.00	135.00	48.92±19.83
Male driver evaluation form	33	33.00	297.00	138.33±33.94
Driving Ability and Vehicle Maintenance	18	18.00	162.00	56.36±24.35
Driver Behaviors	15	15.00	135.00	81.96±21.35

Findings on the female driver evaluation form

One-way ANOVA was applied to compare the mean scores (negative biases increase as the score increases) of the participants in the study by the age, education, marital status and whether their spouses drove. Bonferroni post-hoc test was performed to find the group causing the difference if there was a significant difference ($p<0.05$). Independent-samples t-test was used to compare the mean scores by the gender variable.

When the Driving Ability and Vehicle Maintenance dimension scores of the female participants were examined (Table 6), there was a statistically significant difference in the scores based on gender, educational status and spouses' driving status ($p<0.05$). Considering the mean scores, the university graduates in comparison to the high school graduates, those whose spouses drove in comparison to those whose spouses did not drive and women in comparison to men provided more positive scores.

Table 6. Comparison of demographic characteristics and mean scores of the Female Driving Ability and Vehicle Maintenance subscales

Variables		n	$\bar{X}$	SD	F/t	p	Multiple comparison
Age	18-24	450	82.55	29.52	F=1.846	0.136	-
	25-34	400	84.49	29.68			
	35-44	242	86.25	28.50			
	45 and older	147	88.49	29.14			
Gender	Female	533	68.93	25.49	t=-18.421	**0.000***	
	Male	706	96.44	26.42			
Education	Primary (1)	189	87.21	25.56	F=3.567	**0.014***	2>3
	High School (2)	508	86.90	28.58			
	Graduate (3)	473	81.73	30.77			
	Post-graduate/ Doctorate (4)	69	80.27	33.06			
Marital Status	Single	633	83.07	30.31	F=1.901	0.150	-
	Married	558	86.39	28.25			
	Widow/ Divorced	48	84.39	28.80			
Whether Spouse Drives	No partner/spouse (1)	681	83.18	30.01	F=14.751	**0.000***	3>1, 3>2
	His spouse drives (2)	343	81.39	27.00			
	His spouse does not drive (3)	215	94.24	29.06			

*p<0.05

When the mean scores of the dimension of Female Driver Behaviors were analyzed, there was a statistically significant difference based on age, spouses' driving status and gender. There were more negative scores provided by those at the ages of 25-34 in comparison to those at the ages of 18-24, men in comparison to women and those whose spouses did not drive in comparison to those whose spouses drove (Table 7).

When the mean scores of 33 variables in the female's form were analyzed, it was seen that there was a statistically significant difference based on spouse's driving status and gender (Table 8). In the female driver evaluation scale, there were more negative scores among the men in comparison to the women and those whose spouse did not drive in comparison to those who did not have spouses and those whose spouses drove.

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Table 7. Comparison of the demographic characteristics and the mean scores of the Female Driver Behaviors dimension

Variables		n	$\bar{X}$	SD	F/t	p	Multiple comparison
Age	18-24 (1)	450	47.14	18.88	F=3.199	**0.023***	2>1
	25-34 (2)	400	51.30	21.37			
	35-44 (3)	242	48.58	19.28			
	45 and older (4)	147	48.44	18.77			
Gender	Female	533	41.43	18.45	t=-12.213	**0.000***	
	Male	706	54.57	18.96			
Education	Primary	189	48.09	17.59	F=0.508	0.677	-
	High School	508	49.74	19.72			
	Graduate	473	48.43	20.13			
	Post-graduate / Doctorate	69	48.49	24.17			
Marital Status	Single	633	48.31	20.28	F=0.672	0.511	-
	Married	558	49.48	19.53			
	Widow / Divorced	48	50.50	17.33			
Whether Spouse Drives	No partner/spouse (1)	681	48.37	20.02	F=5.075	**0.006**	3>1, 3>2
	His spouse drives (2)	343	47.60	20.01			
	His spouse does not drive (3)	215	52.72	18.53			

*p<0.05

Table 8. Comparison of the demographic characteristics and female driver evaluation form mean scores

Variables		n	$\bar{X}$	SD	F/t	p	Multiple comparison
Age	18-24	450	129.70	43.28	F=1.829	0.140	-
	25-34	400	135.80	46.26			
	35-44	242	134.83	43.40			
	45 and older	147	136.94	43.71			
Gender	Female	533	110.36	40.43	t=-17.902	**0.000***	
	Male	706	151.01	38.90			
Education	Primary	189	135.30	38.15	F=2.116	0.096	-
	High School	508	136.65	42.90			
	Graduate	473	130.16	46.61			
	Post-graduate/ Doctorate	69	128.76	53.35			
Marital Status	Single	633	131.38	45.89	F=1.533	0.216	-
	Married	558	135.87	42.81			
	Widow / Divorced	48	134.66	41.38			
Whether Spouse Drives	No partner/spouse (1)	681	131.55	45.26	F=12.602	**0.000***	3>1, 3>2
	His spouse drives (2)	343	129.00	42.79			
	His spouse does not drive (3)	215	147.00	41.59			

*p<0.05

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Findings on the male driver evaluation form

Kruskal Wallis analysis was used to compare the mean ranks of the participants in the study by age, education, marital status and spouse's driving status (as mentioned earlier, the responses to the male driver evaluation form were not normally distributed). When a significant difference was found in the variables ($p<0.05$), Bonferroni post-hoc test was applied to find the group causing the difference. Mann-Whitney U test was applied to compare the mean rank of the participants by gender variance.

When the Driving Ability and Vehicle Maintenance dimension mean ranks of the male drivers were examined (Table 9), it was seen that there was a statistically significant difference based on age and gender. It was seen that the participants aged between 25 and 34 had higher mean score ranks than those aged between 18 and 24 and those over 45 years old (as the criteria were negatively expressed in the questionnaires, high score ranks should be interpreted as negative and low score ranks should be interpreted as positive perceptions).

Table 9. Comparison of the demographic characteristics and the mean rank of the driving ability and vehicle maintenance dimension of male drivers

	Variables	n	Mean Rank	X^2/U	p	Multiple comparison
Age	18-24 (1)	450	578.75	X^2=20.011	**0.000***	2 >1, 2>4
	25-34 (2)	400	669.07			
	35-44 (3)	242	653.26			
	45 and older (4)	147	558.01			
Gender	Female	533	651.71	U=171248.000	**0.007***	
	Male	706	596.06			
Education	Primary	189	616.37	X^2=0.59	0.996	-
	High School	508	620.77			
	Graduate	473	621.66			
	Post-graduate/ Doctorate	69	612.87			
Marital Status	Single	633	606.96	X^2=2.648	0.266	-
	Married	558	629.51			
	Widow / Divorced	48	681.40			
Whether Spouse Drives	No partner/spouse	681	609.50	X^2=1.807	0.405	-
	His spouse drives	343	641.33			
	His spouse does not drive	215	619.22			

*p<0.05

When the mean ranks of the dimension of Male Driver Driving Behaviors were examined (Table 10), it was seen that gender and spouse's driving status created a statistically significant difference. Besides, the participants who did not have a spouse and those whose spouse drove a car had a higher mean score rank than those whose spouse did not drive, where the female participants also had higher mean score ranks than the male participants.

DOI: 10.15320/ICONARP.2021.162

Table 10. Comparison of the demographic characteristics and mean scores of male driver behaviors dimension

	Variables	n	Mean Rank	X^2/U	p	Multiple comparison
Age	18-24	450	642.56	X^2=4.161	0.245	-
	25-34	400	600.90			
	35-44	242	628.41			
	45 and older	147	589.08			
Gender	Female	533	682.74	U=154711.000	**0.000***	
	Male	706	572.64			
Education	Primary	189	578.53	X^2=3.265	0.353	-
	High School	508	632.88			
	Graduate	473	621.17			
	Post-graduate/ Doctorate	69	630.72			
Marital Status	Single	633	640.74	X^2=4.370	0.112	-
	Married	558	598.93			
	Widow / Divorced	48	591.39			
Whether Spouse Drives	No partner/spouse (1)	681	642.22	X^2=11.894	**0.003***	1>3, 2>3
	His spouse drives (2)	343	622.39			
	His spouse does not drive (3)	215	545.79			

*p<0.05

When the mean ranks of the 33 variables in the male driver evaluation form were analyzed, it was seen that there was a statistically significant difference based on age and gender. It was seen that the participants aged between 25 and 34 have higher mean score ranks than those aged 45 years and older, where the female drivers were also more likely to score higher than the male drivers (Table 11).

Table 11. Comparison of the demographic characteristics and the male driver evaluation form score mean ranks

	Variables	n	Mean Rank	X^2/U	p	Multiple comparison
Age	18-24 (1)	450	598.03	X^2=11.147	**0.011***	2>4
	25-34 (2)	400	650.34			
	35-44 (3)	242	650.18			
	45 and older (4)	147	555.00			
Gender	Female	533	686.61	U=152644.500	**0.000***	
	Male	706	569.71			
Education	Primary	189	600.66	X^2=0.805	0.848	-
	High School	508	624.16			
	Graduate	473	625.12			
	Post-graduate/ Doctorate	69	607.26			
Marital Status	Single	633	619.73	X^2=0.368	0.832	-
	Married	558	617.70			
	Widow / Divorced	48	650.32			
Whether Spouse Drives	No partner/spouse	681	621.08	X^2=1.943	0.379	-
	His spouse drives	343	635.34			
	His spouse does not drive	215	592.11			

*p<0.05

Finally, to test the relationship between the female and male driver evaluation forms of the driver evaluation scale used in the study, a correlation analysis was applied. Based on the correlation analysis results, the female and male driver evaluation forms of the driver evaluation scale appeared to have a positive and significant relationship ($r=0.114$, $p<0.05$).

EVALUATION OF THE FINDINGS AND DISCUSSION

According to the literature review, gender has an effect on driving ability and behavior in the traffic environment (Newnam et al., 2014; Soliman et al., 2018). In this context, various items have been determined to reveal gendered role biases. As a result of the factor analysis, the items were collected in two dimensions: Driving Ability and Vehicle Care, and Driver Behaviors. When the Driving Ability and Vehicle Maintenance dimension was examined, it was found that female drivers were scored 47.8 points (a new scoring was made in the range of 0-100; as the score increased, positive bias increased), and male drivers were scored 63.8 points. So, female drivers were evaluated as more non-skilled in comparison to male drivers. In the interviews, it was revealed that consideration of women as unskilled drivers disturbed the female driving instructors more. Indeed, they were doing the same job as males with the same qualifications. In this study, the common belief that men are better drivers and that they are better for vehicle maintenance was similar to the assumption that male drivers are perceived as a master, skilled drivers, but female drivers are not seen as part of their identity, as Ozkan and Lajunen (2006) stated. In addition to this, the significantly positive biases of the participants, who were female, university graduates or whose spouses drove, were determined in the dimension of Female Driver Driving Ability and Vehicle Maintenance (this is a result that supports the hypotheses 1, 3 and 4) which may be associated with empathy.

When the dimension of Driver Behaviors was examined, it was seen that the mean scores differed from the first dimension, and women (63.8 points) were found to be evaluated more positively than men (39.3 points). This result coincides with the result of Esiyok et al. (2007) that highlighted the view that male drivers are more aggressive in traffic than female drivers. As a matter of fact, while aggressive and risky behaviors are considered a masculine feature, being a safe and gentle driver is considered a neutral or feminine feature (Ozkan & Lajunen, 2006; Sabbour & Ibrahim, 2010). However, in male-dominated traffic, gendering driver behaviors is a highly problematic situation in terms of traffic safety. Moreover, regarding Driver Behaviors, the participants aged 18-24 had more positive biases than those aged 25-34 (hypothesis 2 was rejected). The female participants had more positive biases than the male participants, and the participants whose spouse drove had

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more positive biases than those whose spouse did not drive (this result supported the hypotheses 1 and 4.).

The results of the study revealed that the men evaluated the driving abilities and behaviors of same-sex drivers more positively, while they evaluated female drivers with more bias. On the other hand, the women evaluated the driving abilities and behaviors of same-sex drivers more positively, while they evaluated men at similar scores to other men who participated in the study (Table 1). This finding was similar to the finding of the study by Sibley and Harre (2009). Gendered role attitudes in traffic were reflected in the scores given. Indeed, the male participants defined female drivers as follows (Items with mean score between 5.00-9.00 were taken into consideration): women are drivers who cannot drive in bad weather conditions ($\bar{x}$:6.10) or in heavy traffic ($\bar{x}$:5.93); who panic at a potential danger ($\bar{x}$:6.16); who have weak reflexes ($\bar{x}$:5.29); who cannot find their directions ($\bar{x}$:5.53); who are easily distracted ($\bar{x}$:5.51); who do not care about vehicle mirrors ($\bar{x}$:5.27); who drive extremely slowly ($\bar{x}$:5.73) and very close to the wheel ($\bar{x}$:5.91); who cannot drive in reverse gear ($\bar{x}$:5.96), and who delay vehicle inspections ($\bar{x}$:5.64). The fact that they evaluated same-sex drivers with very low scores in the same items may be considered as an indication that they perceived some attitudes in traffic as feminine. Perhaps, due to this perception, female drivers experience driver anger, disrespect and frustration more than male drivers (Sullman et al., 2007). The male participants identified males as drivers who drive fast enough to endanger traffic ($\bar{x}$:6.40); who insult others ($\bar{x}$:5.69) and fight with them ($\bar{x}$:5.93); who often toot their horns ($\bar{x}$:5.54); who do not give priority the other vehicles ($\bar{x}$:5.19); who overtake improperly ($\bar{x}$:6.20); who smoke, drink alcohol ($\bar{x}$:6.20) and use their smartphones ($\bar{x}$:6.25) inside their cars (Appendix-Table 2). This result coincided with angry, risky and rule-violating male driver behaviors reported in the literature (Baxter et al., 1990; Ozkan & Lajunen, 2005; Rowe et al., 2015). However, in the in-depth interviews, it was revealed that the participants perceived these behaviors as nature of being masculine, and they did not find these behaviors strange. By the roles assigned to women, similar behaviors (getting angry in traffic, fighting with other drivers, using alcohol or drugs in the vehicle, etc.) of women in Turkey are not tolerated by the society and criticized.

LIMITATIONS OF THE STUDY AND RECOMMENDATIONS FOR FUTURE RESEARCH

In this study, the number of the focus groups interviewed in-depth was very low. Examining gendered role attitudes in traffic with more interviewees shall reveal different problems specific to Turkey which were not included in the questionnaires. Therefore, it is recommended to increase the number of in-depth interviewees regarding the experiences and biases of individuals in traffic in further studies and to

evaluate these biases using qualitative analysis techniques since they may reveal gendered role attitudes among drivers more clearly.

CONCLUSION

In in-city transportation, although it is attempted to improve public transportation systems, the demand for automobiles increases day by day. The conveniences in time-space consumption provided by the use of automobiles make them preferable. While increased automobile ownership has led to the spread of most cities, it has made access to urban services more difficult. In Turkey, automobile and driver's license ownership shows serious differences between genders. This difference causes a male-dominated structure in traffic. As a result of roles and social statuses assigned to men and women in the society, women are also excluded from transportation systems, restricted and alienated. In light of this point, sexist attitudes and perceptions preventing women's inclusion in traffic were aimed to be determined. Based on the obtained findings, it was determined that there was a masculine pressure on women. Women are considered to be unskilled/inadequate drivers just because they are women. The fact that women drivers, who are already few in traffic in numbers, are exposed to gendered role attitudes may limit their utilization of other opportunities in the city. Based on this risk, for women to be active participants in the society and to benefit from urban and public services more easily, acts such as imposing the presence of female drivers in traffic on society through raising awareness (advertisements, brochures, short films, etc.), and thus, overcoming the negative prejudice of the society towards women drivers is recommended to eliminate this inequality.

APPENDIX

Appendix-Table 1. Factor loads obtained as a result of the confirmatory factor analysis regarding the driver evaluation scale

F1: Driver Ability and Vehicle Maintenance		**F2: Driver Behaviors**	
Item No	Factor Loads	Item No	Factor Loads
26	0.775	17	0.778
13	0.727	33	0.767
16	0.714	14	0.713
21	0.714	1	0.717
23	0.718	30	0.695
10	0.698	20	0.685
8	0.696	34	0.718
6	0.697	28	0.656
2	0.676	7	0.653
32	0.636	22	0.637
25	0.640	9	0.664
3	0.659	24	0.572
31	0.615	19	0.503
11	0.609	15	0.414
35	0.565	4	0.378
18	0.508		
5	0.463		
37	0.456		

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Appendix-Table 2. Item score means

Female driver evaluation form				Male driver evaluation form			
Item	**Female**	**Male**	**Total**	**Item**	**Female**	**Male**	**Total**
W1	2.40	3.00	2.74	M1	6.58	6.26	6.40
W2	4.49	6.10	5.41	M2	3.57	3.15	3.33
W3	4.69	6.16	5.53	M3	3.34	3.20	3.26
W4	2.74	3.89	3.39	M4	4.41	4.01	4.18
W5	2.63	3.82	3.31	M5	3.31	3.12	3.20
W6	3.65	5.34	4.61	M6	2.68	2.49	2.57
W7	2.50	3.29	2.95	M7	5.31	4.62	4.92
W8	3.53	5.29	4.53	M8	3.01	2.78	2.88
W9	3.36	4.23	3.86	M9	6.20	6.25	6.23
W10	3.99	5.53	4.87	M10	3.29	3.11	3.19
W11	3.87	5.51	4.80	M11	4.01	3.47	3.70
W12	4.05	5.73	5.00	M12	2.68	2.63	2.65
W13	4.27	5.96	5.23	M13	2.94	2.83	2.88
W14	2.22	2.81	2.55	M14	5.40	4.71	5.01
W15	3.35	4.75	4.15	M15	5.11	4.44	4.73
W16	3.69	5.27	4.59	M16	3.06	2.93	2.98
W17	2.38	2.83	2.64	M17	6.32	5.93	6.10
W18	3.28	4.44	3.94	M18	3.43	3.25	3.33
W19	2.79	4.07	3.52	M19	4.91	4.43	4.64
W20	3.26	4.44	3.93	M20	6.42	6.2	6.29
W21	4.37	5.97	5.28	M21	2.94	2.93	2.94
W22	2.66	3.67	3.23	M22	5.22	4.68	4.91
W23	4.17	5.91	5.16	M23	2.98	2.8	2.88
W24	3.54	4.57	4.13	M24	5.86	5.54	5.68
W25	4.14	5.64	5.00	M25	3.46	3.07	3.24
W26	4.08	5.93	5.14	M26	2.86	2.84	2.84
W27	3.41	4.71	4.15	M27	4.41	4.35	4.37
W28	2.85	4.10	3.56	M28	5.83	5.19	5.46
W29	3.72	5.41	4.68	M29	5.22	4.51	4.81
W30	2.17	2.60	2.42	M30	5.61	4.95	5.23
W31	4.04	5.20	4.70	M31	3.24	3.09	3.16
W32	3.69	4.89	4.38	M32	2.98	2.81	2.88
W33	2.13	2.78	2.50	M33	6.16	5.69	5.89
W34	3.08	3.55	3.35	M34	6.46	6.20	6.31
W35	3.09	4.52	3.91	M35	3.35	3.10	3.21
W36	2.75	4.27	3.62	M36	4.38	3.72	4.00
W37	3.26	4.95	4.22	M37	4.09	3.75	3.90

* The scale ranges from 0 to 9, negative opinion increases as the score increases.

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The author declared that this study has received no financial support.

CONFLICT OF INTEREST

No conflict of interest was declared by the author.

ETHICS COMMITTEE APPROVAL

Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS

In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions and organizations)

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REFERENCES

Acaroglu, R. (2014). Revize edilen hemşirelerin mesleki değerleri ölçeği Türkçe formunun güvenirlik ve geçerliği. *Florence Nightingale Hemşirelik Dergisi*, *22*(2), 8-16.

Akanbi, O. G., Charles-Owaba, O. E., Oluleye, A. E. (2009). Human factors in traffic accidents in Lagos, Nigeria. *Disaster Prevention and Management: An International Journal*, *18*(4), 397-409.

Akerstedt, T., Kecklund, G. (2001). Age, gender and early morning highway accidents. *Journal of Sleep Research*, *10*(2), 105-110.

Aycan, Ş., & Aycan, N.(2014). Trafiğin yazılı olmayan kurallarının kadın sürücü ayağı. Karayolu Trafik Güvenliği Sempozyumu Bildiriler Kitabı, 63-72.

Bamberg, S., Ajzen, I., Schmidt, P. (2003). Choice of travel mode in the theory of planned behavior: the roles of past behavior, habit, and reasoned action. *Basic and Applied Social Psychology*, *25*(3), 175-187.

Baxter, J. S., Manstead, A. S. R., Stradling, S. G., Campbell, K. A., Reason, J. T., Parker, D. (1990). Social facilitation and driver behavior. *British Journal of Psychology*, *81*(3), 351-360.

Berger, M. L. (1986). Women drivers! The emergence of folklore and stereotypic opinions concerning feminine automotive behavior. *Women's Studies International Forum*, *9*(3), 257-263.

Bone, S. A., Mowen, J. C. (2006). Identifying the traits of aggressive and distracted drivers: a hierarchical trait model approach. *Journal of Consumer Behaviour*, *5*(5), 454-464.

Brison, R. J. (1990). Risk of automobile accidents in cigarette smokers. *Canadian Journal of Public Health*, *81*(2), 102-106.

Brookland, R., Begg, D., Langley, J., Ameratunga, S. (2010). Risk perception and risky driving behaviours of adolescents and their parents: New Zealand drivers study. *Injury Prevention*, *16*, A170.

Buyukozturk, S. (2018). *Sosyal bilimler için veri analizi el kitabı*. Pegem Akademi.

Caird, J. K., Willness, C. R., Steel, P., Scialfa, C. (2008). A meta-analysis of the effects of cell phones on driver performance. *Accident Analysis and Prevention*, *40*(4), 1282-1293.

Chan, Y. H. (2003). Biostatistics 101: data presentation. *Singapore Medical Journal*, *44*(6), 280-285.

Derks, B., Scheepers, D., Van Laar, C., Ellemers, N. (2011). The threat vs. challenge of car parking for women: How self- and group affirmation

DOI: 10.15320/ICONARP.2021.162

affect cardiovascular responses. *Journal of Experimental Social Psychology*, *47*(1), 178-183.

EGM. (2016, June 15). *Yıllara gore trafik kaza istatistikleri*. http://trafik.gov.tr/istatistikler37

EGM. (2019, June 19). *Trafik istatistik bulteni.* http://www.trafik.gov.tr/kurumlar/trafik.gov.tr/04-Istatistik/Aylik/nisan19.pdf

Elander, J., West, R., French, D. (1993). Behavioral correlates of individual differences in road-traffic crash risk: An examination of methods and findings. *Psychological Bulletin*, *113*(2), 279.

Esiyok, B., Yasak, Y., Korkusuz, I. (2007). Trafikte ofke ifadesi: Surucu ofke ifadesi envanteri'nin gecerlik ve guvenilirligi. *Turk Psikiyatri Dergisi, 18*(2),1-13.

Fountas, G., Pantangi, S. S., Hulme, K. F., Anastasopoulos, P. C. (2019). The effects of driver fatigue, gender, and distracted driving on perceived and observed aggressive driving behavior, A correlated grouped random parameters bivariate probit approach. *Analytic Methods in Accident Research*, *22*, 1-15.

Glendon, A. I., Dorn, L., Davies, D. R., Matthews, G., Taylor, R. G. (1996). Age and gender differences in perceived accident likelihood and driver competences. *Risk Analysis*, *16*(6), 755-762.

Glendon, A. I., Mcnally, B., Jarvis, A., Chalmers, S. L., Salisbury, R. L. (2014). Evaluating a novice driver and pre-driver road safety intervention. *Accident Analysis and Prevention*, *64*, 100-110.

Goodman, R. A., Istre, G. R., Jordan, F. B., Herndon, J. L., Kelaghan, J. (1991). Alcohol and fatal injuries in Oklahoma. *Journal of Studies on Alcohol*, *52*(2),156-161.

Granié, M. A., Papafava, E. (2011). Gender stereotypes associated with vehicle driving among French preadolescents and adolescents. *Transportation Research Part F: Traffic Psychology and Behaviour*, *14*(5), 341-353.

Gulliver, P., Begg, D. (2004). Influences during adolescence on perceptions and behaviour related to alcohol use and unsafe driving as young adults. *Accident Analysis and Prevention*, *36*(5), 773-778.

Hacısalihoglu, S. K. (2017). Trabzon trafiginde kadın surucu olmak. *İmgelem*, *1*(1), 61-88.

Hoare, I. A. (2007). *Attitudinal factors related to driving behaviors of young adults in Belize: An application of the precaution adoption process model*. Graduate Theses and Dissertations.

IIHS. (2017, June 11). *Fatality statistics*. https://www.iihs.org/topics/fatality-statistics/detail/gender

Juhnke, G. A., Sullivan, T. J., Harman, A. E. (1995). Attitude changes in DWI offenders: A study of a short-term treatment program. *Journal of Addictions & Offender Counseling*, *15*(2), 51-58.

Kim, K., Brunner, I. M., Yamashita, E. (2008). Modeling fault among accident-Involved pedestrians and motorists in Hawaii. *Accident Analysis and Prevention*, *40*(6), 2043-2049.

Klauer, S. G., Dingus, T. A., Neale, V. L., Sudweeks, J. D., Ramsey, D. J. (2006). *The impact of driver inattention on near-crash/crash risk: An analysis using the 100-car naturalistic driving study data*. U.S. Department of Transportation, National Highway Traffic Safety Administration.

Kose, E. (2014). Cinsiyet, teknoloji ve kent: otomobilin muglak heteronormativizmi. *Fe Dergi*, *6*(1), 32-42.

Lajunen, T., Parker, D., Summala, H. (2004). The Manchester Driver Behaviour Questionnaire: A cross-cultural study. *Accident Analysis and Prevention*, *36*(2), 231-238.

Lawrence, C., Richardson, J. (2005). Gender-based judgments of traffic violations: The moderating influence of car type1. *Journal of Applied Social Psychology*, *35*(8),1755-1773.

Ma, L., Yan, X. (2014) Examining the nonparametric effect of drivers' age in rear-end accidents through an additive logistic regression model. *Accident Analysis and Prevention*, *67*, 129-136.

Mangiaracina, G., Palumbo, L. (2007). While driving and its consequences on road safety. *Accident Analysis and Prevention*, *19*(3), 253-267.

Massie, D. L., Campbell, K. L., Williams, A. F. (1995). Traffic Accident involvement rates by driver age and gender. *Accident Analysis and Prevention*, *27*(1), 73-87.

Mcevoy, S. P., Stevenson, M. R., Woodward, M. (2006). Phone use and crashes while driving: A representative survey of drivers in two Australian states. *Medical Journal of Australia*, *185*(11–12), 630-634.

Newnam, S., Mamo, W. G., Tulu, G. S. (2014) Exploring differences in driving behaviour across age and years of education of taxi drivers in Addis Ababa, Ethiopia. *Safety Science*, *68*, 1-5.

Ozdamar, K. (2016). *Egitim, saglık ve davranıs bilimlerinde olcek ve test gelistirme yapısal esitlik modellemesi.* Nisan Kitabevi Yayınları.

Ozkan, T., Lajunen, T. (2005). Multidimensional traffic locus of control scale (T-LOC): factor structure and relationship to risky driving. *Personality and Individual Differences*, *38*(3),533-545.

Ozkan, T., Lajunen, T. (2006). What causes the differences in driving between young men and women? The effects of gender roles and sex on

DOI: 10.15320/ICONARP.2021.162

young drivers' driving behaviour and self-assessment of skills. T*ransportation Research Part F: Traffic Psychology and Behaviour*, *9*(4), 269-277.

Parker, D., Manstead, A. S. R., Stradling, S. G., Reason, J. T., Baxter, J. S. (1992). Intention to commit driving violations: An application of the theory of planned behavior. *Journal of Applied Psychology*, *77*(1), 94-101.

Parker, D., Stradling, S. (2001). Influencing driver attitudes and behaviour: Road Safety. Research Report No. 17.

Preston, C. C., & Colman, A. M. (2000). Optimal number of response categories in rating scales: reliability, validity, discriminating power, and respondent preferences. *Acta Psychologica, 104*(1), 1-15.

Ram, T., Chand, K. (2016). Effect of drivers' risk perception and perception of driving tasks on road safety attitude. *Transportation Research Part F: Traffic Psychology and Behaviour*, *42*(1), 162-176.

Rhodes, N., Pivik, K. (2011). Age and gender differences in risky driving: The roles of positive affect and risk perception. *Accident Analysis and Prevention*, *43*(3), 923-931.

Rosenbloom, T., Ben-Eliyahu, A., Nemrodov, D., Biegel, A., Perlman, A. (2009). Committing driving violations: An observational study comparing city, town and village. *Journal of Safety Research*, *40*(3), 215-219.

Rowe, R., Roman, G. D., Mckenna, F. P., Barker, E., Poulter, D. (2015). Measuring errors and violations on the road: A bifactor modeling approach to the driver behavior questionnaire. *Accident Analysis and Prevention*, *74*, 118-125.

Sabbour, S. M., Ibrahim, J. M. (2010). Driving behavior, driver style and road traffic accidents among young medical group. *Injury Prevention*, *16*(1), 1-13.

Sabey, B. E., Taylor, H. (1980). *The known risks we run: the highway*. In Societal Risk Assessment. Springer.

Santamarina-Rubio, E., Perez, K., Olabarria, M., Novoa, A. M. (2014). Gender differences in road traffic injury rate using time travelled as a measure of exposure. *Accident Analysis and Prevention*, *65,* 1-7.

Shao, A. T., & Zhou, K. Z. (2002). *Marketing research: An aid to decision making.* South-Western/Thomson Learning.

Shinar, D., Compton, R. (2004). Aggressive driving: An observational study of driver, vehicle, and situational variables. *Accident Analysis and Prevention*, *36*(3), 429-437.

Sibley, C. G., Harre, N. (2009). A gender role socialization model of explicit and implicit biases in driving self-enhancement. *Transportation Research Part F: Traffic Psychology and Behaviour*, *12*(6), 452-461.

Silas, O. A., Adoga, A. A., Isichei, C., Echejoh, G. O., Manasseh, M. N., Olu-Silas, R. A. (2011). Road traffic accident deaths as seen in a Tertiary Health Centre Jos University Teaching Hospital (JUTH), Jos, North central, Nigeria. *Journal of Clinical Pathology and Forensic Medicine*, *2*(2), 13-15.

Soliman, A., Alhajyaseen, W., Alfar, R., Alkaabi, I. (2018). Changes in driving behavior across age cohorts in an arab culture: The case of state of Qatar. *Procedia Computer Science*, *130*, 652-659.

Stanton, N. A., Salmon, P. M. (2009). Human error taxonomies applied to driving: A generic driver error taxonomy and its implications for intelligent transport systems. *Safety Science*, *47*(2), 227-237.

Stephens, A. N., Sullman, M. J. M. (2015). Trait predictors of aggression and crash-related behaviors across drivers from the United Kingdom and the Irish Republic. *Risk Analysis, 35*(9), 1730-1745.

Sullman, M. J., Paxion, J., Stephens, A. N. (2017). Gender roles, sex and the expression of driving anger. *Accident Analysis & Prevention*, *106*, 23-30.

Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education*, *48*(6), 1273-1296.

Tavris, D. R., Kuhn, E. M., Layde, P. M. (2001). Age and gender patterns in motor vehicle crash injuries: importance of type of crash and occupant role. *Accident Analysis & Prevention*, *33*(2), 167-172.

Teye-Kwadjo, E. (2011). Risk perception, traffic attitudes and behaviour among pedestrians and commercial minibus drivers in Ghana: A case study of Manya Krobo District. Master's thesis, Norwegian University of Science and Technology.

Ulutas, B., Sapaz, D., & Dumanlı, D. (2015). Ulaşım sektöründe kadın emeği: Ankara'da çalışan kadın sürücü ve makinistler. *Ankara Üniversitesi Eğitim Bilimleri Fakültesi Dergisi 48*(2), 141-164.

Unal, L., Ozdek, N., Unal, N., Kececi, B. (2017). Those women drivers again, cliché, being a woman in traffic. *International Journal of Traffic and Transportation Safety*, *3*(1), 88-109.

Vanlaar, W., Yannis, G. (2006). Perception of road accident causes. *Accident Analysis and Prevention*, *38*(1), 155-161.

Wang, B., Hensher, D. A., Ton, T. (2002). Safety in the road environment: A driver behavioural response perspective. *Transportation*, *29*(3), 253-270.

Wang, Y., Zhang, W., Reimer, B., Lavalliere, M., Lesch, M. F., Horrey, W. J., Wu, S. (2010). The effect of feedback on attitudes toward cellular phone use while driving: A comparison between novice and experienced drivers. *Traffic Injury Prevention*, *11*(5), 471-477.

DOI: 10.15320/ICONARP.2021.162

Warner, H. W., Ozkan, T., Lajunen, T., Tzamalouka, G. (2011). Cross-cultural comparison of drivers' tendency to commit different aberrant driving behaviours. *Transportation Research Part F: Traffic Psychology and Behaviour*, *14*(5), 390-399.

Wolf, C. C., Ocklenburg, S., Oren, B., Becker, C., Hofstatter, A., Bos, C., Gunturkun, O. (2010). Sex differences in parking are affected by biological and social factors. *Psychological Research*, *74*(4), 429-435.

World Health Organization. (2013). Global status report on road safety 2013: supporting a decade of action: summary (No. WHO. NMH. VIP 13.01). World Health Organization.

Yeung, N. C. J., von Hippel, C. (2008). Stereotype threat increases the likelihood that female drivers in a simulator run over jaywalkers. *Accident Analysis and Prevention*, *40*(2), 667-674.

Zhou, H., Zhao, J., Pour-Rouholamin, M., Tobias, P. A. (2015). Statistical characteristics of wrong-way driving crashes on illinois freeways. *Traffic Injury Prevention*, *16*(8), 760-767.

Resume

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The City Experience with Location-Based Media: An Examination Through Cognitive Maps

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Abstract

Purpose

The physical space has been an important value for supporting human experience. With the development of mobile devices and location-based media, these technologies have been increasingly present in our virtual spatial experience and the experience of physical city has been changed permanently. Accordingly, this paper aims to discuss the experience potential of urban space with location-based technologies.

Design/Methodology/Approach

The research structure of this study is based on the literature of location-based media and 'Space of flow' theory. Within the methodology, a workshop is conducted to review the cognitive mappings of the virtual city experience. The workshop is structured through two segments: Documenting the spatial experience revealed using location-based media made by cognitive mappings and testing participants' direct experiences within structured questionnaire-based interviews and finally, interpretating of the obtained data.

Findings

This paper provides an experiential examination of the relationship between the usage of the degree of location-based media and cognitive experience. Findings point out that experience may differ depending on the media interface used and it is controversial comparing with the physical space experience with its multiple relationships.

Research Limitations/Implications

The research subject had been exemplified with limited location-based media in a specific location.

Originality/Value

The proposed method of examining the degree of spatial experience by the location-based media linking with interviews determines the originality of the study. There are also limited studies on the topic of location-based media by focusing on the users' cognitive maps.

Keywords: *Urban space, virtual city experience, spatial cognition, location-based media, cognitive-mapping*

INTRODUCTION

Location-based media (LBM), which establish a connection between physical and digital spaces, differentiate as a functional communication channel that connects the communication media to space and the space to the user's mobile devices. This function allows citizens to communicate with the city with the help of digital interfaces (Ozkul & Gauntlett, 2014; Tokgöz, 2017). Especially in the process of the rapid evolution of social media after 2005, the spread of location-based media started to include media as a new area where users experience the city in space experience research (De Souza e Silva & Sutko, 2010; Gordon & de Souza e Silva, 2011; Humphreys, 2007; Humphreys & Liao, 2013). There is a growing body of literature on location-based media and its spatial experience. The impacts of LBM on individuals' everyday experience of place (Wilken, 2012), LBM impact of social life on urban space (Gordon & de Souza e Silva, 2011; Sheller & Urry, 2006; Wilken, 2012), and memory and cognition effect of LBM (De Souza e Silva & Hjorth, 2009; Ozkul, 2013; Ozkul & Gauntlett, 2014; Saker & Evans, 2016b) has been explored in many studies.

The goals of this area of research are to explore and understand the impacts of LBM and the possible urban interactions. The current study seeks to contribute to this field by exploring the following research questions:

(I) Is it possible to experience a city that has not been physically visited through location-based technologies? (II) How can the spatial perception of a city visited with location-based media be visible in cognitive mapping? (III) Which media tools shape this experience and how? (IV) What are the limitations of a media-based venue experience?

It is possible to come across similar research questions in the literature. More and more architectural scholars attempt to well define and interpret the nature of media-based spatial experience (Akgun Yuksekli, 2017; Iavarone & Dursun Çebi, 2019; Kut et al., 2013). However, these researches are limited by the exploration of space without considering spatial cognition theories background. In order to conceptualize the new spatial experience of LBM impact, this research follows the path of the cognitive mapping studies of spatial behaviour theory and thus seeks to make a contribution to the studies on the spatial experience of LBM.

In the digitalized world era, the city can be discussed as a platform in which image datasets are collected, stored, and shared. According to this scenario, the participants feel they were actually in the place, however with no actual existence in space through location-based media platforms. The present paper tests this hypothesis by applying cognitive mapping methodology.

The article is divided into three parts. The first part introduces the definition of LBM and the theoretical background of media-space studies. After a short review of the literature, the second part focuses on the case study of the structured workshop to explore research questions. The outputs of the workshop, in which cognitive mapping

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was used as a method, were evaluated within the framework of the research questions in two segments: Evaluation of cognitive maps and interviews. In the last section, workshop outputs are interpreted with critical reading. Based on the findings of the case study conducted with the workshop, it can be concluded that LBM has a significant effect on the city even when physical space is not included in the experience. On the other hand, the outputs of the study also show the shortcomings of a virtual visit to a city that is not physically visited, space can only be experienced through images, so the exploration cannot be internalized. The findings of the study also help to read the different forms of experience created by different LBM uses. In this context, the study reveals that the use of LBM is included in spatial experience studies as a new interface in human-environment interaction. In the following section, the conceptual framework surrounding the present research will be outlined, beginning with a discussion of LBM and its impact on the urban spatial experience.

THEORETICAL BACKGROUND

Redefining the Concept of Space Transformed with Media

Since the beginning of computer evolution, a body of research analyzes how media interfaces mediate the relationship between technology use and physical spaces. Manuel Castells (1996), one of the pioneers of this literature, has defined the new system that has been structured by technology, with networks and connections. Since "everyone" and "everywhere" are connected all the time, inevitably, the concept of space and time has also changed. Castells (1996) suggests that space becomes connected. He defined this spatial transformation with the concept of “space of flow” which represents “the material arrangements that allow for the simultaneity of social practices without territorial contiguity” (Castells, 1996, p. 294). He emphasizes that electronic networks interact with space and new dynamics of the spatial experiences that occur with technology. Thus, the understanding of static space began to be replaced by the “fluid space” concept with the effect of technology.

Starting from the perspective that Castells brought to the subject, many questions can be asked to define the unique relationship of the redefined society with space. What happens to space when anyone can go anywhere anytime through the Internet? What will be the experience of the new situation of the space? The context of these questions has changed, especially with the rapid inclusion of mobile and GPS technology in everyday life. Since location-based technologies had started to be part of daily life, they have started to change the way we interact with the place on a daily basis. These technologies have the potential to create new layers of seeing. Therefore, it can be assumed that the way we see the urban context that we live in, and the concept of space is under significant transformation. With the use of LBM, is it possible to talk about “space of flows” for urban experience through Internet networks as Castells suggested? Can LBM create enough realistic atmosphere for urban space experience? Focused on these questions, this article focuses on LBM and the area of research it creates in the following section.

ICONARP – Volume 9, Issue 1 / Published: 21.06.2021

Location-Based Media (LBM) as a Spatial Experience Tool

In a society where technology plays an essential role and creates new experiences, as a major distinctive, media usage identifies the new concepts of spatial experience: location-based media (LBM) usage and its effects on the space (Iavarone & Dursun Çebi, 2019). Within the impact of new media, being online, being visible, and being reachable is the new concept of urban life. Therefore, being in "somewhere" and interacting with the location through mobile devices is essential to be connected to the network.

LBM can be described as mobile device applications that allow users to share their locations and see other's locations (check-in) through their new media networks (De Souza e Silva & Frith, 2010). Location-based media services, such as Foursquare, Facebook Place, Instagram Location, Google Maps, TripAdvisor, help users to share their location data with other users. By doing so, users can find locations, places, and people as well as they can be found too. In other words, people let technology track them in order to have location information.

