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Research Article

Urban metamorphosis in historical town Harput: Analyzing morphological changes with diverse approaches

Asst. Prof. Dr. Rüya Ardıçoğlu[1*]

[1]Fırat University, Faculty of Architecture, Department of City and Regional Planning, Elazığ, Türkiye.
rardicoglu@firat.edu.tr

*Corresponding Author

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Abstract
This study analyzes the morphological transformation and physical character of a historical settlement that underwent dramatic urban metamorphosis, using Harput as a case study. Two different time periods have been compared to shed light on this transformation. The research is significant for addressing morphological changes in historical settlements and for using multiple analytical methods. Street systems, street blocks, and plots have been analyzed using the Conzenian approach, Space Syntax, topological analysis, and Marshall's town plan taxonomies. Employing various methodologies allowed for a more comprehensive evaluation of urban morphology. In conclusion, findings from these methods validated each other, and integration, connectivity, and regularity levels of the town plan increased. The once-organic and irregular street pattern evolved into a more geometric and regular structure. This transformation, particularly in street typology, triggered changes in other urban elements, leading to plan units that are more uniform in size and shape. Hence, the study highlights the hierarchical influence of street patterns on urban form. It provides valuable insights into the urban evolution of Harput and can inform future planning, conservation, and development practices. Ultimately, these analyses aim to be a guide for future applications and conservation as well.

Keywords: Historical settlements, Space syntax, Topological analyses, Urban metamorphosis, Urban morphology

Extended Abstract

Introduction: Cities are complex systems composed of interdependent spatial and physical elements. Understanding the relationships among these components—from individual elements to the entire urban structure—is essential in urban morphological studies. Urban morphology is a discipline that analyzes the physical form of cities, emphasizing how their structural components emerge, evolve, and interact over time. Among these components, streets are recognized as the most stable element of the urban fabric. In comparison, buildings are more susceptible to change, while plots show relative stability. Streets play a pivotal role in shaping other urban elements such as blocks, plots, and building typologies. The geometry of the street network directly influences the size and configuration of street blocks, which in turn determine the layout of plots and the typology of buildings. Therefore, streets function as the primary organizing element in urban form, generating a hierarchical chain of influence throughout the spatial structure. Changes in the street system inevitably trigger transformations in street blocks, and these transformations propagate down to the level of plots and buildings. To analyze these urban elements, over the past century, multiple analytical approaches have been developed in urban morphology. The two primary paradigms are the historical-geographical and architectural approaches. M. R. G. Conzen's historical-geographical methodology remains foundational to the discipline. Meanwhile, the emergence of computational tools has introduced novel approaches such as Space Syntax, developed by Hillier, which combines spatial analysis with technology to assess accessibility and spatial configuration.

Purpose and scope: This study aims to analyze the morphological transformation of a historical urban settlement that underwent significant physical and spatial change, using a multi-method analytical framework. A central research question is how changes in one urban element affect others, revealing the hierarchical and interdependent nature of urban morphology. The case study is Harput, a historical town with a layered urban history. Two distinct time periods were selected for comparative analysis: the late 19th century (1890s) and the mid-20th century (1960s). The 1960s represent a turning point in Harput's urban development, marked by the implementation of a new master plan that significantly altered

its spatial structure. Comparing these two time periods provides insight into the nature and impact of urban metamorphosis in a historical context.

Method: 1. The analysis is structured according to the Conzenian model, which identifies three primary urban components: streets, street blocks, and plots. 2. Space Syntax Analysis: The first analytical phase employs the Depth map software to measure spatial indicators such as integration, connectivity, and choice for both time periods. Grid axiality is also calculated to assess the regularity and coherence of the urban layout. 3. Topological Analysis: The third phase involves Marshall's topological approach, which uses geometric and mathematical parameters to analyze the connectivity and structure of street networks. This empirical method quantifies spatial regularity and intersection types, contributing to a deeper understanding of morphological order. 4. Typological Classification: The next phase applies Marshall's ABCD typology, which classifies urban plans into four types based on their degree of regularity and structural form. This classification provides a comparative framework for identifying shifts in Harput's urban character between the two time periods. 5. Block and Plot Analysis: Finally, street blocks and plots are analyzed in terms of their size and shape. Blocks are categorized as small, medium, or large, and plot dimensions are measured to identify patterns of transformation. This analysis examines how changes in street geometry influenced the configuration of subordinate elements.

Findings and conclusion: According to Marshall's taxonomy, the 19th century plan of Harput corresponds to Type A, characterized by an organic and irregular structure shaped by topography and historical development. This classification is supported by Space Syntax and topological data, which show low integration, low grid axiality, and a limited number of X-intersections, all of which indicate a spatially fragmented and irregular layout. By contrast, the 1960s plan represents a Type C layout, reflecting a more regular and geometric structure. The results indicate a significant increase in integration, connectivity, and the number of X-nodes, which suggests improved spatial coherence. Although grid axiality values in both periods remained below 0.25, the increase in the 1960s confirms a move toward greater regularity. In topological terms, the reduction in T-intersections and the increase in X-intersections contributed to enhanced spatial integration and network efficiency. The transformation of the street system not only redefined connectivity but also influenced the shape and size of street blocks. In the 1890s, blocks were irregular, amorphous, and varied in size due to the organic street layout. In the 1960s, the blocks had become more uniform and modular, except for some large blocks allocated for specific land uses such as schools, green spaces, or heritage sites. A similar trend was observed in plot morphology. The standardization of street geometry led to more regular and similarly sized plots, reflecting the hierarchical influence of street systems on subordinate elements. This shift toward homogeneity in urban form illustrates a broader pattern of planned urban development in contrast to the organically evolved structure of the previous era. In conclusion, the morphological evolution of Harput demonstrates a clear transformation from an irregular, topography-driven urban layout to a planned and regular structure. This change was primarily driven by alterations in street geometry, which initiated a chain reaction affecting blocks, plots, and ultimately building patterns. The study confirms the hierarchical relationship among urban components and highlights the critical role of streets in shaping overall urban form. The integration of multiple analytical approaches—Space Syntax, topological analysis, and morphological typologies—offers a comprehensive framework for understanding urban transformation. These findings contribute valuable insights for contemporary urban planning, conservation, and design, particularly in historically sensitive contexts. Morphological analysis, as demonstrated in this study, can serve as a guideline for future interventions that aim to balance historical continuity with modern development needs.

Keywords: Historical settlements, Space syntax, Topological analyses, Urban metamorphosis, Urban morphology

INTRODUCTION

Cities can be defined as complex objects that are composed of several elements. It is significant to define the relationships between the urban elements from the part to the whole. At this point, urban morphology is an important field to deal with the complexity of cities by using fundamental physical elements in a hierarchical view (Oliveira, 2022: 9). Each settlement is established with different configurations of urban elements (streets, street blocks, plots, and buildings). Therefore, these fundamental elements of urban form generate the urban landscape of the settlements. The configurations and features of urban elements, such as size, form and density, are distinctive parameters for the morphological character of the cities.

Urban morphology is a field of study that aims to define the city in physical aspects. It is defined as the study field that focuses on the formation of human settlements and the process of their transformation (Moudon, 1997: 4). According to Kropf and Malfroy (2013), the goal of research on urban morphology is to elucidate the mechanisms that result in the production and alteration of forms that create the physical environment. In addition, it addresses the interactions and configurations of urban components at different scales from the past

to the present. Research on urban morphology is divided into three groups. The researchers in the first group focus on the spatial changes of cities from past to present with using maps, plans, photographs, and written sources. These studies are mostly carried out to shed light on the current situation by revealing urban evolution in cities and settlements with a strong historical background (Whitehand & Larkham, 2000: 4). Especially, the metamorphosis of urban form in historical settlements is a sign of significant transformation of cities.

Urban settlements are exposed to physical changes over time due to various factors. Urban development, increasing population, necessities of transportation lines, economic, social, or political reasons can cause to metamorphosis of urban form. Therefore, historical development processes and transformation of urban elements have born the necessity of physical analyses and typological classifications. In morphological terms, streets are the most stable urban element. In contrast to streets, buildings can be exposed to transformation more easily, and plots have more stability than buildings (Oliveira, 2022: 17). Hereby, streets are the most distinctive urban elements because they influence the street blocks, plots, and buildings. In other words, street geometry defines the size and form of street blocks and also affects plots and building typologies. Therefore, streets are the main dominant element of the urban form that has a dramatic impact on other urban elements. Since the alteration of the street system, the size and form of street blocks have to reshaped. Then, by the transformation of street blocks, the size, form, and density of plots and related to plots building typologies are inevitably changed. Hence, there is a hierarchical chain between urban elements.

Since each urban element has a relationship to the other and the transformation of someone could influence others, understanding morphological evaluations of cities provides a guide for future designs. Gebauer and Samuel (1983) also consider urban morphology as an analysis method used to determine urban design principles and theories. According to Oliveira (2021), in order to comprehend what practice is, it is important to describe the physical characteristics of urban forms and integrate morphological theories, concepts, and methodologies in design and planning.

Approaches and methodologies of urban morphology have been developed during the last century. The two basic approaches are historical-geographic and architectural, and these have still developed in different ways. Conzen's methodology of the historical-geographic approach is the fundamental base of urban morphology. According to Conzen (1960), the urban landscape is the most significant indicator of physical analysis. Thereby, morphological analyses have been developed within the urban landscape according to the Conzenian approach. Also, a post-modern urban architectural approach has been developed (Bilsel, 2018: 36) and many of studies focus on urban structure, plots and block forms, typo-morphology and transportation systems. Additionally, methodologies on urban morphology have developed in the last decades with technological developments. By virtue of technological improvements, the theory of "space syntax", which is a significant analytical tool of morphological analysis, was developed by Hillier, who combined technology and spatial analysis. Apart from these methodologies, taxonomies of urban form and evaluations of urban elements have been used as a physical analysis of urban patterns.

In this context, this study aims to analyze the morphological changes and define the physical character of a historical settlement that has been dramatically exposed to urban metamorphosis by using diverse approaches. Also, how do physical changes of urban elements affect each other? is a question to be answered. These kinds of studies, analyzing the morphological evaluation of historical settlements, is a main research field of urban morphology. Within this scope, Harput, a historical town that dates back centuries, was chosen as the case study. Two different time periods have been analyzed and compared to each other. These are the town plans of Harput from the 19th and 20th centuries. Even though the town's background extends before 19th century, the oldest visual sources (maps, plans, and photographs) are from the 19th century. On the other hand, the 1960s represent a turning point in Harput's urban development, marked by the implementation of a new master plan that significantly altered its spatial structure. For these reasons, comparing these two time periods provides insight into the nature and impact of urban metamorphosis in a historical context.

There are different types of urban elements such as streets, street blocks, plots, and buildings, thus, each urban element requires different methodologies and approaches for analysis. For this reason, for a comprehensive analysis and to explain the hierarchical relation between urban elements, different methods have been used in the same study. In the study, the headings of analyses have been defined according to the historical geographic

approach of Conzen. Hence, street systems, street blocks, and plots have been analyzed. Even though in Conzen's approach, buildings and their relationship with plots are important parameters, due to the lack of data on buildings of the 19th century, this heading could not have been handled in the study. The analyzing of the street system, that is, the most distinctive urban element that shapes other elements, has been analyzed with the Space Syntax method, Marshall's topological approach, and Marshall's town plan taxonomy. Using Depth map software, integration, connectivity, and choice analysis have been found, and using Marshall's approach, the topological analysis of town plans was done. The grid axiality value was measured to understand the regularity of town plans. Furthermore, the town plans have been classified and interpreted according to Marshall's taxonomies. Also, the size and form of street blocks and plots have been evaluated and compared to each other. While these analyses aim to define alterations of urban forms, they also aim to be a guide for the conservation and revitalization of historical settlements.

Material

The main material of the study is the historical Harput settlement. Additionally, literature sources, master plans of Harput, photographs, and Depth map software are auxiliary materials of the study. As the case study, Harput is located on the north-east of the city of Elazığ, south of the Upper Euphrates Division of Eastern Anatolia, Türkiye. It was the first city core of Elazığ, and before the establishment of today's city, Harput was the main settlement in that region. With the light of excavations (in the 20th century and also the excavations of the inner castle since 2005) and archeological research, the establishment of Harput dates back to the Neolithic era (Kiziroğlu, 2022: 32) and Hittite and Urartu civilizations (Ardıçoğlu, 1997: 7, Sevin et al., 2011). Throughout history, it had been a significant settlement in terms of trade, culture, education, and military. Especially by virtue of its strategic location, Harput became a significant settlement as a defensible military zone. Due to its topographical features and being located on top of a hill, the settlement was called *Carcathiocerta,* which means *stone castle* or *castle town* (Ardıçoğlu, 1997: 19). Then, the name of Carcathiocerta evolved to Harput during the time. It was the center of that region and worked as an important junction of transportation and trade route (Silk Road) and also the Roman Empire's military garrison in east border. In the 11th century, Harput became an important Turkish garrison and settlement. Until the middle of the 19th century, it continued to develop in terms of trade, education, culture, and military facilities. It hosted different civilizations, and different ethnicities lived there. Therefore, its urban form was shaped according to social, topographical, and climatic features.

In the urban layout of the 19th century, there were organic street patterns, cul-de-sacs, and narrow streets. The street typology was formed according to rough topography, and there were open public spaces between historical buildings. Nevertheless, since the middle of the 19th century, it has started to lose its strategic importance and has become an inadequate area for urban development. In that, it was unable to respond to the necessities of the growing urban pattern and railway transportation. The 19th century was the developing era of railway transportation; thus, Harput had improper topography for growing urban fabric and developing railway lines. Hence, the urban metamorphosis was started, and dramatic development occurred with the construction the railway. For this reason, by the middle of the 19th century, settlement started to shift to the plain to its south side, where topographical features were suitable to both growing urban development and railway facilities. Due to being shifted to plain because of the railway, a new settlement was found around the railway station. Hereby, some public services, such as; hospitals, military barracks, and government offices, shops were built on a new settlement (KTB, 1983) and then dwellings were shifted to Elazığ from Harput. Because of the shifting settlement, the rate of population in Harput decreased, and it became a historical district of the newborn city of Elazığ. On account of decreasing population, most of civil houses were demolished to use their materials to construct new houses in Elazığ; therefore, few of them could reach to present (Öztürk, 2013: 1060). Hence, both the old settlement and historical monuments such as; baths, castle, mosques, churches and tombs became neglected during the middle of the 20th century.

In the 1950s and 1960s, for the revitalization of Harput, making a new urban plan came into question. Also, some restorations for historical monuments were started. In those decades, a new urban layout was made for Harput that had a different morphological character than the historical layout. The new plan preferred long and strict lines, and it has fewer organic street types than the previous. Also, the form and size of street blocks and plots were altered by the new urban plan. The new plan caused urban metamorphosis, and it generated new

street typologies, street blocks, and plots that are different from the historical layout of the 19th century. In addition, with new plan decisions, the land use of the area was altered. With new plan decisions, historical places, educational buildings, restaurants, and fewer dwellings were coming forward. Therefore, it started to work as a less populated and historical district of the city of Elazığ. Madran (2009: 76) indicated that, even though this area is accepted as a planned settlement, the new plan's spatial organization seems disrespectful to the historical/traditional physical pattern. Therefore, due to altering street typologies of the settlement, the traditional urban pattern was lost and depended on the altered master plan; the plot system had to be changed. It caused not only the loss of the historical urban pattern also born cadastral problems as well.

On May 30, 1985, Harput was started to be protected, and the castle and its surroundings were registered as the *1st Degree Archeological Site* by the Ministry of Culture and Tourism of Türkiye. On January 1, 2005, it was declared a *Cultural and Tourism Conservation and Development Zone* by the Council of Ministers (Öztürk, 2013: 1056). Add to this, the site was to be on the list of UNESCO World Temporal Heritage List in 2018 (UNESCO, 2018). Today, new archeological excavations in the inner castle and restorations of monuments have been continued. However, even though the area has a strong historical, cultural, and archeological background, it does not work just as a historical settlement, but also it is a livable district of the city with a smaller number of dwellings, restaurants, a school, and a convention center. Apart from protected zones, new constructions can be built for new functions, and most of the historical buildings are used as museums, boutique hotels, or restaurants. In Figure 1, the photographs of Harput from the 19th century are shown. In these old photos, different districts, density of dwellings, traditional houses, mosques, churches, American Euphrates College (in the third photo), French and German Schools are seen. Unfortunately, only a few structures have been able to reach the present. As seen in present photographs (Figure 1), just monuments and a smaller number of dwellings could survive.

Figure 1. Harput photos, 19th century (above), present (below)

METHODOLOGY

In this paper, the methodology consists of five stages. In Figure 2, the flow chart of the methodology is shown. The first stage is defining the headings; the second, third, and fourth stages are related to the analysis of the street system in different methods. The last stage is the classification and assessment of street blocks and plots.

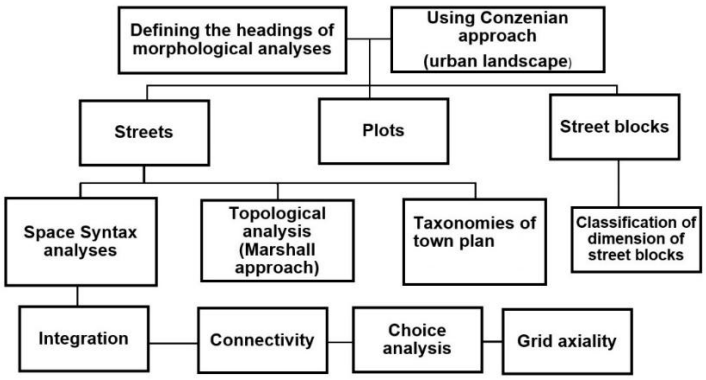


Figure 2. Flow chart of methodology

- The first step is the determination of the analysis headings. These headings have been defined according to the historical geographic approach of Conzen, one of the significant and fundamental approaches of urban morphology.