There has been a growing literature and ongoing debate about this new concept in a variety of scientific fields. LBM has been studied as a personal memory tool (Frith, 2014, p. 2), as an urban locative game (De Souza e Silva, 2006; Humphreys, 2007; Saker & Evans, 2016a; Tokgöz, 2017), as the visualization of space (De Souza e Silva & Sutko, 2011) and as a coordinator of social interactions (Frith, 2014). Researchers such as Humphreys (2010), De Souza e Silva & Frith (2010), Ozkul (2013), Evans (2014, 2015), focused on the different impact of location-based media on spatial experience and urban knowledge and found that location-based media can be an interactive, personal, and informative way of connecting for individuals in terms of spatial experience. They emphasized that location-based technologies create spatial awareness, rearrange social urban habits, and allow individuals to create their own re-narratives of the city. In the literature, it is possible to encounter different studies that argue that LBM increases the individual urban experience and facilitates the establishment of new relationships between the individual and the space.

Gordon & de Souza e Silva (2011), open a debate on an essential question: why location is still a matter if we are experiencing today's society in which everyone is connected with everywhere virtually? They have explained location-aware technologies changing our perception of urban life and LBM's location is a way to be connected through information and shared experience. Saker & Frith (2018), emphasize the impact of locative media networks on urban life, specifically to coordinate everyday life. As mobile devices and new media connect individually constantly, location-based media connects individuals to space and changes their daily routine as well. In a similar perspective, Ozkul (2013) discusses possibilities in representations, geo-tagged, and shared information within a network. As she concludes, locational information improves the social attachment of the places as well as creates a new representation of urban space.

Consequently, LBM is now recognized as part of the urban spatial experience of different dimensions. A direct implication of these studies is that they conceptualize the impact of location-based media usage while physically being in that location. However, parallel with Castells's theory of "space of flows", without being physically there, it can be suggested that it is still possible to receive the locational information

DOI: 10.15320/ICONARP.2021.163

and being aware of the space. In order to contribute to the literature from this perspective, the present paper aims to investigate the human-space interaction created by the use of LBM without including physical experience. Using the two original qualitative studies of the case study, it was examined whether a city could be visited by LBM to perform cognitive mapping and how the representations of spatial cognition could change according to the media used.

THE RESEARCH

Research Material and Method

The present paper uses qualitative methods with the outcomes of the conducted workshop. In the workshop, after a short presentation about the theoretical background, to test the hypothesis and answer the research questions, an experiment was set up in which participants were asked to use any LBM platforms and visit the city of Naples. Within two hours, they have been asked to complete their visit and create a cognitive map of their experience. After the production of cognitive maps, a two-stage study is conducted through cognitive maps of the participants attending workshop, respectively. In the first stage of the study (Part I), cognitive maps are evaluated according to the research questions, and in the second stage (Part II), questionnaire-based interviews are made to understand the participants' direct experiences. The two-stage methodology that is constructed within the workshop linking with a theoretical background also underlines the originality of the research material. The overall research structure is shown in Fig. 1 below.

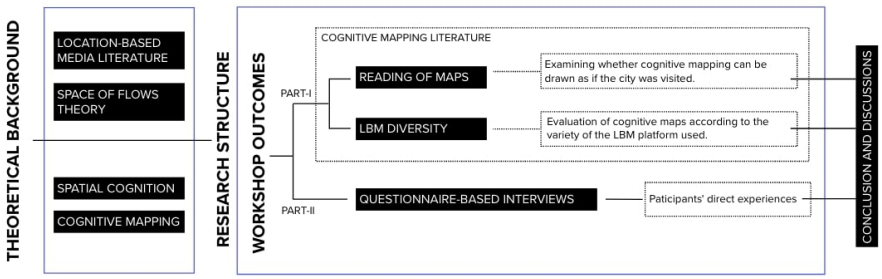

Figure 1. The structure of the research.

Determination of Research Area

The research data collected as a result of the workshop are planned to be personalized experience maps of the place visited through location-based media. Therefore, the place that is expected to visit via location-based media, must be chosen carefully. In the selection of the place to be experienced through the virtual environment, the prerequisite is that it is not physically experienced, however can be experienced virtually. The place chosen for the research question should not have been visited by the majority of the participants to test the power of location-based media influence. For this reason, the place should be chosen between the cities that fewer people have visited and have a large amount of

locational information. In the context of these criteria, the Italian city of Naples was chosen for use in the research question.

Figure 2. The city of Naples on location-based media platforms (from Instagram, Foursquare, Naples Tour, Naples Guide, TripAdvisor applications).

Naples is the third biggest city in Italy in terms of population as well as it is one of the oldest cities. The city is known for its many unique qualities, such as having a large historic heritage, remarkable geographic elements, unique culture, street food, and dominant cultural influence on Italian history and culture. With these qualities, Naples province is also a known tourist city. Therefore, the city has large data-based of geotagged locations on the Internet (Fig. 2). On the other hand, according to the preparatory work for the workshop, it was observed that it was not visited by most participants. For this reason, the city of Naples was found suitable for cognitive mapping by visiting via location-based media platforms, and the students who did not visit the city are selected as participants.

Hypothesis

The present paper aims to understand the effect of LBM use on spatial experience while formulates the following hypothesis:

- With the use of LBM, a city that is not actually visited can be experienced from a virtual environment. This situation can be explained by Castells's (1996) "Space of flow" theory.
- The urban experience created using LBM can be examined with the cognitive mapping method. Cognitive mapping is expected to differ according to the type and number of media tools used.

Method: Cognitive Mapping with Location-Based Media

Since this study is structured on spatial cognition studies, it is based on the cognitive representation literature. Firstly, spatial cognition literature and secondly cognitive mapping must be clarified by the known literature of leading theorists. The spatial concept is defined as a "fundamental idea of space and spatial representation" (Piaget & Inhelder, 1967). The "spatial representation" is defined as "a mental reproduction of a sketch of an object in thought." (Laurendeau & Pinard, 1970). These definitions conceptualize the external representation of

DOI: 10.15320/ICONARP.2021.163

space and cognitive understanding of space and provide a base for spatial cognition.

In the literature of spatial cognition and experience, representation of the personalized image of the spatial environments has been described as cognitive maps (Downs & Stea, 1977). Cognitive map or cognitive mapping is a spatial cognition research method that implies map-like representations of an environment (Hart & Moore, 1973, p. 248). Cognitive mapping is a production of code, store, recall, and decode information about the relative location (G. T. Moore, 1976; Tolman, 1932) in a form of a map-like schema (Downs & Stea, 1977; Neisser, 1982). The function of cognitive maps is to structure the central aspect of spatial behaviour (Downs & Stea, 1977; Lang, 1987). Passini (1984) determines the role of cognitive maps as an ability to represent the environment determined by a person's experience. Because of these features and their intense influence on the literature, cognitive mappings form the basis of spatial cognition studies.

As the representation of mental modal, the cognitive maps are known to be “a picture in the head” (Blackmore, 2003), “a mental process of spatial information” (Kitchin & Blades, 2002), or as (Lynch, 1960) used, simply sketch maps. Downs & Stea (1977) state that a cognitive map is not necessarily a "map" but using the term is a functional analogue. Lynch (1960) also suggests that people have different layouts of the cities so that it is impossible to expect replicas of reality as the maps. Contrarily, Jon Lang states that cognitive maps are "models of reality". With these features, cognitive mappings provide four types of information: recognition, prediction, evaluation, and actions (Kaplan, 1973). Although Kaplan (1983)’s suggestion of the layout of the maps appears in most of the mapping, cognitive mappings differ from person to person as well as task to task. In this sense, cognitive mappings can be used in different research as a methodology of spatial cognition tasks.

It is seen that this cognitive representation of spatial behaviour and experience is used largely in past literature. Cognitive mapping is used both in environmental behaviour literature and LBM impact research. Also, the studies about the digitalization of the urban space (Al-Kodmany, 2001; Dodge & Kitchin, 2001; Kwan, 2001), are influenced by the spatial knowledge of cognitive mapping which has developed by Lynch (1960). Among these studies, using LBM and cognitive mapping together Ozkul suggests that location-based media contribute to individuals' personal storytelling (Ozkul, 2013; Ozkul & Gauntlett, 2014). The fundamental result in her research with cognitive mappings is that participants imagined themselves in a place they represent "virtually" because of location-based media usage. The existence of these studies suggests that traces of the spatial experience can be analysed with the cognitive mapping method. In order to test the hypothesis, based on the strong methodological relation between the cognitive mapping and LBM impact, the collected data of cognitive mappings is analysed in the next chapter.

ICONARP – Volume 9, Issue 1 / Published: 21.06.2021

Part I. Cognitive Mapping of "Virtual City Visit"

Data collection process

In this part of the research, the data collection process is determined based on the production of the workshop's cognitive maps. The given research question for the participants was "Visit the city and draw your virtual experience on given sheets". The sheets were designed to note the information of "links, images, cultural symbols, landmarks/ icons, activities, density, places, transformations" and list LBM applications used during the process. In order to understand the role of LBM in spatial experience, the cognitive mappings prepared by the participants were subjected to two different analyses:

I. Examining whether cognitive mapping can be drawn as if the city was visited.

II. Evaluation of cognitive maps according to the variety of the LBM platform used.

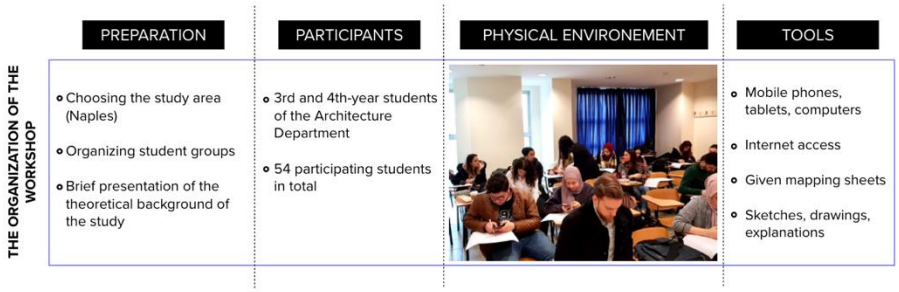

Figure 3. The organization of the workshop.

The workshop, which was held with a participant group consisting of 3rd and 4th-year students of the Architecture Department of Istanbul Kultur University (Fig. 3), was held with the participation of 54 students in two sessions. After a short presentation of the subject to the participants, previously prepared cognitive mapping sheets were distributed. Participants were asked to visit Naples via the LBM platform they wanted and fill these sheets.

During the workshop, the participants were experiencing the city via photos, tags, explanation texts, street-views, videos, etc., and they were taking notes of their experience and the sources. Thus, participants were aware of the influence of media platforms and followed their own steps of the "visit" during the process of virtual experience. After the virtual tour and cognitive mapping process, the spatial cognition of the virtually visited city was reflected in the sheets as sketches, drawings, and explanations.

Is it possible to visit another city with LBM?

In order to check whether the cognitive maps obtained from the workshop reflect the spatial experience of the participants in terms of content and form, they were compared with the cognitive mapping topologies presented by Donald Appleyard (1970) (Fig.4). In terms of language, it has been divided into two basic categories, "sequential" and

DOI: 10.15320/ICONARP.2021.163

"spatial", and sub-patterns of these categories. The fact that similar patterns were obtained at the end of the workshop means that the city can be visited spatially.

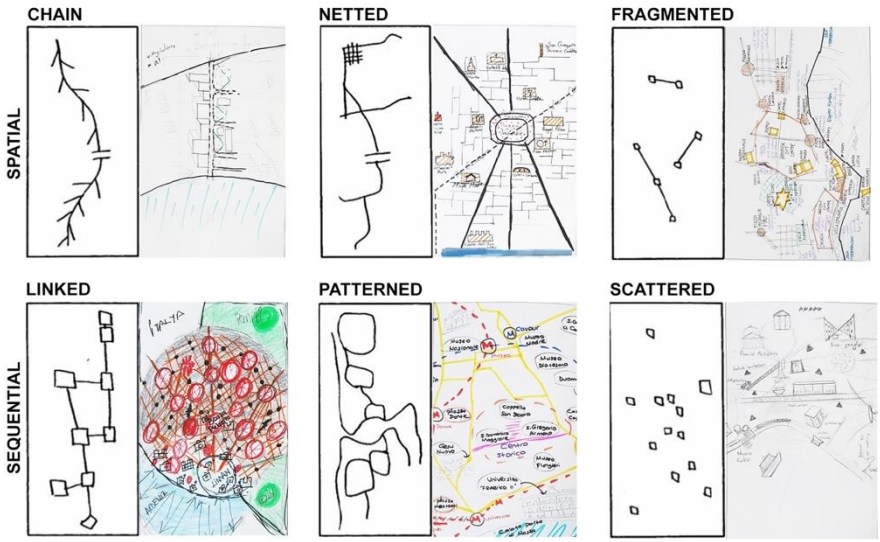

Figure 4. The outputs of the workshop are matches with Donald Appleyard's (1970) cognitive mapping topologies.

When the outputs of the workshop were evaluated, it was seen that the majority of the participants were able to create cognitive maps. As a result of the study, it was observed that most of the participants were able to "almost" visit a city that they had never visited and physically experienced, due to the correct use of the representation and location information of digital tools. As Fig. 4 reveals, despite not leaving the classroom for a minute, they have represented spatial cognition of their experience of the city of Naples, as they would represent if they were there, by using their mobile devices. Although all participants did not have the same ability to analyse location data accurately, conduct digital research, and represent the urban experience on paper, they showed that space can be experienced by roaming on networks.

Personalized expressions and representations in cognitive mapping also prove to us that the phenomenon of space now possesses so much position information that it can be experienced over the network. All these inferences reveal that a "flow" as Castells (1996) described, is possible with the help of location data that can be accessed from anywhere.

How do LBM platforms differentiate cognitive maps?

Based on the results of the study, the following inference can be made: The different information articulated to the virtual layers of the city through LBM platforms enriches the cognitive maps of the participants. The location information embedded in the virtual space of the city instantly transmits a large amount of data about the daily life of the city to the network. Therefore, "readable" and "writable" urban narratives

(De Souza e Silva & Frith, 2010) over the LBM platforms differentiate cognitive maps by playing a role in shaping spatial cognition.

In this context, it can be seen from cognitive mapping that users of different media platforms read the city through different focal points. In a sense, the diversity in cognitive maps reveals the power of LBM in different representations. As can be seen in Fig. 5, different media platforms highlight different urban phenomena in the mental process. The most conspicuous example of this, although the Google Maps application is used by almost all participants, the variety of other applications they use subsequently changed in their representations.

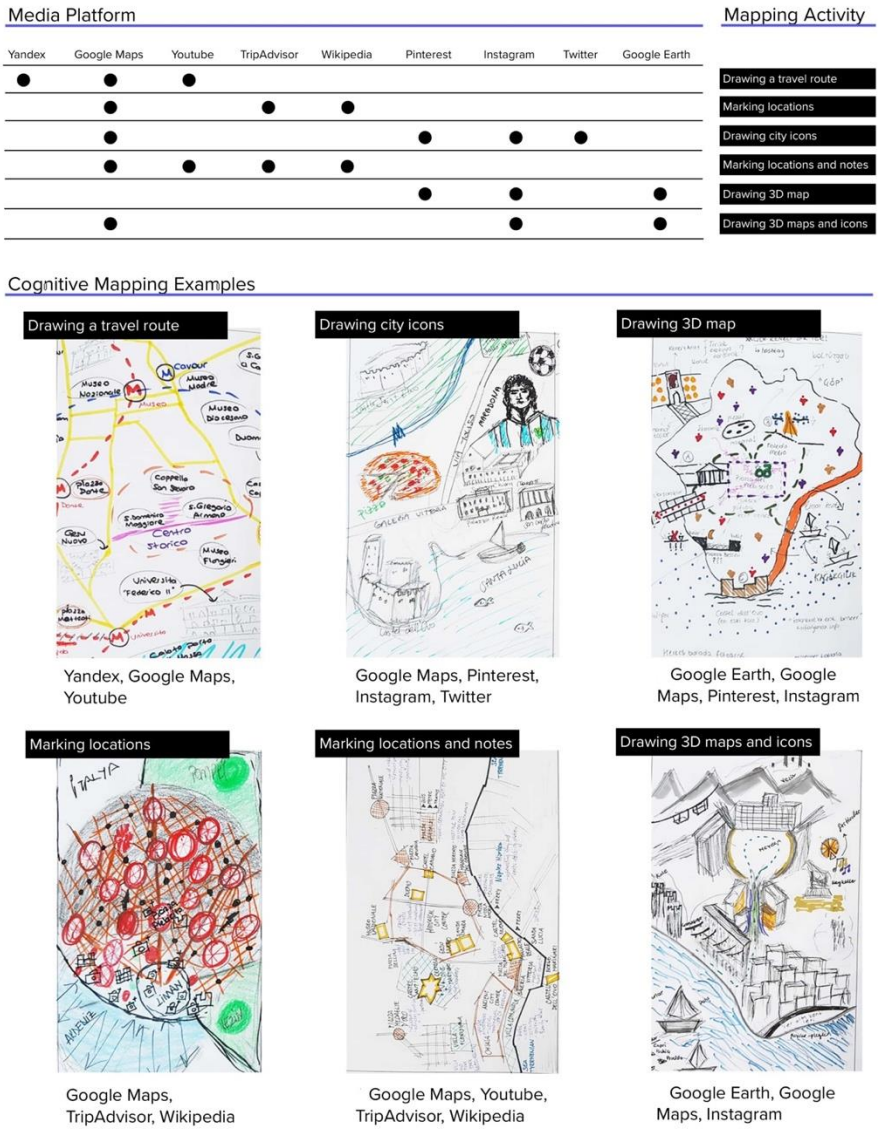

Figure 5. Various examples of cognitive maps are produced depending on the use of different media platforms.

Along with mapping applications, it is seen that the participant, who has examined the travel programs on YouTube, draws a route in his mapping. The participant, who said that he used popular applications such as Instagram, Pinterest, and Twitter besides Google Maps, placed cultural figures and known icons of the city on the map of the city. This situation emerged as a three-dimensional mapping in the participant

DOI: 10.15320/ICONARP.2021.163

who has used Google Earth application instead of Google Maps. Participants who use only information-based platforms such as TripAdvisor and Wikipedia in their study, besides the mapping program, have marked locations or have taken notes on the two-dimensional maps they have drawn. On the other hand, it is seen that the participant who uses Instagram, a social media platform that is based on visuality, besides mapping, filled his map with three-dimensional drawings.

Part II: Structured Questionnaire-Based Interviews

Data collection process

The following stage of the research is conducted through structured questionnaire-based interviews. To do so, the outcomes of the cognitive maps results, and research questions are evaluated in collaboration with the verbal explanations/answers of the participants. In order to have the detailed information, the following questions are determined to be directed to the participants:

- What were the struggles that you have while comprising the cognitive maps?
- What did you concentrate on mostly about the research topics?
- Which social media platforms were more beneficial?
- Do you feel that you know the city now after the workshop?
- How was the experience of space? Did you feel that you were visiting the space, or did it feel like it is far away from being inside?
- Was the research part or the transfer of information part of the workshop more difficult?

The questions are asked to all the participants resulting in an overall evaluation. Starting with the first question, the investigation of being inside virtual space and its struggles are examined. The answers are noted in each interview and the featured and highlighted topics are classified. The interview answers reveal the direct experiences of the participants.

Findings of the interviews reflecting direct experiences

The expression of each participant about their personal experiences in the workshop points out the findings relating to the research topics. The first question was to examine the possibility of experiencing a city that has not been physically visited through location-based technologies. Most of the participants define that trying to understand a city within a digital platform was difficult since the flow is inside many different media applications, the collaboration of the information is not an easy thing to match.

> *"There were many struggles while flowing inside the space. Organizing the gained information was difficult"* (Participant,17).

While experiencing the virtual city, since the topics given to the participants are searched through different media platforms, some titles

become prominent. This finding shows that the used media interface orients the participants resulting in an "oriented experience". Some of the participants talk about the castle and seaside in which the landmarks or important points are focused mostly. Another direction was examining the commonly visited places such as restaurants, or sightseeing places. The oriented experience of virtual space also makes the cognitive mapping process difficult.

The second question depends on how the spatial perception of a city visited with location-based media can be visible in cognitive mapping. The findings show that since the limited time is given to the participants, they end up selecting images, and photographs in visual platforms. Participants also use maps in order to get the reference for their personal cognitive maps. The texts such as blogs, photo comments, travel posts, and user comments are used to develop a deeper experience in the virtual visit.

> *"I have searched the comments of the people who walk through the castle. The texts say so much about the place and experience. They reflect the initial-detailed personal experience of space"* (Participant,15).

The experience of space is differentiated according to the participants. Some expressed strictly that the experience is low and missing while pointing spatial sense is necessary. One of the participants determined that he/she did not feel actually being there but felt like wanting to visit there. This is also an interesting expression that the flow constitutes an "inviting experience" for the participants.

> *"At the end of the process, I felt that the experience was left unfinished. I learned about what activities I can do if I go to that space. Feeling like being a tourist – gaining information about the space. But the virtual journey provided a flow – within the technology the space I envisioned in my mind has become familiar"* (Participant, 2).

Lastly, the media tools shape the experience while understanding the limitations of the media-based orientations. Interview findings show the media tool selection is influential yet varies from person to person. It is seen that if the tool is "user-friendly", the limitations minimize, and the cognitive mapping process becomes more detailed. In addition, the venue selected for the virtual city experience is very determinant. The urban cognition depends on "the character of the selected venue/city" and the information gained from the LBM can differentiate. The city image represented in the media platforms are visually oriented and this affects the participants' spatial cognition through images while other media platforms including texts reflect first-hand experiences of other media users. The overall idea of the interview participants deals with the same difficulty of this limitation that the search was generally easy in LBM however, the re-presentation of the varied information was hard.

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Discussion on Overall Findings

In order to find out whether LBM offers a visiting experience and which media affect this experience, Part-I focused on cognitive maps' examination. Part-II where questionnaire-based interviews were conducted, focused on the participants' comments on the virtual city visit. Although the two investigations have their own conclusions, comparing the outputs and analysing them in the context of general results will help to contribute to the LBM studies. Figure 6 summarizes the key concepts arise from Part-I and Part-II of the study.

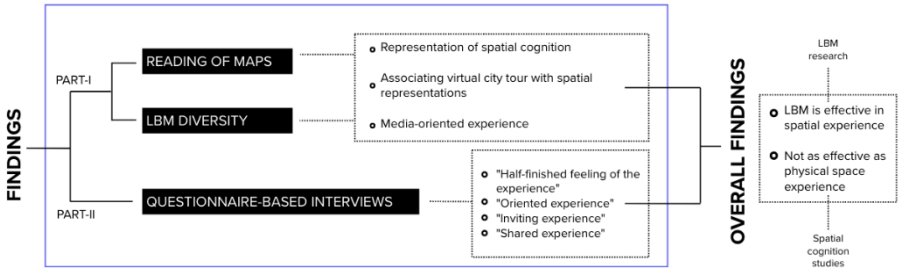

Figure 6. Comparisons between Part I & Part II, determining the expressions.

As it is summarized in Figure 6, in essence, within the investigation of the possibility to visit another city with LBM, testing the feasibility of cognitive mapping proves that an experience is realized. It is also seen as evident in the findings of Part-I that there is a strong relationship between the selection of the media platform and the representation. For instance, the usage of a map-based media platform highlights different urban phenomena in the mental process and the representations appear as drawing the city with a diagrammatical settlement scheme. These findings are considered important as they have the potential to open up the spatial experience discussions shaped by the use of media.

The summarized result in Figure 6 shows that the user interview focused on the information gained from the LBM is mostly the blurred information gained in varied contexts. The interviews reflect the experience with such expressions: "not physical, without interaction, external, no senses, partially experienced, etc.". The reason for this finding is the fact of the usage of informative technologies enables the participants to understand the general framework of the place (the location, the landmarks, the important cultural references, etc.).

Another important point in the user interview is that the spatial mobility and experience in virtual platforms can be called "shared experience" in which many people comprise their personal access. The interviews reflect that the comments and data of other users affect the virtual visit as they combine with the LBM usage. It is also essential to underline the description of "feeling like being there". Interviews emphasize the related situation with the expression of most of the participants as "feeling like walking in the city". This finding indicates

that long-term use of LBM has the potential to create a cognitive perception close to physical space experience.

When the outputs of the interviews and the cognitive map analysis are compared, an important difference emerges. Part-I shows that a cognitive spatial experience takes place, and the media differentiate this cognitive process, while Part-II shows that the participants' experiences cannot replace the physical space experience. The combination of the two studies reveals both the potential impact of LBM use on the experience of space and its shortcomings. The overall results underline the significance of user-space interaction along with the virtual spatial flow since it is also an important issue in today's society that the social media platforms and their tools provide not only visual but also spatial access for the users.

CONCLUSIONS AND RECOMMENDATIONS

This paper explored the potential role of LBM on spatial experience in terms of spatial cognition. The intention is to find out if LBM were able to create a spatial experience of the city that never been experienced, how different LBMs might affect the spatial experience, and what type of information they can offer. The method was applied in a workshop with the contribution of participants that were tasked to visit a city through LBM and produce cognitive maps of the experience. The investigation is entirely conducted through LBM searches. Through the production of cognitive maps of participants, and two qualitative analyses, the hypothesis is examined with the collected data.

The data sets emerging from the two stages of the study were correlated and it was found that LBM's massive potential to create an impact of spatial experience and cognitive mapping is a constructive tool to test it. Furthermore, the investigation on cognitive mapping also showed that LBMs have different spatial implications on spatial cognition that differentiates the cognitive maps' layout.

Since the users are exposed to various spatial data through different platforms, the experience is quite blurred as they have described. In addition to that, the experience of others can easily transform the experience of the media user. While a place that has not been physically visited is envisioned as if it has been visited, it is very difficult to deepen the experience. However, cognitive mapping representations of the virtually experienced city can be produced, therefore we may also argue that LBM influences the spatial experience. The general outputs of this study support the view that the use of LBM constitutes a research area for cognitive space experience studies. The data obtained as a result of the interpretation of all the relationships dealt with in this study are critical for spatial cognition and environmental behaviour research.

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CONFLICT OF INTEREST

The authors declared that this study has received no conflict of interest.

FINANCIAL DISCLOSURE

The authors declared that this study has received no financial support.

ETHICS COMMITTEE APPROVAL

Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS

In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions and organizations) during the survey, in-depth interview, focus group interview, observation or experiment.

REFERENCES

Akgun Yuksekli, B. (2017). Yeni Medyanın Mekânsal ve Dijital Aktivizmdeki Rolü: Kent Kaşifliği Örneği. *Ege Mimarlık Dergisi*, *Ekim*, 18–23.

Al-Kodmany, K. (2001). Supporting imageability on the World Wide Web: Lynch's five elements of the city in community planning. *Environment and Planning B: Planning and Design*, *28*(6), 805–832. https://doi.org/10.1068/b2746t

Appleyard, D. (1970). Styles and methods of structuring a city. *Environment and Behavior*, *2*, 100–117. https://doi.org/10.1177/001391657000200106

Blackmore, S. (2003). *Consciousness: An Introduction*. Hodder & Stoughton. https://www.amazon.co.uk/Consciousness-Introduction-Susan-J-Blackmore/dp/019515343X/ref=sr_1_1?s=books&ie=UTF8&qid=1542539329&sr=1-1&keywords=019515343X

Castells, M. (1996). *The Rise of the Network Society*. Blackwell. https://doi.org/10.4337/9781845421663.00029

De Souza e Silva, A. (2006). From cyber to hybrid. *Space and Culture*, *9*(3), 261–278. https://doi.org/10.1177/1206331206289022

De Souza e Silva, A., & Frith, J. (2010). Locational privacy in public spaces: media discourses on location-aware mobile technologies. *Communication, Culture & Critique*, *3*(4), 503–525. https://doi.org/10.1111/j.1753-9137.2010.01083.x

De Souza e Silva, A., & Hjorth, L. (2009). Playful urban space: a historical

approach to mobile games. *Simulation and Gaming*, *40*(5), 602–625. https://doi.org/10.1177/1046878109333723

De Souza e Silva, A., & Sutko, D. M. (2010). Location-aware mobile media and urban sociability. *New Media and Society*, *13*(5), 807–823. https://doi.org/10.1177/1461444810385202

De Souza e Silva, A., & Sutko, D. M. (2011). Theorizing locative technologies through philosophies of the virtual. *Communication Theory*, *21*(1), 23–42. https://doi.org/10.1111/j.1468-2885.2010.01374.x

Dodge, M., & Kitchin, R. (2001). *Mapping Cyberspace*. Routledge. https://doi.org/10.4000/cybergeo.881

Downs, R. M., & Stea, D. (1977). *Maps in Mind: Reflections on Cognitive Mapping*. Harper & Row. https://doi.org/10.4324/9780203789155-10

Evans, L. (2014). Being-towards the social: mood and orientation to location-based social media, computational things and applications. *New Media and Society*. https://doi.org/10.1177/1461444813518183

Evans, L. (2015). *Locative Social Media: Place in the Digital Age*. Palgrave Macmillan. https://doi.org/10.1057/9781137456113

Frith, J. (2014). Communicating Through Location: The Understood Meaning of the Foursquare Check-In. *Journal of Computer-Mediated Communication*, *19*(4), 890–905. https://doi.org/10.1111/jcc4.12087

Gordon, E., & de Souza e Silva, A. (2011). *Net Locality: Why Location Matters In A Networked World*. Oxford: Wiley-Blackwell Publishing. https://doi.org/10.1002/9781444340679

Hart, R. A., & Moore, G. T. (1973). The Development of Spatial Cognition: A Review. In R. M. Downs & D. Stea (Eds.), *Image & environment: Cognitive mapping and spatial behavior* (pp. 246–288). Aldine Transaction. https://doi.org/10.4324/9780203789155-26

Humphreys, L. (2007). Mobile social networks and social practice: a case study of Dodgeball. *Journal of Computer-Mediated Communication*, *13*(1), 341–360. https://doi.org/10.1111/j.1083-6101.2007.00399.x

Humphreys, L. (2010). Mobile social networks and urban public space. *New Media and Society*, *12*(5), 763–778. https://doi.org/10.1177/1461444809349578

Humphreys, L., & Liao, T. (2013). Foursquare and the parochialization of public space. *First Monday*, *18*(11). https://doi.org/10.5210/fm.v18i11.4966

Iavarone, A. H., & Dursun Çebi, P. (2019). The Urban Space of Network Society: Digital Flaneurs in the Age of Social Media. *Livenarch International Congress*, *September*.

Kaplan, S. (1983). A Model of Person-Environment Compatibility. *Environment and Behavior*, *15*(3), 311–332. https://doi.org/10.1177/0013916583153003

Kitchin, R., & Blades, M. (2002). *The Cognition of Geographic Space*. I. B. Tauris. https://doi.org/10.5040/9780755620951

Kut, S., Aydınlı, S., & Erdem, A. (2013). Sibertektonik mekân. *Tasarım + Kuram*, *9*(15), 21–34. https://doi.org/10.23835/tasarimkuram.240908

DOI: 10.15320/ICONARP.2021.163

Kwan, M. P. (2001). Cyberspatial cognition and individual access to information: the behavioral of cyber geography. *Environment and Planning B: Planning and Design*, *28*, 21–37. https://doi.org/10.1068/b2560

Lang, J. (1987). Cognitive Maps and Spatial Behavior. In J. Lang (Ed.), *Creating Architectural Theory: The Role of the Behavioral Sciences in Environmental Design* (pp. 135–144). Van Nostrand Reinhold.

Laurendeau, M., & Pinard, A. (1970). *The development of the concept of space in the child.* International Universities Press. https://doi.org/10.1192/bjp.119.552.565-b

Lynch, K. (1960). *The Image of the City*. Cambridge, Mass: MIT Press.

Moore, G. T. (1976). Theory and research on the development of environmental knowing. In G. Moore & R. G. Golledge (Eds.), *Theories, research, and methods* (pp. 138–164). Stroudsburg, PA. https://doi.org/10.1177/0013916579111002

Neisser, U. (1982). *Memory observed: Remembering in natural contexts*. W. H. Freeman and Co. https://doi.org/10.1080/00029157.1984.10402579

Ozkul, D. (2013). You're virtually there: Mobile communication practices, locational information sharing and place attachment. *First Monday*, *18*(11). https://doi.org/10.5210/fm.v18i11.4950

Ozkul, D., & Gauntlett, D. (2014). Locative media in the city: Drawing maps and telling stories. *The Mobile Story: Narrative Practices with Locative Media Technologies*, *January*, 113–127. https://doi.org/10.4324/9780203080788

Passini, R. (1984). *Wayfinding in architecture*. Van Nostrand Reinhold.

Piaget, J., & Inhelder, B. (1967). *The Child's Conception of Space*. W.W. Norton.

Saker, M., & Evans, L. (2016a). Everyday life and locative play: an exploration of Foursquare and playful engagements with space and place. *Media, Culture & Society*, *38*(8), 1169-1183. https://doi.org/10.1177/0163443716643149

Saker, M., & Evans, L. (2016b). Locative mobile media and time: Foursquare and technological memory. *First Monday*, *21*(2). https://doi.org/10.5210/fm.v21i2.6006

Saker, M., & Frith, J. (2018). Locative Media and Sociability: Using Location-Based Social Networks to Coordinate Everyday Life. *Architecture_media_politics_society*, *14*(1), 1–21.

Sheller, M., & Urry, J. (2006). The New Mobilities Paradigm. *Environment and Planning A*, *38*(2), 207–226. https://doi.org/10.1068/a37268

Tokgöz, C. (2017). Konum Tabanlı Mobil Oyunlar ve Mekan Algısı: Ingress Üzerine Etngrafik Bir Araştırma. *Ilef Dergis*, *4*(2 sonbahar), 7–36.

Tolman, E. C. (1932). *Purposive behavior in animals and men*. Century/Random House.

Wilken, R. (2012). Locative media: From specialized preoccupation to mainstream fascination. *Convergence*, *18*(3), 243–247.

https://doi.org/10.1177/1354856512444375

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The Relationship Between the Public and Private Spaces in Siverek Traditional Settlement

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Abstract

Purpose

Traditional houses are living spaces that the user shapes over time according to specific environmental factors and needs, which come together in a certain pattern forming some key parts of the traditional settlement texture. This pattern, which also reflects the local culture, is created by the relationships among the public, private, and intermediate spaces. The traditional Siverek architectural settlement is quite rich in such spaces. The main elements that form the urban pattern are the squares and streets that form public spaces, the houses representing the private space, and the in-between spaces such as texture-specific dead-end streets and archways that bridge these two types of spaces. However, due to the uninformed and miscalculated interventions in the original texture, mistimed protection measures, and failure to produce solutions for preservation, these architectural gems are at risk of extinction. At this point, two problems have been identified. The first is the preservation of the historical fabric. Another problem is the incompatibility of the newly planned areas with the old texture and housing layout. The purpose of this study is to provide guidance for new planning by analyzing the spatial arrangement of the traditional Siverek settlement.

Design/Methodology/Approach

In this context, from public spaces to residential private spaces, the spaces and their spatial relationships in the Siverek settlement plan were examined in a hierarchical order. The interrelationships among the spatial elements specific to the original texture of Siverek were discussed, and their status regarding their functional and spatial features in the urban texture were explained.

Findings

As a result of the study, it is stated that the traditional settlement texture and architecture of Siverek should be documented and preserved. Furthermore, considering the fact that the physical and social components that shape the spatial elements of the traditional fabric remain valid today, the need to transfer spatial formations and spatial hierarchies between public and private spaces to new designs on the settlement scale and building scale was emphasized.

Social/Practical Implications

It will serve as a guide for consideration in future designs of the city of Siverek, not by imitating traditional forms, but by analyzing spatial setup.

Originality/Value

This study is the first study on the public and private space relationship in Siverek.

Keywords: *Public space, private space, in betwen space, traditional housing, Siverek*

INTRODUCTION

Siverek is a Mesopotamian settlement in southeastern Turkey that has been home to various civilizations throughout its 7000-year history and has been located on trade routes. (Figure 1).

The traditional settlement of Siverek has a unique organic texture that calls for a careful analysis. With its structure developing organically in and around the castle until the middle of the twentieth century, the settlement is now wedged between the wider and geometric road systems bordered by the zoning islands created by the subsequent zoning arrangements (Figure 2). This has kept increasing the pressure on its traditional texture and accelerated the process of extinction. Although change is inevitable in every living culture and city, managing such a change by taking into account the architectural and urban identity elements is a highly critical issue (Kandemir, 2017, p. 10). In addition, physical conditions and traditional social structure still exist. Today, the spatial formations of these traditional houses, which have been rapidly destroyed because they have not yet been legally protected, are important in terms of transferring cultural continuity to future generations.

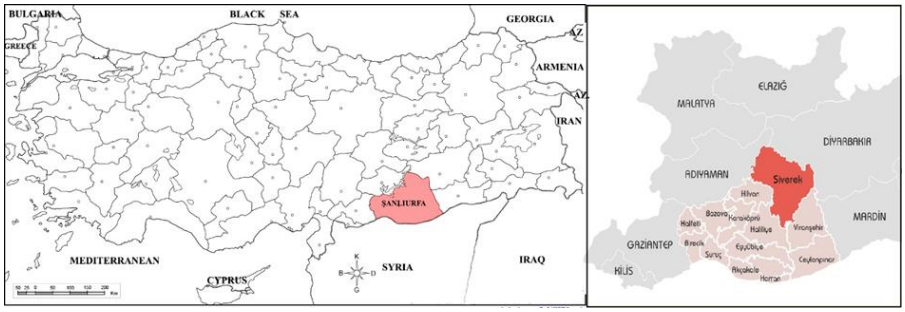

Figure 1. Geographical Location of Siverek District (Kalak, 2018, p.68)

Figure 2. Physical Change of Siverek over the Years (Kalak, 2018, p.63, Sınmaz & Ahsen Özdemir, 2016, p.27)

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As a method; In order to define the concepts of public-private and to gather information about the district of Siverek, a wide literature review was conducted. In the original part of the study, Several analyses have been done on the maps (1953, 1954, 1958, 1984, 1994) and satellite images of the area (1961, 1986, 2005) which were taken from the General Map directoryof the Turkey (Harita Genel Komutanlığı) and the change in the space has been pointed on the output maps. In this context, the historical range of the analysis of the traditional texture of the city has been determined within the scope of the data obtained from HGK (Map General Command). In this way, analyzes were made at city scale. Maps were obtained from 'Milli Kütüphane' for smaller scale analysis; The drawings of the work area were obtained from 'Şanlıurfa Metropolitan Municipality' and 'Siverek Municipality' and the necessary data were obtained from 'Şanlıurfa Cultural Heritage Preservation Regional Board Directorate'. With the data obtained, the borders of the traditional texture, which is the study area, were determined and concentrated in the specified area. In this area, the spatial elements shaped in the context of the public-private space of the city have been analyzed. Then, studies were carried out on a housing scale. 55 residences were entered in order to gather information about the houses. A preliminary examination has been made about the spatial formation and elements of the houses. Sketches of the examined houses were drawn, photographs were taken, oral interviews and observations were included.

The objective of this study is to serve as a guide for consideration in future designs of the city of Siverek, not by imitating traditional texture, but by analyzing spatial setup. In this context, the physical and social components that form the settlement are laid out first. The spatial hierarchies from public to private on the urban scale and from common space to private on the residential scale have been analyzed with field and archive research and transformed into schemes that form this network.

FACTORS SHAPING SIVEREK TRADITIONAL SETTLEMENT

Siverek is located in the region geographically called "Mesopotamia," and is an important settlement that has hosted many civilizations throughout history. The history of the city dates as far back as 5000-4500 BC, the early Chalcolithic Age (Çelik, 2008, p. 130). It has also been home to various tribes and civilizations such as Uruks, Sumerians, Accadians, Assyrians, Hittites, Romans, Sasanis, Mitannis, Byzantines, Arabs, Seljuks, and Ottomans in various periods (Özgültekin, Akman, Demirbağ, & Sun, 2003, p. 40-77). The settlement, which has been on important trade routes throughout history, is a vivid trade hub, being located on the highway connecting the two major cities of Şanlıurfa and Diyarbakır (Kalak, 2018, p. 47-52). Preserving its traditional characteristics until the mid-twentieth century, the urban housing structure of the city has been deeply affected by the Master

Development Plans (1968, 1993, 2004, 2015), which began to be implemented after the migration from rural areas to the city after 1950. Siverek has certain traditional settlement and housing features that are specific to the region. Rapoport defines the traditional residence as the product of folk culture, as an element of an artificial frame that forms the traditional living environments of the society to which it belongs and where architects play almost no role. Traditional settlements and residences where the name of the architect is not known and the architecture belongs to the society rather than the person are called "Anonymous Architecture" (Rapoport, 1969, cited in Eyüce, 2005, p. 6). Many physical and socio-cultural factors have played a part in shaping the traditional Siverek houses and urban fabric.

Physical Factors

The physical factors that physically shape the city can be considered either as natural or man-made. While the eastern borders of Karacadağ and the Euphrates river in the west form the natural borders of the settlement (Akpirinç, 2012, p.1), the geographical and climatic conditions in addition to the Esmer stream running through the city have been some other important natural factors. In addition, the castle in the city center, which was built on a mound during the Assyrian period, has been a key landmark in the city with a flat topographical surface, and the settlement has radially developed around this castle (Figure 3).

Figure 3. Satellite Image from the year 1954 (Archive of the General Command of Cartography), (Kalak, 2018, p.53)

Another critical factor shaping the city has been the climate. Terrestrial steppe climate characteristics are observed in and around Siverek. The warm and dry climate of the city has resulted in the narrow and organic boundaries of the houses formed by the streets (Figure 4). The Siverek houses' being single- or double- storey allows the wind to reach into the

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narrow streets in the city, creating more airy spaces. The narrow streets, archways and high walls of the houses create shaded areas on the streets. The warm climate has also led the houses to be structured around a courtyard (Kalak, 2018, p. 50). In addition, the basalt stone, which is the local material that gives the city its characteristic feature, protects the buildings from the heat in the summer and the cold in the winter, thus maintaining the thermal balance in the environment.

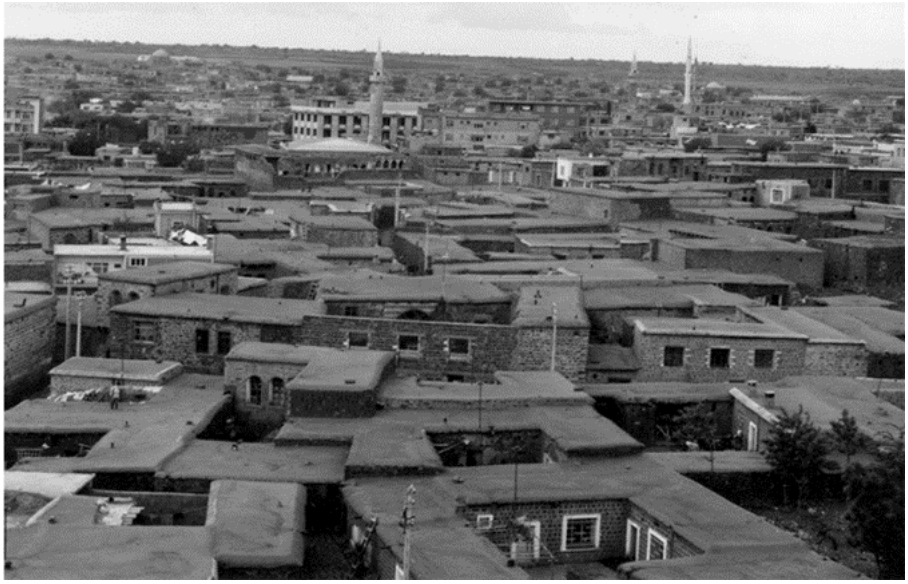

Figure 4. General view of the city in 1926 (Siverek Municipality Archive) (Kalak, 2018, p.64)

Socio-cultural Factors

Rapoport discussed the impact of socio-cultural structure on traditional housing under 5 themes as the basic needs, family, position of women, privacy, and social interaction (Rapoport, 1969, p. 61). The society that constitutes the Siverek settlement has a collective structure based on the agricultural economy, consisting of large families with patriarchal order, where women's life is limited to the home and family environment, and the privacy of the family and women is important. The cul-de-sacs, high-walled houses, that the exterior of the houses are usually shut-off, the height of the window openings are above the human eye level, the interior spaces are completely cut off from the outside, and the haremlik-selamlik (separate rooms for men and women) clearly show the importance of privacy. The courtyard used by women as a working and socializing area is a space open only to the rooms and closed to the outside. Winter provisions are prepared by women who gather in the courtyard and the food is dried on the flat adobe roofs of the houses (Kalak, 2018, p. 59).

In Siverek, the family structure is composed of large families in a patriarchal and hierarchical order with tight-knit family and kinship relationships. The elderly individuals respected as the authority at home have the final say about the lifestyle of other family members. This hierarchy is reflected in the house in the form of a special headroom for the elderly individual of the household. It is deemed appropriate for

multiple families to live together in large houses, consisting of relatives or married children of the household. When the space is too limited to live under the same roof, kinship ties are maintained by living in houses on the same street within close proximity to each other (Kalak, 2018, s. 59).

One of the important factors in shaping settlements is the city's economy and its trade. Siverek has been on an important trade route since ancient times and has become a frequent destination for many civilizations which has led many commercial buildings such as inns, Turkish baths and coffee shops to start their business here, resulting in families with various socio-economic statuses. Families with high economic income have generally resided in mansion-like two-storey structures with cut stones, whereas low-income families resided in single-storey houses. The high-income families' houses have larger guest rooms and other spaces than those of low-income families. While the water needs of the general public are met by common fountains, the high-income families use the wells in their courtyards to meet their water needs. Since there were families who used animals of burden for transportation in the past, barn solutions were also provided in the house. In large families heavily engaged in trade and agriculture, warehouse solutions were also supplied within the housing. However, revised in line with the modern comfort conditions, many original spaces have been removed or altered to serve other functions.

SPATIAL FORMATIONS AND HIERARCHICAL ORDER IN SIVEREK

The spatial hierarchy is the transition between the human-produced public space and the semi-public, semi-private, and private space, or in other words, the whole set of interrelations, as stated by Sennet. There is a hierarchical order among the spaces that are shaped according to the behavior of people in urban spaces determined by concepts such as occupancy-space, functionality, use, accessibility, and ownership (Erdönmez & Akı, 2005, p. 67). Although "public" and "private" are usually used as two diametrically opposite concepts, they may occasionally intertwine and emerge as a private space within the public or a public space within the private, which is an issue for heated debate (Gürallar, p. 54).

Examining the factors that affect the shaping of the city of Siverek and the traditional housing structure makes it easier to read the hierarchical spatial order. The city center as the public space and the houses as private spaces are situated separately from each other. The residential districts consist of neighborhoods. These neighborhoods have developed around the sub-centers with their mosques, coffee houses and fountains. The main axes connecting the main center to the lower centers and the capillary-like smaller axes and cul-de-sacs that extend to the houses from these axes form the hierarchical steps between the public and private spaces (Figure 5). Thus, the city of Siverek was examined as public, private and intermediate spaces.

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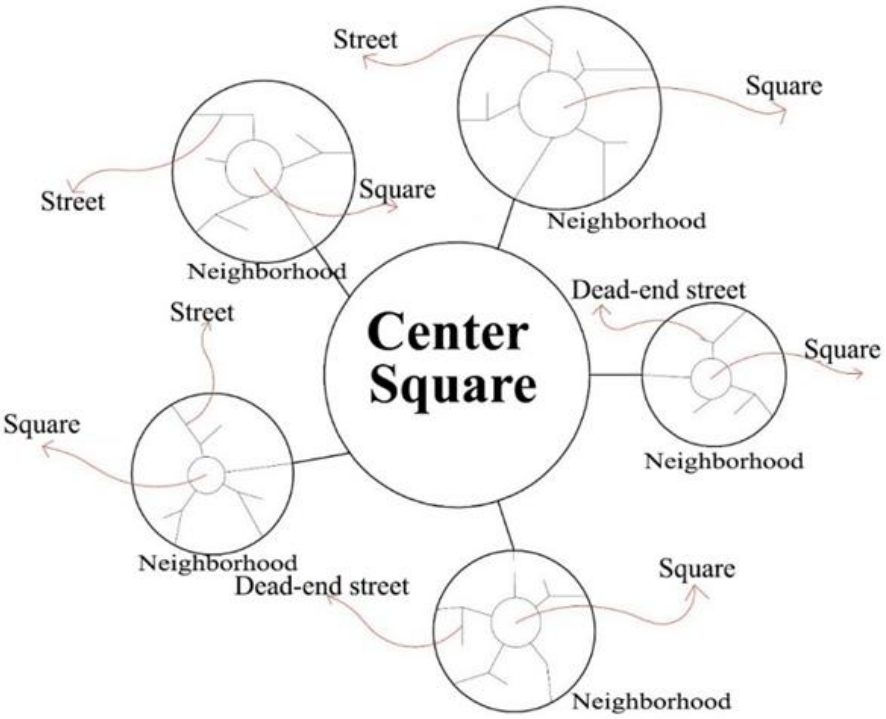

Figure 5. The relationship among the square, small square, street, and cul-de-sac in traditional Siverek urban structure (Kalak, 2018, p.85)

Public Spaces in Siverek

"Common" areas or the spaces where public use is permitted are the public spaces where everyone can be "seen and heard." Public space is labeled as "accessible," that is, as groups of buildings that allow general use or urban open spaces. Being public for buildings can be defined by accessibility, not ownership. Urban/public open spaces are spaces, parks, squares, and streets open for everybody's use (Gürallar, 2009, p. 54). Public space is a common ground in which social or individual activities are carried out, whether in everyday life or during special times such as festivals (Madanipour, 1996). The analysis of the elements that make up public spaces is important since it serves as a guide for urban development. Public spaces that form the formal language of the city are organized in a hierarchical way to ensure distribution and circulation to the city (Gökgür, 2008, p. 79 & Karaman, 1991, p. 31).

In Siverek, the city center is the biggest public space with the mosques, Turkish baths, inns, coffee shops, bazaars, and markets located here. (Kalak, 2018, p. 53). When the location of the city center was examined, it was seen that the castle is located on the eastern outskirts and there are many inns and baths in the area extending to the southern perimeter of the city. In addition, there are accommodation inns at the southern end of the settlement, although separate from the center. This points to the route through which the caravan routes pass, and shows that the city center was formed according to this route (Figure 6).

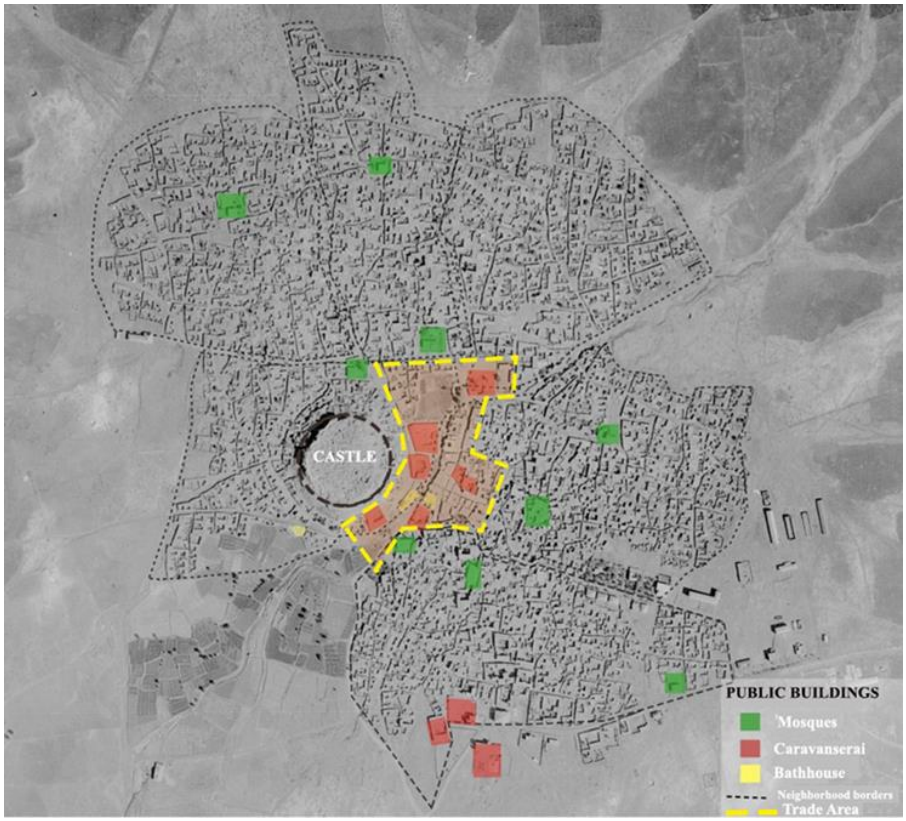

Figure 6. Public structures and layout of the commercial texture (Edited by the Author)

Baths and inns are arranged in a way that they are generally close and related. The mosques and coffeehouses have been important socializing places for men while the fountains built for the public use have been important for women's socialization. In the city where privacy is especially important for women, fountains have become an important means of communication (Kalak, 2018, p. 57). In the following section, squares and streets are analyzed as urban/public open spaces that form different hierarchical levels in the traditional settlement of Siverek.

Squares

Squares are open and large areas, most of which are surrounded by buildings, trees or natural boundaries (Hasol, 2017, p. 320) and public spaces that allow people to gather and interact in various ways (Erdönmez & Akı, 2005, p. 68). Kuban draws attention to the absence of planned squares in the ancient Islamic and Turkish settlements. Open spaces around buildings served as such squares, and when people needed to gather, mosques, courtyards of mosques, and fountains met this need (Kuban, 1970, p. 210). The urban open spaces, which are socially important, did not emerge as city squares as observed in European cities. Apart from a few major monumental structures, the city did not have any structures designed holistically with their surroundings taken into account (Kuban, 1968, p. 70).

The squares in Siverek have a hierarchical order not by size but by intensity of use, and are generally developed in an organic form with the intersection of the roads. Therefore, it would perhaps be more precise to

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call them as an “intersection” rather than a “square.” Such areas formed by the intersection of alleys in Siverek neighborhoods are called a “Düz” (Akman, 2017, p. 156). Although they do not have the characteristics of a real square, they serve as the public areas where ‘düz’, mosques, grocery stores, coffee shops and fountains are located, small farmers’ markets are set up, neighborhood weddings are held and problems related to the neighborhood are discussed. The main squares have been the areas used by all residents of the city (Figure 7).

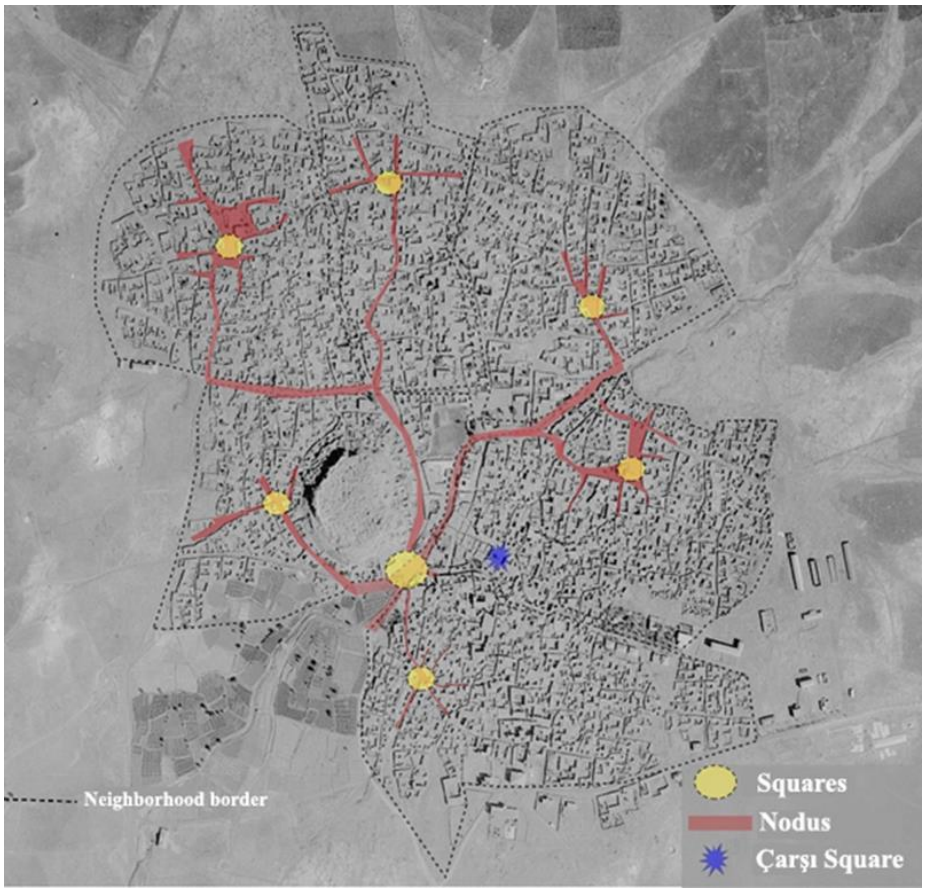

Figure 7: Square layout of Siverek settlement (Kalak, 2018, s. 84)

Streets

Streets are the main components of the public spaces that are the core of the city form (Tanyeli, 1987, p. 154-156). The streets that connect the spaces and buildings are the key elements connecting the empty and occupied spaces of a city. They also create the transitions and relationships between public, semi-public, semi-private, and private spaces. The streets in Siverek are called ‘küçe’ in the local dialect. “Küçe” is a Persian word meaning “street” (https://www.luggat.com/küçe/1/1). The streets in Siverek are in organic texture, narrow and curvilinear and include many dead ends. These streets have provided the relationship between spaces and people in the city with their archways, dead-end streets, the intersections formed by the intersection of the roads, and the narrowing and expanding spaces.

Streets in the city have served as places where time is spent chatting, social assistance is provided, children played in safety, and where neighbors communicate with each other. Being narrow, the streets bordered by high windowless walls provide shady areas for a long time during the day. In the streets, where privacy is important, residential windows either do not open to the outside or open at the eye level. In the facade facing the street, there is almost no movement that will create any plastic effect other than the outer door movements (Kalak, 2018, p. 84). In the traditional Siverek houses, the doors opening to the street open in the opposite direction, thus blocking the view of neighboring houses' doors and allowing their privacy (Figure 8). This aims to cut off the visual contact when the door needs to be left open (Kalak, 2018, p. 107).

Siverek streets have a hierarchical order not by width but by the frequency of use. The dead-end streets, characterized as being intermediate spaces, serve as private spaces used only by certain people.

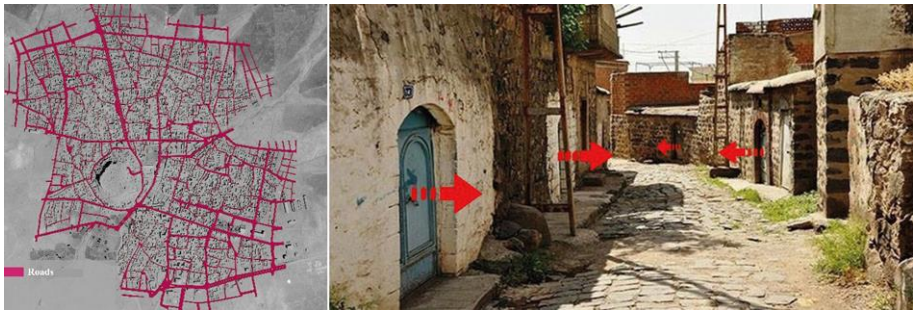

Figure 8. Siverek Street Network System and Street Connections (Kalak, 2018, s. 104)

In-between space, semi-public and semi-private space

Public and private spaces are interdependent because they affect and shape each other. Rather than being sharply separated, they are connected by semi-public or semi-private spaces with different degrees of privacy and openness (Madanipour, 2003, s. 210). Semi-public and semi-private spaces are areas that can be viewed, observed, and inspected within the space hierarchy, ensuring the transition and continuity between public and private spaces. Habraken (1998) and Nooraddin (2002) argue that the controversial concepts of *semi-public* and *semi-private* fail to fully describe such spatial organizations, and propose 'in-between space' as a more inclusive and accurate definition of this concept (Nooraddin, 2002), (Habraken, 1998).

It is also described by terms such as intermediate space, threshold, and public/private space boundary. Forming the interior extensions of a building such as a bay window, balcony, portico, archade, patio, archway, and courtyard, this space not only creates an interface between public and private spaces, but also shapes social relations around the building. Intermediate spaces are distinct elements that shape traditional patterns by allowing spatial continuity. These elements can be attached to the private interior and the public exterior.

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For example, a courtyard connected to a street is a threshold that forms an intermediate space between the private space and the street (Doğan, 2016). Therefore, the cul-de-sacs and archways in the traditional Siverek residential texture can be described as intermediate spaces.

Dead-end streets (Cul-de-sac)

Dead-end streets (cul-de-sacs)[1] are street connections that emerge as a result of many factors. Factors such as culture, social life, privacy, and irregular plot boundaries influence the formation of cul-de-sacs.

The existence of many cul-de-sacs in the organic texture of the city shows that the streets are an important part of the urban life. In the settlement with a radial layout, these dead end streets were built to have access to the houses, especially in the areas between the axes that widen as they get farther from the center. The dead-end streets, which are known as 'küçe çıkmaz' in the local dialect, have been places very busy with the hustle and bustle of daily life. While residential courtyards constitute the common living space of family life, the cul-de-sacs form the common area of the people living there. While the house itself, being shut off from the outside, ensures the household privacy, cul-de-sacs provide privacy for the residents. Such cul-de-sacs are critical especially for the socialization of women, who have only a limited public space. The activities such as wool washing, bread baking, street cleaning etc. that women do together are the indication that the cul-de-sac is used as a living space. In the studies carried out in *Cami-i Kebir* District, the intermediate spaces that are characterized by their role as a connection between the public and private spaces were analyzed, and the hierarchical order was thus explained clearly (Figure 9, Figure 10).

[1]Keleş states that the dead-end street corresponds to the terms 'impase, cul-de-sac' in French, 'sackgasse' in German, and 'dead-end street' in English, and describes it as 'A closed road or place with only one exit, the other end of which is designed to protect residences and individuals from the noise of urban traffic and the concerns it creates' (Keleş, 1980, s. 34).

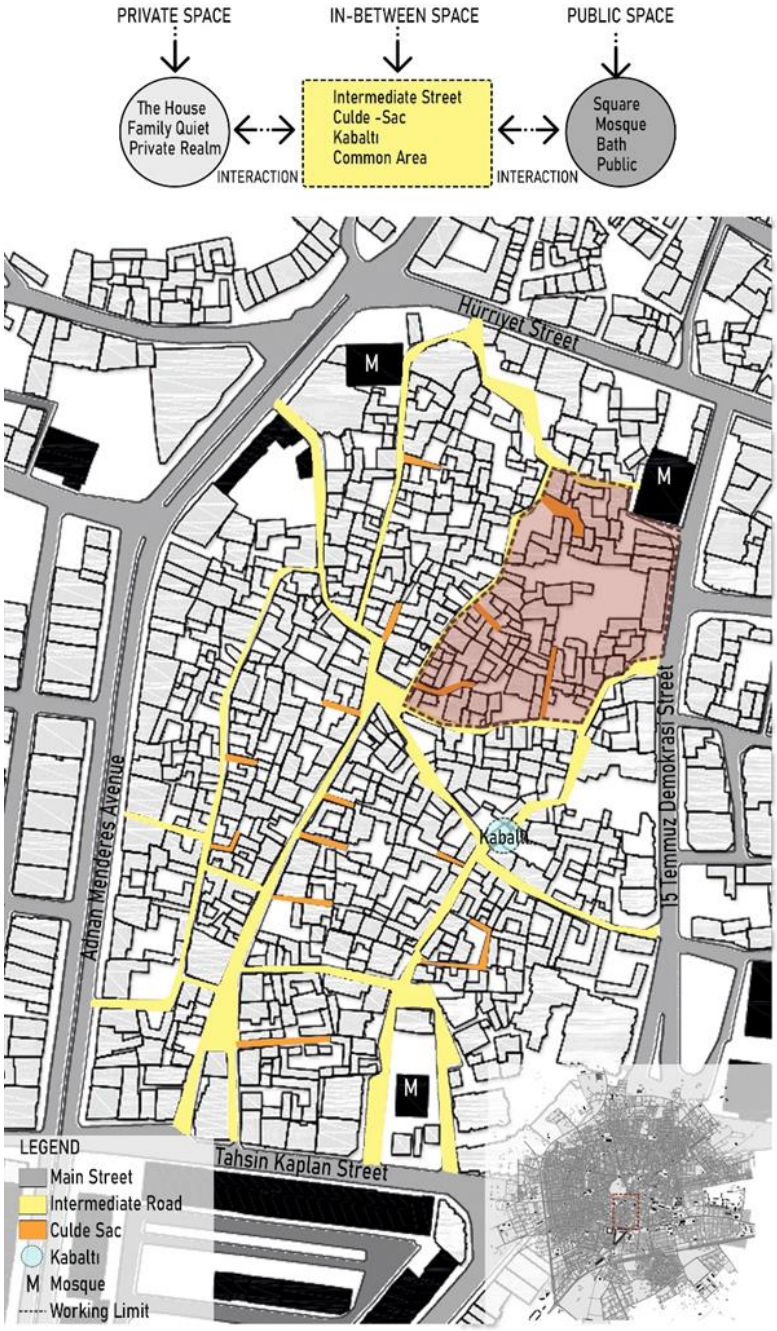

Figure 9. A drawing that shows the relationships among the roads in Cami-i Kebir District (Kalak, 2018, p. 91)

Although nothing blocks the entrances of the cul-de-sacs, these have not been places that are open to everyone. The cul-de-sacs, which form an invisible border monitored by the street residents, form a territoriality under the control of the residents living here. Although they are public space, they act as an intermediate space that allows the streets to run towards the houses and the houses towards the streets. At the same time, they serve as a threshold for the gradual transition from the public space of streets towards the private space of houses.

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Figure 10. The cul-de-sac and residence relationship in Cami-i Kebir District (Kalak, 2018, p. 92)

Figure 11. Cul-de-sacs in the Cami-i Kebir District study area (Kalak, 2018, p.93)

Kabaltı (Archway)

Kabaltı[2] refers to a transit area where the upper level serves as a residence and the lower part is used as a street (Közcü , 2016, p. 8). The high number of such archways in the Southeastern Anatolia Region, where the Siverek district is located, has resulted both from an endeavor to gain extra space within the high building density of the traditional texture and an effort to create some cool shades to avoid the scorching sun. It has been developed in a region-specific way since the warmer climate of the region requires shaded areas. The two archways in Siverek have similar features. *Bucak* and *Alhas* archways are known by the names of the two important families that own these properties (Figure 12).

[2]In the local architecture of Siverek, archways are known as "kantarma". Archways are named differently in different cultures. They are called 'abbara' or 'sabat' in Mardin city and its neighboring region.

Figure 12. Bucak (left) and Alhas Archways

Archways have been important architectural elements that connect the house downstairs to the street and enables the house to interact with the street visually. The door of the house opens to the street under the archway. The archway is a different type of structure in which visual and auditory relations are established with public spaces. While the privacy of the house is ensured through the upper floor, the continuity of the street, which is open to public use, is ensured through the ground floor. Despite the street being a public space, due to the territoriality effect of the archwayed residence property ownership, the space under the archway also serves as an intermediate space that acts as a buffer zone or threshold between private and public spaces, rather than being purely public (Figure 13).

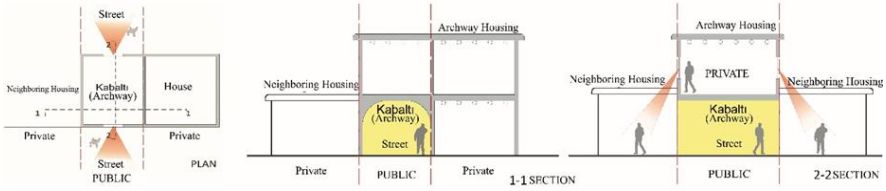

Figure 13. Schematic Illustration Describing the Principle of Archway (Kalak, 2018, p. 108)

Private Space – House in Siverek Settlement

Houses are the private spaces where a family or individuals live, own and obtain adequate privacy from the public space. They reflect the character of the group to which they belong, representing the societies and individuals themselves, their culture, and lifestyle. Rapoport defines 'house' as the place where the form and organization are influenced greatly by the cultural environment to which it belongs and created according to the people's way of life. Siverek's traditional texture and houses are shaped by many factors such as lifestyle, culture, climate, geography, economy, ways of making a living, family structure and size, women's status, and understanding of privacy.

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Figure 14. Settlement Texture of Traditional Siverek Houses (Kalak, 2018, p. 103)

To analyze the Siverek houses, the *Nigar Düzü* area in the *Cami-i Kebir* District was selected in this study. 55 residential buildings in this area were surveyed and their spatial formations were examined (Figure 114). In light of these data, the relationship between the units that make up the house and its formation was analyzed. These units consist of barn, room, rooftop, restroom, furnace, and kitchen space grouped around the interconnected passage, courtyard and iwan, respectively, and are organized in a certain hierarchical order. This hierarchical order includes the grading that begins with the street entrance, which is the public space, and ends with the room unit, which is the most special space (Figure 15).

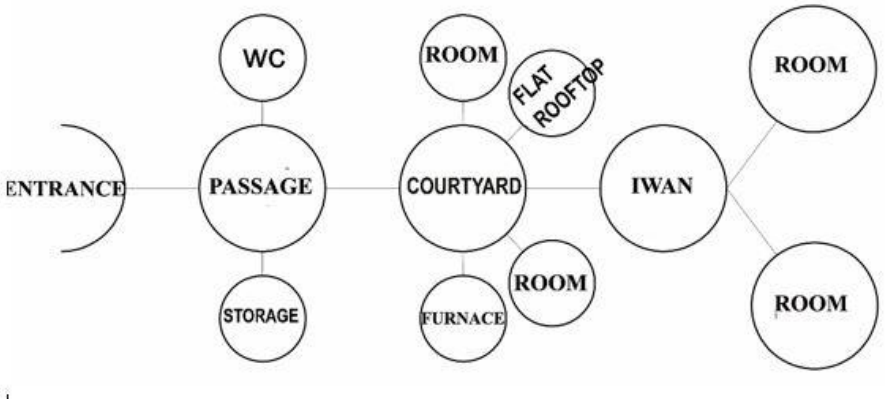

Figure 15. Traditional Housing Organization (Edited by the Author)

Threshold (Passage)

The door threshold (passage) is the area where relations between the indoors and outdoors are experienced. This area is also defined as an interface that allowing and easing the transition between the indoors and outdoors, between the public and private (Hillier & Hanson, 1984).

The concept of threshold and distances forming the threshold vary in every culture (Rapoport, 1969, p. 80).

It can be said that the passages at the entrance of Siverek houses are in the threshold position in the transition from public to private space. The entrance may directly open to the courtyard or entry can be allowed through the arches in the structure. In some houses, this section is designed in the shape of an 'L' to weaken the visual link between the street and the courtyard. Thus, when the door is opened, the visual connection with the courtyard is cut off, and even when the door is left open, sufficient privacy for the courtyard is ensured (Kalak, 2018, s. 109). In most of the houses the restroom is located inside these passages that are close to the street (Kalak, 2018, p. 114).

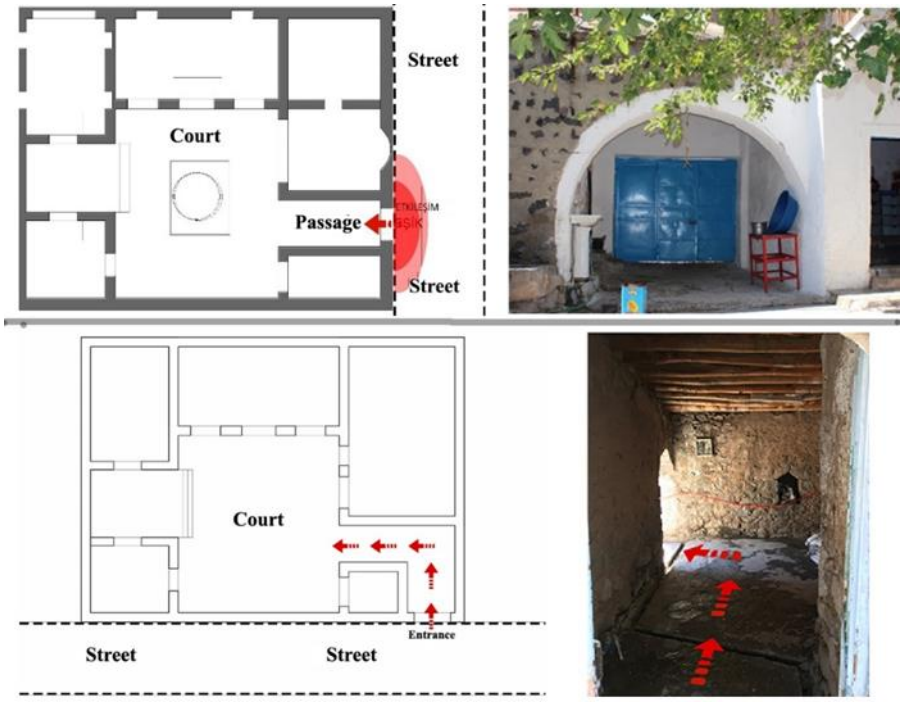

Figure 16. House-passage relationship in traditional Siverek houses (Kalak, 2018, p. 115)

Courtyard

In the traditional Siverek houses, the most important unit of organization is the courtyard, around which the other units cluster. It also plays a key role in the residential hierarchy with its gathering and distributing function. All spaces of the house that communicate with the outside open to the courtyard. The summer units are located to the south of the courtyard. The façade of the summer units face north to provide shade. The winter units are usually located to the north of the courtyard. Built to face south, the façades of these winter units let the daylight in. The washing, resting, cooking etc. activities are performed in the courtyard where the pool, well and landscape elements are located. The courtyard is a place used as an open room in summer. While the trees in the courtyard create a shady area to protect from heat, they also contribute to ensuring climatic comfort by creating moisture.

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The courtyard, which is also used as a socializing place, can be considered as the most active area of the house. Besides being a place for all household members to communicate with and host guests, this area also serves as a playground for children and provides an outdoor space especially for women who spend their time in closed areas (Kalak, 2018, p. 115).

Figure 17. The Courtyard (Kalak, 2018, p. 115).

Iwan (A vaulted or domed space recessed from a central hall or court)

The iwans, which are usually between the rooms, covered on top and on three sides, facing the courtyard, are the places that are used extensively in the summer. This space was designed to have an arch and at a higher grade from the courtyard (Kalak, 2018, p. 116). The iwans, which are generally on the ground floor, are accessed to the ones on the first floor mostly by the stairs connected to the courtyard. The iwan is a semi-open space between the closed room and the open courtyard, it is located in the summer section of the building, and most of the household activities are performed in this area in the summer. The grade of iwans as a private space is higher than the courtyards and lower than the rooms, and thus can be considered as a threshold in the house. The iwan is usually found in the houses owned by high income families.

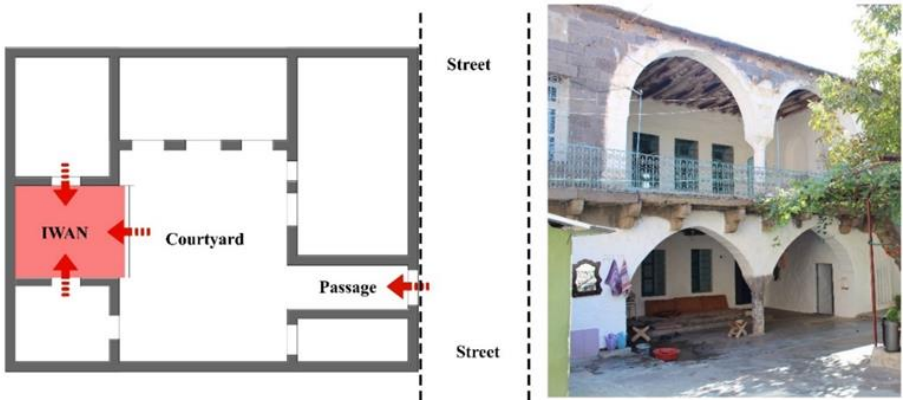

Figure 18. An example of the traditional Siverek Iwan and a schematic drawing of it (Kalak, 2018, p. 118)

Room

In the traditional Siverek houses, rooms are multifunctional and non-specialized spaces. Different functions such as sitting, resting, eating, sleeping, welcoming guests, and bathing are organized to occur in the same space. However, in some large houses, especially in those owned by high-income families, there are some specialized spaces for various

functions as well. Due to climatic factors, these have summer and winter rooms, with the summer rooms facing north and the winter rooms facing south. Taking advantage of their thickness, the traditional Siverek residential walls were built to have some alcoves and niches. Quilts, mattresses and pillows laid on the floor for sleeping at night are placed in an alcove in the wall during the day.

The rooms can be described as the most private and important places in the hierarchy within the house, after the courtyard that is open to everyone and the iwan that is customized according to the courtyard. The room windows open to the iwan or courtyard, which reflects the inward perspective towards the building.

To ensure privacy, some rooms are separated as 'haremlik' (women-only room) and 'selamlik' (men-only room) in some houses. Thus the most important room of the house is the 'selamlık,' also used as the main room. There is a difference in terms of spatial hierarchy due to the fact that 'selamlik' in traditional houses is also a place of living and hosting for men, and the 'haremlik' is used only by women. The 'haremlik' is considered as a more special area because it is kept more secret and closed (Kalak, 2018, p. 119).

Figure 19. A traditional Siverek room and its schematic drawing (Kalak, 2018, p. 120)

Flat Rooftop (Dam)

One of the characteristic features of the Siverek house is its flat adobe rooftops made of earth to ensure heat insulation. These rooftops are obtained by pouring and compacting 30-50 cm of soil on the ground formed with round wooden beam poles. In the summer, when the coolness of the courtyard is not enough in hot weather, the adobe rooftops are used for sleeping purposes (Kalak, 2018, p. 120). The rooftop is also an important place for drying vegetables for consumption during the winter. Compared to the other open space, the courtyard, it appears to have a lower level of privacy. It is observed that although residential privacy from the public space is ensured, the use of such roofing prevents privacy from the neighboring houses. Since the roofs of neighboring houses are adjacent, there are no physical obstacles to block transition from one rooftop to another, but neighbors do not step on each others' rooftops without permission (Kalak, 2018, p. 121).

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Figure 20. A visual depicting the life on the roof in houses with the traditional earthen roofs (Dalkılıç & Bekleyen, 2011, p. 430)

Service Spaces

In the traditional Siverek houses, the kitchen, pantry, and restroom, and in some houses, the bathroom and barn form the service areas. The kitchen exhibits no architectural elements except for the stove, chimney and wall niches. Access to the kitchen is provided from the courtyard and its façade is associated with the courtyard. While preparing and cooking food takes place in the kitchen during the summer months, the preparation processes are done in the rooms and the cooking is done in the kitchen during the winter months due to the cold weather. While the cooking stove is usually located in the kitchen, it may also be in the passage section of some residences. In the households with high income level, the areas where food is cooked and prepared for service are designed as two different places (Kalak, 2018, p. 122). The pantry section is either close to or within the kitchen.

In the traditional Siverek houses, a bathing place is not designed as a separate space, and the bathing takes place mostly in the rooms. High income houses may have a separate Turkish bath as well. Three Turkish baths (Abdal Ağa, Yer Altı and Cıncıklı Baths) are the primary venues that meet most bathing needs of the city (Kalak, 2018, p. 123).

To prevent possible problems by keeping the sewage pipe length short, the restrooms are generally positioned near a street, in the passages where the houses are entered. In addition, due to Islamic beliefs, these restrooms are built to make sure that they do not face South, which is the direction towards the Qibla.

Some barns have been built because some families make their living by raising livestock, ride horses, and use beasts of burden. Some of these are located near the residential entrance and some are located behind the house, which are accessed through the main room (Kalak, 2018, s. 124).

CONCLUSİON

This study discusses the original spatial elements that have shaped the traditional urban texture of Siverek surviving intact to a great extent by examining their hierarchical order. It was observed that there is a continuous hierarchical order between the spaces from the space with

the highest publicity in the city center to the private space with the highest degree of privacy in the house (Figure 21, Figure 22).