Conzen focused on the formation and transformation of physical components of cities throughout history. His approach put into center the urban landscape and it was divided into subtitles. According to the Conzenian approach, the town plan is one of the significant headings and it is analyzed into subtitles: streets, street blocks, plots, and buildings (Conzen, 1960). Among these titles, streets, street blocks, and plots have been defined as headings of morphological analyses in the study. Whitehand (2007: 3) states that these headings are the basic components of urban morphology. They were defined according to the Coznenian approach because his analyses aimed to define urban metamorphosis, especially in historical towns, and these studies aim to understand morphological evolution. Slater (1983) states that, in the Conzenian approach to creating a rational analysis method, the entire historical process of the town should be addressed in research. In Conzen's approach, there are different combinations of plan units and subunits formed by these components. In other words, it is stated that a morphological character of the city emerges with the combination of these sub-components (Kropf, 2009: 105-120). Ünlü and Baş (2015: 16) remark that Conzen points out in his studies that the urban pattern becomes apparent as a result of the relationship between the plot, building, street block, and street as urban form components at micro, meso, and macro scales.

In the next steps, as one of the main headings of the study, street system analyses have been done with three different ways (second, third, and fourth stages). The results in this context have been evaluated as the findings that will be used in the conservation or redesign of the existing morphological character and urban landscape.

- The second step is using the Space Syntax method. By using Depth map software, analysis of integration, connectivity, and choice of both the 19th century town plan and the 20th century was done. In addition, grid axiality was calculated for both time periods to interpret the regularity of the town plan.

Space syntax focuses on the morphological structure of a city and the relationships between morphological structure and spatial usage. According to Hillier (1998: 1), the target of space syntax is to combine formal definitions of spatial features with an experimental observation that makes connections with statistics. It helps to understand both the urban transformation processes of a town and the suitability of the new forms. In this context, it is used not only for past evaluations to analyze the urban evolution, but also for the conservation or development projects for the future to be made, and for solving problems in current situations. Yamu et al. (2021: 1) state that, to calculate the configurative spatial links between streets in the built environment, the space syntax technique expands on graph theory from discrete mathematics. For instance, the collection of connections between streets creates an interaction matrix, which can be thought of as a topological or binary graph. On this matrix, different operations can be performed, such as determining the shortest paths between any two links, which are then used to determine how important or accessible each link is in relation to the others (Batty, 2022).

The movement is shaped according to spatial arrangements, connectivity of places, and the grid level of the town. Therefore, the street lines that generate the movement are signed with axial lines. The spatial formation of these axial lines is formulated with axial lines, and axial values are calculated for quantitative data (Hillier et al., 1983: 47-63). The integration of a plan system is found by calculating and averaging the direction changes required to reach from one place to another for all places in the system. Integration value indicates accessibility of the place (Topçu & Kubat, 2007: 4). By finding integration of a system, the most preferable or less preferable lines, density of streets, and mobility can be measured. Integration value and integration maps are prepared by using the Depth map software throughout the morphological structure of the settlement. Connectivity is measured according to the number of connections of each line. If lines intersect many streets, the connectivity should be high. Segment map analyses are used for choice data. The segment maps analyze the shortest paths that can pass throughout all other areas in the system (Hillier et al., 1987: 217-231). It is a significant analysis for estimating possible pedestrian and vehicle movements.

Grid axiality is a value regarding the grid level of the town plan. It is a measurement based on the grid plan level of a settlement, and it is considered a measure of regularity. In addition, the grid plan level of the area is a parameter that indicates the level of movement of users and the degree of connection between spaces. Its value is between 0 and 1. The value that is close to 1 means that the spatial layout is close to a grid plan type. In contrast to it, a low value indicates that the degree of axial deformation is high. Add to this, if the grid axiality is 0.25 or above, these settlements are accepted, they are in the grid plan system, and the regularity is high. If it is 0.15 or below, it indicates there are grid deformations in the plan system and the settlement has a complex form (Hillier & Hanson, 1984). Grid axiality is calculated with the formula shown below.

Grid axiality = (√ (street blocks) x 2) + 2 / number of axial lines (Hillier & Hanson, 1984).

- Thirdly, Marshall's (2005:96) topological analysis is used for defining the street system. Marshall's approach was developed to determine the morphological structures of cities. This topological method is highly empirical and based on mathematical and geometric parameters. Additionally, thanks to this method, it is possible to determine the typology of a space and to determine the topological similarities or reveal differences between spaces and textures.

This technique was developed to better understand the morphological character or transformation of cities. Marshall developed a diagram and method for the classification of urban typologies using X and T intersections, street blocks (cells), and cul-de-sacs data. The open space systems of urban pattern are expressed with abstract diagrams regardless of nodes, connections, actual length, and size within the framework of Topology, a branch of geometry (Kürkçüoğlu & Ocakçı, 2015: 368). According to the ratio of X and T intersections, as well as the ratio of cells and cul-de-sacs (dead-end streets), the urban plan typology can be determined. According to ratios, the urban plan system can be T-tree, T-cell, X-tree, or X-cell typology according to the number of intersections, dead ends, and cells.

- The fourth step of the paper is analyzing the street system using Marshall's taxonomy of town planning. Marshall (2005: 88) classified the urban plans into four groups, which are called the ABCD typology. The ABCD typology can be explained in terms of composition and configuration. Figure 3 shows ABCD types of town plans and their features of intersection, such as X-T intersections or cul-de-sacs and connectivity.

Marshall (2005:89) explained the ABCD types as below;

Type A refers to irregular and short lines, mixed character of X and T intersections. It contains cul-de-sacs, and this plan type generally has moderate connectivity.

Type B refers to regular, orthogonal, and rectilinear streets. This type does not have cul-de-sacs; X-intersections are seen dominantly, and it has high connectivity.

Type C refers to a mixture of regular and irregular street forms, curved or rectilinear lines. It has a mixture of X and T intersections and a cul-de-sac and has moderate connectivity.

Type D is based on consistent road geometry, branching roads like a tree, and has low connectivity due to a lack of X-intersections. Cul-de-sacs and T-intersections are dominant in this type.

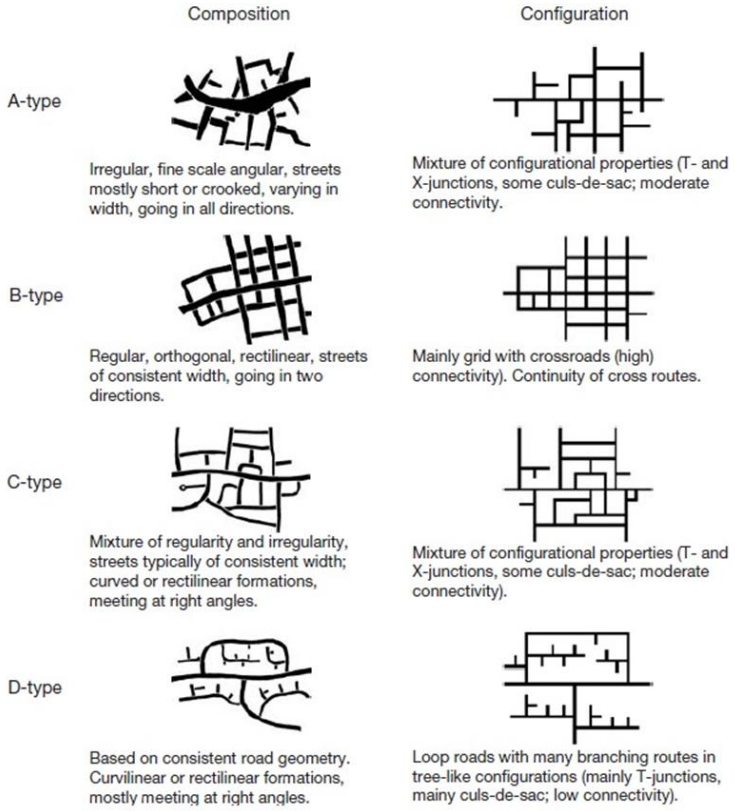


Figure 3. Marshall's taxonomy of ABCD

- As the fifth step, the other urban elements of the Conzenian approach (street blocks and plots) were classified and analyzed in the study. The influence of altering street forms was analyzed by measuring the dimensions of street blocks and classifying them as large, medium, or small for both periods. Also, the changes in size and form of plots were defined. With these measurements and classifications, the transformation of street blocks and plots can be defined, which depends on street geometry.

Classification of the dimensions of street blocks was done into three groups: large, medium, and small. Small blocks refer to 0-1000m^2, large blocks are defined as 8000m^2 and above. Medium-sized blocks are defined as M1 and M2. M1 refers to block sizes between 1000 to 4000m^2, M2 refers to block sizes between 4000 to 8000m^2.

- At the end of the analysis, all findings about all urban elements (streets, blocks, and plots) have been evaluated together, and their interactions with each other have been explained. Findings from using different methods in the study have been combined and interpreted together. Furthermore, the benefits of using different methods for analyzing urban elements and the importance of addressing all of them (street, block, plot) together have been explained according to findings.

RESULTS

The analyzed headings, street system, street blocks, and plots of two different periods of Harput were evaluated into four titles. Hence, the results of the study consist of four headings to represent morphological analysis of the street system, street blocks, and plots. The first one is the space syntax analysis, which includes: integration, connectivity, choice analysis, and the value of grid axiality. The second one is the topological analysis of the street system according to Marshall's approach. The third one is the classification of the settlement plans according to Marshall's town plan taxonomy for understanding the alteration of urban form. The last heading is the analysis of street blocks and plots with measurements and classifications to address the influence of the transformation of street geometry on other urban elements.

Street pattern / Space syntax analysis

The street system of both the 19th century layout (1890s) and the 20th century layout (after 1960s) was analyzed in Depth map software, and the integration, connectivity, and choice analysis of the two periods were mapped and measured. By using Depth map software, the maps of integration, connectivity, and choice analysis are represented in Figure 4. In addition, the minimum, maximum, and average values of this analysis, such as Integration HH, Connectivity, Mean Depth, RA, RAA, Choice R400, and Grid Axiality are shown in Table 1.

Table 1. Measurements of space syntax analysis

	19th century			**1960s**		
	Min.	**Max.**	**Average**	**Min.**	**Max.**	**Average**
Integration HH	0,568	1,66	1	0,736	1,92	1,27
Connectivity	1	12	3,85	1	12	4,63
Mean Depth	3,92	9,59	6,13	3,11	6,52	4,37
RA	0,398	0,639	0,529	0,442	0,703	0,577
RAA	0,599	1,75	1,051	0,520	1,35	0,830
Choice R400	75	16749	2534	7	6359	1359
Grid Axiality	0,116			0,130		

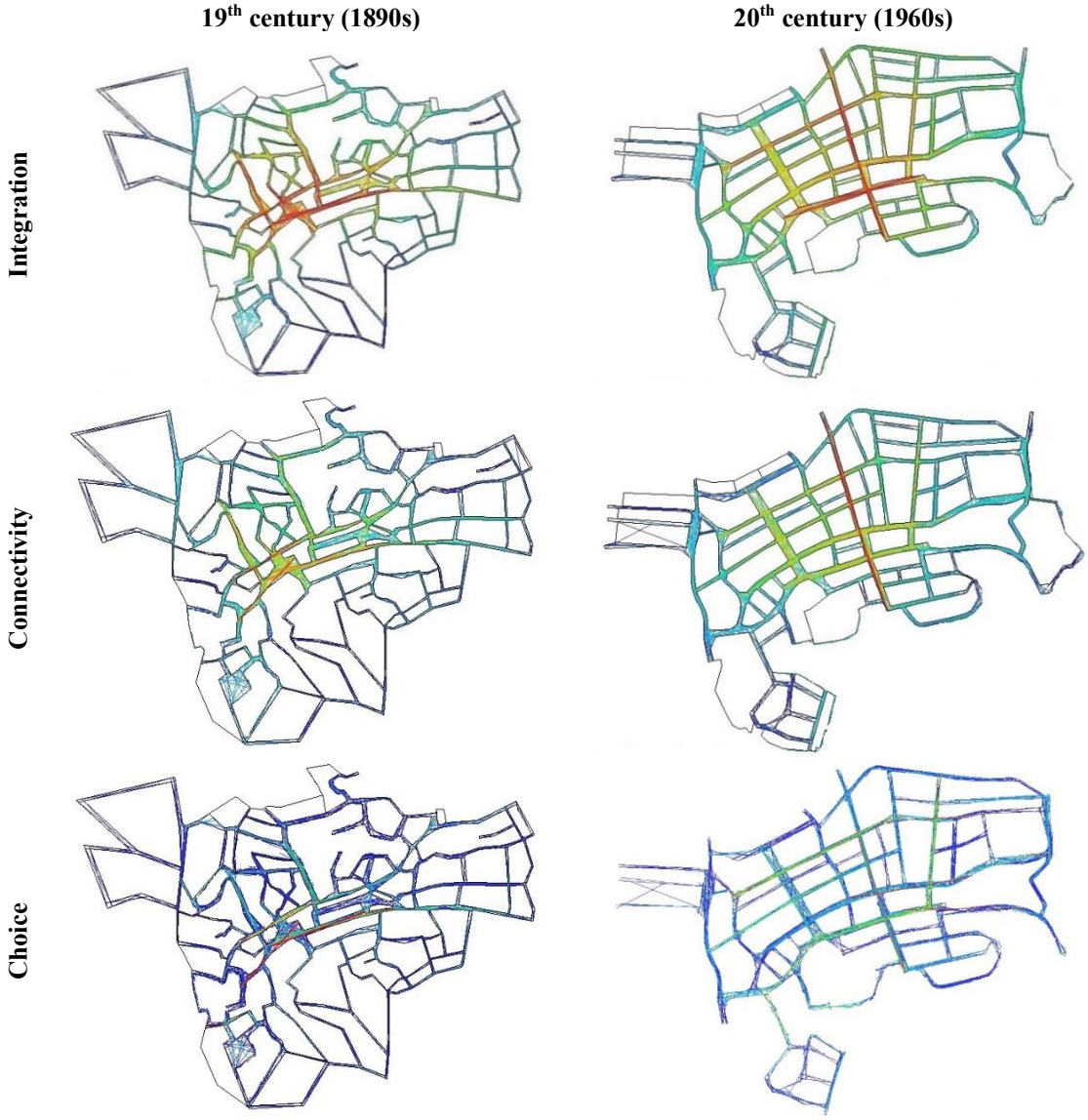


Figure 4. Space syntax analysis maps

According to the integration map and average values of Integration HH, the new plan that was done in the 1960s has a higher integration level than the historical layout. In both maps, the streets that are located in the East-West direction have the highest integration. Even though the form, line length, and connections of East-West streets were changed in the new plan, it continues to be one of the highest integrated lines. Similar to this street, another main street of the area is located in the North-South direction. In both maps, there are the highest integrated lines in the North-South direction. However, the line length and connections of that line were altered in the 1960s plan, and it became a stronger line in terms of integration. In the historical layout of the 19th century (1890s), apart from those highly integrated lines, streets did not have a high level. Mostly, these streets had low integration, and the level of integration decreased towards the periphery. Different from the historical layout, in the 1960s plan, the integration level is moderate, and yellow lines indicate the moderate integration level. Hereby, it refers that the integration of the center of settlement increased during the 20th century, and it has low integration just in the peripheries.

Similar to integration, the average value of connectivity increased in the 20th century after the new plan, and the most connected lines are in the North-South direction. Therefore, this line became the main street of the new plan with its strong integration and connectivity. Different from integration, the connectivity of the new plan varies according to the streets. Even though the 1960 plan has moderate integration for the whole, the connectivity is not moderate for the whole. Just North-South Street has strong connectivity, and few streets have moderate links with other streets that represent yellow lines in the map. Throughout the periphery, the connectivity level decreases because of the lack of street connections. In the historical layout, connectivity was lower than in the new plan, and just the center of the settlement, there was moderate connectivity. In contrast to integration and connectivity, the choice analysis showed that the choice level was higher in the historical layout than new plan. The choice analysis was made according to a radius of 400 (R400) for a local evaluation. According to segment maps, choosing possibilities of streets are shown, and in both maps, there are no high choice values. In historical layout, the highest integrated streets that are parallel to each other and located on East-West have a moderate choice level. In the 1960s plan, the most integrated streets are represented with yellow/green color and which refers moderate choice level. Apart from these streets, other streets have a low choice level.

The grid axiality is an important value that refers to the regularity of the plan structure with calculating street blocks and streets. Grid axiality level was measured for two periods, and it was found to be 0,116 for the historical layout and 0,130 for the 1960s layout. This value is under 0,25 for both periods, and it refers to the plan structure is not close to the grid plan system, and its regularity is low. Nevertheless, although in both periods the plan structures are under 0,25, indicating there are high grid deformations in plan structures, in the new plan the grid axiality level increased. Hence, it means that although the plan is not accepted as a grid, it gets close to a grid layout.