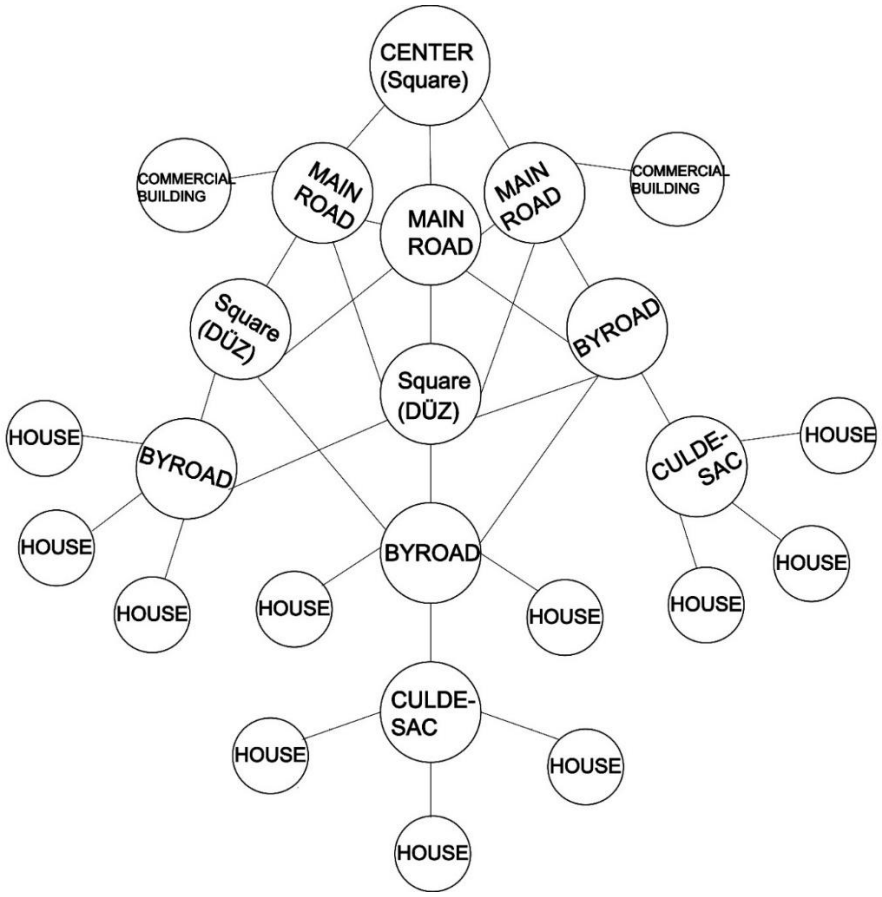

Figure 21. The hierarchical order of the city (Edited by the Author)

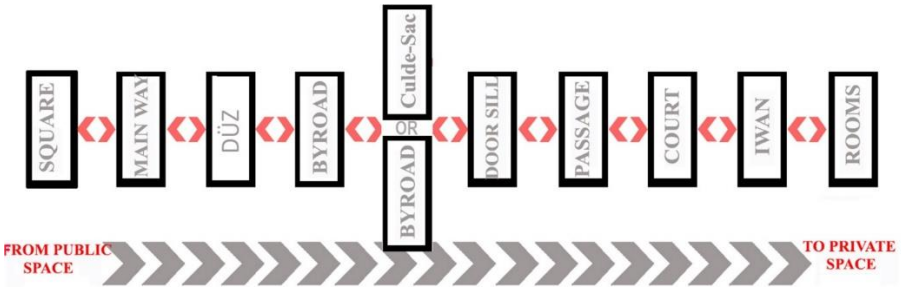

Figure 22. Grading from the square to the room (Edited by the author, Kalak, 2018)

This hierarchical order is unique to the region and seems to have a partially different fiction compared to the traditional settlements of the Ottoman period in Anatolia. Here, kabalti (archway), passage and dam (flat rooftop) are additional steps in Siverek's hierarchical spatial fiction. In addition, the function of the courtyard also makes a significant difference. The courtyard, which is an open version of the sofa in traditional Turkish residences, organizes the transition from the common area of the residence, which is a private space, to the rooms, while also forming a step in the hierarchical transition between the open space and the indoor space. In this aspect, it differs from the

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garden, which is bordered by high walls and has a similarly introverted layout.

These spatial formations, which are the product of hundreds of years of cultural accumulation and experience, are disappearing day by day as a result of miscalculated interventions, delayed conservation measures, wrong decisions and inappropriate solutions, and thus cannot be transferred to the future and thus ensure cultural continuity. There are two main problems here. The first is the problem of preserving the historical traditional texture. Today, conservation work in this area remains limited to some monuments and individual structures that do not properly address the risk that threatens the traditional texture dominated by modern structures. The other major problem is the rapid destruction of the traditional urban fabric by the modern texture. In both new development areas and demolished structures in the old texture, we encounter grid system and multi-storey structures that are incompatible with traditional texture and scale. This approach also disrupts the hierarchical order of public and private spaces. The behavioral, cultural, social, economic, geographical and climatic factors that shape the traditional spatial elements still exist today. This problem can be solved by preserving the spatial elements of the traditional texture and the hierarchy of the public and private spaces by considering them within a broader scale of texture. Therefore, it is critical to include the spatial features of the traditional Siverek house in the new building design processes. Thus, not only the existing traditional texture and the architectural elements that make up this texture will be preserved, but also the architectural values will be transferred to the future generations by reflecting the urban character to the new designs.

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The authors declared that this study has received no financial support.

CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

ETHICS COMMITTEE APPROVAL

Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS

Necessary legal permissions were obtained for research in this study.

REFERENCES

Akpirinç, H. H. (2012). *Siverek İlçe Merkezinin Coğrafi Etüdü (Yüksek Lisans Tezi).* Kahramanmaraş: Kahramanmaraş Sütçü İmam Üniversitesi.

Aydemir, Ş. (2004). Kentsel Arazi Kullanım Modelleri Ve Fizksel Gelişme Formlar. Ş. Aydemir, S. Aydemir, D. Şen Beyazlı, Ö. Nermin, A. M. Öksüz, S. Cenap, . . . Y. Aydın Türk içinde, *Kentsel Alanların Planlanması ve Tasarımı* (s. 119-140). Trabzon: Akademi Kitabevi.

Çelik, B. (2008). *Arkeolojide Urfa.* İstanbul: Şanlıurfa Valiliği İl Kültür ve Turizm Müdürlüğü Yayınları.

Doğan, H. (2016). *The Interaction Between Public and Private Space inTraditional Environments: The Case of KabaltıHouses in Urfa.* Yüksek Lisans Tezi. Gazimağusa, Kuzey Kıbrıs: Doğu Akdeniz Üniversitesi.

Erdönmez , M., & Akı, A. (2005). Açık Kamusal Kent Mekanlarinin Toplum İlişkilerindeki Etkileri. *Megaron, 1*(1), 67-87.

Erdönmez, M. (2005). *. Açık Kamusal Kent Mekanlarının Toplumsal İlişkileri Yapılandırmadaki Rolü, Büyükdere - Levent - Maslak Aksı.* Doktora tez.İstanbul: Yıldız Teknik Üniversitesi.

Eyüce , A. (2005). *Geleneksel Yapılar Ve Mekanlar.* İstanbul: Birsen Yayınevi.

Gökgür, P. (2008). *Kentsel Mekanda Kamusal Alanın Yeri.* İstanbul: Bağlam Yayıncılık.

Grosz, E. (2001). *Architecture from the outside: essays on virtual and real space.* Cambridge : MIT Press.

Gürallar, N. (2009). Kamu - Kamusal Alan - Kamu Yapıları - Kamusal Mekân: Modernite Öncesi ve Sonrası için Bir Terminoloji Tartışması. *Mimarlık Degisi 350*, 52-55.

Habraken, N. (1998). *The Structure of the Ordinary: form and control in the built environment.* Cambridge Mass: MIT Press.

Hasol, D. (2017). *Ansiklopedik Mimarlık Sözlüğü.* İstanbul: Yem Yayın.

Hillier, B., & Hanson, J. (1984). *The Social Logic of Space.* Cambridge: Cambridge University.

Kalak, M. (2018). *Siverek Geleneksel Yerleşimini Biçimlendiren Mekansal Ögeler.* Eskişehir. Yüksek Lisans Tezi: Anadolu Üniversitesi.

Kandemir, Ö. (2017). Architectural and Urban Identity Transformation of Eskisehir. *IOP Conf. Series: Materials Science and Engineering* , 245.

Karaman, A. (1991). Karaman, A. (1991). Toplu Konut Alanlarının Tasarımında Sosyo-Kültürel Veriler: Bazı İlke ve Ölçütlerin İrdelenmesi. *Yapı Dergisi*(118), 35-41.

Keleş, R. (1980). *Kentbilim Terimleri Sözlüğü.* Ankara: Türk Dil Kurumu Yayınları.

DOI: 10.15320/ICONARP.2021.164

Közcü , H. (2016). *Urfa Mimarisinde Kabaltılar.* (N. Karadağ, Dü.) Şanlıurfa: Şanlıurfa Büyükşehir Belediyesi.

Kuban, D. (1968). Anadolu Türk Şehri, Tarihî Gelişmesi, Sosyal ve Fizikî Özellikleri. *Vakıflar Dergisi*, 53-73.

Kuban, D. (1970). *100 Soruda Türkiye Sanat Tarihi.* İstanbul: Çağdaş Yayınları.

Madanipour, A. (1996). Design of Urban Space. An Inquiry into a Socio-spatial Process. *UCL DISCOVERY, 23*(2), 158.

Nooraddin, H. (2002). In-between space: Towards establishing new methods in Street Design. *Global Built Environment Review*, 50-57.

Özgültekin, R., Akman, E., Demirbağ, H., & Sun, K. (2003). *Tarihi ve Kültürüyle SİVEREK.* Ankara: Siverek Kaymakamlığı Yayınları.

Rapoport, A. (1969). *House Form And Culture.* New Jersey: Prentice Hall.

Rapoport, A. (1977). *Human Aspects of Urban Form.* Oxford: Pergamon Press.

Sennett, R. (2002). *Kamusal insanın Çöküşü.* İstanbul: Ayrıntı Yayınları.

Sınmaz, S., & Ahsen Özdemir , H. (2016). Türkiye Şehir Planlama Pratiğinin Kentsel Morfoloji ve Tipoloji Üzerindeki Etkileri, Siverek Kenti İçin Bir Değerlendirme. *İdeal Kent*(18), 8-33.

Tanyeli, U. (1987). *Anadolu-Türk Kentinde Fiziksel Yapının Evrim Süreci (11.-15.yy).* İstanbul: Doktora Tezi: İTÜ Mimarlık Fakültesi.

Resume

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Research Article

ICONARP

The Differentiation of Parental Satisfaction with the Spatial Features of Public Primary Schools: The Case of Pendik, Istanbul

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Abstract

Purpose

The present study aims to examine the change of parents' satisfaction with the spatial features of public primary schools according to personal, residential, school, and neighbourhood characteristics and to measure to what extent the spatial features explain the overall satisfaction with primary schools.

Design/Methodology/Approach

Firstly, the study area was divided into 4 clusters by hierarchical clustering method. In proportion to the number of students in each cluster, an online survey was conducted with 807 parents in 19 public primary schools in Pendik between 5-27 May 2020. Personal and residential characteristics obtained from the survey results and school and neighbourhood characteristics obtained from secondary sources were cross-tabulated with the levels of satisfaction on 19 spatial characteristics of the schools. Later, these 19 spatial features were reduced to two basic dimensions with the principal component analysis, and the level of explanation of these dimensions on the overall school satisfaction was revealed by multiple regression analysis.

Findings

The level of satisfaction of parents with the spatial characteristics of primary schools differs significantly according to personal (15 out of 19), residential (5 out of 19), school (14 out of 19), and neighbourhood (10 out of 19) characteristics. In addition, the parents' satisfaction regarding the spatial adequacies of the primary school has a determinant effect on the overall satisfaction of the parents with the primary school. The most effective factors in the overall satisfaction of parents from primary school are "size of sports fields" and "size of activity spaces".

Research Limitations/Implications

Similar studies in different cases (both in rural and urban areas), different time periods, and for different education levels should be repeated to compare the results.

Social/Practical Implications

This research indicates that spatial characteristics should be taken into account in determining the priority improvements starting from the sports fields and activity spaces of schools.

Originality/Value

The present study evaluates the spatial adequacies of public primary schools and associates it with urbanization and urban planning. It is expected to contribute to the studies to increase the quality of spatial dimensions of primary schools, and consequently urban life quality.

Keywords: *Primary schools, parental satisfaction, spatial adequacy, urban life quality, Istanbul*

INTRODUCTION

The rapid population growth in megacities causes both insufficiencies in urban service provision and numerous social and economic problems, revealing the need to continuously measure and improve the quality of urban life. Therefore, the criteria and indicators used in determining the quality of life in today's megacities have gained prominence. In spatial terms, the level of meeting the standards of urban facilities determines the quality of life and satisfaction with life in the urban area (Massam, 2002). On the other hand, since the criteria of the quality of life can vary according to the society and the individual (Marans, 2007), in studies of measuring the urban life quality, subjective indicators are also taken into account in order to determine the satisfaction based on the perception of the individual along with the objective indicators (Atik et al., 2014; Bognar, 2005; Boylu & Paçacıoğlu, 2016; Campbell et al., 1976; Kerce, 1992; Marans & Rodgers, 1975; Salihoğlu & Türkoğlu, 2019).

Education is one of the basic needs of human life. Primary education as a public activity is not only a necessity for the development of the individual but also one of the most important elements for the healthy development and well-being of society. Therefore, the education indicator has a significant role in measuring the quality of urban life (Galster, 1987). Primary schools on the other hand, which are sensitive in terms of the age group they are addressing, are one of the top priority basic social facilities for urban planning.

The success and quality of education depend on many spatial and non-spatial factors such as curriculum, teacher, administration, educational infrastructure, building conditions, schoolyard size, and equipment. In many studies, it was observed that the success level of schools increased with the development of the spatial conditions of schools (Aydoğan, 2012; Karaküçük, 2008; Şensoy & Sağsöz, 2015; Vural & Sadık, 2003). Therefore, spatial factors such as school buildings and gardens, access to school, and security issues should be a priority in terms of spatial planning.

Since children in primary education need the custody and supervision of their parents, the parents' assessment of primary schools is of critical importance. In addition, parents are often cited as one of the stakeholders of education in the literature. Parents' ratings are influenced by spatial and non-spatial factors such as their relationship with teachers and the quality of their children's classroom life (Epstein, 1985). The aim of the present study is to examine the change of parents' satisfaction with regard to the spatial characteristics of public primary schools, which is one of the vital components of urban life quality indicators, according to personal, residential, school and neighbourhood characteristics, and to measure to what extent spatial characteristics explain the overall satisfaction with primary schools. Within this context, an online survey was conducted on 807 parents between the dates of 5-27 May 2020 in 19 public primary schools in the Pendik district of İstanbul, which is one of the biggest megacities in the world.

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The first section following the introduction is devoted to the review of the literature regarding the spatial adequacy of primary schools and the school satisfaction. The second section explains the method used, the datasets analysed and the study area worked within the paper. The third section firstly presents descriptive statistical findings and then shares the main findings of the study in the three sub-headings: the change in satisfaction level based on personal and residential characteristics, the change in satisfaction level according to the neighbourhood and school characteristics, and the influence of spatial features on the overall school satisfaction. The conclusion section consists of a general evaluation of the study, practical results for urban planning, and recommendations for further studies.

LITERATURE REVIEW

There are two basic approaches in conceptual models for quality of life, namely objective and subjective. The objective approach is the determination of standards that are supposed to meet human needs and the level of meeting these needs. The subjective approach, on the other hand, is an individual's perception-based approach for his or her own quality of life. On the other hand, the individual's satisfaction is not only affected by subjective characteristics such as the individual's perception and evaluation in his / her own life, but also by the objective characteristics of the living environment. Therefore, objective and subjective properties are not independent of each other (Campbell et al., 1976).

Discussions about satisfaction with public schools, which is an important component of quality of life mostly focus on education (Alpakut, 2017; Çamlıca, 2016; Özbaş, 2014) and public administration (Friedman et al., 2006; Friedman et al., 2007; Thompson, 2003). In the preliminary studies conducted in the 1970s, no significant relationship was found between objective measurements and subjective citizen satisfaction (Brown & Coulter, 1983; Parks, 1984; Stipak, 1979). These early studies have been criticized by claiming that the measurements are incompatible with each other (Kelly, 2003), the model is misidentified, and the objective data are collected only for upper-scale development targets and this has negligible effects on individuals (Parks, 1984). On the other hand, it was claimed that citizens were not aware of the level of service they received (Stipak, 1979, 1980). In recent years, models based on the 'Expectations Disconfirmation Theory' (the difference between expectations and perceived performance) that explain how citizens' satisfaction decisions are formed have been commonly used (James, 2009; Morgeson, 2012; Van Ryzin, 2004, 2006).

Charbonneau et al. (2012) indicate that there is an increase in surveys related to parents' satisfaction with public schools. In the study conducted by Charbonneau et al. (2012) on performance measures and parental satisfaction in New York public schools, a positive relationship was found between the objective characteristics of public schools and

parents' satisfaction. For this reason, it is recommended to use objective and subjective data together in evaluating school satisfaction. There are also studies that found that the level of school satisfaction does not show a similar pattern with the observable objective school characteristics (Gibbons & Silva, 2011). Other studies have also found that the relationship between expectations from objective data, perceived quality and behavioural outcome variables had an effect on satisfaction level (Berryman, 2015). Besides, satisfaction studies conducted on parents and teachers showed that the evaluations of parents and teachers were significantly similar. The reason for this may be that there is a mutual relationship between parents and teachers and they affect each other (Favero & Meier, 2013). Neal and Watling Neal (2012) tested the quality of public schools and individuals' satisfaction with their society. Accordingly, it was argued that the quality of public schools determines, directly or indirectly, the satisfaction people have with their society - including those who do not have children of school-going age- as public interest.

Again, studies on the definition of the relationship between school characteristics and parents' school preferences are common. Generally, in these studies, students' average test scores are evaluated for their academic performance as a school characteristic. In the literature, the relationship between the characteristics of the school and local housing prices are analysed using the "hedonic" method. As a matter of fact, Gibbons and Machin (2008) reported that a one-unit increase in the mean test score standard deviation results in an estimated 3-4% house price increase. In another study conducted by Rothstein (2006) it was revealed that the preferences of the parents are more related to the peer group composition. Hastings et al. (2005) found that the school choices of parents are related to the school's proximity to home and average test scores as well as the family's educational background and income level. According to the results of the research conducted by Jacob and Lefgren (2007) it was determined that teachers are effective in the school preferences, and parents prefer teachers who provide student satisfaction.

Relevant studies in Turkey discuss public universities (Cevher, 2015; Ekinci & Burgaz, 2007), private universities (Tayyar & Dilşeker, 2013), open education (Okumuş & Duygun, 2008), tourism education (Şahin, 2011), primary and secondary schools (Bakioğlu & Bahçeci, 2010; Bozyiğit, 2017; Karadağ, 2010; Nartgün & Kaya, 2016). However, in order to determine family satisfaction with primary education, a 'family satisfaction survey' is recommended to be carried out throughout Turkey (Özbaş, 2014). The increase in the number of private schools and the more selective behaviour of parents in choosing private schools increased competition in the private school sector. For this reason, there is increasing number of studies on parent satisfaction and the factors affecting this in terms of private schools. Alpakut (2017) analysed parents' satisfaction with the "Structural Threshold Model" in a private

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primary school in Izmir and determined that the ICT and cafeteria facilities of the school are the most important factors. Özbaş (2014) tested whether the level of meeting the satisfaction of families with primary school administrators varies according to the variables of education status, profession, and income level, which are subjective characteristics of parents, in a study conducted on 264 parents in a primary school in Ankara. Factor groups were determined using the factor analysis and Kruskal Wallis H-Test was applied for comparisons. In the study, it was found that the satisfaction of families with primary school depends on the socio-economic characteristics of the family together with the effectiveness of the school management.

Ahmetoğlu and Acar (2017) examined how parents perceive their children's early childhood experiences in the education process. In this study, the measurement tool named "Parent Satisfaction with Educational Experiences" developed by Fantuzzo et al. (2006) was adapted to Istanbul, and factor analysis and validity-reliability analyses were performed in the study conducted with 442 parents in Istanbul. Karadağ (2010) made a multidimensional evaluation of parent perceptions regarding the quality of service of primary schools with a survey conducted on 470 parents in 6 schools in Istanbul. In this study, data were collected using the SERVQUAL Service Quality Scale. Many Whitney-U and Kruskal Wallis-H tests were preferred for the analysis of the quantitative data of the study, and descriptive analysis was preferred for the analysis of qualitative data. According to the results, a positive relationship was found between the perception of service quality and satisfaction.

Neighbourhood, which is considered as the basic unit in urban planning, is generally formed around a primary school. However, studies relating primary schools to quality of life and urban planning generally focused on accessibility to primary schools and the spatial distribution of primary schools. There is a need for studies linking objective and subjective evaluations of the spatial quality and adequacy of primary schools with urban planning and quality of life. The present study is an original study in terms of its multi-dimensional evaluation of the spatial adequacies of public primary schools and its association with urbanization and urban planning.

METHODOLOGY OF THE STUDY

Material and Methods

The present study aims to investigate the change of parental satisfaction with public primary schools according to personal, residential, school, and neighbourhood characteristics. Within this scope, we used both primary and secondary data for the statistical analysis (Table 1). As primary data, we conducted an online survey on 807 parents in 19 public primary schools in Pendik, Istanbul between 5-27 May 2020. As secondary data, we collected both spatial and numeric data of primary schools to represent school characteristics; and we used the "Socio-

Economic Development Index" of neighbourhoods produced within the scope of the "Mahallem İstanbul" Project (Mahallem, 2016) to represent neighbourhood characteristics.

Table 1. Factors influencing children's environment and stress in hospital

Data	Source	Type
Personal characteristics of respondents (parents)	Survey results	Primary data
The levels of satisfaction with the spatial features of the primary schools	Survey results	Primary data
General satisfaction level with primary schools	Survey results	Primary data
Socio-Economic Development Index of Neighbourhoods	Mahallem İstanbul Project Database, 2016[1]	Secondary data
The number of students and teachers in primary schools	Official web sites of primary schools, 2020 Ministry of Education, 2020	Secondary data
Spatial data of primary schools	Ministry of Education Construction and Real Estate Department,2019	Secondary data
Total population of neighbourhoods	TURKSTAT, 2019	Secondary data
Total surface area of neighbourhoods	(Pendik-Municipality, 2020)	Secondary data

[1] "Mahallem Istanbul" Project was carried out by a team at Istanbul University under the coordination of Prof. Dr. Murat Şeker, with the financial support of the Istanbul Development Agency. Within the scope of the project, an index was created by using secondary data sources in order to reveal the socio-economic development level of the neighbourhoods in Istanbul.hospital (question 21) with an average of 4.5

In the survey, parents were asked to evaluate 19 spatial characteristics in the following six sub-headings related to the primary school their children attend:

- Area of the classrooms, school garden, sports and activity areas;
- Functional facilities such as education (laboratory, music room, painting room), activity (show hall, meeting areas), sports (indoor and outdoor sports facilities) and canteen / dining hall;
- Security of the school and its surroundings such as security measures, school doors and traffic safety;
- Accessibility to school such as transportation and parking facilities;
- Physical structure such as heating / lighting, equipment, hygiene and cleanliness
- Architectural features such as building aesthetics, disabled compatibility and landscape.

The personal and residential characteristics obtained from the survey results as well as school and neighbourhood characteristics obtained from secondary sources were cross-tabulated with 19 spatial characteristics of the schools by using non-parametric tests in SPSS package program. Later, these 19 spatial features were reduced to two basic dimensions with the principal component analysis, and the level of explanation of overall satisfaction with the school of these dimensions was revealed by multiple regression analysis. The steps of the statistical analysis, and the spatial features that are assessed by the respondents can be seen in Figure 1.

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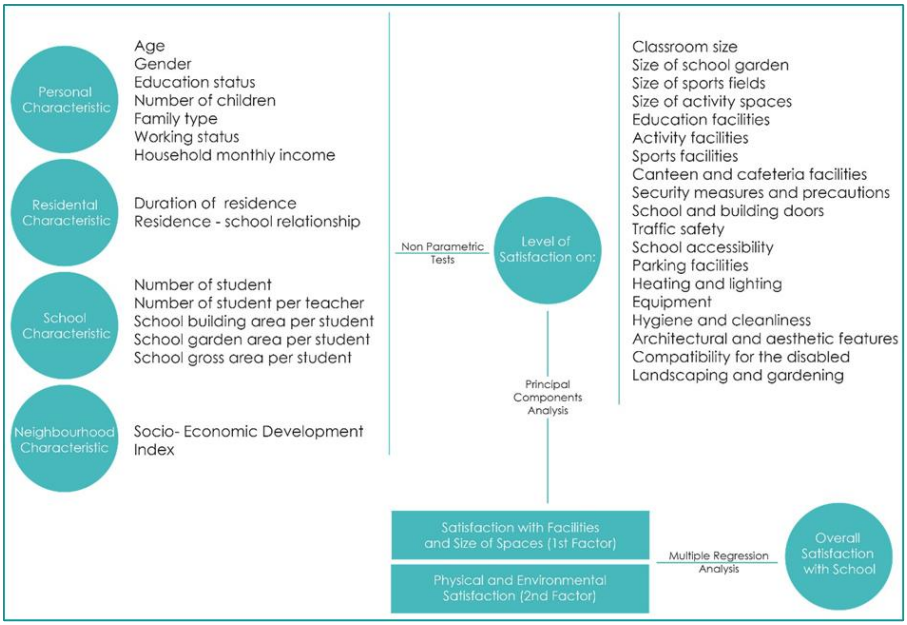

Figure 1. Research Design

Since the data structure does not meet the basic assumptions of parametric tests, we preferred nonparametric tests for cross-inquiries. For nominal-ordinal comparisons, we employed the Kruskal-Wallis test, which is the non-parametric equivalent of ANOVA. The Kruskal-Wallis tests the null hypothesis that more than two independent samples were drawn from the same population. We also employed the Jonckheere-Terpstra test for ordinal-ordinal comparisons. The Jonckheere-Terpstra tests the null hypothesis that more than two independent samples were drawn from the population with an equal median (Karagöz, 2010). In addition to the non-parametric tests, we used principal components analysis and multiple regression analysis in the second stage. Principal components analysis provides ease of interpretation of the results with fewer components and dimensions as it collects the variables that are correlated with each other into the same category. Regression analysis, on the other hand, provides information about the existence and strength of the relationship between variables and enables the definition of its functional form (Hair et al., 1998).

Study Area

The district of Pendik is Turkey's 10th and Istanbul's 4th most populous district with its 711.894 population (TURKSTAT, 2019). The Sabiha Gökçen Airport, which is one of the busiest airports in Turkey and the world, is within the boundaries of Pendik district and this has contributed to the rapid growth of the district. Both the transforming and newly developing areas within the district make it necessary to develop sustainable urban policies and improve the social and technical infrastructure of the district. The foregoing reasons can therefore be said to be sufficient justification for the selection of Pendik as the study area.
Pendik as a municipality has 36 neighbourhoods and 54 primary schools which include 46 public (Figure 1) and 8 private ones (ME, 2020). Public

primary schools can be considered as the core of the neighbourhoods which are accepted as basic units in urban planning. Parents do not have the opportunity to choose the primary school their wards attend, since students are registered in public primary schools according to their addresses of residence in Turkey. Therefore, the spatial characteristics of public primary schools should be among the main priorities of urban policies aimed at improving the quality of urban life for all citizens. For this reason, the present study has been built on public primary schools. The total number of students in 46 public primary schools is 43.622 according to the data found in official web sites of these schools. The number of students per teacher in public primary schools is 21 which is higher than the country average of 18. Likewise, the number of students per classroom (33) is significantly above the country's average of 22 (ME, 2020).

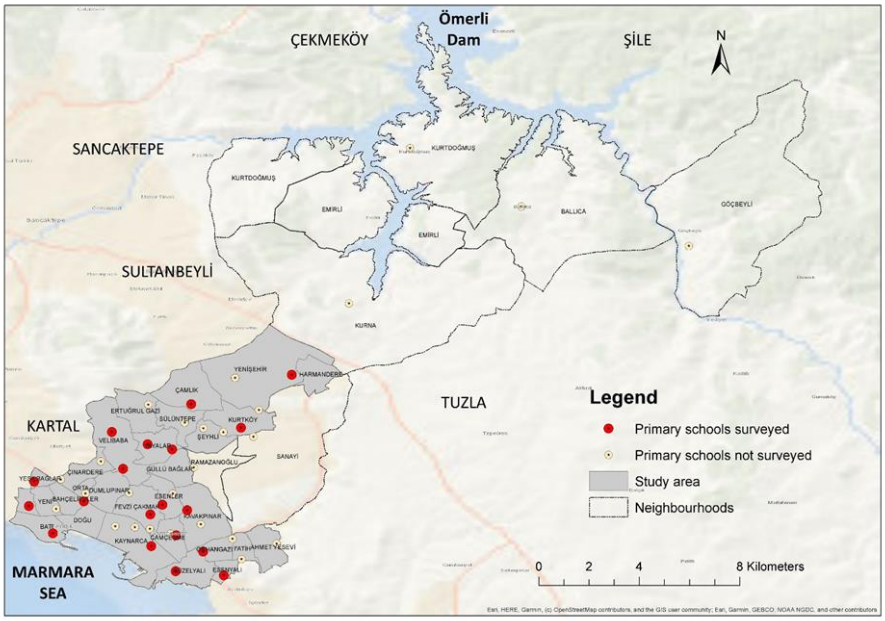

Figure 2. The distribution of public primary schools within the boundaries of Pendik district and the study area (Produced by authors. The source of the school locations: (ME, 2019) Ministry of Education Construction and Real Estate Department)

As stated previously, the district of Pendik has 36 neighbourhoods. Five neighbourhoods (Emirli, Kurtdoğmuş, Ballıca, Kurna, and Göçbeyli) are situated in rural areas and two (Sanayi and Ramazanoğlu) in industrial area. Therefore, these neighbourhoods were excluded from the study area. The total population of the study area (702.055) covers 98,62% of the district's population. Figure 2 shows the boundaries of Pendik district, the study area and the location of the primary schools.

While determining the sample for the survey, public primary schools in Pendik district were clustered through Hierarchical Cluster Analysis according to the variables of socio-economic development (Figure 3a), population density (Figure 3b), and travel distance to the district centre[2] (Figure 3c). After that, the surveys were conducted in schools that were randomly selected to represent each cluster in proportion to the number of (primary school) pupils in each neighbourhood cluster (Figure 3d). For

[2] The location of Pendik train station, which is inside the old city centre in Batı Neighbourhood and adjacent to the traditional Pendik downtown, has been accepted as the district centre. The station serves both as a High-Speed Train and Marmaray station, and is the place where the human mobility is highest in Pendik

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a population of 42.769 students in the study area, the sample size was calculated as 653 for the 0,05 confidence interval and the 99% confidence level. Within the scope of the study, responses to 807 questionnaires were received, and this is above the minimum sample size of 653 in given confidence level and confidence interval.

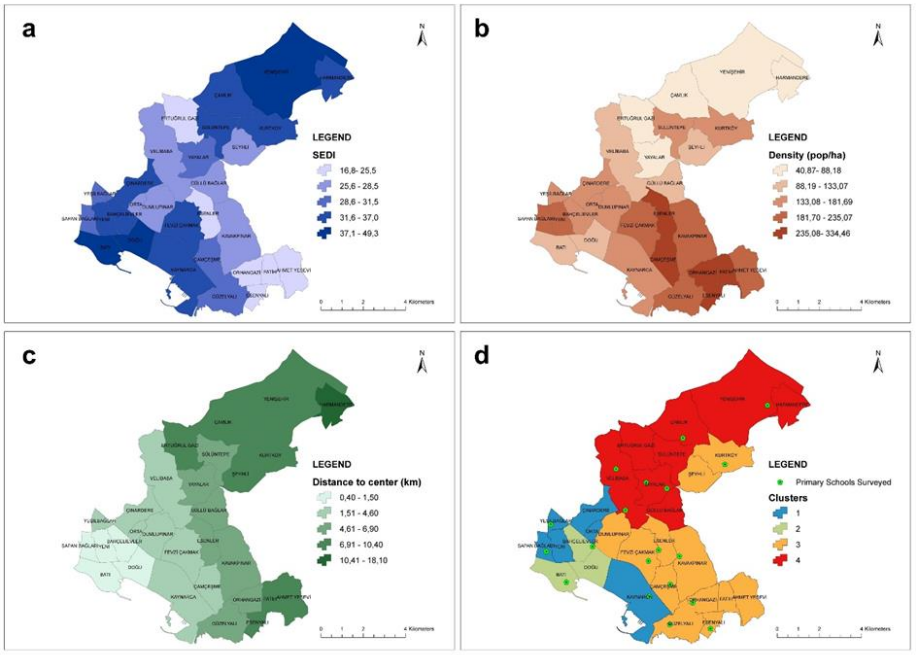

Figure 3. Hierarchical Cluster Analysis: Variables and Clusters
(**3a:** Socio-Economic Development Indexes of neighbourhoods (SEDI);
3b: Population density of neighbourhoods;
3c: Distance of neighbourhoods to the city centre;
3d: Clusters formed as a result of Hierarchical Cluster Analysis)

After determining the neighbourhoods and schools to be surveyed through Hierarchical Clustering Analysis, we first forwarded the prepared questionnaire to the Provincial Directorate of National Education and obtained the necessary permissions. Later, we held face-to-face meetings with school principals and administrators and then we presented the prepared online questionnaire to various classroom teachers. The classroom teachers ensured the participation of parents in the survey through WhatsApp groups. In this way, we conducted a survey with 807 parents in the selected 19 public primary schools[3]. The questionnaire form consists of a total of 37 questions asked in the following 4 subsections:

- 4 descriptive questions (participant's name/surname, name of student's school, student's class and branch);
- 11 multiple-choice questions aimed at determining the personal characteristics of individuals;
- 19 Likert type questions (with 5 options) for the evaluation of individuals regarding the spatial characteristics of the primary school;
- 3 questions, two of which are open-ended, to determine the level of satisfaction of individuals with the school.

[3] In the first stage, a total of 920 questionnaires were collected. The validity of these forms was examined one by one, and 54 questionnaires that were incomplete or inconsistent or were double-entered were eliminated. Later, in order for the number of questionnaires in each cluster to be proportional to the number of students in that cluster, 59 questionnaires were randomly extracted from the clusters with a large number of surveys using the Random Number Generator in M.S. Excel. The resulting 807 questionnaires were used in the analysis.

FINDINGS AND DISCUSSION

Descriptive Statistical Findings

In the first section of the questionnaire, the respondents were asked about personal and residential characteristics. The main descriptive statistics derived from the first section of the questionnaire are summarized in Table 2. The key findings on personal characteristics can be laid out as follows:

- The fact that 84.9% of the respondents of the survey were women suggests that mothers were more interested in primary school pupils than fathers.
- Majority (80%) of parents who have children in primary schools are between 30 and 44 years old.
- In terms of education level of participating parents, high school graduates rank at 35.4%.
- Most (54%) of the participants have two children. The average number of children among the households who participated in the survey was found to be 2.34.
- The average household size among the survey respondents was found to be 4.4. The fact that this size is above the Pendik average of 3.49 can be explained by the fact that families without children are outside the scope of the survey.
- Since the majority of the respondents are women, the rate of non-working people among the participants is considerably high.
- As the duration of residence in the same house increases, the effect of the primary school on housing choice decreases significantly ($\chi 2$: 0.004). The location of the primary school was effective in parents' housing choice for 66.6% of those who changed their residence within the last two years.

Table 2. Personal and residential characteristics of the survey respondents

PERSONAL CHARACTERISTICS		Frequency	Percent
Gender	Female	681	84,9
	Male	121	15,1
	Total	**802**	**100,0**
Age	20-24	12	1,5
	25-29	66	8,2
	30-34	252	31,4
	35-39	267	33,3
	40-44	147	18,3
	45-49	54	6,7
	50-54	4	0,5
	55-59	1	0,1
	Total	**803**	**100,0**
Education	Illiterate	4	0,5
	Literate	7	0,9
	Primary school graduate	152	18,9
	Secondary school graduate	150	18,6
	High school graduate	285	35,4
	Associate Degree	87	10,8

DOI: 10.15320/ICONARP.2021.165

	Undergraduate	101	12,5
	Graduate	20	2,5
	Total	**806**	**100,0**
Number of children in the family	1 Child	91	11,3
	2 Children	435	54,0
	3 Children	220	27,3
	4 Children	36	4,5
	5 Children or more	23	2,9
	Total	**805**	**100,0**
People you live with in your family	Mother, father and child / children	665	83,2
	Mother, father, grandparents and child / children	81	10,1
	Mother and child / children	35	4,4
	Father and child / children	18	2,3
	Total	**799**	**100,0**
Working status	Working	260	37,0
	Not working	442	63,0
	Total	**702**	**100,0**
Family monthly income	2000 TL and below	130	16,3
	2001- 4000 TL	416	52,3
	4001- 6000 TL	154	19,3
	6001- 8000 TL	48	6,0
	8000 TL and above	48	6,0
	Total	**796**	**100,0**
RESIDENTIAL CHARACTERISTICS		**Frequency**	**Percent**
Duration of residence in the house	Less than 2 years	45	5,6
	2- 5 years	114	14,1
	6- 10 years	241	29,9
	11- 15 years	210	26,0
	16 years or above	197	24,4
	Total	**807**	**100,0**
Residence – School relationship *(Did the primary school your child attended have an impact on choosing the house you live in?)*	No direct impact	335	41,8
	Had little effect	72	9,0
	Had an effect	176	21,9
	It had a lot of impact	138	17,2
	It was the most important factor	81	10,1
	Total	**802**	**100,0**

In the second section of the questionnaire, 19 separate Likert-type questions were asked about the satisfaction level of the parents with the spatial features of the primary schools. The results obtained on the basis of these responses are shown on Table 3.

The number of valid answers for each question indicates that the awareness of disabled compliance and educational facilities is lower than the others. Based on the average values of each answer, primary schools appear to do better in terms of basic physical needs (heating, lighting, security, equipment, classroom size, hygiene, etc.) compared to functional requirements (sports fields, educational facilities, activity spaces, etc.) (See Table 3).

Table 3. Spatial Adequacy Contingency Table

Spatial features	N (Valid answers)	Very Insufficient / Poor (1)	Insufficient / Poor (2)	Medium (3)	Sufficient / Good (4)	Very Sufficient / Good (5)	Average Value	Standard Deviation
Classroom size	793	60	115	327	259	32	3,11	0,962
		7,60%	14,50%	41,20%	32,70%	4,00%		
Size of school garden	799	79	156	236	262	66	3,10	1,114
		9,90%	19,50%	29,50%	32,80%	8,30%		
Size of sports fields	741	235	225	155	111	15	2,25	1,116
		31,70%	30,40%	20,90%	15,00%	2,00%		
Size of activity spaces	746	184	214	198	127	23	2,45	1,126
		24,70%	28,70%	26,50%	17,00%	3,10%		
Educational facilities	692	242	193	145	93	19	2,21	1,141
		35,00%	27,90%	21,00%	13,40%	2,70%		
Activity facilities	740	134	182	242	159	23	2,67	1,096
		18,10%	24,60%	32,70%	21,50%	3,10%		
Sports facilities	761	171	235	208	127	20	2,46	1,091
		22,50%	30,90%	27,30%	16,70%	2,60%		
Canteen and cafeteria facilities	773	97	202	255	197	22	2,80	1,046
		12,50%	26,10%	33,00%	25,50%	2,80%		
Security measures and precautions	742	65	93	232	276	76	3,28	1,088
		8,80%	12,50%	31,30%	37,20%	10,20%		
School and building doors	802	61	117	213	284	127	3,37	1,140
		7,60%	14,60%	26,60%	35,40%	15,80%		
Traffic safety	799	203	202	193	163	38	2,54	1,205
		25,40%	25,30%	24,20%	20,40%	4,80%		
School accessibility	795	17	36	189	402	151	3,80	0,872
		2,10%	4,50%	23,80%	50,60%	19,00%		
Parking facilities	730	305	217	120	74	14	2,01	1,078
		41,80%	29,70%	16,40%	10,10%	1,90%		
Heating and lighting	794	14	25	148	370	237	4,00	0,878
		1,80%	3,10%	18,60%	46,60%	29,80%		
Equipment	791	76	132	216	275	92	3,22	1,148
		9,60%	16,70%	27,30%	34,80%	11,60%		
Hygiene and cleanliness	794	108	123	233	236	94	3,11	1,208
		13,60%	15,50%	29,30%	29,70%	11,80%		
Architectural and aesthetic features	756	82	165	240	226	43	2,98	1,086
		10,80%	21,80%	31,70%	29,90%	5,70%		
Compatibility for the disabled	671	66	114	176	240	75	3,21	1,151
		9,80%	17,00%	26,20%	35,80%	11,20%		
Landscaping and gardening	771	107	172	273	169	50	2,85	1,111
		13,90%	22,30%	35,40%	21,90%	6,50%		

In the last section of the questionnaire, the respondents were asked to evaluate their overall satisfaction with the primary schools their wards are enrolled in. The average overall satisfaction rating in Likert scale was measured as 3,34, which is slightly above the middle value (3,00) (See Table 4). On the other hand, the average value of 19 spatial satisfaction assessments is calculated as 2,92, which is smaller than the overall satisfaction value. This illustrates the possible effects of non-spatial factors on the overall satisfaction level. Clues to these possible effects can be found in the answers to the open-ended questions asked the participants.

In addition to all these Likert-type questions, the respondents were asked to assess the schools from both the positive and negative sides with two open-ended questions. The open-ended questions offer hints about the non-spatial factors such as the quality of teachers and school management that influence the overall satisfaction with the schools

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(Table 5). In addition, security appears to be the main concern of the survey respondents according to the answers to the open-ended questions.

Table 4. The overall satisfaction level with the primary schools

Level of overall satisfaction	Frequency	Percentage of Valid Answers	Average	Mode	Standard Deviation
I am not satisfied at all	31	3,8	3,34	3,00	0,954
Less satisfied	93	11,5			
I am moderately satisfied	341	42,3			
I am quite satisfied	252	31,2			
I am very satisfied	90	11,2			
Total	**807**	**100**			

Table 5. Answers to the open-ended questions

Question	Answers (by subject)	Frequency	Percentage
What are the positive aspects?	No Positive Aspects	26	8,39%
	Security	32	10,32%
	The Building and Its Surroundings	45	14,52%
	Teachers and Administration	82	26,45%
	Accessibility	75	24,19%
	Other	50	16,13%
	TOTAL	**310**	**100%**
What are the negative aspects?	No Negative Aspects	10	3,01%
	Security	145	43,67%
	The Building and Its Surroundings	71	21,39%
	Teachers and Administration	1	0,30%
	Hygiene and Cleanliness	25	7,53%
	Other	80	24,10%
	TOTAL	**332**	**100%**

The Change in Satisfaction Level According to Personal and Residential Characteristics

We first investigated, within the framework of the study, whether the degree of satisfaction with the spatial features of primary schools varies according to personal and residential characteristics. We used personal and residential characteristics as independent variables, and the satisfaction levels of parents regarding the spatial adequacies of primary schools as dependent variables. We employed the Kruskal Wallis test for nominal-ordinal comparisons and the Jonckheere-Terpstra test for ordinal-ordinal comparisons.

Table 6 displays the results of the nonparametric tests. According to these results, the level of satisfaction with 15 out of 19 spatial characteristics varies significantly based on at least one of the personal and residential

characteristics. The main findings derived from Table 6 can be listed as follows:

- The level of satisfaction with the spatial characteristics of public primary schools differs mostly according to the income level. As the income level increases, the level of satisfaction increases significantly in terms of hygiene, heating, lighting, equipment, security, traffic safety and accessibility. Only the level of satisfaction with the size of the school garden decreases as the income level increases.
- Hygiene and cleanliness are the spatial attributes most susceptible to personal characteristics. Since women are more susceptible to hygiene, their levels of satisfaction relative to men are also very poor. Parents aged 30-39 have a lower degree of satisfaction with hygiene and cleanliness than other age groups.
- The higher the education level, the lower the level of satisfaction in terms of school garden, sports, canteen, cafeteria and parking facilities.
- The level of satisfaction of those who say the primary school their children attend has an effect on the choice of their housing is higher than those who do not share this opinion.
- The level of satisfaction with the spatial characteristics of primary schools does not vary depending on the number of children in the family.

Table 6. The change in satisfaction level according to personal and residential characteristics (p values)

Satisfaction with Spatial Features	Kruskal Wallis Test			Jonckheere-Terpstra Test					
	Gender	Working Status	Family Type	Age	Education Status	Number of Children	Duration of Residence	Residence-School Relationship	Household Monthly Income
Classroom size	0,771	0,346	0,993	0,281	0,402	0,913	0,659	0,148	0,598
Size of school garden	0,435	0,391	0,797	***0,047***	***0,001***	0,588	0,242	0,436	***0,020***
Size of sports fields	0,709	0,582	0,856	***0,031***	***0,002***	0,832	***0,012***	0,070	0,103
Size of activity spaces	0,910	0,848	0,447	0,359	0,054	0,675	0,119	0,187	0,920
Educational facilities	0,102	***0,017***	0,939	0,971	0,836	0,406	0,815	0,544	***0,027***
Activity facilities	0,239	0,094	0,310	0,520	0,862	0,346	0,980	0,158	0,884
Sports facilities	0,596	0,657	0,645	0,061	***0,009***	0,556	0,314	***0,034***	0,199
Canteen and cafeteria facilities	0,917	0,497	0,304	0,958	***0,004***	0,563	0,742	0,737	0,837
Security measures and precautions	0,884	0,207	0,475	***0,043***	0,250	0,126	0,848	0,056	***0,023***
School and building doors	0,762	0,258	0,463	0,327	0,350	0,098	0,593	***0,039***	***0,001***
Traffic safety	0,886	0,075	0,546	0,145	0,234	0,270	0,383	0,589	***0,000***
School accessibility	0,213	0,651	0,641	***0,015***	0,113	0,629	0,274	0,815	***0,004***
Parking facilities	0,416	***0,015***	0,199	0,532	***0,017***	0,862	0,758	0,154	0,220
Heating and lighting	0,499	0,460	0,565	0,219	0,932	0,073	0,337	0,365	***0,044***
Equipment	***0,038***	***0,001***	0,792	0,121	0,070	0,173	0,564	0,124	***0,000***
Hygiene and cleanliness	***0,010***	***0,004***	0,814	***0,010***	0,052	0,500	0,304	0,125	***0,000***

DOI: 10.15320/ICONARP.2021.165

Architectural and aesthetic features	0,084	0,645	0,051	0,638	0,808	0,491	0,190	0,768	0,167
Compatibility for the disabled	***0.031***	0,752	0,247	0,524	0,396	0,595	0,536	***0.045***	0,220
Landscaping and gardening	***0.013***	0,315	***0.032***	0,091	0,129	0,146	0,415	***0.023***	0,976

* The p values written in bold indicate that the differentiation of the satisfaction level from the spatial feature in the relevant row according to the personal or residential feature in the relevant column is significant at the 0.05 level.

The Change in Satisfaction Level According to the Neighbourhood and School Characteristics

Secondly, we questioned whether the degree of satisfaction with the spatial features of primary schools differ according to the neighbourhood and school characteristics. We employed the Jonckheere-Terpstra test for these comparisons since both variables in row and column are ordinal. As seen in Table 7, the level of satisfaction with the spatial features of primary schools differs statistically according to both the neighbourhood and school characteristics.

The main findings derived from Table 7 can be listed as follows:

- As the socio-economic development level of the neighbourhoods increases, the level of satisfaction with the spatial features of the schools (10 out of 19 spatial features) increases significantly. These results are similar to the abovementioned income level - satisfaction relationship.
- The satisfaction level of 12 out of 19 spatial features of primary schools differs according to the total number of students in schools. Among these, only the satisfaction level of 'classroom size' decreases as the number of students increases. The level of satisfaction with other spatial features and facilities increases as the number of students increases. This situation can be explained by the rise in the financial opportunities and size of the school as the number of students increases. Schools with a small number of students continue their education mostly in old buildings and small areas in Pendik district.
- As the school and / or area of garden per student increases, the level of satisfaction with the sports and activity areas in the school increases. However, as the school area per student increases, satisfaction with hygiene, and cleanliness decreases. On the other hand, it can be deduced from the test results that the increase in the school area per student makes the school more compatible for students with disabilities.

Table 7. The change in satisfaction level according to the neighbourhood and school characteristics

Grouping Variable	Jonckheere-Terpstra Test					
	Socio-Economic Development Index		**Number of Students**		**Student - Teacher Ratio**	
Level of satisfaction on	Std. J-T Statistic	Sig. (2-tailed)	Std. J-T Statistic	Sig. (2-tailed)	Std. J-T Statistic	Sig. (2-tailed)
Classroom size	***2,618***	***0,009***	***-3,304***	***0,001***	***-7,425***	***0,000***
Size of school garden	0,831	0,406	***3,510***	***0,000***	-0,067	0,946
Size of sports fields	1,927	0,054	***4,141***	***0,000***	-0,010	0,992
Size of activity spaces	***2,588***	***0,010***	***3,302***	***0,001***	-0,152	0,879
Educational facilities	***2,530***	***0,011***	***3,458***	***0,001***	0,773	0,440
Activity facilities	***3,815***	***0,000***	***2,777***	***0,005***	0,211	0,833
Sports facilities	1,414	0,157	***2,618***	***0,009***	-0,883	0,377
Canteen and cafeteria facilities	***2,373***	***0,018***	***5,127***	***0,000***	1,834	0,067
Security measures and precautions	***2,169***	***0,030***	***2,125***	***0,034***	1,554	0,120
School and building doors	***3,738***	***0,000***	-0,310	0,757	0,491	0,623
Traffic safety	1,611	0,107	-0,065	0,948	1,820	0,069
School accessibility	0,180	0,857	-1,311	0,190	-1,728	0,084
Parking facilities	-0,343	0,732	***3,048***	***0,002***	-0,402	0,688
Heating and lighting	0,583	0,560	-0,420	0,674	-1,189	0,234
Equipment	***3,332***	***0,001***	1,236	0,216	0,878	0,380
Hygiene and cleanliness	***2,530***	***0,011***	-0,220	0,826	-1,904	0,057
Architectural and aesthetic features	1,636	0,102	***2,570***	***0,010***	***2,253***	***0,024***
Compatibility for the disabled	0,866	0,387	-0,707	0,479	0,510	0,610
Landscaping and gardening	***2,133***	***0,033***	***2,260***	***0,024***	1,078	0,281

Grouping Variable	Jonckheere-Terpstra Test					
	School Building - Student Ratio		**School Garden - Student Ratio**		**School Gross Area - Student Ratio**	
Level of satisfaction on	Std. J-T Statistic	Sig. (2-tailed)	Std. J-T Statistic	Sig. (2-tailed)	Std. J-T Statistic	Sig. (2-tailed)
Classroom size	1,464	0,143	1,361	0,174	1,160	0,246
Size of school garden	***2,371***	***0,018***	***3,665***	***0,000***	***4,415***	***0,000***
Size of sports fields	***3,201***	***0,001***	***2,636***	***0,008***	***2,753***	***0,006***
Size of activity spaces	***3,042***	***0,002***	0,901	0,367	***2,161***	***0,031***
Educational facilities	0,916	0,360	-1,821	0,069	-0,266	0,791
Activity facilities	1,417	0,156	0,793	0,428	1,905	0,057
Sports facilities	1,426	0,154	0,369	0,712	0,554	0,580
Canteen and cafeteria facilities	0,651	0,515	-0,546	0,585	0,431	0,666
Security measures and precautions	0,903	0,367	***-3,348***	***0,001***	-1,913	0,056
School and building doors	0,941	0,347	-1,070	0,285	-1,835	0,067
Traffic safety	1,573	0,116	-1,677	0,094	-0,894	0,371
School accessibility	0,842	0,400	1,622	0,105	0,680	0,497
Parking facilities	1,655	0,098	0,143	0,887	0,892	0,372
Heating and lighting	0,331	0,740	-1,729	0,084	-1,178	0,239
Equipment	0,695	0,487	-0,903	0,367	-0,481	0,631
Hygiene and cleanliness	-1,281	0,200	***-4,978***	***0,000***	***-3,973***	***0,000***
Architectural and aesthetic features	1,839	0,066	***-4,684***	***0,000***	-1,492	0,136
Compatibility for the disabled	***3,595***	***0,000***	***-3,287***	***0,001***	-0,605	0,545
Landscaping and gardening	1,949	0,051	-1,259	0,208	-0,098	0,922

* The p (significance) values written in bold indicate that the differentiation of the satisfaction level from the spatial feature in the relevant row according to the personal or residential feature in the relevant column is significant at the 0.05 level. The J-T test values indicate the direction (negative or positive) and strength of the relationship.

The Influence of Spatial Features on the Overall School Satisfaction

We carried out a multiple regression analysis to test the degree to which the level of spatial adequacies of primary schools explains the level of overall satisfaction with primary schools. In this context, we first reduced 19 spatial features to two factors using principal component analysis.

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The results of the principal component analysis are listed on Table 8. Since the "Landscaping and gardening" variable takes values below 0.5 (0.407 and 0.466) in both factors, the analysis was repeated by removing this variable[4]. For this reason, the table contains 18 out of 19 variables. The KMO value (0.937), which tests the observed and partial correlation coefficients by comparing their significance, obtained through repeated analysis showed that the suitability of the sample for principal component analysis is excellent.

According to the results of the analysis, 18 variables related to the satisfaction levels of individuals regarding the spatial characteristics of the primary school were grouped into 2 components. Among these components, 45.12 percent of the total change is explained by the first component and 9.94 percent of the total change is explained by the second components. With these two components, 55.05% of the total change is explained (Table 8).

Considering the variables included in each component, we named the first component as "satisfaction with facilities and size of spaces" and the second component as "physical and environmental satisfaction". The Cronbach's Alpha values (see Table 8) obtained in the reliability analysis which measures the internal consistency of the components and variables included, indicate that the scales for the evaluation of individuals regarding the objective spatial characteristics of the primary school are reliable and valid.

[4] Although there are different approaches to how to component weights can be interpreted, if the component weight of a variable is 0.50 and above in cases where the sample size is 100 or more, they are considered to be practically significant (Hair et al., 1998).

Table 8. The summary of principal components analysis

Pattern Matrix		Total Variance Explained			
		Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Component Weight	**Total**	**% of Variance**	**Cumulative %**	**Total**
1. Component		8,121	45,12	45,12	7,016
Size of sports fields	0,946				
Size of activity spaces	0,926				
Sports facilities	0,819				
Size of school garden	0,779				
Educational facilities	0,767				
Activity facilities	0,738				
Canteen and cafeteria facilities	0,516				
Parking facilities	0,509				
Classroom size	0,501				
2. Component		1,789	9,94	55,05	6,495
School and building doors	0,800				
Heating and lighting	0,793				
Security measures and precautions	0,718				
Compatibility for the disabled	0,688				
Hygiene and cleanliness	0,683				
Equipment	0,652				
Traffic safety	0,583				

School accessibility	0,575		
Architectural and aesthetic features	0,520		
Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization. Rotation converged in 9 iterations.			
KMO and Bartlett's Test			
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.			**0,937**
Bartlett's Test of Sphericity		Approx. Chi-Square	**4961,421**
		df	**153**
		Sig.	**0,000**

We used the factor scores obtained by the principal component analysis as independent variables and the level of overall satisfaction with primary schools as a dependent variable in linear multiple regression analysis. Both components were included in the regression analysis, respectively, using the "stepwise" method. As shown on Table 9, 46.8% of the variance is explained by the first model in which only the first component is included, and 52.7% of the variance is explained by the second model in which two components are included together. Therefore, the regression equation was created according to the second model. The equation of the model is as follows:

Y' = The level of overall satisfaction with primary schools

$$Y' = \beta 0 + \beta 1X1 + \beta 2X2$$

Y' = 3,262 + 0,489 (1st factor) + 0,289 (2nd factor)

Table 9. The summary of regression model

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	3,262	0,031		105,392	0,000
	1.Component	0,656	0,031	0,684	21,181	0,000
2	(Constant)	3,262	0,029		111,838	0,000
	1.Component	0,489	0,036	0,510	13,657	0,000
	2.Component	0,289	0,036	0,301	8,073	0,000
Model Summary[c]						
		R	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	
	Model 1	,684[a]	0,468	0,467	0,700	
	Model 2	,727[b]	0,529	0,527	0,659	
a. Predictors: (Constant), REGR factor score 2 for analysis 1						
b. Predictors: (Constant), REGR factor score 2 for analysis 1, REGR factor score 1 for analysis 1						
c. Dependent Variable: Overall school satisfaction						
Correlation REGR factor score 1 for analysis 1 whit REGR factor score 2 for analysis 1						-0,579
				VIF (Variance Inflation Factor)		1,504
Tests of Normality						
Kolmogorov-Smirnov (Lilliefors Significance Correction)				**Statistic**	**df**	**Sig.**
				0,037	511	0,09

According to the results of the regression analysis, the variables that make up the 1st factor have a higher level of explanation of the overall

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satisfaction. Based on the loadings of the components that make up the 1st factor, the most effective components are 'the size of sports fields' (0.946) and 'the size of activity spaces' (0.926). Therefore, we can say that 'the size of sports fields' and' the size of activity spaces' are the most important spatial features on the level of overall satisfaction with the primary schools. Based on the factor loadings of the components that make up the second factor, 'school and building doors' (0.800) and 'heating and lighting' (0.793) are the most effective spatial features.

CONCLUSION

The present study investigates the change in parents' satisfaction with the spatial features of public primary schools based on personal, residential, school, and district characteristics and it measures to what extent the spatial features explain the overall satisfaction with primary schools. Previous studies relating primary schools – around which neighbourhoods are usually formed- to quality of life and urban planning mostly focus on accessibility and spatial distribution. There is a lack of studies linking objective and subjective evaluations of the spatial quality and adequacy of primary schools with urban planning agenda. The present study differs from the previous studies since it associates the spatial adequacies of public primary schools with urbanization and urban planning from three aspects. Firstly, the clusters which are generated to select the schools to be surveyed reflect the urbanization patterns of the districts in terms of urban density, urban sprawl (distance to the centre), and urban segregation (socio-economic differences). Secondly, the questionnaire consists of subjective evaluations on both accessibility to and spatial adequacies of the schools, which are two essential components of urban planning regulations in terms of the social and technical infrastructure in Turkey. Thirdly, the cross-tabulations involve statistical analyses linking subjective evaluations of the spatial quality and adequacy of primary schools with objective indicators that reveal the spatial adequacies of public primary schools as an important social infrastructure in urban planning and quality of life studies.

The main results of the present study can be classified into three subtitles: The change in satisfaction level based on personal and residential characteristics, the change in satisfaction level according to the neighbourhood and school characteristics, and the influence of spatial features on the overall school satisfaction. Among the personal characteristics, 'income level' is seen as the factor that affects the satisfaction of the school's spatial characteristics the most. However, one of the most remarkable outcomes of this study is that as the level of income increases, the level of satisfaction generally increases despite the fact that income levels can differ significantly even among parents at the same school. On the other hand, given that there is a significant and positive relationship between the socio-economic development index of the neighbourhoods and school satisfaction, it can be said that the

physical conditions are better in the schools in neighbourhoods where high-income families reside, this is likely due to donations from parents. The results of the study reveal that the number of students and the size of the building and garden/compounds of primary schools also affect parent satisfaction. This also highlights the importance of applying the minimum standards and accessibility criteria in urban planning legislation.

According to the model obtained by multiple regression, one-unit increase in the first factor (satisfaction with facilities and size of spaces) induces an increase of 0.489 units in the overall satisfaction level from primary schools, while one-unit increase in the second factor (physical and environmental satisfaction) causes an increase of 0.289 units in the overall satisfaction level from primary schools. 'The satisfaction with the size of sports fields' (factor load: 0.946) and 'the satisfaction with the size of activity spaces' (factor load: 0.926), which are sub-dimensions of the first factor that make up 46.8% of the total variance in the overall school satisfaction level have the largest influence on the overall satisfaction level. Therefore, these two dimensions have priority in improvements aimed at increasing the urban life quality or general satisfaction with primary schools for the Pendik district of Istanbul.

The regression model can explain 52.9% of the variance in the overall satisfaction level of parents with primary school. This shows that subjects such as school management, teachers, and curriculum may have an effect on 47.1% of the variance, which cannot be explained by spatial characteristics, in the overall satisfaction level.

Since the satisfaction with primary schools is one of the most important components of urban life quality indicators, the results of this study are expected to contribute to the implementation to increase the quality of urban life. Subjective evaluations provide a perspective that goes beyond the judgment of those who set the standards by revealing the individual's personal adaptation possibilities to objective conditions. The present study which enables subjective assessments to be compared with objective data in urban quality of life measurements can help urban policymakers compare spatial standards with user perception and identify deficiencies accordingly. Thus, it may be possible to both improve public service delivery and increase the quality of urban life. On the other hand, this study provides a roadmap to improve service provision for private educational institutions based on customer satisfaction since it reveals changing perceptions on different spatial features of schools. Repeating similar studies in different cases (both in rural and urban areas), different time periods, and for different education levels will be beneficial in terms of enabling the results to be compared. Further studies are expected to deepen the investigations focused on the spatial and non-spatial aspects of primary schools as the core elements of neighbourhoods, which are the basis of urban planning.

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REFERENCES

Ahmetoğlu, E., & Acar, İ. H. (2017). Parents'satısfactıon Wıth Theır Chıldren's Educatıonal Experıences in Early Chıldhood Period. *Electronic Turkish Studies*, *12*(6), 1-14.

Alpakut, S. (2017). Öğrenci Velilerinin Özel Okullardan Memnuniyet Düzeylerinin Yapısal Eşitlik Modeli ile Değerlendirilmesi. *Dokuz Eylül Üniversitesi İktisadi İdari Bilimler Fakültesi Dergisi*, *32*(2), 355-368.

Atik, A., Taçoral, E., & Altunkasa, M. F. (2014). Kent Halkının Kentsel Yaşam Memnuniyeti Üzerinde Etkili Sosyo-Demografik Özelliklerinin Belirlenmesi Üzerine Bir Araştırma: Kemaliye Örneği. *İnönü Üniversitesi Sanat ve Tasarım Dergisi*, *4*(9), 21-33.

Aydoğan, İ. (2012). Okul Binalarının Özellikleri ve Öğrenciler Üzerine Etkileri. *Milli Eğitim Dergisi*, *42*(193), 29-43.

Bakioğlu, A., & Bahçeci, M. (2010). Velilerin okul imajına ilişkin görüşlerinin incelenmesi. *31*, 25-55.

Berryman, A. (2015). Modeling Public Satisfaction with School Quality: A Test of the American Customer Satisfaction Index Model. https://scholarworks.gsu.edu/eps_diss/117

Bognar, G. (2005). The concept of quality of life. *Social theory and practice*, *31*(4), 561-580.

Boylu, A. A., & Paçacıoğlu, B. (2016). Yaşam kalitesi ve göstergeleri. *Akademik Araştırmalar ve Çalışmalar Dergisi (AKAD)*, *8*(15), 137-150.

Bozyiğit, S. (2017). Özel Okulların Eğitim Hizmetlerine İlişkin Veli Beklentisi ve Algısı: Nitel Bir Araştırma. ICPESS (International Congress on Politic, Economic and Social Studies),

Brown, K., & Coulter, P. B. (1983). Subjective and objective measures of police service delivery. *Public Administration Review*, *43*(1), 50-58.

Campbell, A., Converse, P. E., & Rodgers, W. L. (1976). *The quality of American life: Perceptions, evaluations, and satisfactions*. Russell Sage Foundation.

Cevher, E. (2015). Yükseköğretimde Hizmet Kalitesi ve Kalite Algısının Belirlenmesine Yönelik Bir Araştırma. *Journal of International Social Research*, *8*(39), 804-814.

Charbonneau, E., Van, R., & Gregg, G. (2012). Performance measures and parental satisfaction with New York City schools. *The American Review of Public Administration*, *42*(1), 54-65.

Çamlıca, C. (2016). Kktc İlkokullarında Okul-Veli Memnuniyeti (Yedidalga Örneği). *International Journal of New Trends in Arts, Sports & Science Education (IJTASE)*, *5*(3), 40-49.

Ekinci, C. E., & Burgaz, B. (2007). Hacettepe üniversitesi öğrencilerinin bazı akademik hizmetlere ilişkin beklenti ve memnuniyet düzeyleri. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *33*(33), 120-134.

Epstein, J. L. (1985). A question of merit: Principals' and parents' evaluations of teachers. *Educational Researcher*, *14*(7), 3-10.

Fantuzzo, J., Perry, M. A., & Childs, S. (2006). Parent satisfaction with educational experiences scale: A multivariate examination of parent satisfaction with early childhood education programs. *Early Childhood Research Quarterly*, *21*(2), 142-152.

Favero, N., & Meier, K. J. (2013). Evaluating Urban Public Schools: Parents, Teachers, and State Assessments. *Public Administration Review*, *73*(3), 401-412. https://doi.org/10.1111/puar.12022

Friedman, B. A., Bobrowski, P. E., & Geraci, J. (2006). Parents' school satisfaction: ethnic similarities and differences. *Journal of Educational Administration*, 471-486.

Friedman, B. A., Bobrowski, P. E., & Markow, D. (2007). Predictors of parents' satisfaction with their children's school. *Journal of Educational Administration*, 278-288.

Galster, G. (1987). Identifying the correlates of dwelling satisfaction: An empirical critique. *Environment and Behavior*, *19*(5), 539-568.

Gibbons, S., & Machin, S. (2008). Valuing school quality, better transport, and lower crime: evidence from house prices. *oxford review of Economic Policy*, *24*(1), 99-119.

Gibbons, S., & Silva, O. (2011). School quality, child wellbeing and parents' satisfaction. *Economics of Education Review*, *30*(2), 312-331.

Hair, J. F., Anderson, R., Tatham, R., & Black, W. (1998). Multivariate Data Analysis Prentice Hall. *Upper Saddle River, NJ*, *730*.

Hastings, J. S., Kane, T. J., & Staiger, D. O. (2005). *Parental preferences and school competition: Evidence from a public school choice program* (0898-2937). https://www.nber.org/papers/w11805

DOI: 10.15320/ICONARP.2021.165

Jacob, B. A., & Lefgren, L. (2007). What do parents value in education? An empirical investigation of parents' revealed preferences for teachers. *The quarterly journal of economics*, *122*(4), 1603-1637.

James, O. (2009). Evaluating the expectations disconfirmation and expectations anchoring approaches to citizen satisfaction with local public services. *Journal of Public Administration Research and Theory*, *19*(1), 107-123.

Karadağ, E. (2010). İlköğretim okullarında hizmet kalitesi: Veli algılarına dayalı bir araştırma. *Eğitim Ve İnsani Bilimler Dergisi: Teori Ve Uygulama*(1), 19-52.

Karagöz, Y. (2010). Nonparametrik tekniklerin güç ve etkinlikleri. *Elektronik Sosyal Bilimler Dergisi*, *9*(33), 18-40.

Karaküçük, S. A. (2008). Okul Öncesi Eğitim Kurumlarında Fiziksel/Mekansal Koşulların İncelenmesi: Sivas İli Örneği. *Sosyal Bilimler Dergisi/Journal of Social Sciences*, *32*(2), 307-320.

Kelly, J. M. (2003). Citizen satisfaction and administrative performance measures: is there really a link? *Urban Affairs Review*, *38*(6), 855-866.

Kerce, E. W. (1992). *Quality Of Life: Meaning, Measurement, And Models*.

Mahallem. (2016). *Mahallem İstanbul*. Retrieved 13.03.2020 from http://www.mahallemistanbul.com/MahallemSEGE_/

Marans, R. W. (2007). Kentsel Yaşam Kalitesinin Ölçülmesi. *Mimarlık Dergisi*, *335*, 28-35.

Marans, R. W., & Rodgers, W. L. (1975). Toward an understanding of community satisfaction. *Metropolitan America in contemporary perspective*, 299-352.

Massam, B. H. (2002). Quality of life: public planning and private living. *Progress in planning*, *58*(3), 141-227.

ME. (2019). *Ministry of Education Construction and Real Estate Department.Spatial data of primary schools.* Retrieved 15.06.2020 from

ME. (2020). *Ministry of Education* Retrieved 15.06.2020 from http://sgb.meb.gov.tr/www/icerik_goruntule.php?KNO=396

Morgeson, F. V. (2012). Expectations, disconfirmation, and citizen satisfaction with the US federal government: Testing and expanding the model. *Journal of Public Administration Research and Theory*, *23*(2), 289-305.

Nartgün, Ş., & Kaya, A. (2016). Özel Okul Velilerinin Beklentileri Doğrultusunda Okul İmajı Oluşturma. *5*(2), 153-167.

Neal, Z. P., & Watling Neal, J. (2012). The Public School as a Public Good: Direct and Indirect Pathways to Community Satisfaction. *Journal of Urban Affairs*, *34*(5), 469-486. https://doi.org/10.1111/j.1467-9906.2011.00595.x

Okumuş, A., & Duygun, A. (2008). Eğitim Hizmetlerinin Pazarlanmasında Hizmet Kalitesinin Ölçümü Ve Algılanan Hizmet Kalitesi İle N Öğrenci Memnuniyeti Arasındaki İlişki. *Anadolu University Journal of Social Sciences*, *8*(2), 17-38.

Özbaş, M. (2014). İlköğretim okulu yöneticilerinin aile memnuniyetini karşılama düzeyine ilişkin veli görüşleri. *Eğitim Bilimleri Araştırmaları Dergisi*, *4*(1), 243-258.

Parks, R. B. (1984). Linking objective and subjective measures of performance. *Public Administration Review*, *44*(2), 118-127.

Pendik-Municipality. (2020). *Total surface area of neighbourhoods*. Retrieved 17.07.2020 from https://www.pendik.bel.tr/sayfa/mahalle

Rothstein, J. M. (2006). Good principals or good peers? Parental valuation of school characteristics, Tiebout equilibrium, and the incentive effects of competition among jurisdictions. *American Economic Review*, *96*(4), 1333-1350.

Salihoğlu, T., & Türkoğlu, H. (2019). Konut Çevresi ve Kentsel Yaşam Kalitesi. *Megaron*, *14*, 203-217.

Stipak, B. (1979). Citizen satisfaction with urban services: Potential misuse as a performance indicator. *Public Administration Review*, 46-52.

Stipak, B. (1980). Local governments' use of citizen surveys. *Public Administration Review*, *40*(5), 521-525.

Şahin, G. G. (2011). Üniversite düzeyinde turizm eğitiminde hizmet kalitesi beklenti ve algısına yönelik Ankara'da bir araştırma. *İşletme Araştırmaları Dergisi*, *3*(4), 49-65.

Şensoy, A., & Sağsöz, A. (2015). Öğrenci Başarısının Sınıfların Fiziksel Koşulları ile İlişkisi. *Journal of Kirsehir Education Faculty*, *16*(3), 87-104.

Tayyar, N., & Dilşeker, F. (2013). Devlet ve vakif üniversitelerinde hizmet kalitesi ve imajin öğrenci memnuniyetine etkisi. *SOSYAL VE BEŞERİ BİLİMLER ARAŞTIRMALARI DERGİSİ*(28), 184-204.

Thompson, G. L. (2003). Predicting African American Parents' and Guardians' Satisfaction With Teachers and Public Schools. *The Journal of Educational Research*, *96*(5), 277-285. https://doi.org/10.1080/00220670309597640

TURKSTAT. (2019). *Turkish Statistic Institute 2019 Census Data (Address Based Population Recording System)*. Retrieved 21.06.2020 from https://biruni.tuik.gov.tr/medas/?kn=95&locale=tr

Van Ryzin, G. G. (2004). Expectations, performance, and citizen satisfaction with urban services. *Journal of policy analysis and management*, *23*(3), 433-448.

Van Ryzin, G. G. (2006). Testing the expectancy disconfirmation model of citizen satisfaction with local government. *Journal of Public Administration Research and Theory*, *16*(4), 599-611.

Vural, R. A., & Sadık, F. (2003). İlköğretim okul binalarının fiziksel açıdan değerlendirilmesi. *Eğitim ve Bilim*, *28*(130), 16-23.

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Parametric Design as A Creation Tool for The Memory Space

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Abstract

Purpose

This study theoretically discusses the role of parametric design in memory-space design in contemporary architecture. Subsequently, it aims to strengthen the discussion by examining three structures with different interpretations of parametric design: namely, the Abu Dhabi Louvre Museum in the UAE with its attempt to create social and cultural memory; the Yinchuan Museum in China, which has weak ties with its past due to political reasons, trying to re-create its ancient culture with its understanding of contemporary culture; and Istanbul City Museum, which uses parametric design to present the layered structure of its local and cultural memory, are the exemplary architectural structures considered. The three structures' treatment of parametric design, their differentiations of parametric-based form creation methods, and their different ways of constructing cultural memory and space relationship through parametric methods constitutes the purpose of the research.

Design/Methodology/Approach

In the study, descriptive scanning method was followed, and an interview was conducted with Alper Derinboğaz, the architect of the Istanbul City Museum.

Findings

The findings of this study are indicated as the use of information as a source of form in creating societies' cultural memories, the opportunities for cultural and environmental adaptation, and the flexible understanding of design provided by parametric design. These were deduced in all three examples where non-Euclidian and topological forms strengthen the monumentality of the museum structures.

Research Limitations/Implications

It is the fact that the parametric design approach is just developing and the number of museums that have social and cultural importance in contemporary architecture may be seen as determine the limit of this study. However, the continuous increase in the number of samples may weaken this limitation.

Social/Practical Implications

The social and cultural effects of parametric design on the creation of memory spaces are discussed.

Originality/Value

This study is the first study that researching the cultural, environmental and formal harmony that parametric design provides in contemporary museum buildings.

Keywords: memory, memory space, museum, parametric design

INTRODUCTION

While digital technologies have radically changed the architectural design methods in the last 10 years of the 20th century, design phenomena such as non-euclidean forms[1], kinetic and dynamic systems, genetic algorithms, and parametric algorithms have begun to form current digital architecture. However, the search for non-euclidean forms in architecture, which intensified with monumentalizing since the late 1980s, reached different dimensions with numerical technologies' inclusion into design and form production.

"The concepts of permanence and stasis, which are considered as a basis in the rhetoric of 20th-century architecture, are replaced by the concepts of variability and dynamism in the 21st Century" (Turan,2011, p.165). In the past, CAD tools used merely as design representation tools have transformed into tools that can produce rapid prototype forms, execute form and performance analysis, non-euclidean and topological geometries[2], which aren't preferred due to difficulty of drawing and establishing geometric relations, have become easily expressible with numerical modeling methods such as NURBS[3].

the production process were intertwined, and numerical information coalesced with production information. In parametric design, which is one of the computational design methods, the fact that data related to the structure such as environmental and cultural factors can be used as a form source has brought it to the forefront compared to other digital design methods. Designers have had the opportunity through parametric design to create complex and convoluted forms such as topological forms, isomorphic surfaces that are rediscovered together with digital architecture more easily, associate them with other forms, and modify them independently of the design process.

Nowadays, the form possibilities with unusual geometries ensured by parametric design constitute an important part of the architectural designs of commercial, cultural, and social structures in both developed and developing countries such as China, United Arab Emirates, Qatar which maintain their economic development together with cultural evolution. The parametric design method is utilized in the designs of the museum structures that monumentalize these countries' cultural memory.

In this study, parametric design's possibilities in the creation and reconsideration of memory will be assessed in the context of architectural design and memory space relations. The architectural form-artifact relationships of contemporary museum structures designed with parametric design method, their relations with surroundings are studied, how memory-based and environmental information is used in parametric design and its reflections on contemporary museum architecture are investigated. In this context, to investigate the subject from different dimensions and various understandings the Abu Dhabi Louvre Museum (LAD), located in UAE that reconsiders its economic and cultural developments, and reflects parametric design understanding

[1] Non-Euclidean Forms or Geometry: Non-Euclidean geometry is any geometry that is different from Euclidean geometry. Each Non-Euclidean geometry is a consistent system of definitions, assumptions, and proofs that describe such objects as points, lines and planes. For more information:https://www.cs.unm.edu/~joel/NonEuclid/noneuclidean.html

[2] Topology is a branch of mathematics that studies surface curves and their relationships. One of its focal points is to find the invariants of modified geometries. Forms such as Kelin Bottle,Mobius Strips are topological forms. (Kolarevic, 2003,13).

[3] NURBS: Non-uniform Rational Basis Spline: The method of drawing geometric based curves in digital environment. For Detailed Information: Kolarevic,B (2003,15-18)

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with western artifacts from a purely local cultural form and monumentality framework, the Yinchuan Museum of Contemporary Arts (MOCA), located in China that has been achieving its cultural and economic transformation together with its disconnected past, and that uses past/environment relationship as form source and the Istanbul City Museum(ICM), which presents the cultural structure of a city like Istanbul that hosted different cultures for centuries, with all its layers, have been taken as examples. For the legitimacy of the study, an interview was made with ICM's architect Alper Derinbogaz about parametric design, museum, and ICM. Apart from this, the study has a descriptive scanning model and data was collected by document review. The research focuses on the environmental and cultural impacts of parametric design on museum designs and their relationship with them. Instead of approaching parametric design and structure relations from a technical point of view, the study primarily researches the theoretical structure of the parametric design, the environmental, cultural, and formal harmony it provides and then assesses the relationship between parametric design and current museum structures in terms of cultural, environmental, formal and other factors.

In the discussion and conclusion section, the cultural and architectural effects of addressing the memory space relationship in the current museum design with the possibilities enabled by the parametric design are discussed comparatively with examples.

PARAMETRIC DESIGN; AS A MEANS OF RE-CREATION OF FORGOTTEN GEOMETRIES

...forgotten geometries lost to us because of the difficulties of their representations.
(Moneo,2001, cited Kolarevic,2003,6)

Greg Lynn's book, *The Folding in Architecture* covering merely CAD tools has been a turning point for digital design. Lynn which uses Leibniz's mathematics as root in his book, argues that there is nothing in the universe that cannot be digitized, including architecture. But Lynn is hardly interested in the repertoire of pre-determined and chosen forms of the world or its architecture, as well as "Modulorist" digitization, or deconstructivism, which makes the breaks of form a focal point. He is in pursuit of curvilinear heterogeneity, differentiations."

Fold allows unrelated elements to participate in an incessant mixture" (Şentürk,2006,p.124). The focus of Lynn's philosophy is topological forms that can be reformatted at any moment, lost because of the difficulty of their manufacture in the past.

In topology, the form's flexibility and external conditions' determination are gathered in a single fold, intertwined, and become inseparable. According to Lynn, time is the opposite of infinity and architecture's dynamism. Topology, by going beyond the space concept, is proof of the "curved" form of the architectural form consisting of infinite components. After the fold, with technological developments, digital architecture[4] has entered into expansion period both theoretically and practically. Reas describes this period as "the period when new architecture is transformed" (Reas & McWilliams, 2010, p.17).

Digital's theoretical development is achieved incrementally. For nearly a decade after the fold, digital architecture has been characterized by designers with philosophical and mathematical statements. In the second decade, tools and software that were integrated with design processes such as algorithmic and parametric design insights, biomimetic design, digital materialization, evolutionary design, which fall under the main title of computational, and sensitive to digital productive practice, which was introduced in the first decade, came into view. In his book of "Non-Standard Architecture", Frederic Migayrou states that "nature-based, complex forms attained by computational, mathematical and differentiation processes are conceptual expressions of the next generation, non-standard architectural design" (Migayrou,2012,p.26-33). Especially, computational design's integrated structure with production and design process and complex form creation facilities provided by digitization have brought forward research and discussions about this method in architectural circles. While Lynn placed the fold concept to the architectural form phenomenon's center, topological forms such as Blobs,

Klein Bottle, Möbius Strips, and isomorphic surfaces which were not preferred by architects due to calculation difficulties and production through algorithmic and parametric design, have been rediscovered by digital design. Terzidis (Terzidis,2003, p.56-57) states that; "just like everything else, the forms have also geometry, the design process in the past restricted the architect with existing tools, but computational numerical software lifts these restrictions".

In the early stages of algorithmic-based design, the difficulties of controlling limitless geometric structure inherent in topological forms have been one of the most significant problems designers experienced. While "limitlessness" improves the designer's creativity in the production of conceptual forms, it has led to difficulties in putting the design into practice in a discipline such as architecture. Despite these problems, designers have developed a parametric design method, which is based on parametric algorithms that enable the limitless geometries' production, which can treat architectural knowledge as a form source.

Parametric design is a digital design concept based on correlations of models. It relies on constraints as a means of producing a geometry in variable forms. Parametric design as a tool in the geometric relations'

[4] Although slightly different from its present meaning, the term 'digital architecture' was first used by William Gibson in his book Neuromancer as descripted with "cyberspace" term (1984). For more information: Neuromancer.(Gibson,2016, 8)

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control enables the creation and modification of the elements that constitute a design by differentiation. Numerical algorithms form the basis of parametric design tools. Thus, it increases the designer's control over the design geometry, allowing the designer to evaluate certain conditions. "Computationally speaking, there isn't a difference between algorithmic and parametric systems; algorithms by default operate on parameters, and a parametric system's fundamental component is the algorithm itself, called the schema or definition" (Dino,2012, p.210). The design's geometry is determined, designed, correlated with different geometries, and replaced at the interface called "schema". Schemas function as interfaces, where any geometric form is created, modified, and correlated with other geometries using decodes that can perform algorithmic calculations (Figure 1).