Marshall's topological analyses and town plan taxonomy

In addition to space syntax analysis, the street systems were analyzed according to Marshall's approach, and their topological evaluations were done. Figure 5 shows topological maps of Harput. The maps represent the T and X intersections and also cul-de-sacs (dead-end streets). In Table 2, the number of T and X intersections, cells (street blocks), cul-de-sacs, connections, and routes are shown as the topological results. Furthermore, in the same table, the topological diagrams of the 19th and 20th centuries' layouts are shown.

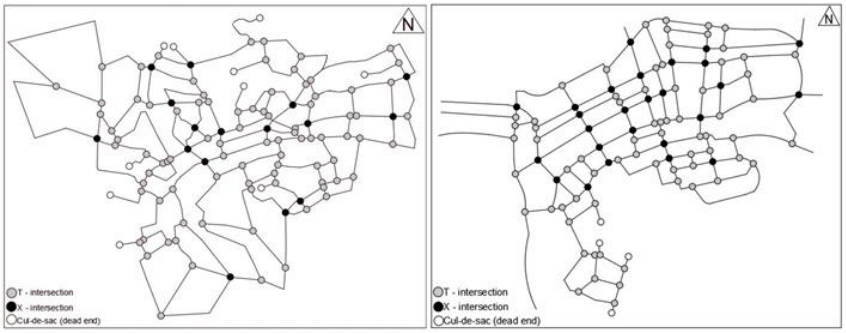
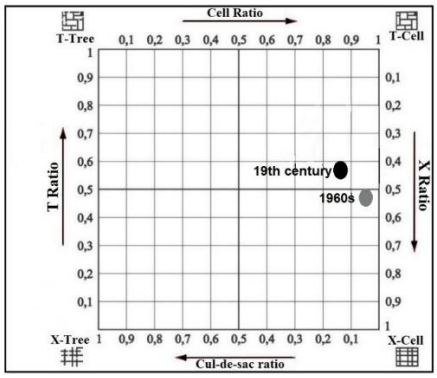


Figure 5. Topological maps /20th century layout (right), 19th century layout (left)

Table 2. Topological results and diagram

	19th cent. Layout	1960s Layout
T – intersection	88	69
X – intersection	16	26
Cell	66	68
Cul-de-sac	10	4
Connection (L)	148	142
Intersection (J)	104	95
Route R=L-J	44	47



The crucial change of topological features is in the ratio of X and T nodes. In both periods, the settlement plans are close to the cell structure because of the excess ratio of cells. In both layouts, even though there are cul-de-sacs, due to the exceeding ratio of cells, structures are accepted in the cells. The ratio of cell structure increased in the 20th century because of the decreasing ratio of dead-end streets. In terms of X and T nodes, the historical plan structure had plenty of T intersections and thus, it is close to the T-Cell structure. In contrast to the historical layout, in the new plan structure, the ratio of X intersections increased, and it gets closer to the X-Cell structure.

Apart from topological findings, the urban forms were also classified according to Marshall's taxonomy. According to Marshall's classification of town plans, the historical layout is close to Type A, and the layout of the 20th century is close to Type C. Type A refers to the organic layouts that have many dead ends and low connections. Type C has a connector main roads and street system developed around the main lines. While the historical layout had irregular and short lines like Type A, the new urban layout gets closer to Type C as it decreases irregular and short lines. However, it still contains regular and irregular streets, though regularity gets high. In terms of intersections, the historical layout (Type A) had dominantly T-intersections and also a mixed character of X-T and cul-de-sacs. In new urban layout (Type C) has a mixed character in terms of X-T and cul-de-sacs, like the historical layout. However, as X-intersections increased, the number of cul-de-sacs decreased, and street forms became more rectilinear.

Street blocks

The form and size of street blocks depend on the street typologies. Thus, the street typology shapes the street blocks and their features. Hereby, while the street system is transformed, street blocks have to be reshaped. For this reason, because of the urban metamorphosis in the historical urban layout of Harput, the dimensions and forms of street blocks have different features. Figure 6 shows both the street blocks' forms and the classification of dimensions. In Table 3, the classification of street block dimensions and the ratio of block types are shown. In the analyses, the dimension of blocks was evaluated into three types: small, medium (M1/M2), and large. The findings indicate, in both periods, most of the blocks have a medium dimension between 1000 to 8000m^2. Most of the medium-sized blocks are between 1,000 and 4,000 m^2, which is defined as M1. In both periods, the M1 ratio of blocks is higher than M2. Hence, it indicates the major blocks' dimensions are between 1000 and 4000m^2 for two periods. While comparing layouts, after the new plan, both small and large types of blocks decreased, and the ratio of medium type blocks increased. It is an important sign for generating similar plan units and similar block types to each other. Because in the 20th century, in terms of both dimension and form of blocks, they became similar to each other. In contrast to the 20th century, in the historical plan, the blocks had a variety of forms and sizes.

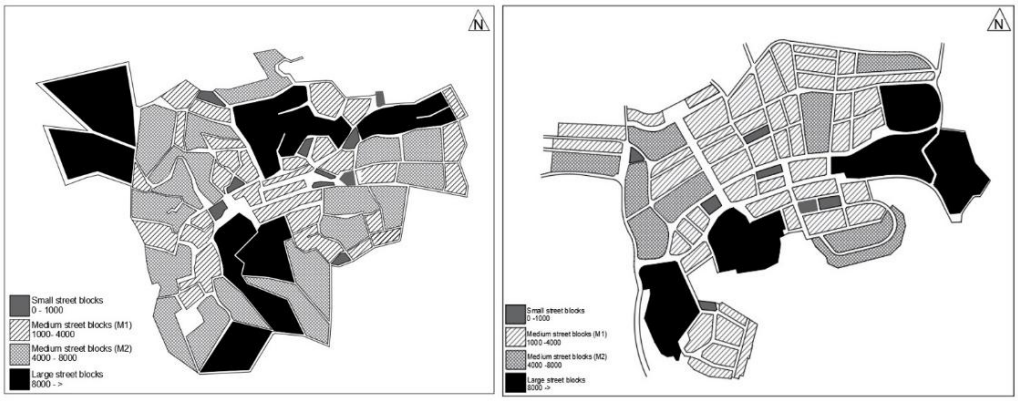


Figure 6. Classification of Street blocks / 1960s (right), 1890s (left)

Table 3. Ratio of dimension of street blocks

	Small	**Medium**		**Large**
	0-1000m²	**M1**	**M2**	**8000m² - >**
		1000-4000m²	4000-8000m²	
19th cent. Layout (1890s)	15,2%	47%	27,2%	10,6%
		74,2%		
20th cent. Layout (1960s)	10,5%	67,1%	16,4%	6%
		83,5%		

Plots

The transformation of street blocks affected the plot's character. Since the old period maps could not be read completely, only some of the plots could have been drawn and evaluated in the historical layout of the 19th century. According to reached data from the historical layout, the plot size ranged between 100m² and 500m². Most of the plots were suitable for a single house. The smallest plot that has been measured was 25m²; thus, these kinds of plot sizes were not provided for enough construction of buildings. Hence, from this data, it can be estimated that some houses covered more than one plot. Also, these very small plots could be a result of property rights. In terms of plot form, although the blocks had organic forms, plots had regular forms such as rectangular or foursquare form. In the new plan of the 20th century, the plot sizes are similar to previous period. The plot dimensions differ between 200m² and 450m² in general. Different from the previous layout, the smallest plots were removed completely, and the smallest plots are not under approximately 200m². Regarding both dimension and form of plots, the new layout was planned to be balanced, in that dimension and form are similar to each other. The large plots of the 1960s layout have specific land uses: green area/parks, education/school zone, or a historical site that has historical monuments. While altering plot character depends on street and block geometries generates not only a new physical plot pattern, it also changes cadastral features and ownership status.

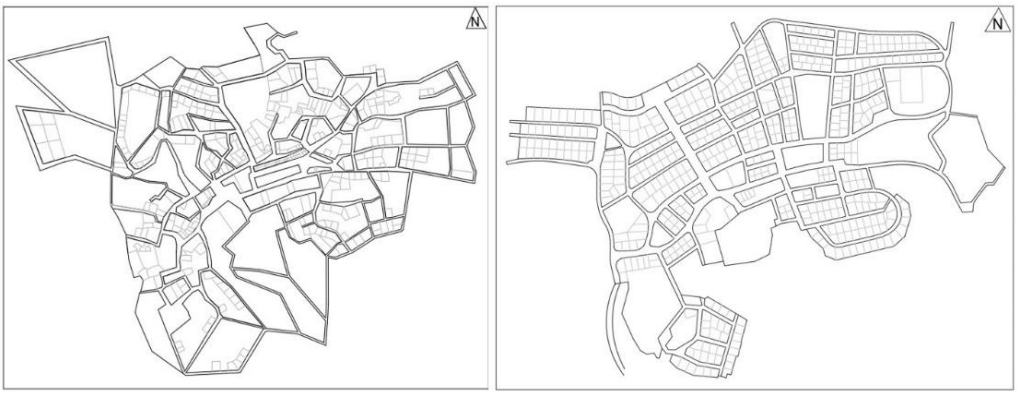


Figure 7. Plots / 1960s layout (right), 1890s layout (left)

CONCLUSION

Evaluation of findings

The study has important outputs for indicating hierarchical influences of urban elements. The findings point out that the transformation of urban elements, especially street typology, has a chain effect that causes other urban elements to transform as well. This paper also remarks, urban metamorphosis in historical towns has a crucial role in the sustainability of historical identity. Due to physical transformations in Harput, the historical identity could not be sustained. The study also has essential findings since it sheds light on morphological evolution and the historical background of the settlement with different methods.

Especially, analyzing and interpreting the street forms with both Space Syntax and Marshall's topological analysis provides a comprehensive evaluation. These two methods that provide for analyzing street patterns have both common and different points. Movement, regularity, and connectivity analysis of Space Syntax were interpreted with topological findings. Hence, validation of some data can be done by using two methods. For instance, topological results were interpreted with grid axiality and connectivity. On the other hand, while Space Syntax focuses on movement, regularity, density, and integration of streets, topological analysis addresses the issue by intersections, cells, and cul-de-sacs. Thus, for the same urban element, different evaluations could be done. While these two methods focus predominantly on streets, for a holistic analysis of urban elements, measurements, and classifications of blocks and plots were also handled in the study. Their results were associated with findings of the street pattern. It is concluded that there are different types of urban elements; for this reason, to comprehensively analyze and explain the hierarchical relation between them, different methods should be used in the same study.

In terms of the case study, the plan structure of Harput was dramatically changed in the 1960s. The plan had been changed easily as civil architectural buildings had been demolished over time, and only monumental buildings remained standing. When the street structure was interpreted together with Space Syntax and topological analyses, it was seen that the plan structure became more regular over time. Although the grid axiality value was below 0.25 in both periods, the increase in the value in the 1960s indicates, the regularity level of the plan increased. In addition, in topological analysis, decreasing the ratio of T-intersections increased the ratio of X-intersections in the new plan, which was interpreted as another reason. The increase in X nodes is also associated with an increase in the connectivity level. On the other hand, the increase in X-nodes has been interpreted as a factor that increases the integration and connectivity levels of the settlement. This finding shows that the accessibility level and X nodes can be directly proportional. One of the surprising results of the study is that, despite the organic plan structure of the 19th century, the number of dead-end streets is low, and the topological structure was a cell form in both periods. Another surprising result is from choice analysis. The segment maps (choice analysis) have a lower degree in the 20th century's layout than the historical layout. This result shows that although organic plan structures are more complex, they provide more possibilities for movement.

While evaluating the layouts according to Marshall's taxonomy, the historical layout is Type A, and it refers to organic and irregular plan structures. These morphological features of Type A validate the topological data, grid axiality value, and integration value of that time period. Type A layouts are organic and irregular plan structures; thus, the low value of grid axiality, integration, and a low number of X-nodes support to this plan structure. According to Marshall's taxonomy, the new layout is Type C. When comparing the morphological features of Type C with Space Syntax and topological analysis, it is seen that the level of integration, regularity, and X-nodes increased, which reflects a more regular plan type like Type C. In contrast to Type A, Type C contains generally geometrical street blocks and plots that have similar forms and size. It shows the transformation of Harput's layout from Type A to Type C.

Since the morphology of street blocks depends on the street typology, they were completely changed with the transformation of the street typology. While the street blocks in the 19th century were generally amorphous and had different sizes due to the streets being shaped according to the topography, in the 1960s, they emerged with similar forms and sizes. Merely the large street blocks in the new plan seem different from other blocks because of their specific land usages, such as historical sites, school zones, or green areas. The increasing ratio of medium-sized blocks in the 20th century indicates, the plan units are becoming similar in terms of size and

form. This is one of the main differences between the historical and modern layout of Harput. It is an essential alteration of urban form because each street block works as a plan unit; therefore, the similarity or variety of them influences and shapes the plots and building typologies. In other words, the similarity or diversification of street block typology causes the similarities or differentiations of plots and building typologies. Hence, the modern plan layout of the 20th century was formed mostly with homogenous plan units.

The plots have geometric forms in both periods, even though the street blocks did not have completely geometric forms in the 19th century. The main difference plots of between two periods is the minimum dimension of the plots and the estimated building coverages. In contrast to the 19th century, the minimum dimension of plots in the 20th century is not below 200m^2. Thus, this means that building coverage was differentiated during the time.

Recommendations

These findings can be used for future planning and design practices. These kinds of morphological analysis are targeted to be a guide for future applications. Within this scope, understanding of the current situation and transformations has vital importance to show how new plans and design codes should be produced. This town not only works as a historical urban settlement of the city, but it also works as a livable district of the city that contains schools, a convention center, mosques, restaurants, and green open spaces. Hence, especially these kinds of historical towns that continue to work as today's urban places are continued to physical and functional alterations. In other words, urban metamorphosis is continuing in these kinds of towns, which work as a part of today's cities. For this reason, making the most convenient planning and design decisions in these areas, both previous and current morphological analyses have to be used for integrating them into today's cities, with conservation of historical identity as well. For instance, with the help of integration, connectivity, and choice analysis, land use should be decided or changed. New functions can be added according to these results.

Also, for revitalizing the historical identity, the traces of historical urban layout can be used in future designs and plans. Because with the transformation of the town plan, the urban memory was lost. For this reason, for revitalizing the urban memory, some of the significant physical elements of the historical layout can be used as a trace for future designs. For instance, historical paths/streets, open spaces can be revitalized in future designs. Moreover, these data could be a guide for conservation applications. These kinds of morphological analysis should be integrated into processes of planning and design for reaching continuity of both historical identity and also integrating with today's urban fabric. Lastly, if some data on buildings of previous periods can be reached, these results can be used as a base for future analysis, such as analyzing relationships between blocks/plots and architectural typology or the influence of social and climatic factors on urban form.

Author's Contributions

The author contributed 100% to the study.

Competing Interests

There is no potential conflict of interest.

Ethics Committee Declaration

This study does not require ethics committee approval.

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Figure References

Figure 1: Author's personal archive (above photos),

Anonymous. (2025). Harput'un tarihi. https://harput.web.tr/harputun-tarihi/ (02.05.2025) (below photos)

Figure 3: Marshall, S. (2005). *Streets and patterns*. Spon Press.

Author's Biography

Rüya Ardıçoğlu received the bachelor degree at Bilkent University, Department of Urban Design and Landscape Architecture in 2012. The master degree was received in 2014 and her PhD study was completed in 2019 at Ankara University. She works as an assistant professor at Fırat University Faculty of Architecture. She had been at Universidade do Porto in 2024 as visitor researcher. Her research interests are urban design, urban morphology, spatial analysis, accessibility, urban landscape and historical environments.

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Research Article

İçmimarlıkta meslek etiği: ECIA Davranış İlkeleri üzerinden bir değerlendirme

Professional ethics for interior architects: An evaluation of ECIA Code of Conduct

Burcu Gökbayır[1*], Ezgi Yıldırım[2], Prof. Buğru Han Burak Kaptan[3]

[1]Eskişehir Technical University, Institute of Graduate Schools, Department of Interior Architecture, Eskişehir, Türkiye.
burcugokbayir@ogr.eskisehir.edu.tr

[2]Eskişehir Technical University, Institute of Graduate Schools, Department of Interior Architecture, Eskişehir, Türkiye.
ezgi.yildirim@ogr.eskisehir.edu.tr

[3]Eskişehir Technical University, Faculty of Architecture and Design, Department of Interior Architecture, Eskişehir, Türkiye.
bkaptan@eskisehir.edu.tr

*Corresponding Author

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Özet
İçmimarlık estetik ve işlevsel mekanlar yaratırken aynı zamanda kullanıcıların gereksinim, istek ve seçimlerinin de dikkate alındığı bir disiplindir. Bu alandaki profesyonellerin, toplum, meslek ve meslektaşlarına karşı etik ilkeler çerçevesinde şekillenen sorumlulukları bulunmaktadır. Araştırma, Türkiye'de içmimarlık alanında yaşanan etik sorunları örnek olaylar üzerinden inceleyerek, mesleğin etik ve kurumsal çerçevesini değerlendirmeyi ve bu yolla içmimarlık alanında mesleki etik kuralların gerekliliğini vurgulamayı amaçlamaktadır. Araştırmada Türkiye'de içmimarlık mesleğiyle doğrudan ilgili ve basına yansımış haberler analiz edilerek meslek etiğine dair örnekler incelenmiştir. Araştırmada örnek olay tarama modeli kullanılmış; internet ortamından ulaşılan yedi farklı haber, doküman incelemesi yöntemiyle analiz edilmiştir. İnceleme kapsamında ele alınan haberlerde hem içmimarlar hem de içmimar olmayan kişiler tarafından gerçekleştirilen ve içmimarlık ile doğrudan ilişkisi olan uygulamalar değerlendirilmiştir. Bulgular, içmimarlık hizmetlerinin meslek mensubu olmayan kişiler tarafından yürütülmesinin kamu güvenliği, kullanıcı hakları ve meslek itibarı açısından çok boyutlu riskler oluşturduğunu göstermektedir. Ayrıca, meslek mensuplarının etik sorumluluklarına dair farkındalığın sınırlı olduğu ve denetim mekanizmalarının yetersiz kaldığı tespit edilmiştir. Araştırmanın sonuçları, mesleki etik ilkelerin geliştirilmesi, uygulanabilirliğinin artırılması ve ECIA ilkeleri gibi standartların yerel bağlama uyarlanmasının gerekliliğine işaret etmektedir. Bu çalışma, literatürde içmimarlık alanında etik ihlalleri somut örneklerle ele alan sınırlı araştırmalardan biri olarak gelecekte yapılacak uygulamalı çalışmalar ve politika geliştirme süreçlerine katkı sağlamayı hedeflemektedir.