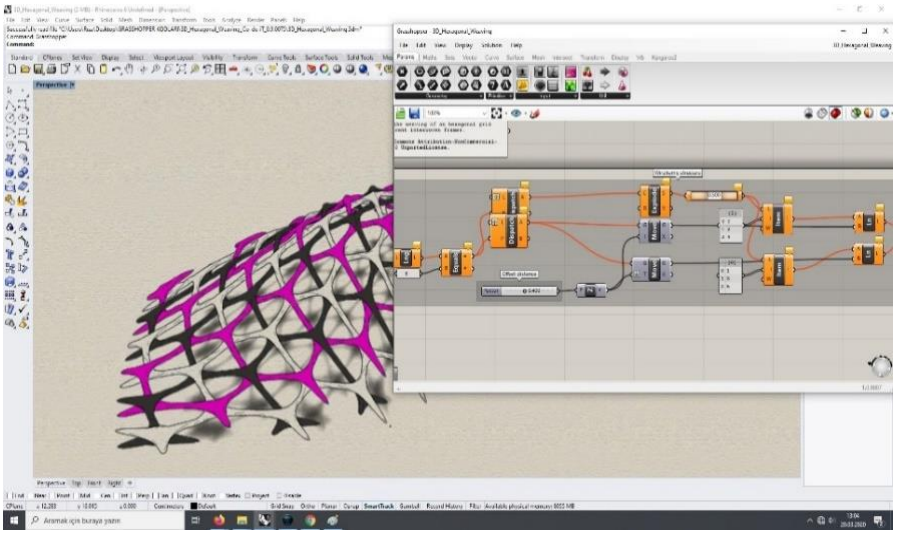

Figure-1. Models created via parametric schema can be manipulated simultaneously. (Author's design)

The elasticity of parametric design systems lies in the productive potential of infinite topological variations. This qualification enables the creation of a visual model of the design on the schema. "This model can be addressed as the main theme of a design, but, it can also bring together numerous design layers" (Derinboğaz, 2019).

Parametric Design is Adaptive

The flexibility brought by parametric design also generates the design's "adaptation" phenomenon. In a parametric design schema, one or more basic form particles that will form the design are considered. Based on the algorithm written, these form pieces multiply, differentiate, and create the main form. Thus, the designs created can adapt to another design by modification of their data or become part of it. The "adaptation" concept in parametric design can regulate not only design geometry but also its relations with the structure's environment. Parametric creation of a local pattern symbolizing a culture can provide structure's "cultural adaptation" while shaping its facade consistent with wind and topography can provide "environmental adaptation".

ICONARP – Volume 9, Issue 1 / Published: 21.06.2021

"The Whale" research center and museum on the Norwegian island of Andøya, which is designed by Dorte Mandrup, is one of the important examples on this subject. It is shaped according to the strong polar winds around the structure, where the whale, which has an important place in the culture and ecology of the region, is treated as a metaphor. Strong polar winds are handled according to their direction and processed with parametric software. The use of wind as a source of form not only adapts in the formal sense but also ensures controlled use of airflow in research and ventilation of interiors (Figure 2).

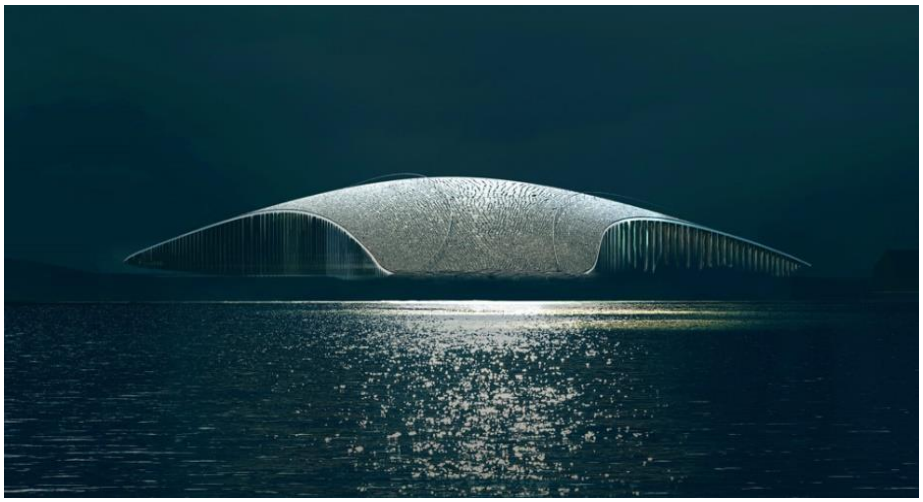

Figure.2: The Whale research center and museum has been form by enviromentally winds with parametric design method. (https://parametric-architecture .com/dorte-mandrups-aerodynamic-whale-museum-rising-in-the-arctic-circle/)

What constitutes the identity of parametric design is the designer's approach to geometries and the ability to relate them to each other. In the schema, non-euclidean, topological forms can be correlated with each other, iterated, differentiated by creating the main form (continuous differentiation and differentiation). With these operations, the same form's different variations can be derived (Figure 3). While all
of these elements compose the formal character of parametric design, it also ensures the achievement of formal harmony.

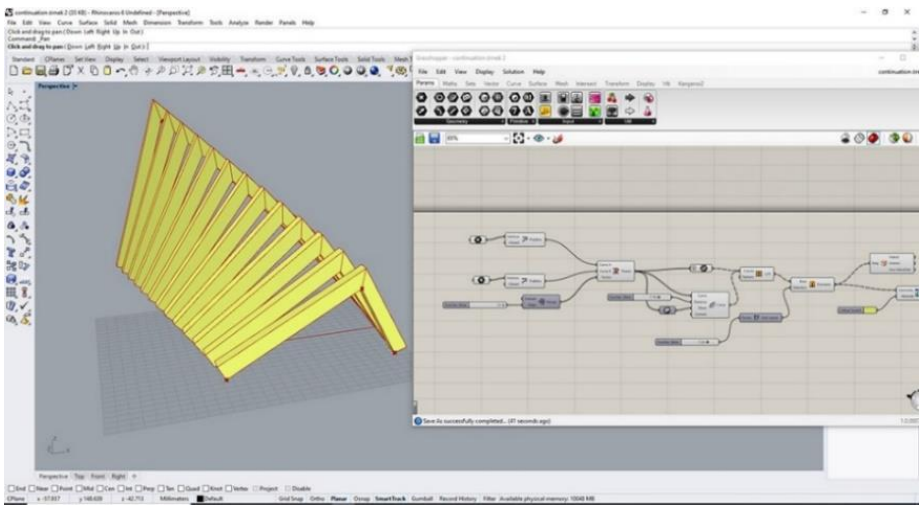

Figure 3: Producing the same form by Continuous Differentiation and iteration methods with different variables, repetition, and augmentation. (Author's Design)

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Parametric Design is Based on Data(s)

In architecture, one of the most important design components is to have tectonic information that includes mathematical and structure's three-dimensional morphology. "Parametric design implies the ability (knowledge as well as digital skills) to mediate tectonic knowledge" (Oxman & Oxman,2014, p.138).

Information's source can be representational, metaphorical, topological, or any geometric structure. Information can be processed into parametric schemas in any form, form can be produced. In parametric schema based on performance (performative) and form generation, forms that are compatible with forces affecting the structure such as sun angle, wind direction, topography can be created. These forcers can shape design, and materials and manufacturing systems can be encoded compliant with design. In his article "A New Global Style for Architecture and Urban Design", Patrik Schumacher describes the parametric design as "a paradigm of design beyond a formal style that can use purely environmental influences" (Schumacher, 2009, p.15). This paradigm enables the creation of all tectonic fabrics, from environmentally compatible facade geometry to light-controlled openings. According to Derinboğaz, "through parametric design's possibilities, it is possible to create designs in which structure and various environmental factors can come together" (Derinboğaz,2019).

"The built environment, with its complex matrix of territorial distinctions is a giant, navigable, information-rich interface of communication" (Schumacher,2013, p.2). It is a communication tool based on every environment, design, and phenomenon. The use of a space requires compliance with the code of conduct prescribed by the type of social situation, which constitutes architecture's social processes.

Parametric design is based on "data" The form-creating qualifications (rules) of parametric software such as differentiation, adaptation have now begun to diverge, while the urban and architectural subsystems have converged to represent each other. Over time, the uncontrolled stratification of urban memory resulting from increased information density can be reconsidered and refined into design geometry. A pattern or a form unique to a particular culture, i.e. the representation geometry of memory, can be considered as a form source, can be modified, transformed, presented with a new understanding. Similarly, while the artifact of memory is exhibited in museums that are the space of memory through parametric design, representative geometry that creates structure's form can be metaphorically re-formed. This is how the memory space relationship can be achieved.

PARAMETRIC DESIGN AS MEMORY SPACE CREATION TOOL

...in short, the museum is a tool for managing change and controlling difference.
(Preziosi,1989; cited Artun,2006,170)

Museums fall into the same category of architecture and art as monuments, temples, churches, shrines, and certain types of

palaces(Duncan,2006,50). Museums, like ancient ceremonial monuments, incarnate the idea of the state and make it visible.

Monumentality brings curiosity and charm. Museum's monumentality doesn't come solely from size and architecture. What brings it the monumentality is what it preserves inside. The museum doesn't only exhibit society's cultural memory, it also strengthens the culture of the civilizations it dominates by displaying the dominant society's power. The museum's subconscious function is ideological. The goal is to indoctrinate to those who benefit from or visit the museum the supreme beliefs and society's values. They persist in the power and culture of a protectorate class. Even though a museum space is perceived as a vacant shell without its exhibits, it is an ideologically vigorous structure.

Benedict Anderson (Anderson,1993,182-186), in his book *Imaginary Communities*, proposes three conditions for a nation to be formed; It must have a map, a flag, and museums. Societies at the stage of becoming a nation are strengthened by displaying their ideology, culture, and memories. A nation's ideological and cultural transformations are reflected in their museums, accordingly in of their museums' architecture.

"Museums are progressively transformed into a spectacle, penetrating popular media, everyday life, education, tourism, and the fashion industry. The most important element of this spectacle is no longer art, but architecture" (Artun,2017). Museum buildings' qualities are no longer determined by the artifacts on display, but by the architecture.

According to Vergo (Vergo,1989,p.21-27) who distinguishes museum studies as new and old understanding, the concept of "the form follows the function" in past museums' architecture, is replaced by a style and size oriented architecture in current museums in contemporary architecture, parametric design is frequently used in museum designs of countries that create or reconsider their cultural memory due to their infinite form creation qualities and the possibility of producing different geometric forms. These countries monumentalize their cultural memories through parametric design. They chose to intersect cultural data that make up their memories with digital architecture's parametric algorithmic data.

Parametric design's geometry forming qualifications such as differentiation and iteration affect not only the design geometry but also the museum's relationship with its environment. Museum's monumentality strengthens as it varies from its surrounding structures with its non-euclidean geometry. For example, while Zaha Hadid's Maxxi Museum in Rome symbolizes contemporary Italy, its design and dimensions make it distinctive from the traditional Roman urban fabric around it. Building's monumentality is ensured not only by its characteristics but also by its form (Figure 4).

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Figure 4. In Zaha Hadid's Maxxi Museum, the phenomenon of difference determines both the building's shape and its relationship with its environment. (https://www.zaha-hadid.com/architecture/maxxi/)

Parametric design's adaptation phenomenon can establish a relation between the museum with the artifacts it exhibits, local culture, and environmental factors. However, information use related with structure as a form source can strengthen these relationships. Shanghai Natural History Museum (Perkins & Will-2015) in China can be considered one of the best examples in this regard. The "Ice Crack" texture used in Shanghai's traditional architecture is performed parametrically on the museum's facade, where cultural artifacts unique to the region are exhibited along with nature artifacts, is considered parametric and it covers the entire facade of the building like Ivy (Figure 5).

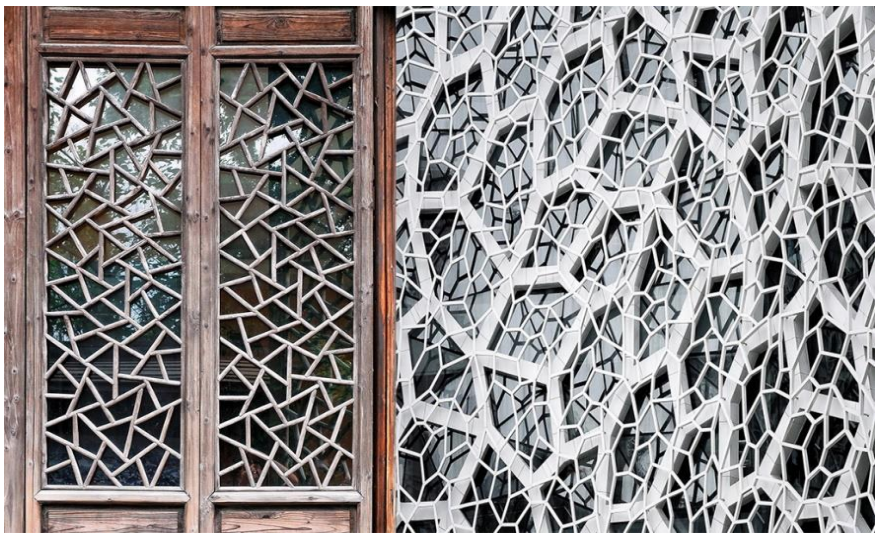

Figure 5. Traditional Ice Crack window pattern of Southern and transformation of this form with parametrical algorithms in Shanghai Natural History Museum's facade. (Brownell,,2015)

In this section, the current museum architectures of the countries endeavoring to reconstruct and reconsider their memory will be analyzed within possibilities enabled by parametric design. The results of using cultural memory and environmental data as form sources in museum buildings will be discussed. Within the scope of the study, Abu Dhabi Louvre Museum in UAE trying to create its memory, Yinchuan MOCA in China trying to bring together past and current memory, and

ICM strengthening Istanbul's multi-layered cultural memory will be studied as examples.

Abu Dhabi Louvre Museum(LAD)

The UAE, a small country whose economy was based on pearl and seafood trade in the past, has become a principal oil state with oil resources' discovery in 1971. While the discovery of oil reserves enabled the UAE to develop rapidly, on the other hand, population and multicultural problems started to emerge due to the increasing migrations.

As such problems escalated, the country introduced its Emiratization[5] policy in 2013 which included programs such as the increase of the local population, reconstruction, and preservation of the national culture and memory. In this context the emirate has decided to develop the cultural structure of Abu Dhabi, which is already an important commercial center of the country, unlike Dubai, which has become a multinational economy, culture, and trade center by itself, and in this context, the Abu Dhabi 2030 project, which includes the artificially constructed island of Saadiyat, has been prepared.

According to Ajana, it was decided to build cultural and artistic structures such as museums, art galleries, and concert halls that exhibit contemporary and classical artworks on Saadiyat Island, which is an "identity project" (Ajana,2015, p.331), to create Abu Dhabi's cultural memory (Figure. 6). In memory's construction, it was planned to build brand museums that can compete with museums such as the British Museum, Louvre, MOMA and that can promptly bring modernism to the country at monumental scales.

[5]For more information: (Üçağaç,2015,231-239) and (Karadeniz,2018,138-141)

Figure 6. Saadiyat Island is designed as an artificial culture Island with museums such as the Louvre and the Guggenheim under the policy of Emiratization. (https://www.weetas.com/gccnews/jumeira-group-runs-new

In this section, the Abu Dhabi Louvre museum, whose dome was designed through parametric design, regarded as the most important project of Saadiyat Island both symbolically and architecturally, will be addressed and parametric design's role in the creation of memory will be discussed.

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Louvre Abu Dhabi is a classical art museum designed as Saadiyat Island's cultural center. Gallery space covering 22,500 square meters, interior space, water channels designed to cool the interior, and other spaces are shaded under an iconic dome with a diameter of 180 meters, representing traditional and contemporary Arab culture (Figure 7).

Figure.7. Aerial view of Louvre Abu Dhabi Museum. (Jeannouveaul.com)

The museum was designed by Atelier Jean Nouveau and inaugurated in 2017. The dome, which forms the design's focal point, combines environmental, aesthetic, cultural, and structural functions.

Environmentally, it connects spaces in the museum and provides shade and coolness to the open spaces. Aesthetically, it serves as a canopy that filters sunlight and creates dramatic rain of light under the dome. Operationally, the canopy has certain spaces' lighting function and cooling the interiors by evaporating water in the channels.

The structure is covered by the dome used by all civilizations commonly. Jean Nouveau designed the 'mashrabiya', which was used as a cover in the Middle Eastern architecture as textures' form source that constitutes the dome. This one is made of a web of different patterns interlaced into a translucent ceiling which lets a diffuse, magical light come through in the best tradition of great Arabian architecture" (Ajana,2015, p.322). Therefore, the Abu Dhabi Louvre is not only a museum but also is a structure formed by the Arabic mashrabiya texture, an architectural element of the common culture, displaying Western artifacts under a dome. The lights enter through the dome, which represents Arab culture, are sunlight's metaphors flowing through palm leaves (Figure 8).

In order to create this effect, the design team consisting of different disciplines initially formed a parametric model using structural constraints (self-weight), aesthetic (cultural texture), and natural light (angle of the sun's rays) data. The model formed was regarded as a basis for continuous development and arrangement of its details. A geometry consisting of squares and hexagons, which is the shape that best symbolizes the filigree pattern of the region's mashrabiya origin, was determined, this model was rotated, repeated, and scaled with respect to

ICONARP – Volume 9, Issue 1 / Published: 21.06.2021

the desired criteria by parametric software called SMART Sizer and SVN, and prototype textures of each canopy was created (Figure 9).

Figure 8. While LAD's dome filters the sunlight, it also directs it to the desired areas. (https://www.archdaily.com /793182/in-progress-louvre-abu-dhabi- jean-nouvel)

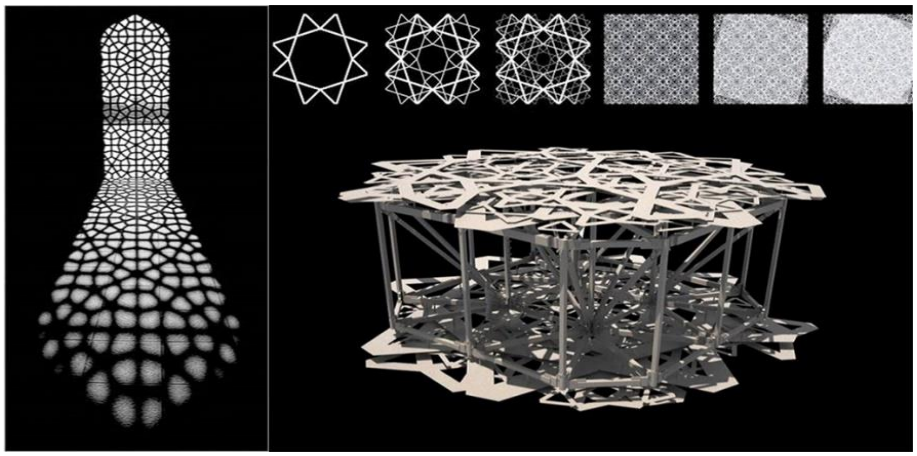

Figure 9. Traditional mashrabiya and transformation of this form with parametrical algorithms in LAD dome. (Aida,S ,2020; Imbert,F.,Frost,K.,Fisher,A., Witt,A., Tourre, V. Koren,B.,2012,79-Manupilation: by Author)

The dome is designed to minimize the disadvantage of the area receiving sunlight for 320 days. Each layer of the dome, consisting of five layers, is planned to pass 30% of the sun's rays through the top layer and 3% through the innermost layer. Each layer's structure consisting of a steel and aluminum mixture is calculated instantaneously and considering the calculations and the permeability layers' functions, the structure was formed simultaneously and with different alternatives. In this way, the central model became a responsible data-driven tool for synthesizing both external light information and structural analysis metrics. The model adapted itself to each data set, providing recipient feedback for the interrelationship between the two" (Imbert et al,2012, p.84).

Performative parametric design tools were used in the design of the dome to meet the lighting needs suitable for the functions in the interior in the most efficient way naturally. In addition to directing and filtering the sunlight of the dome, a parametric-based EEL dome prototype was used to illuminate the interiors with daylight at the desired values (Figure 10).

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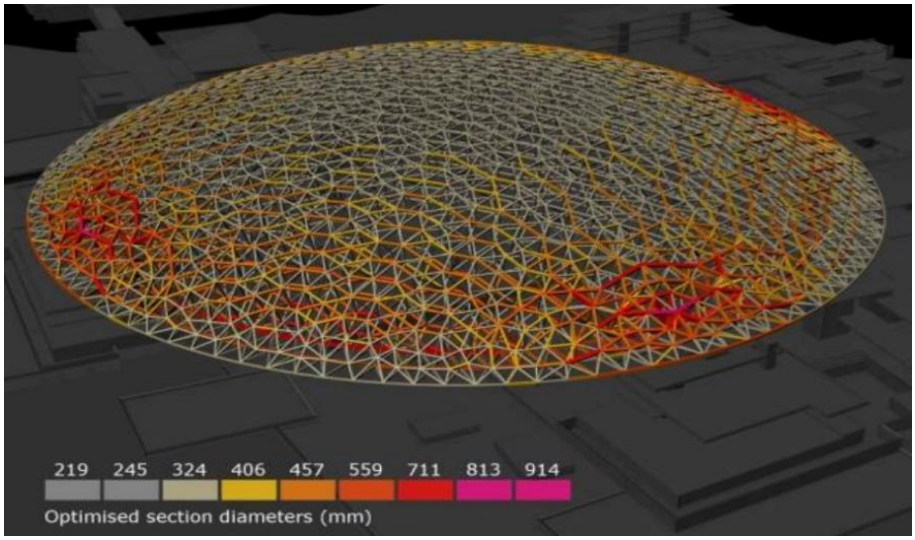

Figure 10. Light-based and Parametrically modeled EEL Lighting Dome Simulation. (Wortmann,2018,71)

On EEL, which acts as a simulation of daylight movements, 1028 triangular constituting mesh were added, forming the main texture of the dome. These openings on the prototype are adjusted by controlling the forms to ensure that sun rays provide optimal lighting of the interiors in June and December. As the model is processed parametrically, the shapes of the dimensions of the openings remain intact, and even if the texture dimensions change, they remain constant. Tourre (Tourre,2009, p.789), one of the designers of the dome explains it as follows; "The right one for the light-based parametric design allows working directly to compute the building properties. Therefore we are interested in the design tools in which the lighting intention can be represented".

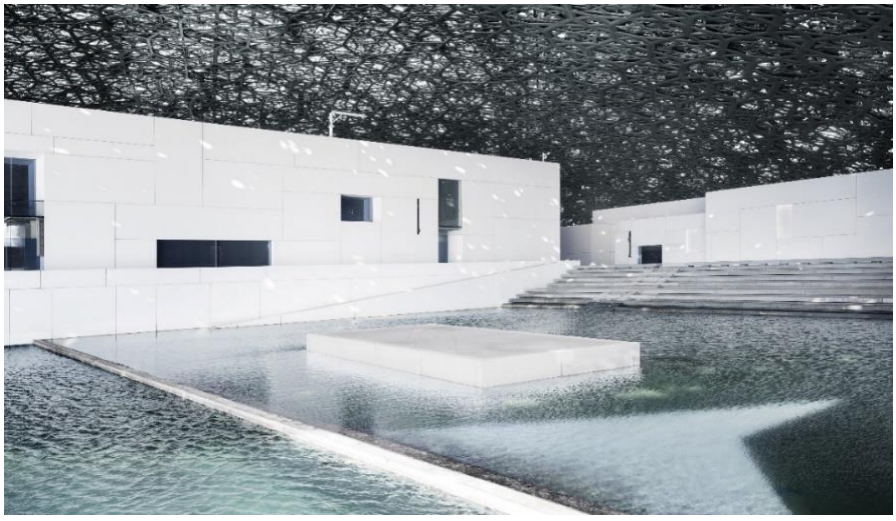

Figure 11. Sunlight filtered in LAD also supports air conditioning system by evaporating water in the internal channels.(Jean Nouveau www.jeannouvel.com/en/projects/louvre- abou-dhabi-3/)

The final textures were created by selecting models that will provide the desired structural building and geometries that will function as lighting. The geometric forms that compose each layer are different in size and have different dimensions for transmitting and directing the sun's light. By changing these openings in accordance with the desired design, it is ensured that the sunlight reaches more space in different sizes. In the

ICONARP – Volume 9, Issue 1 / Published: 21.06.2021

final phase of the calculations, openings on the dome were reduced or replaced in accordance with interior spaces' heat requirements to ensure natural coolness by evaporating water in the galleries by sunlight. Synchronization with the criteria of the calculations of other functions was ensured and lights coming through the dome were directed to required water channels (Figure 11).

Yinchuan Museum of Contemporary Art (Yinchuan Moca)

Today, parallel to its rapid economic growth, the People's Republic of China is also developing rapidly in cultural areas such as architecture, contemporary arts, and fashion. Being one of the most significant countries of the world production market China strengthens its relations with the west and it changes textures of old cities such as Beijing with contemporary architectural examples through its economic power.

As collectorship became one of the most important hobbies of Chinas' new rich class, Chinese collectors started to collect "Chinese artifacts smuggled to the West in the past, valuable western civilization artifacts and contemporary art objects, and exhibit their collections through museums. In order to provide urban development through museums, to bring new memory to the regions, and to provide touristic and cultural development, the majority of recent buildings and museums in China are built in regions where urbanization has just begun and the population density is low. However, new museums are criticized by architectural and cultural circles for architectural incompatibilities with the environment, unplanned urban developments, and their collections' disqualifications. Therefore, due to these problems, several museums became dormant over time. "Since these museums are built to shape historical and cultural development, they become an architectural mirage over time" (Fournier,2016. p.82).

Owing to these problems, museum owners and architects have recently sought designs that are compatible with the museum's collection and the region's cultural structure in which it is located. Parametric design method's advantages, such as the use of environmental effects as form source and formative monumentality brought to the buildings, have made parametric design one of the most widely used design methods in contemporary museum architecture in China.

Yinchuan MOCA, built in China, is one of the first and most important examples which enables past and current relationship by using the topographic structure of its surroundings as a source of parametric form. Yinchuan MOCA is located in Ningxia rural district of Yinchuan City, China. The building in service since 2015 was designed on 13,188 square meters and 4 floors by Zhang Di and Waa Architects between 2011 and 2015.

Since the region's cartographies drawn by Jesuit priests in the 16th and 17th centuries constituted Museum's main collection, the museum was built on the banks of Yellow River in Yinchuan. Thus, it was aimed to achieve harmony between the artifact and the region and to strengthen

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the relationship between memory and space. Yellow River's surrounding area, where the structure is located, has been a region inhabited by different ethnic and religious groups, playing an influential role in embodying of Chinese culture and different cultures harmonization throughout history. The construction was built in marshy land and on a hilltop elevated for development purposes in the past (Figure 12).

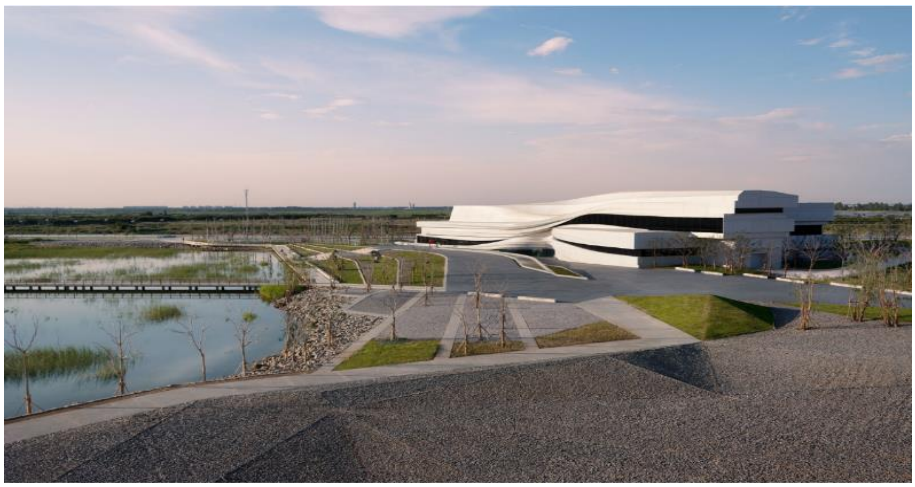

Figure 12. Yinchuan Moca is located on a hilltop, in the swamps of the Yellow River. (http://w-a-a.cn/project/moca-yinchuan /)

The building's "T" shaped schema and its facade compatible with the geographical structure and interior spaces are designed in a clear contrast (Fournier,2016, p.83). The entrance of the museum is designed as a cave entrance on the side of the road with the aim of providing contrasts, rather than being made from the green area in the rear section (Figure 13).

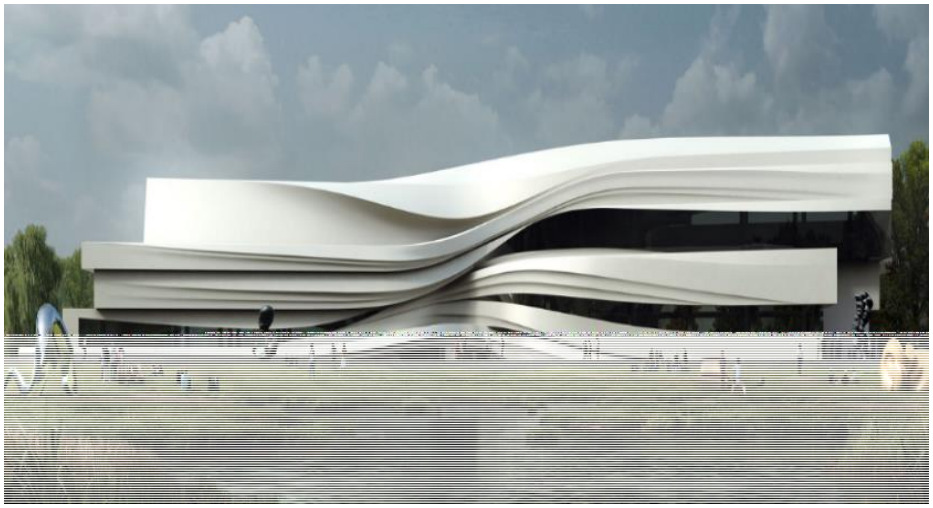

Figure13.Back facade and backyard of Yinchuan MOCA (http://w-a-a.cn/project /moca-yinchuan/)

The mentioned "cave entrance" depicts prehistoric age's people that settled in the region centuries ago, while the green areas opposite the entrance and behind the building soften the sharp contrast (Figure 14).

Figure.14.Yinchuan MOCA's narrow cave entrance. (http://w-a-a.cn/project /moca-yinchuan/)

The six main concepts of the museum (mass, split, landscape, layer, fracture, and pinch) were achieved by Buro Happold using parametric based BIM programs. Appropriate ones among different form alternatives are chosen and the carrier system is created through the memory software. Thus, form-structure harmony is achieved. (Figure 15).

Figure.15.Yinchuan MOCA's narrow cave entrance. (http://w-a-a.cn/project /moca-yinchuan/)

Building's exterior facade, which also affects its interior, takes its form from the Yellow River's sedimentary layers, which have enabled the formation of cultures of people who have settled around it for centuries. The River, with the deposition of alluvium it brought from other regions over time, enabled the emergence of fertile farmland and settlement in parallel. The formation movements of the sedimentary layers that form the structure's source spread over centuries were simulated in a computer environment, and the forms compatible with topography were processed by the method of creating a parametric model. The most compatible forms for the geographical structure were selected and lines forming the shape were combined with the parametric design method again, and main lines forming the structure were revealed (Figure.16).
Museum's structure, which takes its reference from sedimentary layers, allows visitors to feel the forgotten history. "They like to think of their building as "fossil," something that belongs to the geological history of the site and also, perhaps, to the ancient civilizations that may have lived

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there a long time ago" (Fournier,2016,p.83). River's sedimentary layers, integrated with the museum's shape, describe the "Chinese culture" that has been stratified from an early age and will continue forever. How this story will be narrated is created through the technology that forms the new face of China, namely digital design. Fiberglass concrete (GRC), which can be aged over time, has been used to strengthen the continuity of the structure in exterior cladding. This material, which can gather moss over time, was also used to strengthen the harmony of the structure with its surroundings. Although the building's exterior is effective in shaping the interiors, Zhang Di took different approaches at the entrance and atrium to change visitors' perception psychology. The main entrance, which resembles the cave, is kept narrow and dim. However, as you move across inside the museum, ceilings rise, spaces expand and the sunlight is received in certain places. The visitor entering the structure progresses from a dark rough area to a bright smooth area in a gradual process that affects consciousness The "process" concept presented to the visitor was intended to be kept alive as obfuscatory and convoluted(Figure 17).

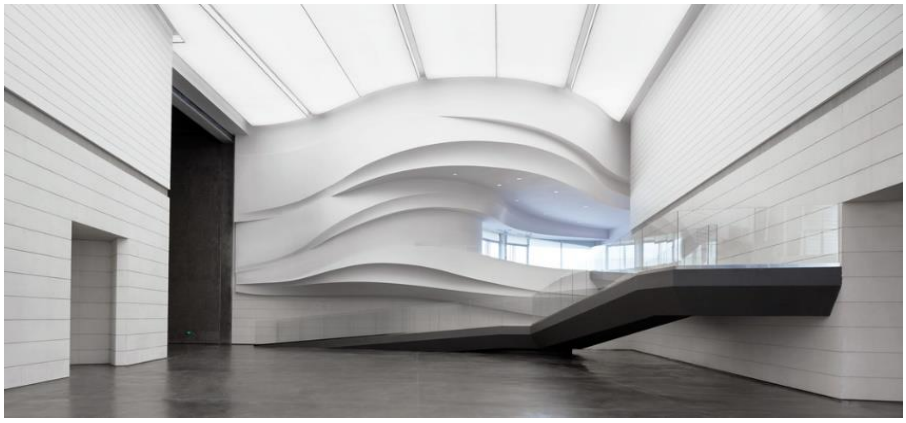

Figure.17. Yinchuan MOCA, wide and curved gallery representing Chinese culture reached through a narrow and low cave entrance. (http://w-a- a.cn/project/moca-yinchuan/)

Istanbul City Museum(ICM)

The absence of a city museum that presents ancient culture in a refined manner in Istanbul, whose archaeological history dates back to the Neolithic era and which was a noteworthy center of three empires, has been debated by the art and culture circles for years. Although there are museums of archaeological, periodical history, and contemporary arts in Istanbul, there has not been a city museum that presents the city's memory in a refined manner with all its qualities.

The "History Foundation" initiated the first studies on city museums and proposed the building of the Darphane-i Amire as the museum's location, but the proposal was not executed. With the protocol signed between the Ministry of Culture, Istanbul Metropolitan Municipality(IMM), and the History Foundation in 2005, it was decided that Sirkeci Station would be built as a city museum and conversion projects were made. However, this project was canceled due to various reasons.

The Museum's nature and the artifacts to be exhibited were decided on 17-18 November 2012 at the Istanbul City Museum Workshop, which was

attended by experts such as IMM, Ministry of Tourism and History Foundation officials, archaeologists, art historians, and academics. In the workshop, along with the museum's previous locations, Haliç, Marmara Coast, Haydarpaşa Station, and shipyards on the Haliç coast were recommended. The museum was also decided to be located in the Topçu Barrack that would be built in Gezi Park. But the decision was not implemented due to the protests.

In the workshop, the decisions regarding cultural and economic contributions to be ensured by the ICM, which has a multi-layered memory, were also taken and the works to be performed were given to the responsibility of the IMM and the Provincial Tourism Directorate.

ICM's project design and main theme ideas, which is still under construction, were created in the Venice Biennale in 2004 with the exhibition "Urban Transformation of Istanbul and Superficial Methods" prepared by Alper Derinbogaz (Derinbogaz, A,2019). Alper Derinboğaz assumed museum's consultancy and design in the process commenced after the ICM workshop. Construction of the museum began in 2017.

The museum is located in Topkapı, outside the city fortification walls, unlike the existing museums in the historical centers of Istanbul. The lands in the region located out of the city were used as an orchard and a cemetery in the past. The region was declared as a "Unesco Cultural Heritage" area due to its historical characteristics in 1986, thus possible construction in this area was avoided. The areas used as orchards and fields were later utilized as parks and green areas. The most significant reasons for choosing the museum's location were proximity to Istanbul's historical fortification walls, lack of infrastructure in the region due to the E5 highway as well as the presence of Tekfur Palace, Kariye Museum, Mihrimah Sultan Mosque, Yenikapı Mevlevi Lodge, and Yedikule Dungeons. On the other hand, the last remnants of the fortification walls, having great importance for Istanbul since the Roman period, are also located in the region. The historical buildings and the Kariye Museum have been excluded from the visitor routes since they are out of the city boundaries, there is limited settlement and transportation is difficult. However, the disuse of parks and green spaces for similar reasons has prevented the recognition of the region's historical importance. Revitalization and transformation of the region and presentation of all the details of cultural and historical texture were aimed at with ICM's construction. The museum was conceived as a key point that unites Istanbul's entire historical fabric and brings its memory together (Derinboğaz, A.2019).

The structure, designed by Alper Derinboğaz using the parametric design method, has an area of 38,880 square meters, a total of 5 floors including the ground and first floor (Figure 18).

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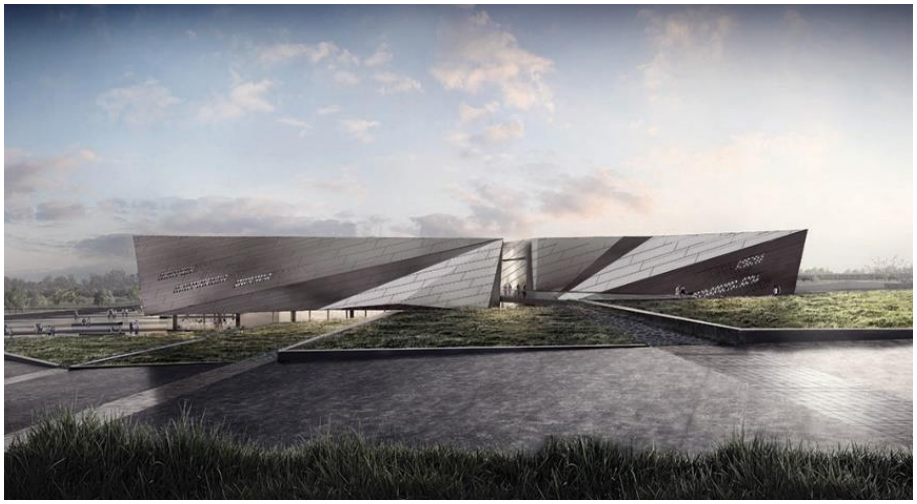

Figure 18. ICM's General View. (Salon Alper Derinboğaz's Archive)

While Istanbul's multi-layered cultural structure forms the main theme of the structure's schema, fortification walls' layered structure nearby the structure is incorporated into the theme to reinforce this idea. The spiral is considered as the reflection of the 'multi-layered' theme of the form structure. In order to maintain the spiral stratification with the historical process in it, it was twisted, broken, and distorted, torn in certain places, but its continuity has not been interrupted (Figure 19).

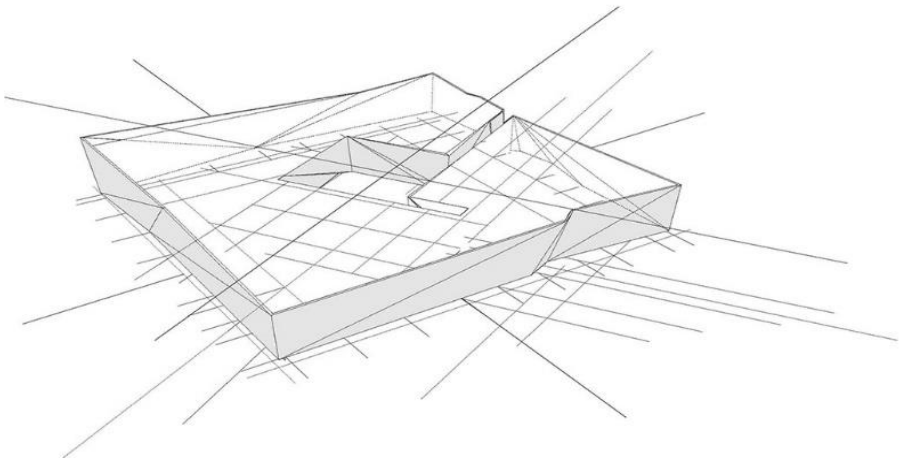

Figure 19. ICM's schema is formed by twisting, folding, and breaking in certain places of the spiral shape that represents multi-stratification. (Salon Alper Derinboğaz's Archive)

"The helical scheme also determines the museum's circulation paths and diversifies the circulation. "With this structure of the scheme, it is targeted to show visitors Istanbul's all breaking points in the symbolized form."(Derinbogaz,2019). The museum's tour which will be based on the spiral form representing the breaking periods of Istanbul will commence from the Neolithic era on the top floor and end in the atrium. Both in the atrium and certain sections of the upper floor, there will be contemporary art exhibitions that will represent Istanbul's current face (Figure 20).