Anahtar Kelimeler: İçmimarlık, Meslek etiği, Davranış ilkeleri

Abstract
Interior architecture is a discipline that creates aesthetic and functional spaces while also considering users' needs, preferences, and choices. Professionals in this field bear responsibilities shaped by ethical principles toward society, their colleagues, and the profession. This research aims to examine ethical issues encountered in the field of interior architecture in Turkey through case studies, to evaluate the profession's ethical and institutional framework, and thereby emphasize the necessity of professional ethical codes within the discipline. In the study, news reports related to the interior architecture profession in Turkey, as covered by the media, were analyzed to identify examples relevant to professional ethics. A case study screening model was employed; seven different news articles accessed online were analyzed using document analysis methods. The reviewed reports included practices directly related to interior architecture, conducted by both registered interior architects and individuals without professional qualifications. The findings demonstrate that the provision of interior architecture services by unqualified individuals poses multidimensional risks to public safety, user rights, and the reputation of the profession. Additionally, it was determined that awareness of ethical responsibilities among professionals remains limited and that oversight mechanisms are insufficient. The results of the research indicate the need to develop professional ethical principles, enhance their applicability, and adapt ECIA standards to the local context. As one of the few studies in the literature that addresses ethical violations in interior architecture with concrete examples, this research aims to contribute to future applied studies and policy development processes.

Keywords: Interior architecture, Professional ethics, Code of behavior

Extended Abstract

Introduction: Interior architecture is a discipline that requires professionals to use creative and technical skills to design spaces that are not only aesthetically and functionally effective but also responsive to users' needs, preferences, and expectations. As highlighted by Kaçar (1998), the fundamental focus of interior architecture lies in shaping environments that address human requirements from practical, aesthetic, and symbolic perspectives, emphasizing the inherent link between space and user. This human-centered approach imposes critical ethical and professional responsibilities on interior architects, who must safeguard human values in all stages of design and implementation. The practice of interior architecture, therefore, extends beyond artistic creation, encompassing complex processes of communication and relationship management with clients, colleagues, and society. Ethical principles, including honesty, fairness, and accountability, form essential foundations the regulate these relationships and ensure that professional conduct aligns with the broader public interest. While national and international organizations such as the Chamber of Interior Architects of Turkey (CIAT), the European Council of Interior Architects (ECIA), and the American Society of Interior Designers (ASID) establish and oversee professional standards, gaps in legal frameworks and enforcement mechanisms continue to pose challenges. In Turkey, the lack of applied research exploring the impact of ethical breaches on professional credibility and public trust highlights the need for systematic inquiry into real-world practices, especially.

Purpose and scope: This study aims to emphasize the necessity of ethical rules in the interior architecture profession and identify professional ethical violations. By analyzing case studies from news reports in Turkey related to the interior architecture profession, the research seeks to evaluate these cases from an ethical perspective. Although there are numerous studies on professional ethics in general, there is a lack of sufficient examples specifically related to interior architecture. Therefore, this study aims to contribute to the field by addressing ethical issues unique to the interior architecture profession. The scope of the study is limited to news articles published in Turkey over the past ten years that are directly related to the interior architecture profession. News sources were screened using specific keywords through internet searches, and cases related to ethical violations were selected. The chosen case studies were analyzed within the framework of the European Council of Interior Architects (ECIA) Code of Professional Ethics and Conduct. The study examines the level of adherence to professional ethics among interior architects, their client relationships, and the impact of ethical violations on the profession.

Method: In this study, the case study analysis method was used to identify and analyze ethical violations in the interior architecture profession. The case study model was chosen to evaluate professional ethics violations and their impact on the profession through a detailed examination of specific incidents. Instead of printed sources, online news articles were used as the primary data source. A search was conducted on Google News using keywords such as "Interior Architect," "Interior Architecture," "Interior Design," and "Interior Space Design." As a result, seven news articles directly related to the interior architecture profession were selected. Special attention was given to selecting articles that focused on professional ethical violations rather than sensational or entertainment-oriented content. The collected news articles were analyzed using the document analysis method and classified based on the European Council of Interior Architects (ECIA) Code of Professional Ethics and Conduct. Ethical violations were coded and categorized according to predefined criteria. The findings of the document analysis were presented through summaries and tables highlighting key trends and insights. Through this method, the study aims to provide a clearer understanding of ethical issues encountered in the interior architecture profession and their impact on professional practice.

Findings and conclusion: This study has revealed that ethical violations and deficiencies in professional oversight are prevalent in interior architecture practice in Turkey. Among the seven cases analyzed, six involved unauthorized individuals or practitioners lacking professional qualifications, highlighting critical issues such as blurred boundaries of responsibility, lack of enforcement, and risks to public safety and trust. These findings demonstrate that interior architecture is not only a technical discipline but also a field of significant social responsibility that requires robust institutional frameworks. The study emphasizes the need to strengthen legal regulations, enforce mandatory professional membership, and adapt internationally recognized ethical standards, particularly those set by the European Council of Interior Architects (ECIA), to the Turkish context. Promoting ethical awareness, institutional accountability, and a culture of professional self-discipline is essential for enhancing the credibility of the profession and ensuring the delivery of safe, high-quality services. Future research should explore comparative analyses of ethical breaches across regions, investigate the impact of ethical dilemmas on decision-making processes, and evaluate the effectiveness of ethics education.

Keywords: Interior architecture, Professional ethics, Code of behavior

GİRİŞ

İçmimarlar tüm mekanları yaratıcı ve teknik beceriler kullanarak estetik ve işlevsel şekilde tasarlamaktadır. Tasarım sürecinde kullanıcının sadece gereksinimleri değil, istek ve beğenileri de önemli bir etken olmaktadır. Bu açıdan değerlendirildiğinde Kaçar'ın içmimarlık tanımı mesleğin kavranması açısından dikkate değer bir açılım sağlamaktadır. "İnsanların gereksinimlerini karşılamak amacıyla belirlenmiş mekanları pratik, estetik ve sembolik işlevleri açılarından ele alan, insanların fiziksel ve ruhsal özellikleri ve eylemlerine uygun olarak mekanları biçimlendiren bir meslek alanıdır" (Kaçar, 1998: 56). Kaçar'ın tanımında, içmimarlığın ilgi alanının ve temel sorunsalının insan olduğu belirtilmektedir. Kısaca insanlar için, insanlar tarafından üretilecek değerlerin; bu kişilerin yaşamlarına yönelik, onların daha iyi, daha doğru ve daha güzel yaşamalarını sağlayacak ortamların oluşturulması amacıyla üretilmesi gerekliliği vurgulanmıştır (Kaptan, 2013: 48). Bu nedenle mekan-kullanıcı arasındaki bağı kurmakla yükümlü içmimarın ilişkileri ve iletişimi yürütürken insana ait değerleri de koruması beklenmektedir. Bu durum hem tasarım hem de uygulama aşamasında önemli bir etken olarak ortaya çıkmaktadır.

İç mekan bireylerin gündelik yaşam deneyimlerinin şekillendiği temel bir bağlamdır. Bu bağlamın tasarlanması, yalnızca estetik ve işlevsel tercihleri içeren bir mesleki faaliyet olmamakla birlikte önemli etik ve profesyonel sorumlulukları beraberinde getirir. İç mekan tasarımı pratiği, mesleğin icrasında profesyonellik ve iş odaklılık ilkelerinin benimsenmesini gerektiren çok katmanlı bir süreçtir. İçmimar, iç mekanları tasarlama sürecinde çoğunlukla ilişkiler ve iletişim konularına emek harcamaktadır (Piotrowski, 2002: 5). Kullanıcı iletişimindeki somut-soyut ilişkiler genellikle bir takım toplumsal ve ahlaki kuralların da tasarım süreçlerine etki etmesine neden olmaktadır (Piotrowski, 2002: 31). Bu nedenle içmimarın topluma ve mesleğe ait birtakım ilkelere ve tutumlara uyuyor olması beklenir. Bu ilkeler ve tutumlar mesleğin hem tasarım hem de uygulama süreçlerinde adil, dürüst ve sorumlu davranışların sergilenmesinde temel yaklaşımlar olarak büyük önem taşımaktadır (Anderson vd., 2007: 6). Günümüzde sektörel düzenlemelere ilişkin politikalar doğrultusunda, devlet tarafından lisanslanan veya sertifikalandırılan tasarımcıların, iç mekân tasarımına yönelik stratejik yaklaşımları benimseme olasılığı daha yüksek görülmektedir. Bu durum, söz konusu tasarımcıların yüksek düzeyde öğrenme hedefi yönelimine sahip oldukları şeklinde özetlenebilir (Huber, 2021: 28). İçmimarın mesleği, meslektaşları, müşterileri ve toplumla olan ilişkilerini düzenleyen ilkeler ve tutumlar genellikle etik, kamu etiği, iş etiği, meslek etiği gibi başlıklar altında toplanmaktadır. İş etiği alanlarından biri olan mesleki etik ilkelerine bağlı hareket etmek, rekabet ortamında başarı olasılığını arttırmaktadır (Erdirençelebi & Filizöz, 2019: 1230).

Mesleki etik ilkelerin oluşturulması ve meslek profesyonellerince uygulanması, meslek üyelerinin birlikte hareket edebilme yeteneğiyle doğrudan ilişkilidir. Meslek kuruluşları bu ortamı düzenlemek ve denetlemekle görevlidir (T.C. Ticaret Bakanlığı, 2019). Meslek profesyonellerinin bir arada olduğu ve aynı hedeflerle meslek etkinliğini gerçekleştirdiği bu kuruluşlar, ulusal yasalarla düzenlenmiştir. İçmimarlık alanında, 6235 Sayılı Türk Mühendis ve Mimar Odaları Birliği Kanunu çerçevesinde kurulmuş olan Türk Mühendis ve Mimar Odaları Birliği'ne (TMMOB) bağlı İçmimarlar Odası (İÇMO) bu görevi üstlenmektedir. Meslek kuruluşları, belirli ilkeler ve standartlar belirleyerek, bir denetim mekanizmasıyla desteklenen adil ve şeffaf sektörel bir ortam oluşturmayı amaçlamaktadır. Uluslararası alanda ise, AB kapsamında üye ülkelere yönelik, Avrupa İçmimarlar Konseyi (European Council of Interior Architects-ECIA) ile Amerika Birleşik Devletleri'nde (ABD), Amerikan İçmimarlar Derneği (American Society of Interior Designers-ASID) içmimarlık mesleğine dair ilke ve standartları sunma ve denetleme görevlerini yürütmektedir. Meslek etiği ilkeleri, bu kuruluşların görev tanımı içinde olup mesleği, hizmet alanlarını, meslek profesyonellerini, müşterilerini ve topluma ait hakları korumak üzere uygulamaya geçirilmiştir.

Literatürde yapılan çeşitli çalışmalarda da içmimarlık mesleğinin etik ilkelere dayalı yapısının önemi vurgulanmaktadır. Wilensky (1964: 138), bir mesleğin profesyonel otorite kurabilmesi için teknik bir temele dayandırılması, özel bir yargı yetkisi iddia etmesi, beceri ve yargı yetkisini eğitim standartlarıyla ilişkilendirmesi ve kamuoyunu sunduğu hizmetlerin eşsiz bir güvenilirliğe sahip olduğuna ikna etmesi gerektiğini belirtmektedir. Bu bağlamda profesyonel mesleklerin bilgi taşıyıcısı ve temsilcisi olma işlevleri de ön plana çıkmaktadır. Ayrıca Freidson (1986: 26), mesleklerin yalnızca yükseköğretim yoluyla değil aynı zamanda üyelerinin davranış ve bağlılıklarını kontrol eden kurumlar yoluyla da toplumsal kontrol mekanizmaları oluşturduğunu belirtmektedir.

Günümüzde tasarım iş rekabetinde önemli bir unsur haline gelirken ekonomik değerlerin ve işlevselliğin sosyolojik boyutların önüne geçtiği görülmektedir. Bununla birlikte tasarım alanında etik sorumlulukların giderek daha fazla önem kazandığı ve tasarımcıların bu konuda çözüm yolları aradığı belirtilmektedir (Anderson vd., 2007). Benzer şekilde Małek-Orłowska (2021: 2), içmimarlık mesleğinin oldukça uzmanlaşmış bir alan olmasına rağmen mesleğin hukuki statüsünün hala tam anlamıyla netleşmediğini ve meslekle ilgili yetkinlikler ile yükümlülüklerin resmi olarak tanımlanmadığını ifade etmektedir. Polonya örneğinde dile getirilen bu durumun, Türkiye'de de benzer şekilde varlığını sürdürdüğü söylenebilir. Bununla birlikte literatürde özellikle Türkiye bağlamında, içmimarlık mesleğine ilişkin etik ihlallerin ele alındığı çalışmalara rastlanmamaktadır. Mevcut etik tartışmalar ağırlıklı olarak normatif ilkeler çerçevesinde ele alınmakta; ancak uygulamada karşılaşılan etik ihlallerin mesleğin itibarına ve kurumsal yapısına etkilerine ilişkin uygulamalı araştırmalar sınırlı kalmaktadır. Bu çalışma içmimarlık alanında basına yansımış bazı uygulamaları mesleki etik çerçevesinde analiz etmeyi ve değerlendirmeyi amaçlamaktadır. Bu doğrultuda çalışma aşağıdaki sorulara odaklanmaktadır:

- Türkiye'de içmimarlık alanındaki uygulamalarda hangi etik sorunlarla karşılaşılmaktadır?
- Bu etik sorunlar meslek itibarını ve mesleğin kurumsal yapısını nasıl etkilemektedir?

Çalışma, içmimarlık mesleğinin itibarına etki eden ve Türkiye genelinde haber olma niteliği taşımış uygulama örneklerini incelemektedir. Bu örneklerden yola çıkarak Türkiye'de içmimarlık alanının mesleki etik kurallarının olması ve denetlenmesi gerekliliği tartışılmaktadır. İçmimarlık, yalnızca estetik ve işlevsel mekânlar yaratma pratiği değil; aynı zamanda bireyin fiziksel, psikolojik ve toplumsal gereksinimleri karşılayan, sorumluluk temelli bir tasarım sürecidir (Poldma, 2010: 4). Tasarımcıların bu süreçte yalnızca teknik yeterlilik değil aynı zamanda etik karar verme becerileriyle de donanmış olması beklenmektedir. Mesleki etik ilkeleri içmimarlık uygulamalarında dürüstlük, adalet ve sorumluluk gibi temel davranışların belirlenmesinde kılavuz rolü oynamaktadır (Anderson vd., 2007: 6).

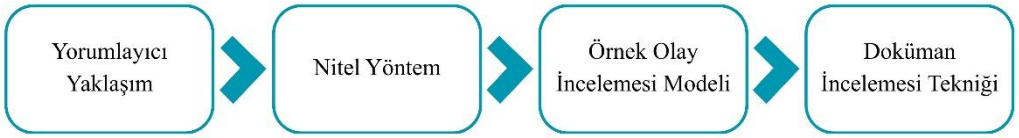
Araştırmanın kapsamı, Türkiye genelinde içmimarlık mesleği bağlamında gerçekleşmiş ve halkın erişimine açık şekilde haberleştirilmiş uygulamalarla sınırlıdır. Bu haberlerden alınan örnek olaylar, mesleki uygulama süreçlerinin toplumsal görünürlüğünü artıran ve bu yönüyle meslek itibarını etkileyen durumları temsil etmektedir. Çalışmada kullanılan örnek olay yöntemi, etik sorunların bağlamsal olarak değerlendirilmesine olanak tanırken aynı zamanda meslek profesyonellerinin uygulama süreçlerindeki kararlarının toplumsal ve profesyonel yansımalarını açığa çıkarmaktadır (Stake, 1995: 11; Yin, 2018: 24).

Çalışmanın önemi içmimarlık mesleğinin yalnızca sunduğu hizmet alanlarından değil, aynı zamanda kamu yararını doğrudan etkileyen yapısal bir niteliğe sahip olmasından ileri gelmektedir. ECIA gibi kuruluşlar, meslek profesyonellerinin yalnızca müşteriye karşı değil, topluma karşı da etik sorumluluk taşıdıklarını belirtmektedir (ECIA, 2005). Nitekim etik kuralları sadece bireysel davranışları değil, aynı zamanda mesleğin kamu nezdindeki itibarını da düzenleyici bir işlevi bulunmaktadır. Bu nedenle meslek etiği, içmimarlık eğitiminde ve uygulamasında merkezi bir rol oynamaktadır (Piotrowski, 2013: 45). Özellikle içmimarlık uygulamalarında ortaya çıkabilecek mesleki sorumluluk ihlalleri, yalnızca meslek profesyonellerini değil mesleğin genel saygınlığını ve güvenilirliğini de etkilemektedir. Bu bağlamda, mesleğin etik boyutlarının sistematik biçimde incelenmesi ve mevcut uygulama alanlarındaki etik yaklaşımların değerlendirilmesi mesleki gelişimin sürdürülebilirliği açısından çalışmanın önemini ortaya koymaktadır.

Yapılan örnek olay incelemesinde ulaşılan olayların içmimarlık alanı kapsamında bulunmasına, haber niteliği kazanmış olmasına ve en önemlisi halka açık ve gündelik hayatın içinde olan uygulamalar olmasına dikkat edilmiştir. Çalışma Türkiye ile sınırlandırılmış olup medya tarafından haberleştirilmiş olayların incelenmesine yer vermektedir. Elde edilen veriler, olaylara ilişkin basın kaynakları üzerinden değerlendirilmiştir. Bu bağlamda, çalışma bulguları olayların kamuya yansıyan yönleriyle sınırlıdır. Ayrıca olayların etik açıdan değerlendirilmesi, meslek etiği ilkeleriyle sınırlı bir çerçevede yapılmıştır.

YÖNTEM

Doğru araştırma modeli seçimi çalışmanın güvenilirliğini etkilemektedir. Araştırma için uygun yöntemlerin belirlenmesi ve elde edilen sonuçların bilime katkılarının tartışılması da bu sürecin önemli aşamalarındandır (Demirci, 2014: 74). Çalışmada izlenen yöntem Görsel 1'de özetlenmiştir.



Görsel 1. Çalışmada izlenen yöntem

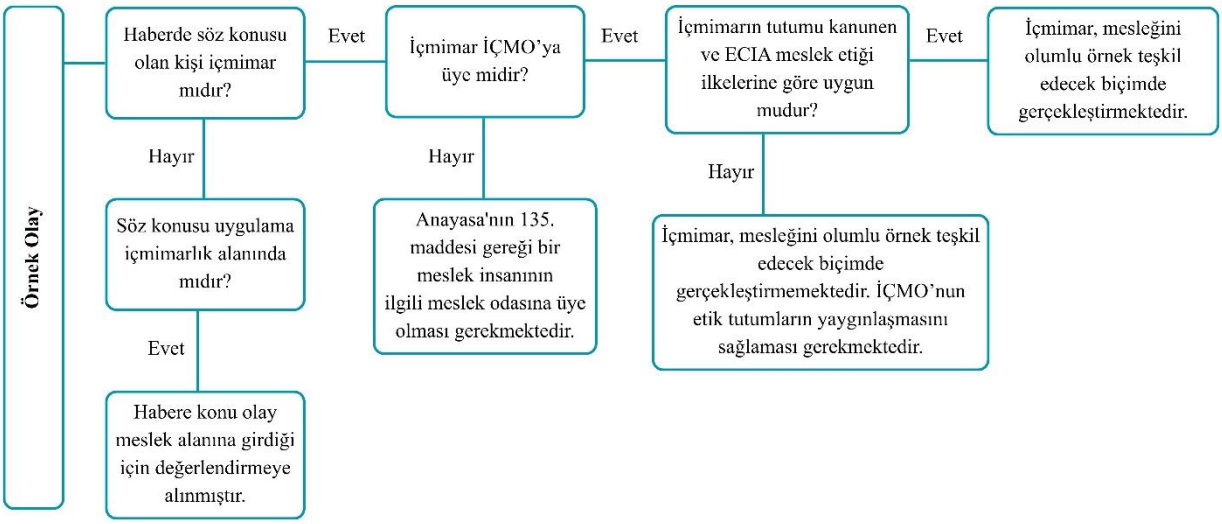
Temel veri ve bilgilerin oluşturulması sonrasında çalışmanın yöntemi olarak örnek olay tarama modeli belirlenmiştir. Örnek olay tarama modelinde olgunun önem taşıdığı durumlarda belge inceleme ve gözlem gibi veri toplama teknikleri kullanılarak durumu oluşturan değişkenler ortaya çıkarılabilir, bu değişkenler arasındaki etkileşimler belirlenebilir ve farklı durumlar karşılaştırılabilir (Şimşek, 2012: 93). Örnek olay incelemesi modeli yalnızca verimli hipotezler oluşturmakla kalmaz aynı zamanda bu hipotezlerin test edilmesine yardımcı olabilecek veriler sunarak genel bilgi birikiminin zenginleşmesine katkıda bulunur.

Veri Toplama Süreci: Çalışmada gazete, dergi gibi basılı, günlük süreli yayımlanan kaynaklar yerine güncelliği, kolay ve hızlı erişilebilirliği göz önüne alınarak internet kaynakları seçilmiştir. Günümüzde birçok basılı yayın organı anlık haberleri yayınlama ve geniş kitlelere ulaşabilmek için internet yayıncılığını da kullanmaktadır (Arslan, 2023: 40). İnternet ortamında yapılan bir arama için çeşitli yöntemler kullanılmaktadır. Bu bağlamda Türkiye'de en çok kullanılan arama motorunun Google olduğu görülmektedir (Önder & Topatan, 2018: 32). Çalışmada, bu arama motoru halka ulaşabilirliği de göz önünde bulundurularak seçilmiş ve belirli anahtar kelimeler kullanılarak tarama gerçekleştirilmiştir: "İçmimar", "İç Mimar", "İçmimarlık", "İç Mekan", "İç Mekan Tasarımı". Verilen anahtar kelimeler üzerinden son on yıla ait haberler incelenerek mesleğe etki eden haberler ayrıştırılmıştır. Ayrıştırma sonucunda ortaya çıkan haber metinleri içinde içmimarlık alanında ahlaki ve etik konularıyla ilişkisi bulunanlar ele alınmıştır. Bu ayrıştırma sürecinde ulusal düzeyde farklı kaynaklarda yayımlanmış ve yüksek okunurluk oranlarına sahip yedi haber metni, örnek olay olarak seçilmiştir. Seçilen bu yedi haber, nitel araştırma yöntemlerinden biri olan örnek olay incelemesi tekniğiyle analiz edilmiştir. Örnek olay için belirlenen yedi sayısı, örnek olay tarama modeli için yeterli kabul edilen 4-10 sayı aralığı (Zainal, 2007: 3) içindedir. Seçilen haberlerin olay niteliği dikkate alınırken, içmimarlık mesleğiyle doğrudan ilgili/ilişkili olmasına özen gösterilmiştir. Ayrıca içmimar-müşteri ilişkileri ile tasarım süreçlerinin yol açtığı sonuçlar da göz ardı edilmemiştir. Örnek olaylarda adı geçen içmimarların, oda üyelikleri olup olmadığına dair bilgi, yazarlar aracılığıyla İÇMO'ya yazılı olarak "4982 sayılı Bilgi Edinme Hakkı Kanunu" kapsamında sorulmuş olup, İÇMO'nun "6235 Sayılı Türk Mühendis ve Mimar Odaları Birliği Kanunu'nun 2. maddesi (b) bendi ile İÇMO Ana Yönetmeliği'nin 8. maddesi (b) bendi ve 27. maddesi (ö) bendi kapsamında" 31 Mayıs 2025 tarih ve 2025/587 sayılı cevap yazısına göre belirlenmiştir (TMMOB İçmimarlar Odası, 2025).

Veri Analizi: Örnek olaylar haber kaynaklarına başvurularak incelenmiştir. Belirlenen örnek olaylar ve elde edilen veriler doküman incelemesi yöntemiyle irdelenmiştir. Doküman analizlerinin sonuçları genellikle anlatı biçiminde özetlenir veya eğilimleri ve diğer önemli sonuçları gösteren tablolarla bütünleştirilir. Durum çalışması araştırmacısı tarafından incelenen belgeler; internetten elde edilen materyaller, özel ve kamuya ait kayıtlar, fiziksel kanıtlar ve araştırmacı tarafından oluşturulan araçları içermektedir (Hancock & Algozzine, 2006: 52). Her haber konum, uygulama, neden ve sonuç başlıklarına göre sınıflandırılmıştır. Elde edilen verilerin değerlendirmesi, Türkiye'de İçmimarlık alanında etik ilkelerin tanımlanmamış olması nedeniyle ECIA'nın Meslek Etiği ve Davranış İlkeleri kapsamında yapılmıştır.

Etik değerlendirme kapsamında yürütülen analiz süreci, etik kavramının doğası gereği belirli ön kabullerin sorgulanmasını ve değerlendirme aşamalarının bu doğrultuda yapılandırılmasını gerektirmiştir. Bu bağlamda, çalışmanın örnekleminde yalnızca mesleki yeterliliğe ve içmimarlık ünvanına sahip profesyoneller değil aynı zamanda içmimarlık alanında faaliyet göstermesine rağmen bu ünvana sahip olmayan kişi ve kurumlar tarafından gerçekleştirilen uygulamalar da yer almıştır. Bu tercih, araştırmanın temel amacına dayanmaktadır: İçmimarlık mesleğinin sınırları, yalnızca yasal yetkinlikler ve meslek odası üyeliği gibi biçimsel kriterlerle

değil aynı zamanda fiili uygulamalar ve bu uygulamaların kamusal alana özellikle medya aracılığıyla nasıl yansıdığıyla da şekillenmektedir. Örnek olayların seçiminde uygulamanın içmimarlık meslek alanı kapsamında değerlendirilip değerlendirilemeyeceği temel ölçüt olarak alınmış uygulayıcı kişi ya da kurumun meslekî ünvanı ve yasal yetkinlik durumu ise analiz sürecinde ikincil düzeyde ele alınmıştır. Çalışmanın kapsayıcılığını artırmak ve alana ilişkin etik sorunları daha bütüncül biçimde ortaya koymak amacıyla, içmimarlık hizmet alanına giren ancak yetkisiz kişi ya da kurumlar tarafından gerçekleştirilen uygulamalar da inceleme kapsamına dahil edilmiştir. Söz konusu örnek olay analizinde izlenen yöntemsel aşamalar Görsel 2'de sunulmaktadır.



Görsel 2. Meslek etiği analizi için sağlanması gereken önkoşullar

KAVRAMSAL ÇERÇEVE

Kavram, insan zihninde anlam kazanan bir bilgi yapısıdır. Bu bağlamda kavram öğrenme süreci, aslında bilgi edinme sürecinin bir parçasıdır (Karadüz, 2004: 52). Genel anlamda kavram; farklı nesne, olgu ve olayların değişebilen ortak özelliklerini temsil eden zihinsel bir yapı olarak tanımlanabilir (Ülgen, 2001: 100). Dolayısıyla kavramlar, doğada kendiliğinden var olmadıkları için, içinde bulundukları bağlama göre tanımlanmaları gerekmektedir. Ahlak ve etik kavramlarının tanımlanması da meslek etiği bağlamında ilkelerinin anlaşılır olması, bu kavramlar arasındaki ilişkinin anlaşılması, davranış ilkelerinin yorumlanması açısından gereklidir. Bu bilgi, meslek profesyonellerinin meslek yaşamlarında hangi davranışların kabul edilebilir olduğunu anlamalarını sağlarken, kullanıcı ilişkilerinde de daha doğru kararlar vermelerini sağlayabilmektedir. Ahlak; klasik sözlüklerde en genel anlamıyla insanın yaratılıştan gelen kökleşmiş tabiatı olarak tanımlanmakta ve bireye özgü tabiat, fıtrat, mizaç, cibilliyet, şahsiyet, seciye ve huy gibi terimlerle açıklanan kişilik ve karakter özellikleriyle ilişkilendirilmektedir. Bu bağlamda ahlak, toplumsal değil bireysel bir niteliğe sahiptir ve her bireye özgü kişisel bir özellik olarak değerlendirilmektedir (Koca, 2016: 132). Ahlak kavramı bugüne kadar birçok araştırmacı tarafından değerlendirilmiştir.

Davranış kalıplarının ahlak üzerine kurgulanmasına Kant'ın çalışmalarında rastlanmaktadır. Kant, "tüm ahlak yargılarının en yüce ilkesi akılda bulunur" diyerek aklı her türlü ahlaki eylemin temel belirleyeni olarak vurgular. Ona göre, akıldan kaynaklanan hareket nedeni nesnel ve a priori olmalıdır (Çilingir, 2015: 55). Ahlak bireylerin iyi-kötü, doğru-yanlış konusundaki inançlarını belirleyen ve bu inançlara göre davranışlarını yönlendiren kurallar ve standartlar bütünüdür. Bu kurallar ve standartlar, toplumsal beklentiler ve kültürel normlar doğrultusunda şekillenir ve bireylerin toplumsal yaşamda uyumlu olarak bir arada yaşamalarını sağlar (Ferrell & Fraedrich, 2016: 33). Ahlak, ne yapmalıyım sorusuna yanıt verir. Yanıt başkalarının denetiminden beklenen ödüller veya yaptırımlardan bağımsız olarak bireyin kendi kendine kabul ettiği ya da etmesi gereken kurallar bütünüdür. Diğerleri ne yapmalıdır sorusunun yanıtı ise töre kavramında bulunur. Ahlak, yalnızca birinci tekil şahıs açısından meşru ve değerlidir, ancak bu meşruiyet evrensel bir nitelik taşır; yani tüm insanlar için geçerlidir (Comte-Sponville, 2006: 21). Kohlberg ahlak gelişimi süreçlerini gelenek öncesi, geleneksel ve

gelenek ötesi olarak evrelendirmiştir. Gelenek öncesinde kişi cezadan kaçınmak ya da ödül amacıyla kurallara uyar. Geleneksel süreçte kişi zor durumda kalmadıkça kurallara uymaktadır. Gelenek ötesinde ise toplumsal düzen evrensel ilkelerle sağlandığı için bu ilkelere herkesin sorumluluk taşıdığı düşüncesiyle uyulur (Kohlberg, 1964: 429). Ahlakta insanların davranışlarının belirli normlara uygun olması beklenir ve bu davranışlar genellikle otomatik olarak sergilenir. Ahlaki normlar zamanla ve topluma göre değişebilir. Ancak etik değerler, her zaman ve her yerde insanın insan olma değerini koruyan sabit ilkelerdir (Kuçuradi, 1996: 17). Etik ve ahlak kavramları çoğu zaman iç içe geçmiş ve birbirlerinin yerine de kullanılmıştır. Ahlaki normların toplumsal ve kültürel değişimlere bağlı olarak farklılık göstermesi doğaldır. Etik değerler her zaman ve her yerde insanın değerini ve onurunu koruyan bir bilgi birikimini temsil eder. Özellikle ahlak ve etik arasındaki bu ayrım bireylerin davranışlarını değerlendirirken dikkate alınması gereken önemli bir noktadır.

Etik, ahlaki olanın özünü, temellerini inceleyen bir bilim dalıdır ve insan davranışlarıyla ilgili sorunları ele alan bir felsefe disiplini olarak tanımlanır. Etik, ahlak felsefesidir. Bireylerin davranış ve eylemlerinin ahlaki doğruluğunu değerlendirir. Etik, insanın tüm davranış ve eylemlerinin altında yatan temelleri araştırır (Cevizci, 2015: 11). Ahlak, etiği öncelikli kılmaktadır. Etik amaçların ahlaki normların süzgecinden geçmesi gereklidir. Ahlaki normların uygulanmasında çıkmazlar yaşandığında etiğe başvurulması doğal bir süreçtir. Ahlak, etik amacın meşruiyetini ve önemini sağlayarak onun sınırlı bir şekilde gerçekleşmesine zemin hazırlar. Bu bağlamda, etik ahlakı kapsar ve bu iki kavram birbirlerini tamamlar niteliktedir. Böylece moral ve etik teoriler karşılıklı bir tamamlayıcılık içinde bulunurlar (Ricoeur, 2010: 233). Kant'ın etik anlayışında, görev ve özgürlük arasında iç içe geçmiş bir ilişki bulunmaktadır. Görev etiği, özgürlüğü beraberinde getirir. Kant'a göre ahlaki yasa olmadan özgürlük kavramından söz edilemez, çünkü özgürlük, bilinçli olarak ahlaki yasalar aracılığıyla elde edilir, doğrudan elde edilmez (Kant, 1980: 34). Etik, ne yapılmalıdır sorusuna cevap arar. Kuçuradi'nin etik anlayışında yer alan değer kavramıyla sözü edilen şey, o eylemin yapıldığı koşullarda diğer eylem olanaklarından farklı, yani bunun yapılmasında neler harcandığı ve aynı şartlarda başka şeyler yapılsaydı neyi sağlayacağı, neyi koruyacağı, neyi harcayacağının tutarlı bir şekilde ifade edilmesidir (Çamak, 2023: 40). Etik ahlaki normların temellerini araştırır ve bu temelleri genel ve evrensel kurallara döker. Ahlak bireysellik göstererek kişiden kişiye değişen bir kavram olsa da etik için böyle bir değişimden söz edilemez. Etik felsefe içinde kapsamlı bir alanı kaplamaktadır ve meslek etiği de bu alanın bir parçası olarak görülmektedir.