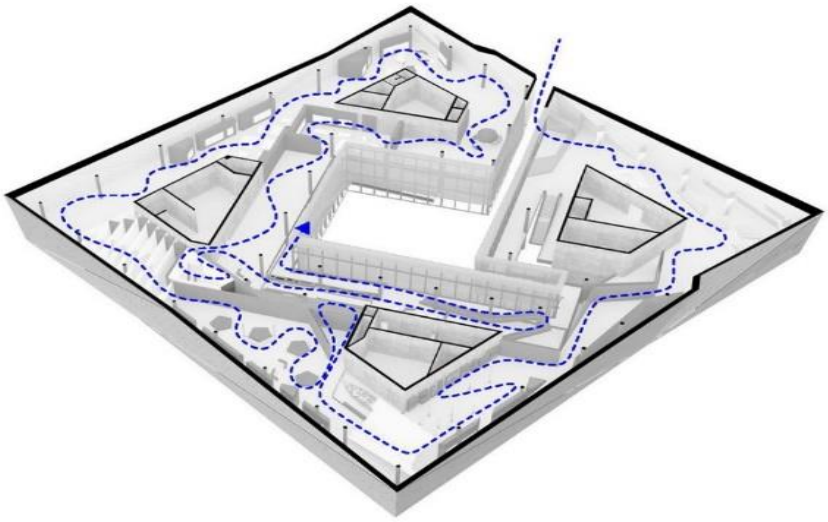

Figure 20. The ICMs cycle is designed based on the spiral schema. (Salon Alper Derinboğaz's Archive)

The atrium (Derinboğaz, 2019), which symbolizes Istanbul as a social entity, boosts this situation, gathers all visitors, and is connected to the exhibition spaces on the top floor with a ramp. The atrium has been designed to bring together the memory exhibited inside and the memory living outside, and sustain the city's memory under a single structure (Figure 21).

Alper Derinboğaz paraphrases this design as "While transparent floor (atrium) combines with green spaces around the structure and produces a functional infrastructure, it associates with the constant exhibition mass that brings all cultures together in the layered form" (Derinboğaz, 2019).

Figure 21. ICM's atrium, which symbolizes Istanbul, also ensures the museum's relationship with the city. (Salon Alper Derinboğaz's Archive)

Owing to the Wall Fortifications' repairs in the Roman, Eastern Roman, and Ottoman periods, each period's wall lining styles as well as the layers formed by different materials directly affect the building's layout. The wall, which is basically an architectural element built not only to restrict certain things but also to live inside, was considered metaphorically and aimed to pace Istanbul's walls in the museum. "Different cultures are

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symbolized both layered and intertwined, just as the stones of Istanbul's walls" (Derinboğaz,2019).

The museum's facade is designed to limit sounds coming from outside to keep the concentration of visitors and visually reflect the museum's surroundings. In order to fulfill the stated functions and reinforce the design's form integrity, the spiral geometry forming the scheme was used on facades. Unlike the schema, the spiral geometry applied for facade's shaping is designed to reflect the sound that is likely to come from the E5 highway and to change the direction of the wind. The facade's design was created by processing the data of wind speeds occurring for 12 months around the structure as a parametric algorithm, accordingly dissimilar faults, and slopes were produced on the facade (Figure 22).

Figure 22. ICM's facade formed by the parametric fracture of the spiral form is designed to display Istanbul's various views in a blurred form. (Salon Alper Derinbogaz Archive)

However, the facades were intended to reflect Istanbul with the sky and its surroundings in blurred form. The facades are not designed in a way directly to reflect their surroundings like mirrors, but to take the color of the sky at different hours of the day. Due to the façade's different angles, different appearances were aimed to be reflected at different hours instead of reflecting the same appearances continuously, thus, a facade design has emerged that symbolizes Istanbul, which produces its own diversity (Derinboğaz,2019). This feature of the facade is reinforced with grainy texture by using semi-matt anodized aluminum material on coatings.

DISCUSSION AND CONCLUSION

Simon Critchley, in his book called "Memory Theatre", focuses on memory theatre which is different from the usual theatre concept that Guilio Camillo designed as a model in 15th century. In Camillo's memory theatre, "the audience stands in the middle of the theatre and can watch both the stage and the audience" (Critchley,2014,). The theatre has a cosmic design in Vitruvius's theatrical layout. Thus it can mathematically enlarge and vary constantly. What shapes it is astronomy, geometry, logic, and philosophy, in other word is the knowledge that human history has discovered until then. Ali Artun associates Camillo's memory theater,

which is shaped by memory and exhibits the power of knowledge, with museums. “The memory theater where Camillo structured the information has been an inspiration for many museums until the modern museum period” (Artun, 2006, p.86). Memory spaces designed by current parametric design can be merely shaped with the memory itself, such as Camillo's “Memory Theater”. The geometries designated as the source of memory's format can be modified, associated with different formats, and converted.

Over three examples examined in this study, it is deduced that there are four important main criteria in museum structures designed through parametric design. These criteria are tabled as shown in Table.1 It can be seen that the four main criteria related to museum design can successfully be fulfilled thanks to the possibilities provided by parametric design. To summarize these criteria in the context of the possibilities provided by parametric design;

Form and Artifact Relation: The parametric design provides the memory-form relationship with the harmony of the museum and the artifact exhibited, and strengthens the energy represented by the museum. A symbolic geometry linked to exhibited artifacts can be used as the main source of form that can be re-addressed in a contemporary form. Thus, the metaphorical meaning of the structure can be strengthened while the relationship between form and artifact can be established. The memory of the structure identifies with its design and the memory exhibited. Structures and artifacts become one.

Environment and Form Relation

Parametric design can provide the environment identity to a museum. The facade and dome of the structure can be shaped according to environmental factors such as wind and sun. In this way, not only the harmony of form but also the efficient use of natural resources can be ensured. Thanks to the adaptation quality of parametric design, contemporary museum designs can be created in harmony with environmental factors such as climate and topography.

Cultural Memory and Form Relation:

In the parametric design concept, local cultural forms and symbols can be changed, transformed, and re-addressed with a contemporary understanding and used as forms. Using symbolic information in design as a form source of cultural memory can create a cultural memory& structure relationship and ensure that the represented culture can be maintained with a new understanding.

Monumentalism and Differentiation

Thanks to parametric design in architecture, topological, and non-euclidean geometric forms can be used in a controlled manner. The use of such forms in museum architecture can significantly separate the structure from its surroundings. While this makes the structure iconic, it strengthens the monumentality inherent in the museum.

DOI: 10.15320/ICONARP.2021.166

Table 1. The possibilities provided by parametric design in three museums' design.

MUSEUM	FORM AND ARTICAFT RELATION (MEMORY OF ARTIFACT ITSELF)	ENVIROMENT AND FORM RELATION	CULTURAL MEMORY AND FORM RELATION	MONUMENTALISM AND DIFFERANTIATION
LOUVRE ABU DHABI	Debatable. Although the museum exhibits mostly Western artifacts, the display of these artifacts under a dome representing Arab culture and power can be considered metaphorical.	The dome is shaped with regard to the angles of the sun falling into the region.	The grid structure that composes the Dome took its form source from the texture of the Arabic Mashrabiya. However, this structure of the dome also symbolizes Arabian tents.	Its large 180-meter dome immediately distinguishes it from other structures on the island.
YINCHUAN MOCA	Topographic maps of the region, which the museum exhibits and drawn by Jesuit priests, are also among the form sources of the museum.	The tide layers of the surrounding river are considered as the source of form..	The Yellow River, which shaped the Chinese culture, was also the form source of the museum	While the artifacts exhibited differ from the rural area with its different structure, it takes its source of form from its surroundings. It tries to capture both contrast and harmony..
ISTANBUL CITY MUSEUM	The museum takes its design from Istanbul, where it displays its artifacts. However, the cycle of the scheme is organized based on the historical events symbolized by the objects on display.	While it takes the form source from the walls of Istanbul, its facade is also shaped to restrict the wind and the sound coming from the highway.	Its schema and facade is. designed based on the multi-layered cultural structure of Istanbul.	Has a differentiated design than its environment. But also tries to adopt the environment with its metaphoric meanings

In the creation of societies' memory spaces, parametric tools can enable complex geometric structures to be processed flexibly, along with facts symbolized by environmental, cultural factors, and artifacts. Thus, the memory-space relationship can be established strongly. On the other hand, in the understanding that there is no relation between the artifacts exhibited and the museum, parametric design can serve as a design paradigm that monumentalizes the culture to which the museum belongs and that can regulate its relations with its surroundings. The parametric design method is a contemporary problem-solving tool that can handle architecture, topography, and cultural elements such as architecture from the past with a holistic design approach.

CONFLICT OF INTEREST
No conflict of interest was declared by the authors.

FINANCIAL DISCLOSURE
The authors declared that this study has received no financial support.

ETHICS COMMITTEE APPROVAL
Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS

In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions, and organizations) during the survey and in-depth interviews.

REFERENCES

Ajana, B. (2015). Branding, Legitimation and the Power of Museums: The Case of the Louvre Abu Dhabi. *Museum and Society*, *13*(3), 322-341.

Anderson, B.(1993). *Hayali Cemaatler*, İstanbul:Metis

Artun, A. (2006). *Sanat Müzeleri- Tarih Sahneleri- Müze Ve Modernlik*, Ankara:İletişim

Artun, A. (2017). *Mümkün Olmayan Müze-Müzeler Ne Gösteriyor?,* Ankara:İletişim,

Brownell, B. (2015). *Contemporary Architecture in China: Unedited, at 25/06/2020* from https://www.architectmagazine.com/technology/ contemporary- architecture-in-china- unedited_o

Castellanos, J.(2007). What is Non-Euclidean Geometry, at 25/06/2020 From https://www.cs.unm.edu/~joel/NonEuclid/noneuclidean.

Critchley, S.(2014). *Bellek Tiyatrosu*, İstanbul:Metis. 18-21

Derinboğaz, A. (19/12/2019). Interview with the author, Istanbul.

Davidson, M.C. (2009). *Abu Dhabi: Oil and Beyond*, New York, Columbia University Press.

Dino, İ.(2012), Creative Design Exploration By Parametric Generative Systems In Architecture, *METU JFA* ,29(1),207-224.

Duncan, C. (2006).Törensel Mimari Olarak Müzeler, on A.Artun , *Müze ve Eleştirel Düşünce- Tarih Sahneleri-Sanat Müzeleri* (50-56),Ankara: İletişim.

Fearson, Amy (2015). Undulating Facade of Yinchuan Art museum References the Gradual Shifts of a Chinese River, *at 25/06/2020* from https://www.dezeen.com/2015/08/06/museum-contemporary-artyinc huan-moca-waa-china-yellow-river-undulating-facade

Fournier, C. (2016). Foundation Myths ,*Time+ Architecture*, 2016(3), 82-89.

Gibson, W. (2016).Neuromancer-S.F Masterworks, UK: Gollancz.

Hadid, Z. (2020). *25/06/2020 from* https://www.zaha-hadid.com/archite cture/maxxi/

Imbert,F.,Frost,K.,Fisher,A.,Witt,A.,Tourre,V.,Koren,B. (September 2012). Concurrent Geometric Structural and Environmental Design: Louvre Abu Dhabi,Symposium Paper on *Advances in Architectural Geometry* 2012 (77-90). Vienna,Springer.

DOI: 10.15320/ICONARP.2021.166

Karadeniz,C. (2018). Birleşik Arap Emirlikleri'nde Kültürel Miras ve Müzeler. *Yedi:Sanat,Tasarım ve Bilim Dergisi,2018(20),137-148.*

Kolarevic, B.(2003). Digital Morphogenesis**,** on B.Kolarevic, *Architecture in the Digital Age: Design and Manufacturing,(13-28),* New York: Taylor&Francis.

Migayrou, F. (2003). *Architectures Non-Standard*-Revised with New Introduction, Paris: Centre Pompidou.Nouveau, J.(2020).at 25/06/2020 from www.jeannouvel.com/en/projects/louvre-abou-dhabi-3/

Oxman, R., Oxman, R.(2014).*Theories Of The Digital in Architecture*, Cornwall: TJ Int.Limited.

Reas, C., McWilliams, C. (2010). *Form and Code in Design, Art and Architecture*, New York: Princeton Architectural Press.

Shafei, A.(2020). *New Generation of Mashrabiya* at *25/06/2020 from* https://aidashafei.com/new-generation-of-mashrabiya

Schumacher, P.(2009). A New Global Style for Architecture and Urban Design, *AD Architectural Design – Digital Cities,* 79(4), 14-23.

Schumacher, P.(2013).Parametric Semiology – The Design of Information Rich Environments, on P. L. Eiroa & A.Sprecher, *Architecture in Formation– On the Nature of Information in Digital Architecture (p.53-59)*, New York: Taylor and Francis.

Şentürk, L. (2006). Deleuze ve Mekan, *Doxa*,10(3),122-127

Terzidis, K. (2003). *Expressive Form: A Conceptual Approach to Computational Design*, London: Spon Press.

Turan, O,B. (2011). 21. Yüzyıl Tasarım Ortamında Süreç, Biçim ve Temsil İlişkisi. *Megaron,* 6(3),162-170

Üçağaç, A. (2016). Birleşik Arap Emirlikleri 2015. K. İnat, M. Ataman, *Ortadoğu Yıllığı 2015* (231- 239), İstanbul: Açılım.

Vergo, P. (1989). The Reticent Object *The New Museology*. London: Reaktion Books.

Waa Architects (2020). *25/06/2020 from* http://w-a-a.cn/project/mocayinchuan/

Weetas (2020) at 25/06/2020 from https://www.weetas.com/gccnews/jumeira-group-runs-new-jumeira-resort-al-saadiyat

Resume

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Research Article

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The Use of Human Body as a Medium in Architectural And Structural Education: "Yogarch" Program

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Abstract

Purpose

One of the main difficulties for first year architecture students is to sort out complicated physical rules of constructional systems and reflecting those rules to their designs. These topics are also difficult to understand in built environment education (B.E.E.) designed for children. In order to simplify the learning process of these abstract topics, an experiential program is designed and explained in the scope of this paper. This paper aims to introduce the YogArch program and the outcomes of its implementation.

Design/Methodology/Approach

This program is based on two different disciplines, which are yoga and architecture. Therefore, it is called "YogArch". YogArch matches specific yoga asanas (positions) with suitable architectural elements and systemic principles. This program gives the participant a chance to experience these constructional facts on his/her own body. In the scope of this paper 8 different implementations of YogArch program are examined. There are two different participant groups: children and first year undergraduate architecture students. There are totally 221 participants in these two focus groups. In the scope of this research, the outputs of the workshops are collected and analyzed, findings are generated and some suggestions are made on the future use of the program.

Findings

The outcomes of implemented YogArch workshops are analyzed. According to these findings, this program supports creating built environment awareness for children. For the undergraduate students, the program supported and clarified the knowledge they've obtained in their formal courses. Also, it is a practical method for simplifying complicated terms in the curricula.

Research Limitations/Implications

The YogArch program is based on practicing some yoga poses in order to create physical experience. During the implementation of the workshop schedule, some participants had difficulties due to their own lack of training, in practicing some of the poses which require reasonable amount of strength. In such cases the instructor had to support and direct the participant to practice the pose in a more suitable version and develop body awareness.

Practical/Social Implications

The safety of a living environment depends on the consciousness level of inhabitants and users. Providing sufficient knowledge on constructional principles of buildings for the entire society and extending built environment education have vital importance especially for the countries which are at risk about earthquakes, like Turkey.

Originality/Value

This study focuses on offering an experimental education model in structural and architectural design education for all ages. This paper introduces a new educational program called YogArch. The proposed model differs from previous studies, as it expands the educational methods in formal and informal architectural education.

Keywords: *Architectural education, yoga and architecture, structural design education, built environment education, body experience*

INTRODUCTION

From the beginning of architectural history, human body has been an inspiration for architectural design both in metaphorical and morphological terms. Beginning with Vitrivius in Roman Architecture, human body became the main source of proportional systems in structural design. As far as human body was believed to be perfect structurally and aesthetically, architects tried to reflect this harmony to their buildings. In Renaissance, which might be called as rediscovery of Antiquity, human body became a template for designing not only a single building, but also the city as a whole. In the following periods, as there were profound examinations on the mechanics of human body, the constructional principles of human body leaded a way for the creations in architectural and industrial design (Plowright, 2018). In the 19th and 20th centuries the need of standardization in architecture, caused to emerge measurement systems based on the size of human body and its limbs.

Designers have been inspired from nature in architecture and engineering for many centuries. Therefore, examining biological/natural systems is an enlightening approach for understanding the mechanical solutions and structural systems of the design-work created by human-beings. The YogArch program examined in terms of this paper, considers human body as an instrument for understanding architectural elements and principles of constructional systems. If human body is an inspirational source for architecture, it might also be used as a handy material for revealing architectural physiology.

The use of human body in architectural education became a popular approach in recent years, especially in first year undergraduate education and built environment education for children. Exploring the human body and focusing on the differences created by the changes in body posture under several forces, helps to clear up the fundamentals of structural systems. Based on this assertion, a program called YogArch is designed. It matches some yoga asanas (positions) with some architectural elements and systemic principles. This program gives the participant a chance to experience these constructional principles on his/her own body. The case of self-experimentation eases and shortens the participant's perception process on this subject. This can be a practical alternative to conventional educational systems which are based on theoretical explanations of complicated physical rules.

This paper aims to clarify the origin, the methodology and potentials of YogArch program. The historical background of using human body in experiencing architecture will be discussed in the literature review. The YogArch schedule, the structured workshops and the collection process of the outputs of these workshops will be explained in the methodology section. In the evaluation and discussion part, the results of the workshops will be examined. Finally, in the conclusion, some suggestions will be made on the potential use of this program in formal and informal architectural education.

HUMAN BODY IN EXPERIENCING ARCHITECTURE

Human body, which is a system of proportional relations, is also a source of defining ratios and measurements in architectural design. The anthropometric measurements of human body are important in defining architectural standards. On the other hand, the complicated mechanisms

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which keep the human body erected, and working principles of these systems inspired the disciplines of architecture and engineering in structural terms. All of these various aspects about the relation between human body and architecture will be reviewed in this section.

Morphological interaction between human body and architecture

Making an analogy between human physiology and structural elements of the building is a traditional approach in architecture. In Ancient Rome, Vitrivius stated that in the design of an aesthetically perfect temple, the proportions of human body can be used as a pattern (Vitrivius, 1960). He identifies the order of columns, by which he clarifies the relationship between human body and building. According to Vitrivius each type of column (Doric, Ionic, and Corinthian) is matched with a different type of body (male, female and girl) (Figure 1) (Plowright, 2018).

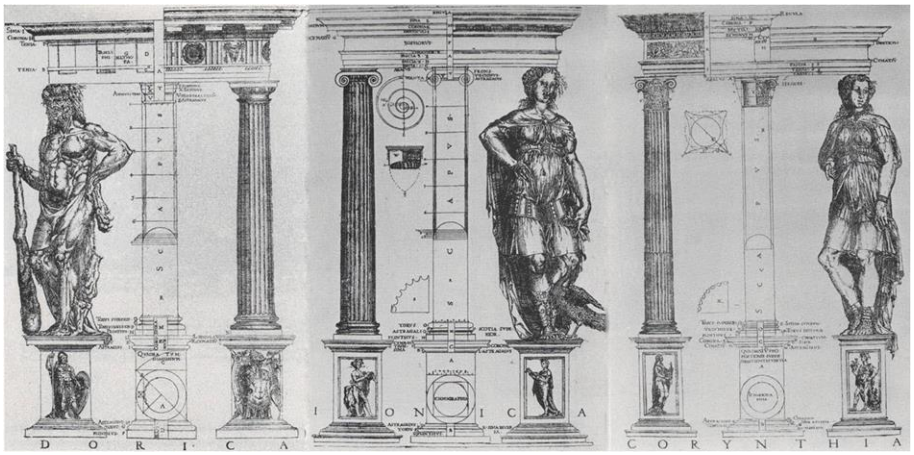

Figure 1. Column type-human body type matchings (Url-1)

Alberti, connected human body references to building elements in Renaissance. He established analogies between human body and building elements stating that "with every type of vault, we should imitate Nature throughout, that is, bind together the bones and interweave flesh with nerves running along every possible section" (Alberti, 1988; Plowright, 2018).

Another Renaissance architect, Francesco di Giorgio, created an analogy between human body and a church plan (Figure 2). He also stated that there is a resemblance between a column capital and a human face (Figure 3). He mentioned the importance of using the proportions of human body in architectural design in his book: “Trattato di Architettura Civile e Militare” written in 1470 (Steadman,1979).

According to Filarete, a Florentine architect lived in 15th century, the limbs and cavities of human body is similar to the building which has voids such as doors and windows. Furthermore, Filarete believed that a building or a city is a mortal creature like a human-being which lives, gets ill, recovers and dies at the end (Vidler, 1990).

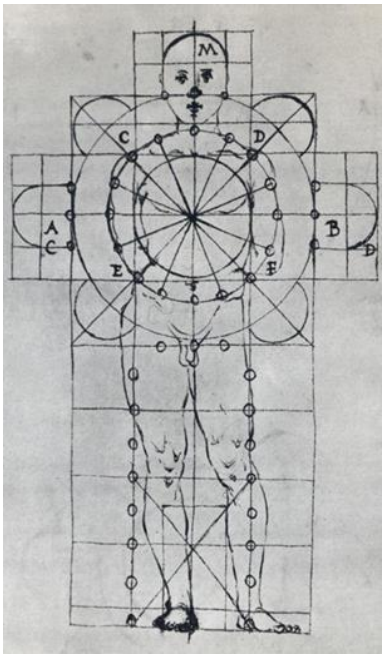

Figure 2. Proportional rules for the construction of a church (Url-2)

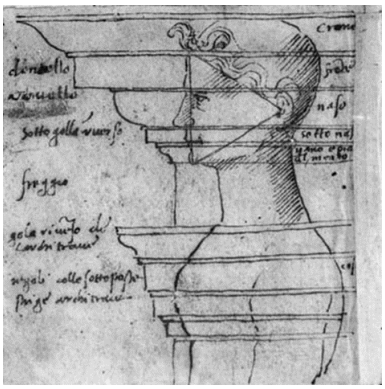

Figure 3. Proportional rules for the construction of a column capital (Url-3)

Leonardo da Vinci, a pioneer architect and artist of Renaissance, drew the Vitruvian Man based on “De Architectura” written by Vitrivius. Vitrivius wrote the oldest known book of architecture, between 30 and 15 BC. Fifteen centuries later in 1492, Da Vinci created the most famous visual material of architectural history and immortalized the analogy between the geometry of “perfect” proportions of human body and architecture (Figure 4).

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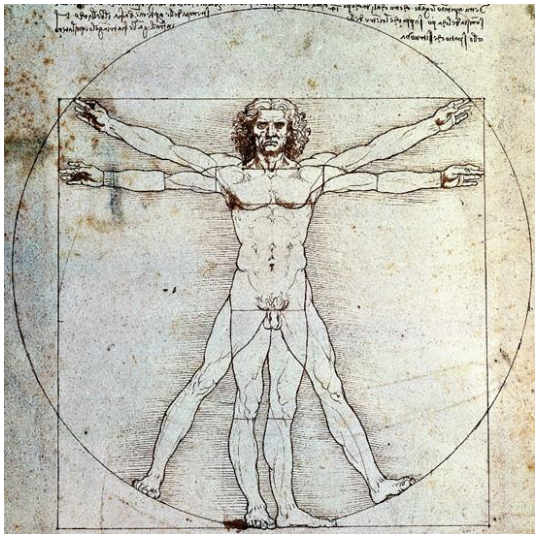

Figure 4. Vitruvian Man by Leonardo Da Vinci (Url-4)

Vidler (1990), described the history of the body in architecture as the progressive distancing of the body from the building; a gradual extension of the anthropomorphic analogy to the final 'loss' of the body as an authoritative foundation for architecture, starting from Vitruvius to contemporary architecture. He classified this process into three stages: the building as body; the building exemplifying bodily states; the environment carrying bodily characteristics. In Vitruvian and Renaissance theory, the body is seen as a perfect source of inspiration for designing buildings. But the modernist thought is more focused on the concept of body rather than just the plain morphology of it. An exceptional representative of morphological analogy between human body and architecture in modernity is Le Corbusier and the scale system he created: "Modular". Le Corbusier used the measures of human body, indeed his own body, in order to establish a proportion system. "Modular" was first published in 1950. In his book, Corbusier used the principle of the Golden Section in order to derive two series of dimensions from the human figure. First one is based on the height of a standing man with upraised arm: 2.26 meters and the second one is based on the height of this man measured from his feet to the top of his head: 1.83 meters (Figure 5) (Le Corbusier, 2014).

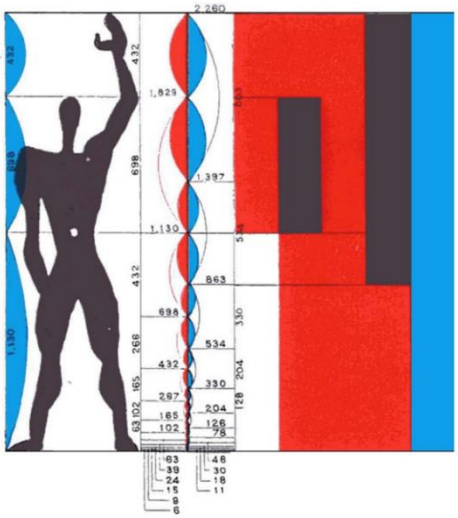

Figure 5. Modular by Le Corbusier (Url-5)

The tradition of the anthropomorphic analogy between human body as the nature's creation and architectural building as human-being's creation constitutes a wide literature, a limited part of which is mentioned in the previous paragraphs. This analogy might be accepted as a medium for understanding the logic of the systematic rules of proportion, scale and structure in architectural buildings and elements.

Technical interaction between human body and architecture

The human body is also an inspiration for architecture in terms of its mechanical and technical integrity. The biological mechanisms of natural creations achieved a significant breakthrough in design sector in recent years. The bionic design innovation in building sector leads up reasonable use of intelligent technology and sustainable development in architecture (Lotfabadi, Alibaba & Arfaei, 2016). The term "bionic" became prevalent in 20th century. It is an interdisciplinary concept which combines biological sciences with various fields such as construction, architecture, engineering, medicine, material and etc. (Chiou & Chiu, 2010). Bionics might be accepted as a bridge between nature and technology. As far as the nature is based on sustainable development of complex systems, it might bring new initiatives to innovative constructional systems.

Another term which engages biology and architecture is "biomechanics". Biomechanics is the study of the movements of living things using the science of mechanics (Knudson, 2007). Understanding the kinesiology of human body might be useful for designing adaptive high-technology constructive systems.

The interaction of human body (as a biological form) with structural design is a relatively new concept, which has a big potential for the future of architecture. Since the biological qualities of the human body can be a resource for structural system design, it can also be a resource for perceiving the working principles of existing structural systems.

METHODOLOGY

As explained in the previous chapter, human body has a rich potential for shaping and perceiving architecture. This reveals the educative potential of human body. In order to use this potential, a workshop schedule that might be used in structural design education in architecture, is designed and it will be explained in the scope of this paper. This program combines two disciplines and it is called "YogArch", taking its name from the disciplines it is based on: yoga and architecture.

One of the main difficulties for first year architecture students is to sort out complicated physical rules of constructional systems and reflecting those rules to their designs. Their limited experience in the field of architecture makes it more difficult to analyze the structural rules of three dimensional design. During architectural and basic design courses and theoretical physics lectures the freshmen students are introduced to these academic subjects. But this knowledge might become much more permanent if supported with experimental techniques. On the other hand, architectural education shouldn't be admitted only in vocational terms. It should be perceived as a life-long journey and ought to be supplied to each member of the society regardless of their age and profession. But it might be an abstract subject for a child or a non-professional to understand how buildings erect on earth and how structural systems work. The "YogArch" program is designed to make it

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simpler for both children and adults to internalize the rules of structural systems. The resemblance between structural principles of the human body and the architectural construction is an inspiration for this program. Human body is a handy tool for an individual to experience the basic forces in a constructional system. The skeleton and the muscular system together can be instructive for comprehending the laws of balance. The mental effort to conceive structural principles of architectural elements should be supported with physical perception. The need of self-experimentation inspired to use a physical method during which an individual can sense the changes happening in his/her own body and relate these with constructional rules. With the aim of designing a self-experimental program, yoga was chosen as a medium. The main forces and architectural elements are matched with yoga postures in the context of this physical workshop. These workshops were realized with two different target groups: children aged between 6-14 years and first year architecture students. The aim was to reveal the effects of body-experience in structural education. Also the differing perceptions of the participants depending on their ages and the academic education level they have was another subject that was searched for. The duration of the workshops was decided according to the concentration level of the participant group. The findings of the implemented workshops were collected by various methods including, self-observation, questionnaires, interviews and group conversations. Also visual recordings were also taken under information and permission of the participants. The collected data was examined and analyzed in order to systemize the effects of the program on the participants. The general inclination of the participant groups was visualized by graphics based on the findings. At the end, depending on the analyses, some suggestions were developed on the use of YogArch workshops and the potentials of the program. The details of the methodology are explained in this section.

The Structure of YogArch Workshops

Yoga is an ancient discipline combining sensational and physical experience, in which the individual searches his/her own limits. In the physical practices of yoga some poses, which are called "asana", are used. These poses put human body into specific postures. They are based on three topics: flexibility, balance and power. By practicing these poses, one can explore the working principles of architectural elements and systems on his/her own body. In other words, yoga asanas might be assumed to be practical tools for comprehending physical laws of balance.

YogArch program is constituted from a set of yoga asanas supported by visual materials. The set is designed in the norm of an ordinary beginner-level yoga class. The order of the asanas is not coincidental. The program consists of three parts respectively: simple warming-up asanas, more complicated asanas of balance & power and relaxation poses; following the order of a typical yoga practice. The methodology of the program is based on three sections: audiovisual learning, physical experience and evaluation. The program is beneficial for both children and adults such as students of architecture. As far as there is a wide range of participants, the content of the audio-visual part is changeable depending on the needs and the expectations of the participant group. As it will be explained in the following parts, YogArch program might be practiced as a single workshop for children as a part of built environment education; also as a

warm-up exercise for architectural design course or a hands-on learning exercise for structural design course in first year educational schedule of undergraduate architecture education.

A YogArch workshop longs for approximately 60-80 minutes, depending on the age level of the participant group. The program consists of 22 different asanas each of which symbolizes a constructive principle or an element. Some of these asanas practiced alone, some of them with a group. Before practicing the pose, the instructor, preferably experienced both in architecture and yoga, explains and gives adequate information on visual materials, about the architectural element or principal that will be practiced. Following this brief explanation, the instructor practices the asana him/herself (if needed getting help from a participant) and explains the key-points that should be focused on during the implementation of the pose. The tensile and pressure forces felt on body are matched with the forces in the constructional system. Therefore, the participants focus on the changes on their own body when they are in the pose, so that they can understand the similar situation in a building. At the end of each workshop the participants are asked to answer a short questionnaire in order to get feedback about the pros and cons of the program. Also face to face interviews and group evaluation are the methods used for collecting participants' opinions. Photos are taken for recording the flow of the program. The participation to the workshops are on voluntary basis. All of the documentation are made under the information and permission of the participants and their parents (in case of children attendees).

YogArch Schedule

The schedule consists 22 different yoga poses. Each pose is matched with an architectural element or a principle. In this section these matchings will be explained in detail. All poses will be explained according to the implementation order. First the name of the architectural element/system, then the original (Sanskrit) name of the pose and then the English name of the pose will be given. The working principles of the element and matching qualities of the posture and the element will also be explained (Arın, 2013; Pappas, 2006; Kaminoff & Matthews, 2012; Worby, 2007). The postures and the elements they are matched with are also shown in Figure-6.

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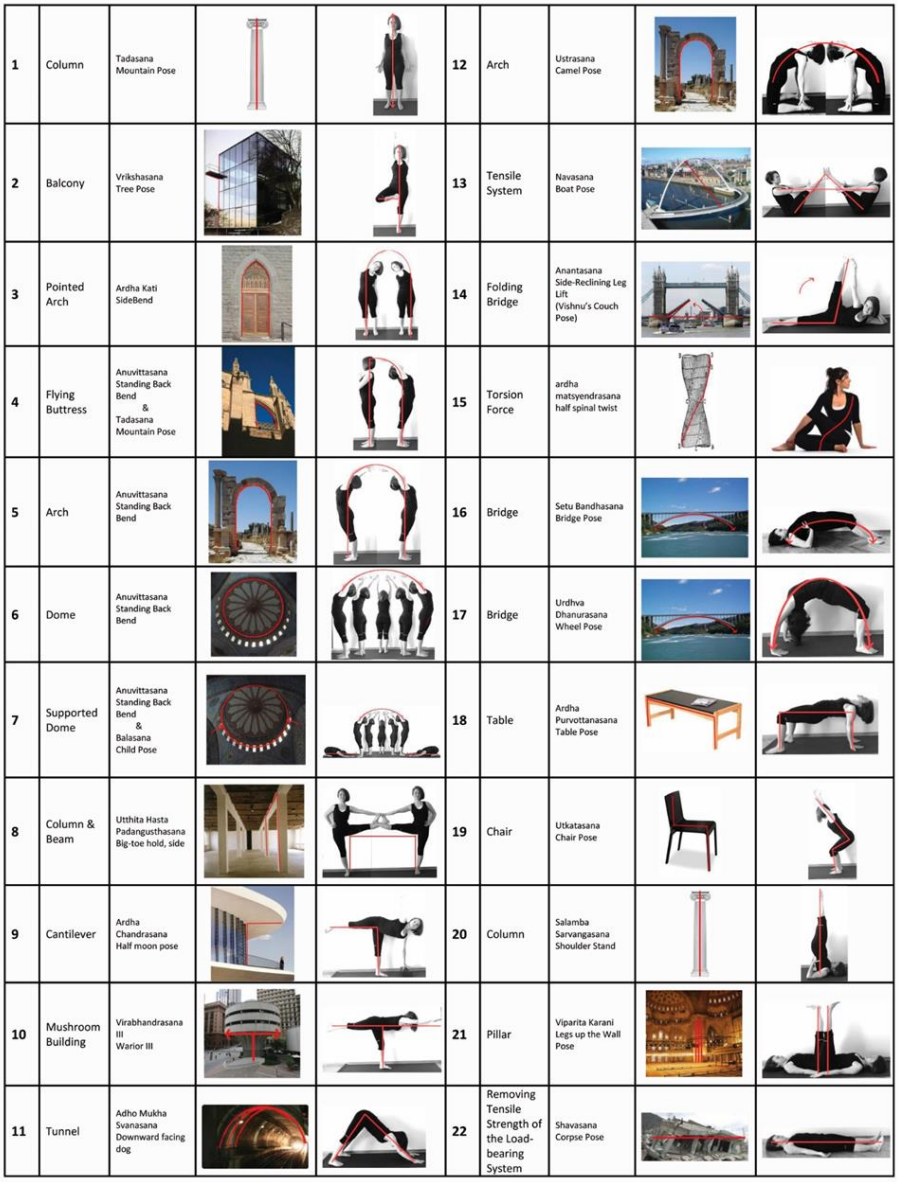

Figure 6. YogArch Schedule Diagram

1. Column / Tadasana / Mountain Pose: The column is one of the main structural elements in buildings. In this program it is symbolized with the natural posture of human body, which is called "mountain pose". In this pose, the person stands hanging his/her arms besides the torso, opens the legs as wide as the hips and balances the body weight on the feet. The spinal column bears the load of the body and transfers it to the ground. Similarly, a column bears the load of the building and transfers it to the ground through foundation.
2. Balcony / Vrikshasana / Tree Pose: In this pose the person places one foot, high up on his/her thigh on the other side. This pose replicates the balanced stance of a tree. The human body stands balanced on one leg while the other one is twisted from the knee and attached to the standing leg. In the case of a balcony, the floor slab of the balcony is attached to the main building and transfers the load from that junction point.
3. Pointed Arch / Ardha Kati Chakrasana / Side Bend: In this pose the person stretches his/her body and leans to a side by extending his/her arm over the head. The tension force on the lengthened side of

the body is deeply felt. When this pose is practiced with a partner catching the leaning hand, it resembles a pointed arch. The hands of the partners support each other and work together like a key stone. The person might experience the similar forces of an arch structure on his/her body.

4. Flying Buttress / Anuvittasana & Tadasana / Standing Back Bend & Mountain Pose: The combination of these two poses practiced by two partners is used to visualize a load-bearing element called flying buttress which is generally used in medieval buildings. The inclined bended structure transfers the lateral forces that push a wall outward to the ground while creating a void between two elements. The secondary element is attached to the main building from an upper level, so that the structure is much lighter by creating a gap.

5. Arch / Anuvittasana / Standing Back Bend: This is a couple pose which is realized by two partners siding back and it resembles the arch structure. The compression force on the back of the partners lets them experience the forces that help to protect the integrity of an arch.

6. Dome / Anuvittasana / Standing Back Bend: This pose is another version of Pose-5 by at least six people. It is used in order to visualize the dome structure which is a circular covering element. Each member of the group works like a rib of the dome. In a dome structure, the compression force on top is transferred to the main building by the ribs creating a tension force. The group members might feel the similar forces on the meeting point of their hands and on their stretched torso. In order to deepen the pose, the instructor might apply some load on the top of the group members' hands. By this way the practitioners might understand how the load on a dome is transferred to the ground by the structural system. This structure might also be formed by practicing standing front bend.

7. Supported Dome / Anuvittasana & Balasana / Standing Back Bend & Child Pose: If the base diameter of a dome is relatively huge, a support might be needed. Also in case of a back bend (or a front bend), if the distance between the toes and finger tips, which are the start and end points of the arch, is lengthened it becomes difficult to keep the body steady because of the compression force. In this case a support from the feet might be useful to avoid collapsing and stay in the pose for a longer period. By this way the members of the group can understand the function of the supporting elements. In order to make all members understand the forces, the ones practicing back or front bend and the ones practicing child pose might exchange their positions.

8. Column & Beam / Utthita Hasta Padangusthasana / Big-toe Hold, Side: In this pose, two individuals are holding up their legs meanwhile holding their partners' leg with their hands and supporting each other to stand stable. This is a good example for understanding the column-beam working principle. The legs on the ground symbolize columns and the legs together in the air symbolize the beam. When the members of the couple stand closer to each other and the distance between their bodies is shorter, they can keep their stability for a longer period. Also when they put their legs onto each other's, it becomes more durable against a force implemented on the unity of two legs. Similarly, in a column and beam system the length and width of a beam between two columns determines the strength of the system.

9. Cantilever / Ardha Chandrasana / Halfmoon Pose: In this pose one leg is held up to 90° angle position to the other. Meanwhile, the other

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leg and one arm are touching the ground for supporting the body. This position is proper for perceiving the logic of cantilever. In this position the arm and the leg attached to the ground symbolize the columns of the building, where as the torso symbolizes the floor slab between the columns and the leg up in the air symbolizes the slab extended. The instructor might apply force on different parts of the leg in the air. This way the practitioner might understand that the closer the force to the center of gravity, the more durable is the system. If the force is implemented on the foot, the person cannot stay steady as much.

10. Mushroom Building / Virabhandrasana III / Warrior III: In this pose the person stands on only one leg. Meanwhile, the other leg and arms stay up, parallel to the floor. This posture resembles the look of a mushroom building in which there is a central load-bearing element. If some force is applied on the hands and the foot up, the experience might become deeper.

11. Tunnel / Adho Mukha Svanasana / Downward Facing Dog: All members of the group are aligned side by side practicing "downward facing dog" pose. In this pose the hand and the foot are on the ground, forming a void under the hip. This position resembles the tunnel structure which might be explained as a linear repetition of arch. After forming the tunnel structure, the participants might pass under it one by one.

12. Arch / Ustrasana / Camel Pose: This position is the combination of two individuals practicing "camel pose" back to back. In this pose each individual stands on his/her knees, bending backwards getting support from the arms attached to the heels. Outer contour of the couple is another version of visualizing the arch structure. The camel pose also resembles flying buttress, when practiced individually.

13. Tensile System / Navasana / Boat Pose: This is a couple pose. When the boat pose is practiced with a partner, it creates a tension on the arms of both practioners. In the boat pose, the person tries to stay stable on his/her hips on the ground, while the legs are up and the arms are pointing forward. If the soles of feet and the hands of the partners are attached together it becomes easier to stay steady. The changes in the distance between the partners effect the tension force felt by them.