Zaman içinde tüm meslekler, bu mesleklerde aktif olan bireylerin ahlaki değerlerine, gereksinimlerine ve beklentilerine uyum sağlamak amacıyla etik kurallar tarafından yönlendirilir (Ercan vd., 2021: 99). Bu açıdan değerlendirildiğinde, meslek etiği belirli bir meslek grubunun üyelerinin uyması gereken etik kurallardır. Bu kurallar, genellikle toplumsal kültürün ve değerlerinden bağımsız olarak evrensel nitelik taşır. Örneğin hekimler dünya genelinde aynı Hipokrat yeminini ederler. Benzer şekilde muhasebecilerin ve avukatların uyması gereken mesleki etik ilkeleri nerede olurlarsa olsunlar genellikle benzer özellikler taşır (Arslan, 2005: 108). Meslek etiği, bir mesleğin icra edilmesi sürecinde ahlaki ve mesleki ilkeler doğrultusunda hareket etme disiplini olarak kabul edilir. Bir mesleği yerine getirirken meslek profesyonellerinin bu ilkelere olan bağlılığı, o mesleğin toplum içinde saygı ve güven kazanmasına katkı sağlar (Özkol vd., 2005: 109). Etik, evrensel kazanımların genel olarak tüm mesleklere yansıtılmasını sağlar. Meslek etiği, iş hayatında yer alan bireylere mesleklerinin ilke ve standartları konusunda rehberlik eder. Belirli bir meslek grubunu kişisel eğilimlerden uzaklaştırarak, mesleki kurallara uymaya teşvik eder. Mesleğin ideallerini göstererek ilkesiz davranışları dışlar (Kayabaşı, 2018: 5).

Kuçuradi (2003: 8), "bugün 'etik' adı altında karşımıza çıkan ahlaki değerlerin, ahlaki ilkelerin veya mesleki etik kurallarının yaşamımızda önemli bir rolü vardır. Ancak bu değerler ve ilkeler, felsefi bilgi temelinde oluşturuldukları, değerlendirildikleri ve kendi özgün işlevleri anlaşıldığı zaman yaşamımızda tam olarak yerlerini bulabilirler" demektedir. Meslek etiği bireyden kurumlara kadar toplumun her kesiminin etik anlayışlarından etkilenir. Ancak, belirlenen etik ilkeler ve standartlar bazı meslek profesyonelleri tarafından engelleyici koşullar olarak görülmektedir. Bunun önemli bir nedeni meslek profesyonellerinin kurallar çerçevesinde hareket etme zorunluluğudur. Bazı zamanlarda iş yapma sürecinde kısıtlı bir hareket alanı bırakmaktadır. Bu durum maddi ve manevi başarıyı etkileyen bir etken olarak kabul edilmektedir. Ancak bu ilke ve standartlar, meslek profesyonellerinin ve hizmet alanlarının, dolayısıyla mesleğin haklarının ve

itibarının korunması, rekabetin adil olması ve eşit koşullarda iş yapma olanaklarının sağlanmasına hizmet etmektedir.

Meslek Kuruluşları, Etik ve Davranış İlkeleri

Dilimize Arapçadan geçmiş olan meslek kavramı, Türkçe bilim terimleri sözlüğünde "geçim sağlamak için tutulan iş güç, yürütülen etkinlik ya da ekonomik çalışma" ve "aynı etkinlik kümesinde bulunan kişilerin oluşturdukları topluluk" şeklinde açıklanmaktadır. Avcı'ya göre (2012: 45) meslek, "kişinin yaşamını devam ettirebilmesi için yaptığı, genellikle bir bilgi birikimi, eğitim ve seçilen mesleğe göre yetenek geliştirmeyi gerektiren bir çalışma sürecinin sonunda elde ettiği ünvandır." Kavramın İngilizce karşılıklarına bakıldığında meslek *occupation* ve diploma gerektiren meslek *profession* ayrımı yapıldığı görülmektedir (Cambridge Dictionary, 2025). Meslek kuruluşları, bir meslek grubuna ait kişilerin mesleklerini gerçekleştirebilmek amacıyla üye oldukları, onların haklarını koruyan, mesleğin standartlarını belirleyen ve denetlenerek sürdürülmesini sağlayan, üyeler arasında dayanışmayı sağlayan kamu kurumu niteliğindeki meslek örgütleridir (Nohutçu, 2019: 77). Başka bir yaklaşımla, "bir mesleğin gelişimini sağlamak, meslek üyelerinin gereksinimlerini karşılamak ve bunlar gibi o mesleğe ilişkin özel veya kamusal yararları gerçekleştirmek üzere oluşturulan tüzel kişilerdir" (Avcı, 2012: 47). Bu tür bir örgütlenmenin gerçekleştirilebilmesi için yasa ve yönetmeliklerle düzenlenmiş olması gerekmektedir. Türkiye'de Anayasanın 135. Maddesi, kamu kurumu niteliğindeki meslek kuruluşları, meslek üyelerinin oluşturduğu, tüzel kişilikleri olan, bir kısım kamu görevlerini yerine getiren, üyeleri üzerinde kamu hukukundan doğan bazı yetkilere sahip olan kişi topluluklar olarak belirtilmiştir. Yapısı ve görevleri yönünden diğer kamu kurumlarından ayrılırlar, kamu tüzel kişileridir (Gözübüyük & Tan, 2001: 24). Bu tüzel kişilik Türkiye'de meslek odası tanımı ile bilinmektedir. Meslek odaları, meslek alanını ve üyelerini devlet adına denetleyen ve kontrol eden kuruluşlardır. Meslek üyelerinin kayıtlarını, sicillerini, mesleki ilkelere uyumlarını sağladıkları gibi, onları devlet adına denetler ve disipline eder. Bu yönüyle değerlendirildiğinde mesleki kuruluşların, devlet adına kamu otoritesini kullanan kuruluşlar olduğu söylenebilir (Çaha, 2011: 216). Bu amaçla yasa ve yönetmelikler hazırlayarak ilgili meslek alanının düzenlenmesini, kontrol edilebilmesini ve denetlenebilmesini sağlamaktadır.

Bütün meslekler için toplumsal düzen ve refahın sağlanması ve güven ortamının oluşturulması adına uygulanması gereken temel bazı davranış ilkeleri bulunmaktadır. Bu ilkeler belirli bir meslek grubunun, meslek üyelerine emreden, onları belli kurallarla davranmaya zorlayan kişisel eğilimlerini sınırlayan, yetersiz ve ilkesiz üyeleri meslekten dışlayan, mesleki rekabeti düzenleyen ve hizmet ideallerini korumayı amaçlayan mesleki ilkelerdir (MEGEP, 2006: 23). İş hayatı içerisinde doğru davranış biçimlerini uygulamak, dürüst, adil, eşit ve tarafsız olmak, bu temel ilkeler içinde kabul edilmektedir. Kamuda ve birçok meslek kuruluşunda bu ilkeler, meslek etiği kapsamında ele alınmıştır. Evrensel bir yaklaşımı içeren meslek etiğinin temel ilkeleri "doğruluk, yasallık, yeterlik, güvenirlik, mesleğe bağlılık, sorumluluk, insan haklarına saygı, sevgi-hoşgörü" şeklinde sıralanır.

TMMOB İçmimarlar Odası (İÇMO), 4 yıllık eğitim veren içmimarlık ve içmimarlık ve çevre tasarımı bölümlerinden mezun olarak "içmimar" ünvanı almış meslek profesyonellerini üye olarak kabul eden, hak ve yetkilerini savunan bir meslek kuruluşudur (TMMOB İçmimarlar Odası, 2018a). İÇMO, diploma gerektiren meslek olarak kabul edilen içmimarlığın itibarını ve içmimarlara yönelik hakları korumak, sektörde adil ve eşit iş yapma olanaklarını sağlamak ve içmimarlığın uygulama standartlarını oluşturmak ve denetlemek amacıyla bir dizi tüzük ve yönetmelik yayınlamıştır. Bu yönetmelikler aşağıdaki gibidir.

- TMMOB İçmimarlar Odası Ana Yönetmeliği (TMMOB İçmimarlar Odası, 2006).
- TMMOB Serbest İçmimarlık Hizmetlerini Uygulama, Tescil ve Mesleki Denetim Yönetmeliği (TMMOB İçmimarlar Odası, 2008).
- TMMOB İçmimarlar Odası İçmimari Proje Çizim ve Sunuş Standartları Şartnamesi (TMMOB İçmimarlar Odası, 2018b).

Bu yasa ve yönetmelikler İÇMO'nun yapısı, kurulları ve çalışma ilkeleri ile meslek profesyonellerinin sorumluluk alanları, iş yapma yöntemleri, uygulama alanları gibi mesleki düzenlemeler içermektedir.

ECIA mesleki etik ve davranış ilkeleri

Avrupa Yeterlilikler Çerçevesi (AYÇ), 23 Nisan 2008'de Avrupa Parlamentosu ve Konseyi tarafından kabul edilmiş bir sistemdir. Amaç; Avrupa'daki yeterliliklerin şeffaflığını artırmak, ülkeler arası tanınmasını ve taşınmasını kolaylaştırmak, ulusal sistemler arasında karşılaştırma yapabilmektir. AYÇ, bireylerin bilgi, beceri ve yetkinliklerini tanımlayan sekiz seviyeden oluşur. Tavsiye kararına katılan ülkeler, kendi ulusal yeterlilik çerçevelerini AYÇ ile uyumlu hale getirmeyi ve belirlenen takvime göre uygulamayı kabul etmiştir. Türkiye'de AYÇ Ulusal Koordinasyon Merkezi, Mesleki Yeterlilik Kurumu'dur (Mesleki Yeterlilik Kurumu, 2013). Avrupa Parlamentosu ve Konseyi (2005) tarafından kabul edilen 2005/36/AT sayılı Direktife göre mesleklere ait eğitim ve sektörel alanlardaki düzenlemeleri içeren Mesleki Yeterliklerin Karşılıklı Tanımlanması Direktifine bağlı olarak Türkiye'de içmimarlara yönelik meslek etiği ve davranış ilkelerinin bulunmaması nedeniyle, bu bölümde kaynak olarak ECIA'nın meslek etiği kapsamında belirlediği davranış ilkeleri örnek alınmıştır.

ECIA içmimarlık alanındaki Avrupa meslek örgütlerinin temsilci organı olarak 1992'de kurulmuştur. ECIA üyesi içmimarlar için mesleklerini icra etme yöntemlerine ilişkin standartlar belirlemeyi hedeflemektedir. Standartlar ECIA Model Davranış Kuralları ve Mesleki Etik olarak yer almaktadır. Tüm ilgili içmimarlar bu kurallara uymakla yükümlüdür. Kurallar üyelerin mesleki davranışlarını, topluma, müşterilere ve meslektaşlara olan tutumlarını tanımlar. Bu kapsamda, ECIA-İçmimarlar için Davranış ve Mesleki Etik Kuralları Modeli (ECIA-Model Code of Conduct and Professional Ethics for Interior Architects) ile içmimar meslek kuruluşlarına bir model önermiştir. Bu kurallar, üyelerin mesleki davranışlarını, mesleğe, topluma, müşterilere ve meslektaşlara olan tutumlarını tanımlamaktadır. Malmö'de 1 Ekim 2005'te ECIA genel kurulu tarafından kabul edilen Davranış İlkeleri altı ana başlık altında toplanarak uygulamaya geçirilmiştir. Bu ilkeler, genel başlıklar ve açıklamalarıyla birlikte aşağıdaki gibidir.

Genel Sorumluluk: İçmimar sorumlulukları dahilindeki davranış, değer, tutum ve iş yükümlülüklerini bilmek ve bunlara uymakla yükümlüdür. Mesleğin onur ve itibarını zedeleyecek tutumlardan kaçınmalı ve yargı sınırları dışında kalan, ahlaki açıdan tutarsız durumlara karşı etik ilkeler doğrultusunda hareket etmelidir. İçmimar, kabul ettiği görevlerin yetki sınırlarını aşmadığından emin olmalı, yetkisinin gerektirdiği mesleki bilgi ve becerileri ile ilgili sürekli gelişmeye çalışmalıdır. Ayrıca kabul ettiği görevlerde kişisel çıkarları ve mesleki görevlerinin çatışmadığından emin olmalıdır.

Topluma Karşı Sorumluluk: İçmimar müşterilerine bilgi, görgü ve entelektüel kapasitesini aktararak hem müşterinin hem de toplumun çıkarlarını koruyacak şekilde bu bilgileri kullanmalıdır. İçmimar, profesyonel hizmet sunduğu kişilere geniş bir bakış açısı sunabilmeli, tasarım ve uygulama hizmetlerinde yaşamı kolaylaştıran ve mekan ile ilişkileri geliştiren öneriler yapmalıdır. İçmimar, çevreye, doğaya ve insana karşı duyarlı olmalı, bilgisini bu duyarlılıklar doğrultusunda güncelleyerek en makul şartlar altında faydalı olacak şekilde uygulamalıdır.

Müşteriye Sorumluluk: İçmimar, müşteri çıkarlarını gözeterek projeleri üstlenmeli ve iş anlaşmalarını yasal prosedürlere uygun olarak yazılı hale getirmelidir. Projelerin kapsamı, sunulacak hizmetler, çalışma koşulları ve maliyetler gibi detaylar net bir şekilde belirlenmelidir. Ücretlendirme konusunda şeffaf bir iletişim sağlanmalı ve meslek kuruluşu tarafından belirlenen asgari ücret tarifesine uyulmalıdır. Proje süresince ek hizmetler veya maliyetler hakkında müşteri bilgilendirilmeli ve onay alınmalıdır. İçmimar, projeye dair ayrıntılı bir plan yapmalı, kalite kontrol süreçlerini uygulamalı ve düzenli belgelendirme ile hesap verilebilirlik sağlamalıdır. Müşteri bilgileri ve proje detayları gizli tutulmalı, izinsiz paylaşım yapılmamalıdır.

Mesleğe Karşı Sorumluluk: İçmimarlar, meslektaşlar arasında dayanışmayı güçlendirerek bilgi ve deneyim paylaşımıyla mesleki standartların yükselmesine katkı sağlar. Mesleki sorumluluk, meslektaşlara saygıyı ve itibar zedeleyici davranışlardan kaçınmayı içerir. Dayanışma, yeni nesillere destek olmayı da kapsar. Proje gereksinimlerinde risk, yarar ve paydaş analizi yapılmalı; rekabet ortamında etik kurallara uyulmalı ve meslektaş projelerine saygı gösterilmelidir. Çalışanlara uygun koşullar sağlamak, adil ücretlendirme ve dürüst iletişim, kurum performansını artırır. İntihal, etik dışı olup fikri mülkiyet haklarına aykırıdır; özgün tasarımlar geliştirmek mesleki itibar için gereklidir. Ekip çalışması ise yenilikçi tasarımların temelidir.

Halka Açıklık: Reklamlar, tüketicileri bilgilendirme ve yönlendirme işlevleriyle ekonomik sistemde kritik bir rol oynar; ancak bu işlevlerini yerine getirirken etik ve yasal sorumluluklara uyulmalıdır. İçmimarın reklamları, meslektaşlarını veya toplumun bir grubunu küçümsemeden, yanıltıcı olmaksızın gerçek, anlaşılabilir bilgi sunmalı ve ürünün doğru kullanımını yansıtmalıdır (İnal, 2000'dan aktaran Tandaçgüneş, 2016: 55). İçmimari eserin özgünlüğü, tasarımcının yaratıcılığını esere katmasıyla sağlanır (Buldaç & Kaptan, 2020: 294). Bu nedenle, içmimarın tanıttığı projeler kendi tasarımlarını yansıtmalı, başkalarının çalışmalarını sahiplenmekten kaçınılmalıdır. Yarışmalara katılımda veya jüri üyeliğinde ulusal ve uluslararası meslek kuruluşlarının kurallarına eksiksiz uyulmalı, değerlendirme ölçütleri ve ödül dağıtımında adil bir yaklaşım benimsenmelidir.

***Uyumluluk ve Yaptırımlar*:** Mesleki etik kurallarını benimsemiş kişilerin veya kurumların ortak denetimi, etik kurulların şikayetleri adil bir şekilde değerlendirip kanıtlar sunarak karar vermesi açısından önemlidir. Genellikle, meslek kuruluşlarının yasalarında üç ana birim bulunur; yönetim, denetim ve disiplin kurulları (Çaha, 2012: 109). Meslek etiği ilkelerinin yazılı kurallar veya standartlar olarak belirlenmesi ve tüm meslek üyelerine benimsetilmesi, hatalı kararların çözümünü kolaylaştırabilir (Özkol vd., 2005: 109). Etik kurullar, içmimara uyarı, disiplin cezası veya üyelikten men gibi yaptırımlar uygulayabilir. Bu yaptırımlar, mesleki etik kurallarına uyumu teşvik eder ve mesleğin itibarını korur.

Örnek olaylar bu açıklamalarla ele alınan davranış ilkeleri aracılığıyla değerlendirilmiştir. Doküman analizi sonrasında elde edilen verilerin ilişkilerinin analizi ile elde edilen bulgular tablolar aracılığı ile gösterilmektedir.

BULGULAR

Belirlenen yedi örnek olay ahlaki ve etik olgular üzerinden doküman inceleme yöntemiyle irdelenmiştir. Bu yedi olay Görsel 2'de belirtilen yönteme göre incelendiğinde aşağıdaki gruplar ortaya çıkmıştır.

- Yetkisiz kişilerin yer aldığı örnek olaylar
- İÇMO üyesi olmayan içmimarın yer aldığı örnek olaylar
- İÇMO üyesi olan içmimarın yer aldığı örnek olaylar

Örnek olaylar ve olaylara ait haber karekodlarının yer aldığı tablolarda, haberler orijinal metinleri bozulmayacak biçimde özetlenmiş ve detaylı okuma için haber kaynağına karekodla erişim olanağı sunulmuştur.

Yetkisiz Kişilerin Yer Aldığı Örnek Olaylar

Tablo 1. Örnek olay 1

Haber Başlığı	**İstanbul, Beşiktaş'ta yangın**
Konum	İstanbul, Beşiktaş, Gayrettepe
Uygulama	İç mekan tadilat uygulaması Yetkisiz kişilerce ruhsat alınmadan kaçak tadilat yapılması
Neden	Yangın
Sonuç	Ölüm: 29 kişi Yaralı: 1 kişi Gözaltı: 9 kişi (4 kişinin farklı suçlarda kaydı bulunmaktadır.)

İlgili haberde İstanbul'da 16 katlı binanın gece kulübü olarak kullanılan giriş katında çıkan yangında 29 kişinin hayatını kaybettiği, 1 kişinin yaralandığı belirtilmektedir (Medyascope, 2024). Haberde belirtilen olayda yapılan uygulamanın yasa ve yönetmelikler bağlamında bir içmimarlık hizmeti olduğu görülmektedir. Bu kapsamda yapılan uygulamanın projelendirilmesi, uygulanması aşamasında yetkisiz kişilerin görev aldığı belirlenmiştir. Konuyla ilgili yerel yönetimlerden, esaslı ya da basit tadilat izni alınmadığı, iş güvenliği önlemlerinin alınmadığı ve şantiye ile ilgili bir yetkili atanmadığı görülmektedir. Bu usulsüzlüklerle yapılan uygulama sonucunda çıkan yangın can kaybına sebep olmuştur.

Tablo 2. Örnek olay 2

Haber Başlığı	**Dikkat! Sahte içmimarın yeni hedefi siz olabilirsiniz!**
Konum	İstanbul
Uygulama	İç mekan tasarımı ve uygulaması Asıl mesleği elektrikçilik olan kişinin kendini içmimar olarak tanıtması
Neden	Yanlış/niteliksiz uygulama, kusurlu üretim
Sonuç	Yüzden fazla kişinin şikayeti söz konusudur

Superhaber'in (2024) haberine göre kendini içmimar olarak tanıtan bir kişinin, yetkinliği olmadan projeler üstlenerek birçok kişiyi maddi zarara uğrattığı ortaya çıkmıştır. Haberde belirtilen olayda yapılan uygulama, yasa ve yönetmelikler kapsamında bir içmimarlık hizmetidir. Yapılan uygulamanın bir içmimar tarafından yapılmadığı, uygulamayı yapan kişinin asıl mesleğinin elektrikçi olmasına karşın kendini içmimar olarak tanıttığı ve bu alanda hizmet sunduğu belirlenmiştir. Haberde kişinin gerçekleştirdiği birçok uygulama için yüzlerce şikayet olduğu belirtilmektedir. Bu kişinin içmimar olduğunu belirterek gerçekleştirdiği uygulamalar mesleğin itibarını zedeleyecek sonuçlar doğurmuştur.

Tablo 3. Örnek olay 3

Haber Başlığı	**Ece Erken'in mimarı sahte çıktı**
Konum	İstanbul
Uygulama	İç mekan tadilat uygulamaları İÇMO'ya kaydı bulunmayan kişinin yetkisi olmayan alanda kayıt dışı tahsilatla uygulama yapması
Neden	Fazla ücret talebi
Sonuç	Konu hakkında başlatılan yasal süreç

Ece Erken, evinin tadilatını gerçekleştiren kişinin, sahte içmimar olduğunu iddia ederek yargı süreci başlatmış; söz konusu kişinin İçmimarlar Odası'na kayıtlı olmadığı, fatura kesmeden tahsilat yaptığı ve vergi usulsüzlüğü yaptığı belirtilmiştir (Milliyet, 2024). Konunun yapılan işe fazla ücret talep edilmesi ve bunun tahsil yöntemiyle başlamasına karşın, doğru olmayan bilgilendirme ve yanıltıcı tanıtım yapılmış olması sonucu, mesleğin itibarını zedeleyecek gelişmelerin yaşanmasına neden olmuştur. Avukatın basın açıklamasında, olaya konu olan mekan tasarımını yapan kişi için, "...bahsi geçen şahsın, içmimarlar odasına kaydı olmadığı..." ifadesi yer almaktadır.

Görsel 2'de yer alan değerlendirme aşamalarının ilk basamağı olan içmimar olma kriterini aşamayan bu üç örnek olayda mesleki etik değerlendirme yapılamamaktadır. Bu olaylar sonuçları itibariyle, meslek etiği ilkeleriyle değil bireysel ahlaki tutumlarla ilişkilidir.

İÇMO Üyesi Olmayan İçmimarların Yer Aldığı Örnek Olaylar

Tablo 4. Örnek olay 4

Haber Başlığı	**35 kişinin öldüğü Ezgi Apartmanı soruşturmasında yeni gelişme**
Konum	Kahramanmaraş
Uygulama	İç mekan tasarımı ve uygulaması Uygulama sırasında kolon kesilmesi
Neden	Deprem
Sonuç	Ölüm: 35 kişi

Kahramanmaraş merkezli depremde 35 kişinin hayatını kaybettiği Ezgi Apartmanı'na ilişkin yürütülen soruşturma kapsamında, binanın zemin katında bulunan pastanenin iç mekân tasarımını yapan kişi, kolon kesilmesine ilişkin hatalı kararı gerekçesiyle tutuklanmıştır (Cumhuriyet, 2024). Haberde belirtilen olayda yapılan uygulama yasa ve yönetmelikler kapsamında bir içmimarlık hizmetidir. Yapının taşıyıcı strüktürü ile ilgili uygulamalar mimarların ve mühendislerin yetki alanında olup resmi kurumlarca onay ve denetime tabidir. Ancak bu uygulamada taşıyıcı strüktüre müdahale edilmiş binaya ait bir kolon 40 santimetre kesilerek perde duvara zarar verilmiştir. Haberde söz edildiği gibi içmimarların yapının taşıyıcı strüktürüne müdahale etmemesi gerekmektedir. Olay yargıya intikal etmiştir. Bu olayın haberlerinde yer alan kişinin meslek odasına

kaydı bulunmadığı İÇMO'nun 31 Mayıs 2025 tarih ve 2025/587 sayılı cevap yazısıyla belirlenmiştir (TMMOB İçmimarlar Odası, 2025).

Tablo 5. Örnek olay 4: Meslek etiği ilkeleri analizi

	Meslek İnsanı	Oda Üyeliği	Genel Sorumluluk	Topluma Sorumluluk	Müşteriye Sorumluluk	Mesleğe Sorumluluk	Halka Açıklık	Uyumluluk ve Yaptırımlar
Olay 4	✓	X	X	X	X	X	X	X

Meslek etiği ilkelerinin hiçbiri yerine getirilmediği ve bütün ilkelerin ihlal edildiği görülmektedir. Örnek olay 4, yapılan uygulamanın olumsuz sonucuna ve haber metninde yer alan ifadelere göre içmimarlık mesleğinin itibarını zedeleyecek bir konumdadır.

Tablo 6. Örnek olay 5

Haber Başlığı	**İranlı içmimar B. müşterilerinden gelen garip istekleri anlattı**
Konum	İstanbul
Uygulama	İç mekan tasarımı ve uygulaması Müşterisinin şahsi bilgilerinin halka açık paylaşılması
Neden	Röportaj
Sonuç	Haber paylaşımı

Bir içmimarın meslek hayatı boyunca karşılaştığı sıra dışı müşteri taleplerini paylaşmıştır (Yeni Mesaj, 2022). Haberde belirtilen olayda yapılan uygulama yasa ve yönetmelikler kapsamında bir içmimarlık hizmetidir. Olaya konu olan içmimar, tasarladığı projeye dair bilgileri ve müşteri isteklerini halka açık biçimde paylaşmıştır. İçmimarın meslek odasına kaydı bulunmadığı İÇMO'nun 31 Mayıs 2025 tarih ve 2025/587 sayılı cevap yazısıyla belirlenmiştir (İÇMO, 2025).

Tablo 7. Örnek olay 5: Meslek etiği ilkeleri analizi

	Meslek İnsanı	Oda Üyeliği	Genel Sorumluluk	Topluma Sorumluluk	Müşteriye Sorumluluk	Mesleğe Sorumluluk	Halka Açıklık	Uyumluluk ve Yaptırımlar
Olay 5	✓	X	X	✓	X	X	X	X

İlkelerden topluma sorumluluk kapsamında mesleki bilgisini medya önünde aktararak görevini yerine getirmiştir. Müşteriye sorumluluk kapsamında ise mahremiyet açısından önemli bir ihlal söz konusudur. Yapılan uygulamada, yalnızca mesleki bilgi değil müşterilerin kişisel istek ve beğenileri doğrultusunda özel hayatlarına ait tasarım verilerinin de paylaşılması mahremiyeti ihlal etmiş ve mesleğe karşı sorumluluk, halka açıklık ilkelerinin sağlanamadığını göstermiştir. Genel sorumluluk kapsamında ise içmimarlık mesleğinin itibarını zedeleyecek bir konumdadır. İrdelenen örnek olayda altı ilkeden sadece birinin yerine getirildiği görülmektedir.

Tablo 8. Örnek olay 6

Haber Başlığı	**Villası mimarları birbirine düşürdü**
Konum	İstanbul, Beykoz
Uygulama	İç mekan tasarımı ve uygulaması Tasarımın başka bir şirket tarafından yapılmış gibi gösterilmesi
Neden	Tazminat davası
Sonuç	Davalı şirketin davacı şirkete 10 bin lira manevi tazminat ödemesine karar verilmesi

Bir villanın tasarım sürecinde yaşanan fikir ayrılıkları, projeye dahil olan mimarlar arasında anlaşmazlığa neden olmuş ve bu durum, mimarlık alanında tasarım sahipliği ile mesleki etik üzerine tartışmaları gündeme getirmiştir (NTV Haber, 2025). Haberde belirtilen olayda yapılan uygulama yasa ve yönetmelikler kapsamında bir içmimarlık hizmetidir. Habere göre; iki ayrı firmanın karşı karşıya geldiği olayda ilk firma tarafından gerçekleştirilen iç mekân tasarımının, tadilat sürecini üstlenen ikinci firma tarafından kendi tasarımıymış gibi kamuoyuna sunulduğu ve bu suretle haksız rekabet oluşturulduğu iddia edilmiştir. Konuya ilişkin açılan dava, yaklaşık dört yıl süren yargılama neticesinde karara bağlanmış ve mahkeme, ilk firmanın taleplerini kısmen

haklı bularak tazminat ödenmesine hükmetmiştir. İçmimarlık hizmetini kendisinin yaptığını iddia eden ilk firma sahibinin haberde belirtildiği gibi içmimar olmadığı görülmektedir. Tadilat sonrası tasarımı sahiplenen firma sahiplerinin ikisi de içmimar olarak eğitim almış meslek profesyonelleri olmasına karşın İÇMO üyelikleri bulunmamaktadır. İçmimarın meslek odasına kaydı bulunmadığı İÇMO'nun 31 Mayıs 2025 tarih ve 2025/587 sayılı cevap yazısıyla belirlenmiştir (İÇMO, 2025).

Tablo 9. Örnek olay 6: Meslek etiği ilkeleri analizi

	Meslek İnsanı	Oda Üyeliği	Genel Sorumluluk	Topluma Sorumluluk	Müşteriye Sorumluluk	Mesleğe Sorumluluk	Halka Açıklık	Uyumluluk ve Yaptırımlar
Olay 6	X							
	✓	X	X	✓	X	X	X	X

Bu olayın iki tarafı olması nedeniyle her iki taraf için de değerlendirme yapılması gerekmektedir. Açılan haksız rekabet davasını kazanan ilk firma sahibi meslek profesyoneli olma ve meslek kuruluşuna üye olma ön koşullarını yerine getirmemektedir. Bu kapsamda Etik Değerlendirme Analizi yapılamamaktadır. Açılan haksız rekabet davasını kaybeden ikinci firma sahipleri, değerlendirmenin ilk aşamasını oluşturan meslek profesyoneli olma ön koşulunu sağlamasına karşın meslek kuruluşuna üye olma ikinci koşulunu yerine getirmemektedir. İkinci firma sahipleri kendilerine ait olmayan bir tasarımı kendilerininmiş gibi göstererek olumsuz bir davranış sergilemiş ve etik ilkelerden hiçbirini uygulamamıştır.

Bu başlık altında gerçekleşmiş üç olayda da meslek kuruluşu olan İÇMO üyeliği bulunmadığı tespit edilmiştir. Anayasanın 135. Maddesi gereği meslek odasına üye olmak yasal bir zorunluluktur. Meslek profesyonellerinin İÇMO üyesi olmaması, denetimden uzak bir uygulama serbestliği sağlamaktadır. Dolayısıyla yapılan uygulamalarda eksik, kusurlu ve hatalı üretimlerin oluşabileceği, insan hayatına mal olabilecek boyutta usulsüzlüklerin uygulanabileceği ya da ticari ahlak ilkelerinin ihlal edilebileceği bu üç örnek ile gözlemlenmiştir. Bu tür yaklaşımların çoğunlukla sorumlulukların ihlaline ve içmimarlık mesleğinin itibarının zedelenmesine neden olduğu görülmektedir.

İÇMO Üyesi İçmimarın Yer Aldığı Örnek Olay

Tablo 10. Örnek olay 7

Haber Başlığı	Taşınabilir afet evleri depremzedelerin yüzünü güldürecek
Konum	İstanbul
Uygulama	Taşınabilir afet evlerinin tasarımı ve uygulaması
Neden	Deprem
Sonuç	Gönüllü olarak hazırlanmış afet evlerinin depremzedelere ulaştırılması

Anadolu Ajansı'nın (2024) haberine göre, depremzedelerin barınma sorununa çözüm sunmak amacıyla geliştirilen taşınabilir afet evleri, hızlı kurulumu, dayanıklılığı ve yaşam konforunu artıran özellikleriyle afet sonrası geçici barınma ihtiyaçlarını karşılamada etkili bir alternatif olarak değerlendirilmektedir. Haberde belirtilen olayda yapılan uygulama yasa ve yönetmelikler kapsamında bir içmimarlık hizmetidir. Uygulama ve tasarım meslek profesyonelleri tarafından yürütülmekte olup, habere konu olan kişinin Oda üyeliği bulunmaktadır (TMMOB İçmimarlar Odası, 2025). Örnek olayda ulusal medyaya yansıyan haber gönüllülük esası taşıyan bir sivil toplum girişimi olarak kabul edilmiş ve birçok meslek profesyoneli tarafından gönüllü destek verilmiştir.

Tablo 11. Örnek olay 7: Meslek etiği ilkeleri analizi

	Meslek İnsanı	Oda Üyeliği	Genel Sorumluluk	Topluma Sorumluluk	Müşteriye Sorumluluk	Mesleğe Sorumluluk	Halka Açıklık	Uyumluluk ve Yaptırımlar
Olay 7	✓	✓	✓	✓	✓	✓	✓	✓

Etik Değerlendirme Analizi kapsamında ilk aşamayı oluşturan meslek profesyoneli olma ve meslek kuruluşuna üye olma koşullarını sağlamaktadır.

Meslek etiği ilkelerinden genel sorumluluk kapsamında uygulama yapan meslek profesyonellerinin davranış, değer ve tutumları içmimarlık mesleğinin onur ve itibarını yüceltecek bir girişimde bulunarak gerçekleştirilmiştir. İlkelerden topluma sorumluluk kapsamında hem tasarım hem de uygulama hizmetlerinde bilgisini yaşamı kolaylaştıracak bir biçimde kullanarak çevreye ve insana karşı duyarlı olmalı görevini yerine getirmiştir. Müşteriye Sorumluluk kapsamında ise her ne kadar bir müşteri olmasa da projelendirme ve bütçeleme açısından yapılan gönüllü girişim içinde açık, şeffaf ve sorgulanabilir bir süreç yürüttükleri görülmektedir. Yapılan uygulamada, meslektaşlar arasında dayanışmayı güçlendirerek bilgi ve deneyim paylaşımının sağlanması, ortak bir hedef üzerinde birlikte çalışılması, mesleki standartların korunması ve yükselmesi ve dayanışmanın üst düzeyde sergilenmesi ile mesleğe karşı sorumluluk ilkesinin yerine getirildiğini göstermektedir. Halka açıklık ilkesi kapsamında olayın kendi doğası gereği reklamdan öte bir bilgilendirme ve yönlendirme işlevleriyle ekonomik sisteme yapılabilecek katkıların sunulması ve bunların dijital ve sosyal medya aracılığıyla paylaşılması olumlu bir girişim olarak kabul edilebilir. İrdelenen örnek olay, ilk beş ilkenin gerekliliklerini yerine getirmiş olup, herhangi uyumluluk veya yaptırıma gerek görülmemektedir.