14. Folding Bridge / Anantasana / Side-Reclining Leg Lift (Vishnu's Couch Pose): In this exercise the person holds up/down his/her leg while lying on one side. The femur is attached to the ilium by hip joint and the movement of femur is realized by this joint and the muscles. The leg moving upwards and downwards from the hip joint is a good example of animating the opening/closing action in folding bridges.

15. Torsion Force / Ardha Matsyendrasana / Half Spinal Twist: In this pose the person rotates his/her spine on opposite directions trying to keep the coccyx steady. Each vertebra rotates at different angles depending on the distance from the coccyx. This pose is included in the program in order to explain torsional force. Structural systems have to resist against tore caused by constructive and natural forces. The elasticity of each person is different so that the maximum angle they are able to turn also differ. Similarly, the elasticity of materials and the constructional system used in the building changes its resistance to torsional force.

16. Bridge / Setu Bandhasana / Bridge Pose: In this pose the body is bended like a bow with the support it gets from the feet & the shoulders.

These two parts of the body are the only points that the body is attached to the ground and transfers the load. This pose helps to perceive the constructional principles of a bridge which crosses a long distance with the support from two edges.

17. Bridge / Urdhva Dhanurasana / Wheel Pose: This pose is similar to Pose-16, but in this one the support is coming from the feet & hands. It is another way of visualizing the bridge structure. The person practicing these poses one after the other, might experience the difference created in the tension and compression forces with the change in the curve of an arch.

18. Table / Ardha Purvottanasana / Table Pose: This pose is the reflection of an everyday object: table. The posture of the body resembles a panel parallel to the floor standing on four support points. The torso facing upwards symbolizes the top whereas the legs and arms symbolize four legs of the table. The instructor might direct the individual to take off his limbs in the air to experience the change in the center of gravity because of the missing supports. Different positions such as one limb up, the cross limbs up and two limbs on one side up create different structural experiences.

19. Chair / Utkatasana / Chair Pose: Another popular everyday object is chair. This pose gives a chance to experience the constructional principles of it with the human body. The individual stands straight with his/her feet slightly apart. Then, the knees are bended by pushing the pelvis down like sitting on a chair. The angle that the upper legs and the calf makes resembles a chair. The instructor or a group member might exert pressure on the upper legs in order to make the practitioner understand the structural system of this object during carrying a load.

20. Column/ Salamba Sarvangasana / Shoulder Stand: This pose is also resembling the column structure, like the first pose of the schedule. But, as this is a reverse pose, it should be practiced with a warmed up body. The shoulders, touching the ground, are holding the body up in a linear position by carrying the whole load. It emphasizes the importance of the spine in carrying the body load.

21. Pillar / Viparita Karani / Legs up the Wall Pose: In this pose both of the legs are kept up in the air with 90° angle position to the rest of the body. Practicing it by four people by keeping the legs of all individuals together, the total figure resembles a pillar. Pillar is a powerful constructive element used in mosques and cathedrals. Because in such buildings a wide space is covered with a huge dome and there is a necessity of carrying this giant structure. In order to understand the logic that lay behind, a load is applied on the feet of an individual in this pose. Then, when the group come together a bigger load is put down on the surface of the feet of all. This little experiment helps to prove that the load bearing capacity can be increased by increasing the surface area.

22. Removing Tensile Strength of the Load-bearing System / Shavasana / Corpse Pose: In this pose all the tension of the body is cleared away by loosening and releasing it. A yoga session is generally ended with this pose. When the load-bearing function of the spine is canceled, the body can't stay stand any more. Therefore, the pose is called "corpse pose". The physical integrity of the human body can't be protected when the spine doesn't function anymore. Similarly, when the constructional system of a building is injured and loses its integrity, it can't bear the load anymore and it collapses down. The reason behind the destruction of a

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building after an earthquake or another natural disaster is this loss of integrity.

The Implementation Process of YogArch Workshops

The program explained in the previous section is convenient to practice with different age groups. The workshops realized might be classified in two groups: children workshops, adult workshops for undergraduate students.

YogArch workshops for children

YogArch workshops were practiced with children aged between 6-14 years-old on several occasions. As far as some poses in the schedule are practiced with partners, the age ranges of the participants are preferred to be close to each other in each group. By this way the physical and mental perception of the members of the group might be at a similar level. Each workshop started with an introduction of the instructor, workshop process and participants. Each pose is explained before practicing. The instructor gave information about the effects on the human body and the resemblance between the human body and architectural element symbolized. After practicing, the participants explained what they felt on their body and try to explain the possible effects on a building. The workshop took approximately 60 minutes. After completing the whole schedule, the participants answered a short questionnaire. Permissions for visual recordings and data collection were taken from the parents of the participants.

Four workshops have been realized with children with a total number of 57 participants. Three of these workshops were with children aged 6-7 years old (15,11 and 8 participants in each) implemented as a part of a built environment education program realized by "Çocuk İstanbul" between 2015-2017, in İstanbul. The other one was included in a long term built environment education program called "Play Without Barriers" realized in 2014, in Bursa. The participants were aged between 8-14 years old (23 participants). The instructor determined the educational approach according to the inclination and age range of the group. During the workshops with 6-7 years old children, the explanations about the building elements and structures were less detailed. Playful explanations were added in order to attract the participants' attention. Some of the participants found the practice inspirational for their daily play routine.

The YogArch workshop realized with 8-14 years old children was followed by a clay modeling exercise. The participants designed and modeled a shelter using the constructional principles they've learned at the YogArch session. Fifteen of the total twenty-three participants found the body experience useful for designing their own constructions.

YogArch workshops for undergraduate students

Four individual YogArch workshops were practiced with the first year undergraduate architecture students of different universities in Turkey. The number of the participants of each workshop were: 64 (realized in 2014, at METU Department of Architecture), 39 (realized in 2014, at BOU Department of Architecture), 36 (realized in 2017, at AGU Department of Architecture), and 25 (realized in 2015, at TOBB ETU Department of Architecture); 164 people in total. The workshops were organized within

ICONARP – Volume 9, Issue 1 / Published: 21.06.2021

architectural and structural design courses. The aim of YogArch workshop practiced with undergraduate students was to help freshmen students understand vocational terms in a practical way and reflect this knowledge to their designs. As far as it was designed to be a part of vocational education, the information given in the explanation parts during the implementation of the schedule was much more detailed compared with children workshops. The working principles of architectural elements and systems were explained on visuals supported by graphics drawn simultaneously. The participants were asked to relate the terms they learn during formal lectures with the practice they experience at YogArch. During the practice, the participants discussed the terms and working principles of architectural elements and shared their own experiences and what they felt with the other members of the group. As far as the explanations were more detailed and there were group discussions on the terms learned, the workshops for undergraduate students took a longer time compared with the workshops for children. Usually, a YogArch workshop for undergraduate students was completed in 80 minutes. At the end of each workshop all participants answered a short questionnaire about the outcomes. Also face to face interviews and group conversations were made for the evaluation of the workshop process. The visual recordings were made under the permission of the participants.

FINDINGS

The data collected from each workshops was classified according to the age group of the participants and the findings were analyzed. The methods used in the collection of this data were interviews with the participants, group conversations and short questionnaires about the participants' experience. In these questionnaires, the most successful / enlightening yoga pose-architectural element matching according to the participant was asked. Also the most distinctive quality of the program, the most effective and the most ineffective parts of the schedule were questioned. The other subjects examined in the questionnaire were the effects on their perception and the difficulties of the schedule. The participants asked to evaluate the program from useful to useless in 5 point Likert Scale.

The answer sheets of 57 children aged between 6-14 years old, who attended the workshops at four different sessions, were examined and analyzed (Figure 7). %26 of the participants of this group found Pose-11 (Tunnel) most effective and enjoyable (Figure 8). The whole group worked as a team in this pose to form the tunnel structure. Also the play-like character of the pose made it more enjoyable for younger age groups. Each member of the group passed under the tunnel and experienced how the system works. The second most successful matching according to the members of the group was Pose-16 (Bridge) with %21. This was an individual pose based on self-experience. Each participant explored the limits of his/her body in this pose and examined how the weight of the structure is transferred to the ground. The third favorite matching was Pose-6 (Dome) (Figure 9). %14 of the participants of this group found this pose efficient for learning the principle laying behind. This was a smaller group pose in which 4-6 participants work together. They all came together to form the structure of a dome. It also had a play-like character, when a load was implemented on top. The members of the group worked and resisted as a team to carry the load. It was very enlightening for

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understanding how the weight of the load was transferred to the ground through the dome structure. The other asana-architectural element matchings found efficient by this age group were Pose-22 (Corpse) with %12, Pose-18 (Table) with %10, Pose-8 (Column and beam) with %9, Pose-3 (Arch) with %3, Pose-20 (Column) with %3 and Pose-2 (Balcony) with %2.

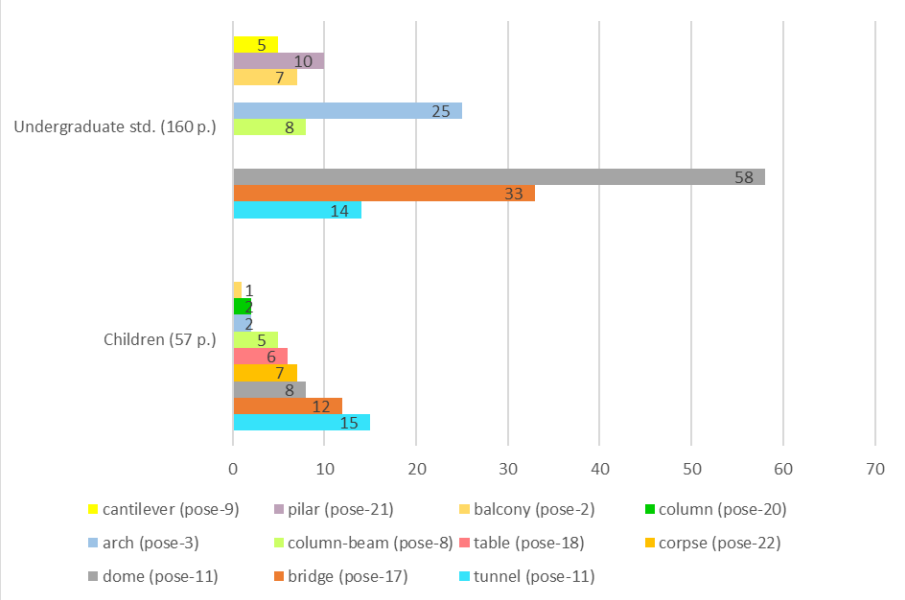

Figure 7. Most effective yoga pose- architectural element matching in children & undergraduate YogArch workshops

Figure 8. Pose-11/Tunnel pose in a YogArch workshop for children

Figure 9. Pose-6 /Dome pose in a YogArch workshop for children

The answer sheets of 164 undergraduate students who attended the workshops from four different universities at separate sessions were examined and analyzed. %36 of the participants of this group found Pose-6 (Dome) the most effective matching. (Figure 10). In the theoretical explanation, the working principles of the dome structure and the forces effecting it were explained in detail. Depending on the physical capabilities of the participants, the whole weight of a human body might be hang on top of the dome constructed by the group members. When this pose was followed by the supported dome pose (Pose-7) the changes in the durability of the "human dome" against loads and structural forces were better understood. According to %21 percent of this group, Pose-17 (Bridge) was successful in explaining the working principles of the structure. It is interesting that the order and percentage of this pose is the same with the younger age group's choices. %16 of the participants of this group found Pose-3 (Arch) as a successful asana-architectural element matching (Figure 11). Two individuals came together and formed a pointed arch in this pose. The hands worked as a key-stone together. The changes in the compression and tension forces might be experienced by changing the distance between two bodies. In this participant group, the other poses found effective in explaining the structural systems were as follows: Pose-11 (Tunnel) with %9, Pose-21 (Pillar) with %6, Pose-8 (Column and beam) with %5, Pose-2 (Balcony) with %4 and Pose-9 (Cantilever) with %3.

workshops commented that the program was most successful in explaining the concepts of durability, balance and structural mechanisms. Whereas for the undergraduate students the most clarified concepts were structural mechanism, body mechanism and structural forces (Figure 12). The different perceptions of successful concepts were caused by the difference in the implementation method of the schedule. The main motto of a children workshop was turning the YogArch schedule into a play-like activity in which participants enjoy their time and learn basic concepts and terms of architecture. In order to raise awareness on built environment and make the gained knowledge permanent, the play-like potential of yoga was used. The physical activity combined with aural and visual representations of architectural concepts turned the whole schedule into a fluent activity. Sharing this experience with their peers,

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the children saw this activity as an opportunity to play. As far as playing is an important method of learning in pre-school and primary school education, body experience combined with peer-play become more effective for relaying information to children. The concepts of durability and balance were explained with poses in which participant interact with the instructor or the other members of the group. For example, in Pose-2 (tree pose), the instructor implemented different amounts of weight on participant's leg in order to show how the body structure reacts to the changes in the loads applied to it. Meanwhile the participant tried to resist and protect his/her balance, like a balcony in a building. Also in Pose-8 (big toe-hold), two individuals mimicked a column and beam structure. When the distance between the partners was changed the practitioners experienced the difference it made on the durability of the system. Also when the instructor implemented weight on the legs at different positions, the working principle of the structure was better understood. The interaction of the participants and the instructor enriched the play-like character of the YogArch schedule. The most appreciated pose by children in the schedule was Pose-11 (downward facing pose) in which the whole group worked together to form a tunnel. In order to deepen in the pose and keep the participants stay in the pose as long as possible some attractions were added. The members including the instructor passed under the tunnel in order to stay as long as possible in the pose and understand how the durability of the structure was provided.

Figure 10. Pose-6 /Dome pose in a YogArch workshop for undergraduate students

Figure 11. Pose-3 /Arch pose in a YogArch workshop for undergraduate students

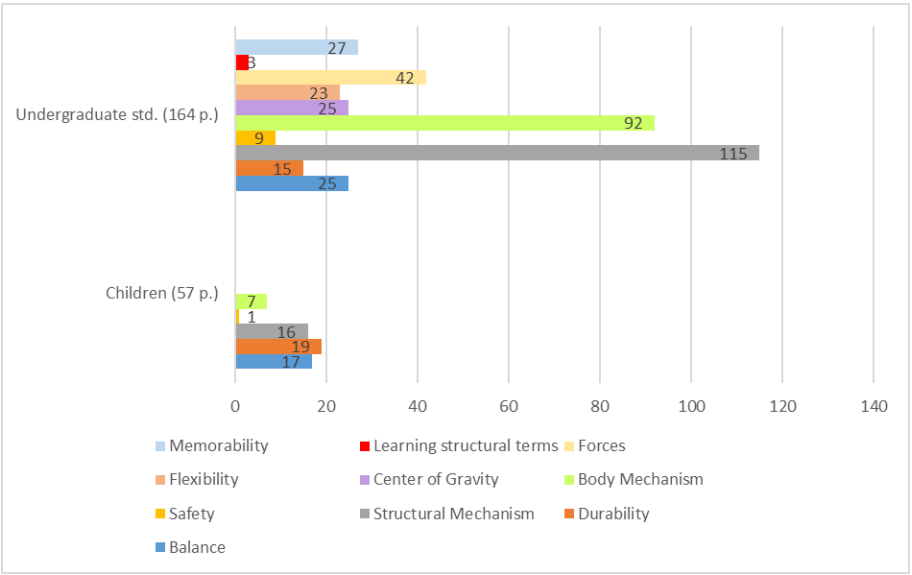

Figure 12. Prominent concepts in YogArch workshop acquisitions

The younger participants (6-14 years-old) attended the YogArch
The answers to the questionnaires showed that the undergraduate students tended to focus on more technical concepts in the schedule. When implementing YogArch schedule with undergraduate students, vocational concerns became more determinant. The instructor emphasized on structural terms, forces effecting the constructional system when explaining each asana-architectural element match. Therefore, the participants focused on perceiving systematical principles while practicing the poses. They tried to understand both the functioning of human body and the building structure and the similarities in-between. Due to all these reasons, in this participant group, top three choices about the most clarified concepts by the schedule were structural mechanism, body mechanism and structural forces. This is an outcome of the theoretical support given to the physical activity (Figure 12).
At the end of each workshop session the participants asked to evaluate the program from useful to useless in 5 point Likert Scale. In none of the groups the program was found partly useless or useless. The younger

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participants (6-14 years-old) attended the YogArch workshops evaluated the schedule as %93 useful, %5 partly useful and %2 neither useful nor useless (Figure 13). Besides gaining built environment awareness, this age group found this activity as a good inspiration for their daily play routine. This is remarkable to show that the concepts explained during the implementation of the program were internalized and have the potential to become permanent depending on self-repetition in daily life.

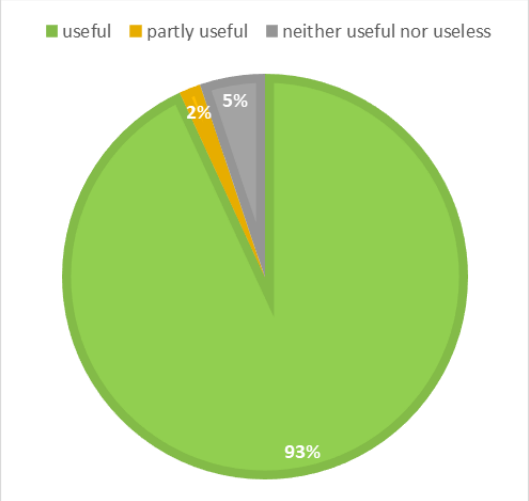

Figure 13. Prominent concepts in YogArch workshop acquisitions

The undergraduate students attended the YogArch workshops evaluated the schedule as %79 useful, %18 partly useful and %3 neither useful nor useless (Figure 14). The participants commented that the implementation of the program supported and clarified the knowledge they've obtained in their formal courses. They also added that using body experience in learning constructional rules is a practical method to simplify complicated terms. This method might also be adapted to other terms and elements which are not present in the original program.

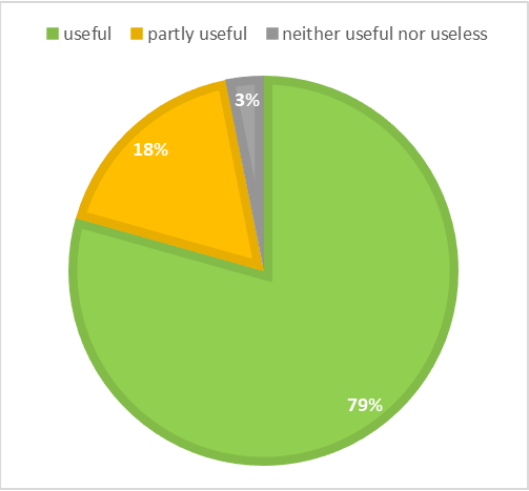

Figure 14. Satisfaction level of participants in Undergraduate YogArch Workshops

Even though, all poses used in the schedule are simple and at beginner level, some participants had difficulties due to their own lack of training, in practicing some of the poses which require reasonable amount of strength. In undergraduate workshops, %23 of the participants complained about their lack of training and stated that they had difficulties in practicing some of the poses such as Pose-9 (cantilever /

half-moon pose), Pose-10 (mushroom building / warrior III pose), Pose-17 (bridge / wheel pose) and Pose-20 (column / shoulder stand). This was the only detected weakness of the program. But in the discipline of yoga, there are a number of versions of each asana suitable for the differing ability and sufficiency of the practitioner. Therefore, if the instructor has sufficient yoga training and teaching experience, he/she might support and direct the participant to practice the pose in a more suitable version and develop body awareness.

CONCLUSION & SUGGESTIONS

YogArch program is created in order to become a supportive educational material for built environment education (BEE). Magliocco (2003) states that in order to make "architecture", architectural education is not always an obligation, but the education of the public on built environment is a must. The quality of architectural environment is directly related with the consciousness of users as much as professionals. The safety of a living environment depends on the consciousness level of inhabitants and users. Providing sufficient knowledge on constructional principles of buildings for all members of the society and extending built environment education have vital importance especially for the countries which are under earthquake risk, like Turkey. Being aware of the risks and vulnerability of their built environment, users can be more conscious about taking the right precautions against natural disasters. One of the main reasons of designing this program is creating this consciousness for the youngsters. The earlier this awareness is gained, the more effective and permanent it becomes.

The second target group of YogArch program is the freshmen students of architecture and civic engineering. Supporting the formal curriculum based on theoretical knowledge with an informal method based on body experience makes it more understandable for the students, who are facing with the complicated academic study for the first time. Even though the YogArch schedule forms a framework with a limited number of architectural elements and rules, once the basic principle of the schedule is understood, it might be adapted to numerous examples by the users. At that point, human body would serve as a practical tool for experimenting on structural principles.

The general context of the program has the potential to be adapted to any age group. The YogArch workshops mentioned in this paper were realized with different age groups. The schedule was both used as part of built environment education for children aged between 6-14 years old, and a part of first year architectural education integrated with architectural design and basic design courses in various universities. Some suggestions might be made on the future use of the program depending on the feedback supplied from the previous implementations. In the case of YogArch workshops for children, the program might be spread to a wider community. Architecture is an interdisciplinary subject related with various areas. Consequently, there are many programs and activities realized with the aim of promoting these areas to children. In the UIA Built Environment Education Guidelines (Peck, 2002), it is stated that "critical thinking, responsible citizenship, cultural literacy, social relevance and environmental sustainability all can be addressed through using issues of the built environment to teach traditional curriculum material." The topics related with built environment and architecture are also practical tools for teaching other academic subjects such as

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mathematics, literature and science. Therefore, YogArch schedule might be integrated with the curriculum of one of these lectures in primary education. Besides it might be used as a tool for raising built environment awareness as a part of project and performance tasks.

In the case of YogArch workshops for undergraduate students, the schedule might be used as a warm-up exercise for whole first year students of architecture and civic engineering. By this way the freshmen students might easily internalize basic technical terms that they would be dealing with in their whole vocational education. Besides, as far as the program is based on group working, it might create a social atmosphere for the freshmen students. The schedule might also be implemented in the scope of architectural design studio as a primary exercise before designing the first constructional entity. Experiencing the structural principles would be useful for the students who have limited structural knowledge and who are expected to create a design with constructional integrity. It would also be effective to use YogArch program as a part of structural design or statics and strength lectures. It would be beneficial to simultaneously experience the structural forces, which are theoretically explained in the lecture, on their own body.

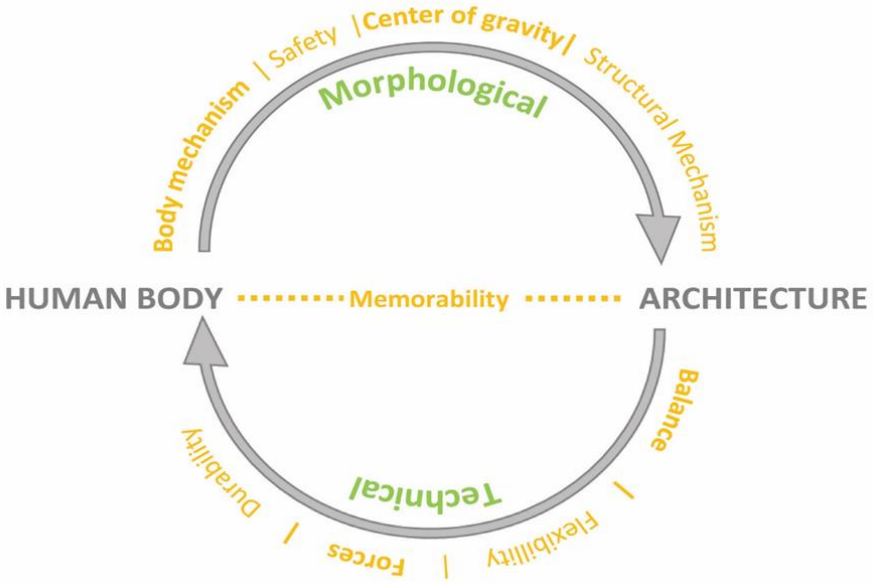

Figure 15. The interactional cycle between "human body" and "architecture Satisfaction level of participants in Undergraduate YogArch Workshops

The previous researches in the literature, which are mentioned in the scope of this paper, claim that there are morphological and technical connotations between human body and architecture. Architects have been inspired from human body in both terms. The findings of YogArch workshops indicate that the correlation between human body and architecture might also be used in analyzing and decoding architecture. In other words, the source of inspiration might be used as the key of understanding and internalizing. The participants of YogArch workshops expressed that the program eased the perception of morphological and technical interactions between human body and architecture. The prominent concepts in the participants' comments on their self-experience show that YogArch serves as a medium for revealing the resemblances between body and structural systems. Also the use of human body enhances the memorability of the knowledge and experience acquired (Figure 15).

This program which integrates body experience and architectural knowledge has the potential to be adapted to different occasions. Due to the fact that the physical aspect of yoga is suitable for all ages, the YogArch program is also applicable with participants of various ages. Due to the play-like character of the schedule, the participants might spend an enjoyable time learning and thinking about architectural and structural rules. This process makes the gained information more permanent.
Since the beginning of architectural history, human body has been seen as a source of inspiration for architectural design. The proportions of human body, the mechanism of the biological entity of the human body guided architects for solving constructional problems in their designs, for centuries. Depending on this fact, reading this equation in reverse and using human body for understanding constructional systems emerge as a reliable method.

ACKNOWLEDGEMENTS
We would like to thank the participants of "YogArch" workshops who attended on voluntary basis, including the workshops realized at "Çocuk İstanbul", PWB project (children sessions) and first year students of Faculties of Architecture at BOU, METU, AGU and TOBB ETU (undergraduate sessions). The workshops mentioned in the paper have been spread over a wide time span from 2013 to 2017. The data collection and visual recordings are made with the permission of the participants. Unless otherwise stated, all rights of the tables, images and photos belong to the author.

FINANCIAL DISCLOSURE
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ETHICS COMMITTEE APPROVAL
Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS
In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions and organizations) during the questionnaires, observation and experiment.

REFERENCES

Alberti, L. B. (1988). *On the Art of Building in Ten Books.* Cambridge, Mass: MIT Press.

Arın, S. (2013). Architectural Education For Children; A Case Study: Experiencing Architecture By Yoga. International Workshop COAC Barcelona 2013. 29-31 May 2013. Universitat Politécnico de Catalunya: Barcelona; (ISBN 978-84-695-9424-7) (http://www.pa.upc.edu/Varis/altres/arqs/congresos/international-workshop-coac-barcelona-2013-jornadas-cientificas-coac-barcelona-2013/comunicaciones-isbn-in-process/Sebla%20Arin.docx/view) (Accessed on 10.04.2020)

DOI: 10.15320/ICONARP.2021.167

Chiou S, Chiu W. (2010). On design methodology and practice of bionics. In: Proceedings of the 10th IEEE international conference on digital game and intelligent toy enhanced learning. Kaohsiung, Taiwan

Gruber, P. (2011). *Biomimetics in Architecture: Architecture of Life and Buildings.* Wien: Springer Pub.

Kaminoff, L. & Matthews, A. (2012). *Yoga Anatomi.* İstanbul: Sistem Yay.

Knudson, D. (2007). *Fundamentals of Biomechanics.* Chico, California: Springer Pub.

Le Corbusier. (2014). *Modulor.* İstanbul: YEM Yay.

Lotfabadi, P., Alibaba, H. Z. & Arfaei, A. (2016). Sustainability; As a combination of parametric patterns and bionic strategies. *Renewable and Sustainable Energy Reviews.* V:57, pp: 1337-1346.

Magliocco, A. (2003). "Education in Architecture. University role into architectural-environmental education: parallel experiences of didactic workshop." EAAE Transaction on architectural education N°15 Writings in architectural education, EAAE prize 2001-02 (ed. Ebbe Harder), Royal Danish Academy of Fine Arts, School of Architecture, Copenhagen: 207-217.

Pappas, S. (2006). *Yoga Posture Adjustments and Assisting.* Victoria,BC: Trafford Pub.

Peck, M. (Dir.). (2002). UIA Built Environment Guidelines, *UIA International Work Programme "Architecture and Children (Built Environment Education).*

Plowright, P. (2018). Extending Skin. ARCC Conference Repository. https://doi.org/10.17831/rep:arcc%y552 (Accessed on 10.07.2020)

Steadman, P. (1979). *The Evolution of Designs: Biological analogy in architecture and the applied arts.* Cambridge: Cambridge University Press

Vidler, A. (1990). The Building in Pain: The Body And Architecture in Post-modern Culture. *AA Files,* No:19 (Spring 1990), pp. 3-10. https://www.jstor.org/stable/29543679 (Accessed on 019.03.2020)

Vitruvius, P. (1960). *Vitruvius: the ten books on architecture.* New York: Dover Pub.

Worby, C. (2007). *Her Yönüyle Yoga.* Ankara: Arkadaş Yay.

Url-1: http://figuredrawingdotinfo.blogspot.com/2015/08/why-should-we-care-about construction_14.html (Accessed on 20.06.2020)

Url-2: http://letteraturaartistica.blogspot.com/2014/01/english-version-francesco-di-giorgio.html (Accessed on 25.06.2020)

Url-3: http://letteraturaartistica.blogspot.com/2013/11/massimo-mussini-francesco-di-giorgio-e.html (Accessed on 25.06.2020)

Url-4: https://www.thetimes.co.uk/article/vitruvian-man-must-stay-in-his-vault-9x527hkk8 (Accessed on 25.06.2020)

Url-5: https://www.archdaily.com/902597/on-the-dislocation-of-the-body-in-architecture-le-corbusiers-modulor (Accessed on 14.07.2020)

Resume

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Book Review

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Architecture and Planning Practice of the Last 50 Years with Memories

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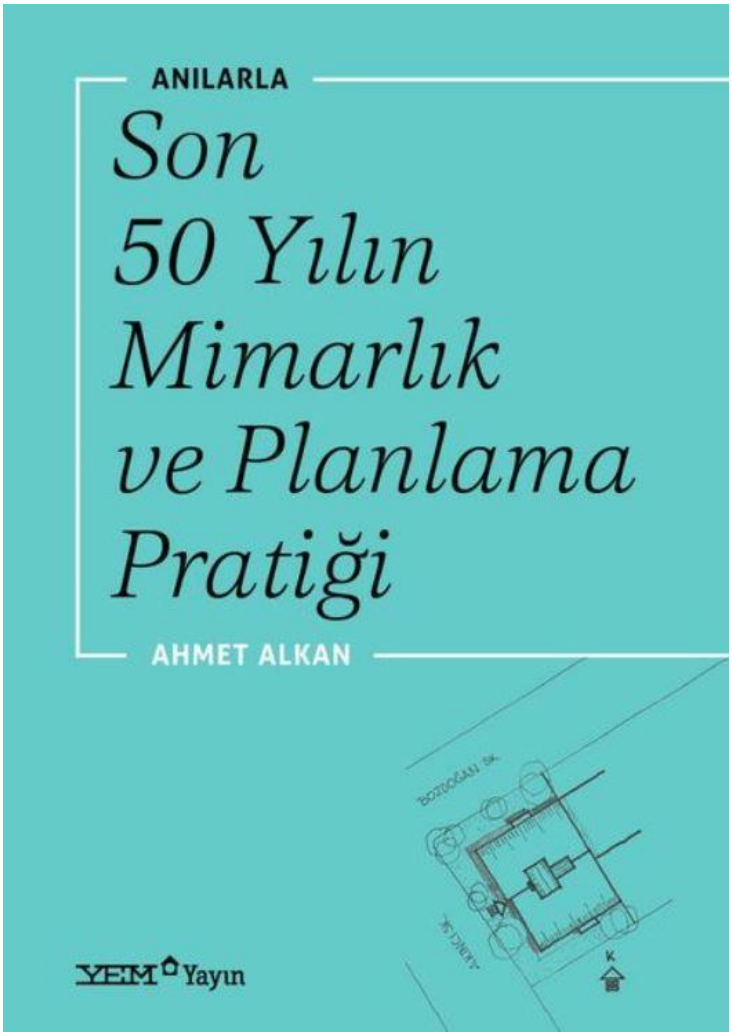

The cover of the book "Architecture and Planning Practice of the Last 50 Years with Memories"

The book “Architecture and Planning Practice of the Last 50 Years with Memories” was written by Ahmet Alkan and published by YEM Publishing in 2019. The book is on architecture and planning practice in the genre of autobiographical fiction - as the name suggests. In addition to his academician identity, the author stands out with his designs and applications especially in Konya and Ankara for many years.

The cover of the book has a very minimalistic design. The sketch on the cover, which is presented as the "Father's house" layout plan, is barely perceptible. This sketch is placed on the cover gives the impression that the content of the book more prominently includes application projects. However, its focus is slightly different. The choice of color on the cover may have relation of being in Mevlana’a land.

The focus of this book is the effects and results of lessons learned from 50 years of professional experience. However, we see that this process is more than an academic past; the problems that have existed from the 1970s to the present, affected the understanding of architecture and design, and increased in different aspects are shared through experiences. In this context, the book mainly focuses on three main titles;

* *The effect of the period of laws and cooperatives on the design process*,
* *The effect of those who see the right to change and carry out the design process,*
* *Ignoring the labor and time of architects in the design process.*

1. The author explains the effects of the period of laws and cooperatives on the design process, especially the factors of negative effects on the city, the public, and the architect.

The author, who witnessed the rapid increase in migration and spread of slums, the deterioration of the infrastructure of the cities after the 1950s, explains how the prepared zoning plans succumbed to the emerging commercial understanding. In this sense, he evaluates Slum Law No. 775, which was enacted towards the 1970s, and this period as the most annoying years in terms of creating these types of projects (Alkan, 2019, p.38).

It is interesting that he regards this process as "periodic opportunities," although he predicts that the new type of construction called "large housing production" by the author, which spread especially fast, will result draw reactions from scientists (Alkan, 2019, p.60). The author himself later acknowledges how these periodic opportunities have turned into a tangle of problems over time, but he attributes this to the inability to implement and enforce the correct zoning laws.

Undoubtedly, he reveals the fact that the city and its inhabitants' breathing spaces disappear as a result of the increase in density with the zoning plan changes. He emphasizes that individual rights should be abandoned if the issue concerns the future of a whole city and its inhabitants. Otherwise, we will experience the negative consequences of

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this as a society in the medium and long term and we will pay a price, he argues (Alkan, 2019, p.125-127).

2. The author frequently questions the damage done to this profession by those who see the right to change or carry out the design process.
Adopting Howard Roark's "destructing his own buildings against those who feel the right to change something they did not, and could not, create" as his own understanding, the author states that he tries to show his reaction by giving up designing. He states that he explains this in order to attract the attention of the members of the profession and to raise awareness (Alkan, 2019, p.225).
The author criticizes those who interfere in the architectural design even though they are not professionals in architecture by saying, "Let me express with this sentence how tired I am of architectural style discussions starting from Baltic architecture to contemporary interpretation of modern and traditional architecture and how everybody acts like they know architecture in-depth, enough. In short, everyone who requested project design from me was a planner and architect, except for me" (Alkan, 2019, p.170-172).
As can be seen, the psychological pressure of the architectural design process on an architect is quite high. Project production takes long periods. It is not a simple setup and has many parameters in it. Therefore, as the author says, these builders cause cities to lose their urban identity and completely disrupt the user-oriented design approach.
The author illustrates this change process to the reader through both "multi-story housing" and "University campus" projects. In this sense, he opens it up to discuss how these builders who overstep their own profession or those who feel the right to change the project cause problems to the city and its inhabitants.
Another challenging process for the designer discussed in the book is the process of explaining the project to the client, the employer. He states that, at this stage, the involvement of “priorities of interest” instead of questioning the pragmatic-syntactic relationship within the design of the client/employer, and therefore the effort to stand up to the unjust and unfair wishes of the client, can result in relations reaching the point of break (Alkan Ahmet, 2019, p.150) and the architect getting greatly disappointed. As a matter of fact, the "employer's interest" is fighting against the architectural concept of design, which is unfortunately always common in our country.

3. Ignoring the labor and time of architects in the design process also leads to burnout over time in those who practice this profession.
The author also describes this burnout as “waste.” In the context of time, he evaluates this waste as a loss for both the city and its inhabitants and the loss of the architect. In this sense, the author demonstrates through example projects that the future of a city will be negatively affected,

resources will be wasted, and the city user will be stripped of the right to life. He reveals the losses of the architect in all this time period in a certain flow. Regardless, it is portrayed as a heavy blow that the efforts and time of the architects are stolen and their dreams are not valued (Alkan, 2019, p.99).

In all this negative process, the author describes the only weapon of the architect as "time" and emphasizes that time will justify the architect. However, even if time justifies the architect, the unplanned buildings both harm the city and the city user, and the financial dimension of this affects future generations as a problem.

Another characteristic of the book is that it conveys experiences to the reader as a short message through concepts; Love, Trust, Responsibility, Patience, Risk, Working Together (Team Spirit), Taking Lessons (Repetition of Mistakes), Change, Consultation, Sharing (Common Work Area, Collaboration), Regret, Professional Ethics, Business and Sustainability, Process Management. In addition, his supporting the chapters in the book with various discourses gives the reader preliminary information about the content.

Love:

"The love for the profession is the key to success and happiness." Starting a job you love, being a companion to someone you love can be a way of overcoming all kinds of negativity.

Trust:

Trying to implement a process based on trust in business life is only possible with a correct and sufficient method.

Contracts should be made with experts as if one works with the most malicious people in order to prevent financial and moral negative consequences.

In life, one should be careful and avoid compliments that were not deserved.

Responsibility:

It is not enough to just design and sign. The work must be checked. The responsibility belongs to the designer.

As a professional, you must have dreams for your country and city. There must be a desire to fulfill your duty with great desire.

Patience, Risk:

A goal should be set for the future. In order to achieve this goal, it is necessary to wait patiently and therefore take certain risks.

Life can sometimes offer surprises, positive or negative. Whatever happens, one should keep on going.

Working Together (Team Spirit, Harmony):

Not all jobs can make one happy, even if the pay is good.

DOI: 10.15320/ICONARP.2021.168

The working environment is very important. This environment should be lightened and quiet.
Even if you are an employee, the environment should be established on the common principles of the person or people to be worked with. Spiritual harmony should be ensured with the person or people to be worked with.
It is important to work together, to create a team spirit. However, the involvement of more people than necessary in a job may lead to undesirable results.

Taking Lessons:
Personal relationships may not provide professional improvement, there is a need for a system with an institutional structure that will protect the ethical values of professional people.
Life can sometimes make you repeat the same mistakes, no matter how careful you are.
The desire to carry out different tasks at the same time will cause distraction; "If you are doing laundry, just do the laundry."

Change:
An information-based structure is developing in the world. This situation offers different opportunities to the profession and people. Success depends on how well you can keep up with this change.
There will always be change throughout our lives.

Consultation:
People in search of a better future should definitely consult someone, get ideas, compile prominent suggestions, and live their lives. The evaluation should be made together with the family.
During the design process, it is important to always choose to solve the problems by discussing them with the addressees of the issue and preserving the communication.

Sharing (Common Work Area, Collaboration):
Sharing and cooperation are now a necessity in this age.
The best organizer of communication between people is sharing.
Common working areas should be established based on common points between people. With this common working environment, contradiction, separation, and idleness can also be prevented.
Everyone, from the state to non-governmental organizations, should cooperate. Otherwise, many processes can become blocked.

Regret:
Sometimes, some actions cannot be carried out due to being busy with work. Instead of regretting not being able to do them later, time should definitely be made now.

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Professional Ethics, Business, and Sustainability:
Professional ethics is an integral part of business life and a sought-after characteristic.
Providing business and sustainability in business life is as important as design.

Process Management, Productivity:
Process management, which will reveal the architect-employer relationships in working life, should be well resolved. The backbone of the boundaries and responsibilities of this duo must be established solidly.
It is important to prioritize legislation, multiple laws, regulations, and provisions.
The project may fall victim to "bureaucracy," "local governmental fight," and "user pressure." In order to overcome this, process management should be well planned.
Hard work is a necessity in architecture, but not an adequate one. In order for the work to be efficient and effective at the same time, time management should be set up correctly.

TO CONCLUDE,
* The language of the book is fluent, understandable, and maintained around a certain historical axis.
* The book clearly reveals the values advocated by the author. In this sense, it discusses the difficulties, pleasant moments, changing and developing aspects of the profession of architecture, and the positive and negative effects of legal processes in planning and implementation.
* Looking at the entire book, it is seen that the author's period and his memories are documented for future generations, colleagues, and students, they draw a road map, and consequently record them.
* The author describes his first professional years after graduation as the period of "considering himself the best." However, 50 years of experience ends with the following words: A lifetime is not enough to be able to say “I have become an architect.”

REFERENCE
Alkan, A. (2019). Anılarla Son 50 Yılın Mimarlık ve Planlama Pratiği, YEM Yayın, 1.Baskı, İstanbul.

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