SONUÇ

Bu çalışma, Türkiye'de içmimarlık meslek pratiğinde ortaya çıkan etik sorunları örnek olaylar aracılığıyla inceleyerek mesleğin mevcut kurumsal ve etik çerçevesine dair önemli tespitler sunmaktadır. İncelenen yedi örnek olaydan altısında mesleğe dair uygulamaların, yetkisiz kişiler veya mesleki yeterliliği bulunmayan aktörlerce gerçekleştirildiği görülmüştür. Örnek olaylardan yalnızca bir tanesi olumlu bir değerlendirme taşımaktadır. İncelenen altı farklı olay, içmimarlık mesleğinin güncel uygulama alanlarında karşılaşılan etik sorunları, yetki karmaşalarını ve denetim eksikliklerini görünür kılmıştır. Bu durum, içmimarlığın yalnızca teknik bir uzmanlık alanı değil aynı zamanda toplumsal sorumluluk gerektiren bir meslek pratiği olduğunu ortaya koymaktadır. Özellikle yetkisiz uygulamaların, kullanıcı güvenliği, kamu yararı ve meslek itibarı açısından çok boyutlu riskler doğurduğu tespit edilmiştir. Örnek olaylarda yaşanan can kayıpları, mali kayıplar, mahremiyet ihlalleri ve haksız rekabet gibi sonuçlar içmimarlığın kurumsal denetim ve etik standartlarla desteklenmesi gereken bir hizmet alanı olduğunu göstermektedir. Araştırma bulguları, meslek mensubu olmayan kişiler tarafından gerçekleştirilen uygulamalara karşı etkili bir hukuki yaptırım ve kurumsal denetim mekanizmasının geliştirilmesinin önemini vurgulamaktadır. Ayrıca meslek profesyonellerinin etik sorumluluklarına ilişkin farkındalığının ve öz disiplininin artırılması, meslek odası üyeliğinin yaygınlaştırılması ve mesleki davranış ilkelerinin oluşturulmasıyla birlikte uygulanabilirliğinin güçlendirilmesi bir gereklilik olarak öne çıkmaktadır. Bu açıdan değerlendirildiğinde etik sorumluluklar hem mesleki profesyonelliği güçlendirecek hem de toplumun güvenilir ve kaliteli hizmet almasını sağlayacaktır.

Bulgulara göre, Türkiye'de içmimarlık mesleğinin uygulama alanları, mesleki sorumlulukları ve yetki sınırları hâlen tam olarak netleşmemiştir. Bu eksiklik, disiplinlerarası sınır aşımı ve sorumluluk karmaşası yaratmakta, mesleğe dair toplumsal güveni zedeleyen sonuçlara neden olmaktadır. Araştırmada tespit edilen sorunları önleyecek kurumsal düzenlemelerin geliştirilmesi gerekmektedir. ECIA tarafından belirlenen meslek etiği ilkeleri, Türkiye bağlamında önemli bir referans niteliği taşımaktadır. Bu ilkelerin, yerel hukuki düzenlemeler ve kültürel bağlam gözetilerek uyarlanması hem mesleğin uluslararası standartlara yakınlaşmasına hem de meslek itibarının güçlenmesine katkıda bulunacaktır. Mesleki etik ilkeler, kurumsal denetim, hukuki sorumluluklar ve meslek mensuplarının öz disiplin anlayışı bir bütün olarak ele alındığında mesleğin sürdürülebilir gelişimi önemli görülmektedir. Araştırmanın ortaya koyduğu bulgular ve öneriler, içmimarlık mesleğinin etik standartlara dayalı, kurumsal olarak güçlü ve toplumsal sorumluluk bilinciyle sürdürülebilir bir şekilde gelişmesine katkıda bulunmayı hedeflemektedir.

Araştırmanın bulguları, içmimarlık mesleğinin etik ve kurumsal yönlerine dair literatüre önemli katkılar sağlamaktadır. Gelecek çalışmalarda farklı ölçek ve bölgelerdeki etik ihlallerin karşılaştırmalı incelenmesi, etik ikilemlerin karar süreçlerine etkisinin araştırılması ve meslek etiği eğitiminin etkinliğinin değerlendirilmesi önerilmektedir. Ayrıca etik ilkelerin yerelleştirilmesi, denetim uygulamalarının analiz edilmesi ve disiplinlerarası kapsamlı projeler yürütülmesi, meslek etiğinin içmimarlık pratiğinde uygulanabilir standartlar haline gelmesine destek olacaktır.

Authors' Contributions

The authors contributed equally to the study.

Competing Interests

There is no potential conflict of interest.

Ethics Committee Declaration

Ethics committee approval is not required.

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Authors' Biographies

Burcu Gökbayır is a multidisciplinary designer based in Eskişehir, Turkey. She received B.S. degrees in Interior Architecture (2020) and Architecture (2021) from Eskişehir Technical University (ESTU). Since graduating, she has been involved in a range of design and implementation projects and has maintained an active professional practice in these fields. In 2023, she joined the Department of Interior Architecture at ESTU as a part-time instructor. She began her Master of Arts studies at the same institution in 2024. She has also shared her professional expertise through several talks and professional meetings.

Ezgi Yıldırım is a designer whose practice spans multiple disciplines and is currently based in Ankara. She completed her undergraduate studies in Interior Architecture and Environmental Design at Başkent University, graduating in 2023. Following her degree, she engaged in a range of professional and educational design activities, maintaining her involvement in both areas. In 2024, she joined the Interior Architecture Department at Eskişehir Technical University as a part-time instructor, coinciding with the start of her graduate studies in the same department's Master of Arts program in February of that year.

Buğru Han Burak Kaptan graduated from the Department of Interior Architecture and Environmental Design at Bilkent University-Türkiye (1992). After national and international experiences, between 1992-1994, He started to study in the Department of Interior Design at Anadolu University. His Master of Arts thesis is "Relation between Form-Space in Interior Architecture/Design" (1996) and his Proficiency in Art thesis is "Development of Interior Architecture/Design Education Which Parallels to Social Changes in 20th Century" (2004). He participated in many design projects and exhibitions. In addition to articles and books, he has participated as a speaker in numerous panels, interviews and meetings. He is continuing his studies at Eskisehir Technical University as a professor.

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Research Article

İç mimarlık lisans eğitiminde yer alan iş sağlığı ve güvenliği dersine bakış

A perspective on the occupational health and safety course in interior architecture undergraduate education

Beyza Nur Azmanoğlu [1*], İrem Zülal Karabina[2], Prof. Dr. Şengül Yalçınkaya[3]

[1]Karadeniz Technical University, Faculty of Architecture, Department of Interior Architecture, Trabzon, Türkiye.
423990@ogr.ktu.edu.tr

[2]Karadeniz Technical University, Faculty of Architecture, Department of Interior Architecture, Trabzon, Türkiye.
433219@ogr.ktu.edu.tr

[3]Karadeniz Technical University, Faculty of Architecture, Department of Interior Architecture, Trabzon, Türkiye.
sengulyalcinkaya@ktu.edu.tr

*Corresponding Author

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Özet
İş sağlığı ve güvenliği (İSG) ile iç mimarlık, mekânların kullanıcı için güvenli, sağlıklı ve ergonomik biçimde tasarlanmasını zorunlu kılan ve birbirini tamamlayan disiplinlerdir. İç mimarlık eğitiminde İSG'nin yer alması, öğrencilerin yalnızca estetik ve işlevsellik değil, aynı zamanda insan sağlığı ve güvenliği açısından bilinçli tasarımlar yapmasını sağlar. Bu araştırmada, Türkiye'deki iç mimarlık bölümlerinde verilen İSG derslerinin mevcut durumu içerik analizi tekniği kullanılarak incelenmiştir. Araştırma kapsamında, 208 üniversite içerisinden iç mimarlık veya iç mimarlık ve çevre tasarımı bölümü bulunan 76 üniversite değerlendirilmiş, bunlardan 35'inde İSG derslerine yer verildiği tespit edilmiştir. Veri kaynağı olarak üniversitelerin web sayfalarında yayımlanan ders bilgi paketleri (amaç, öğrenme çıktıları, içerik ve haftalık ders programları) kullanılmıştır. İçerik analizi sonucunda, İSG dersleri sekiz ana tema altında sınıflandırılmıştır. Bulgularda, ders içeriklerinin mevzuat ve teorik bilgiler etrafında yoğunlaştığı, ancak tasarımsal etmenler, ergonomi, kimyasal ve biyolojik riskler konularının yetersiz ele alındığı görülmüştür. Bu durum, iç mimarlık öğrencilerinin çalışma hayatında karşılaşabilecekleri riskleri öngörme ve güvenli mekânlar tasarlama yetkinliklerini sınırlamaktadır. Sonuçlar, İSG derslerinin daha kapsamlı, uygulamalı ve multidisipliner bir yapıya kavuşturulması gerektiğini göstermektedir. Ders içeriklerinin, teorik bilgi ile pratik uygulamaları bütünleştiren bir formatta yeniden yapılandırılması önerilmektedir. Bu doğrultuda, İSG eğitiminin iç mimarlık müfredatındaki konumu güçlendirilmeli, dersler bir zorunluluk değil, mesleki bilinç oluşturmanın aracı olarak ele alınmalıdır.

Anahtar Kelimeler: İSG, İç mimarlık, Eğitim, Müfredat analizi

Abstract
Occupational health and safety (OHS) and interior architecture are complementary disciplines that mutually reinforce the necessity of designing spaces that are safe, healthy, and ergonomic for users. Integrating OHS into interior architecture education enables students to create designs that are not only aesthetically pleasing and functional but also conscious of human health and safety. This study examines the current state of OHS courses in interior architecture programs in Turkey using content analysis. Within the scope of the research, 76 universities offering interior architecture or interior architecture and environmental design programs were evaluated out of a total of 208 universities, and it was found that 35 of them included OHS courses. The data source consisted of course information packages published on university websites, including course objectives, learning outcomes, content, and weekly schedules. Content analysis revealed that OHS courses could be classified under eight main themes. The findings indicate that course content primarily focuses on legislation and theoretical knowledge, whereas design-related factors, ergonomics, and chemical and biological hazards are insufficiently addressed. This situation limits interior architecture students' ability to anticipate workplace risks and design safe environments. The results suggest that OHS courses should be made more comprehensive, practical, and multidisciplinary. It is recommended that course content be restructured to integrate theoretical knowledge with practical applications. Accordingly, the position of OHS education within the interior architecture curriculum should be strengthened, and courses should be approached not merely as a requirement but as a means of fostering professional awareness.

Keywords: OHS, Interior architecture, Education, Curriculum analysis

Extended Abstract

Introduction: Occupational health and safety (OHS) has become an indispensable part of modern working environments, constituting a multidisciplinary field of study. Ensuring the safety of work environments is not only aimed at preventing occupational accidents and diseases but also at enhancing the employees' well-being and productivity. Particularly, the integration of OHS practices into various professional disciplines is considered not just a legal obligation but also an ethical responsibility. This issue holds particular significance in the field of interior architecture, which places human-centered design processes at its core. Interior architecture, as a discipline concerned with organizing the physical environment to meet individuals' health, safety, and comfort needs, is directly related to OHS topics. Environmental factors such as ergonomics, lighting, air quality, and thermal comfort are crucial in ensuring the safety of interior spaces. In this context, equipping interior architecture students with OHS awareness facilitates approaching design processes more safely and sustainably.

Purpose and scope: The purpose of this study is to comprehensively analyze the content, objectives, learning outcomes, and curricula of OHS courses offered in interior architecture departments in Turkey. The research aims to identify the key themes emphasized in OHS courses at universities and reveal any topics that may be underrepresented or overemphasized. The study examined the course syllabi of OHS courses in interior architecture departments across 35 universities, analyzing them through content analysis to evaluate their objectives, outcomes, content, and course programs. The scope of the research reveals the alignment between the OHS knowledge students are expected to acquire and the interior architecture curriculum. The course content was analyzed in relation to fundamental OHS concepts, regulations, personal protective equipment, risk analysis, emergency safety, and other practical topics, such as design-oriented applications and professional OHS solutions.

Method: This research was conducted to evaluate the current state of OHS courses offered in interior architecture departments in Turkey and propose improvements. The study was designed using qualitative research methods and carried out based on content analysis. During the data collection process, the curricula of 76 interior architecture departments across Turkey were examined, and OHS courses were found to be offered in 35 of these departments. The course information packages published on the web pages of these 35 universities were collected and systematically categorized for in-depth analysis. In the content analysis process, three independent researchers reviewed the course texts, and the data obtained from these texts were grouped under eight main themes: *Occupational Health and Safety Concepts and Historical Development, OHS Regulations and Legislation in Interior Architecture, Personal Protective Equipment (PPE) and Safety Signs, Emergency and Disaster Safety in Interior Spaces, Risk and Hazard Analysis, Design Factors in Interior Spaces, Chemical and Biological Risks in the Workplace, Organization, Solutions, and Practical Applications of Interior Space OHS.* These themes were analyzed based on their frequency in course content, and the relationships between the themes and the prioritized topics of the courses were evaluated. To enhance the reliability of the study, the consistency of the findings from independent analyses was compared and verified. Additionally, the impact of OHS courses on students' safety awareness and professional skills was examined by integrating literature review findings with the analysis results. This holistic approach enabled an assessment of the potential of the course content to increase student OHS awareness.

Findings and conclusion: According to the findings, the most emphasized topics in OHS courses were the theoretical foundations, specifically "Occupational Health and Safety Concepts and Historical Development" and "OHS Regulations and Legislation in Interior Architecture". These two themes were extensively covered in course objectives, learning outcomes, content, and weekly schedules, highlighting the importance of learning the basic principles and legal aspects of OHS. On the other hand, practical topics such as "Emergency and Disaster Safety", "Chemical and Biological Risks", and "OHS Solution Applications" were addressed in a more limited way. This indicates gaps in the practical application-oriented aspects of OHS within interior architecture education. Based on the findings, it is emphasized that OHS courses in interior architecture departments should integrate more practice and practical aspects. It was found that students need practical education on how OHS is applied in real-life scenarios and design processes. Furthermore, it is suggested that OHS courses be offered in collaboration with other disciplines through a multidisciplinary approach. Emphasizing topics such as ergonomics and psychosocial factors would improve the understanding of how interior design affects workers' health. In conclusion, while theoretical knowledge is given priority in OHS courses within interior architecture departments, there are gaps in practical applications and professional content. It is recommended that the content of OHS courses be addressed in a more comprehensive and in-depth manner. Additionally, to make OHS education more effective and comprehensive, it is suggested that the courses be structured in two phases. The first phase should focus on general OHS knowledge, while the second phase should address risks and practical applications specific to the interior architecture profession. This structure would allow students to acquire both theoretical knowledge and professional skills.

Keywords: OHS, Interior architecture, Education, Curriculum analysis

GİRİŞ

İş sağlığı ve güvenliği (İSG), günümüzde giderek daha fazla önem kazanan bir disiplindir. Çalışma ortamlarının güvenli hale getirilmesi, yalnızca iş kazalarının önlenmesini değil, aynı zamanda çalışanların refahını ve verimliliğini artırmayı da hedefler. Bu bağlamda, İSG'nin farklı meslek disiplinlerine entegre edilmesi, yalnızca yasal bir gereklilik değil, aynı zamanda etik bir sorumluluk olarak görülmektedir (Martin vd., 2012: 351). Özellikle iç mimarlık gibi mekân tasarımını merkeze alan bir alanda, güvenli çalışma ortamlarının oluşturulmasına yönelik bilgi ve farkındalık büyük önem taşımaktadır. Bu çalışma, Türkiye'deki iç mimarlık bölümlerinde verilen iş sağlığı ve güvenliği lisans eğitimine yönelik kapsamlı bir analiz sunmayı hedeflemektedir. Eğitim müfredatlarında yer alan İSG derslerinin içerik, kazanım, amaç ve program özelliklerini inceleyerek, iç mimarlara konunun hangi yönleri ile verildiği tespit edilmektedir. Bu derslerin, öğrencilerin İSG farkındalığını geliştirme ve meslek hayatlarında güvenli mekânlar tasarlama becerilerini artırmadaki rolü araştırılmaktadır. Bu amaçla, 35 üniversitenin İSG derslerine ilişkin veriler, belirli temalar üzerinden incelenerek iç mimarlık eğitimindeki iş sağlığı ve güvenliği dersi ile ilgili bir çerçeve oluşturulmuştur. Bu bağlamda, çalışma hem eğitimin içeriğine dair bir durum tespiti yapmakta hem de İSG'nin iç mimarlık eğitimindeki yerini güçlendirmek için öneriler geliştirmektedir. Çalışmada kullanılan içerik analizi yöntemi, ders metinlerinden elde edilen bilgilerin sistematik bir şekilde sınıflandırılmasını sağlamış, belirlenen temalar aracılığıyla İSG'nin iç mimarlık eğitimi bağlamındaki kapsamını ortaya koymuştur. Bu yaklaşımla, disiplinler arası bir alan olan İSG'nin iç mimarlık eğitimine entegrasyonuna yönelik somut ve uygulanabilir öneriler sunulmaktadır. Bu araştırmanın, iç mimarlık bölümlerinde İSG eğitimine yönelik farkındalığı artırarak daha güvenli ve bilinçli tasarım süreçlerine katkı sağlaması beklenmektedir. Aynı zamanda, iç mimarlık öğrencilerinin meslek hayatında karşılaşacakları güvenlik risklerini daha iyi anlamalarına ve bu risklere yönelik çözüm üretme yetkinliklerini geliştirmelerine destek olmayı hedeflemektedir.

Literatürde İş Sağlığı ve Güvenliği

İş sağlığı ve güvenliği, çalışma ortamlarında meydana gelebilecek riskleri önleme ve çalışanların fiziksel, ruhsal ve sosyal refahını koruma amacı taşıyan disiplinlerarası bir alan olarak tanımlanmaktadır (Akkaya, 2017: 504). Endüstriyel devrimle birlikte iş kazalarının artması ve çalışma koşullarının kötüleşmesi, bu alandaki yasal düzenlemelerin ve bilimsel çalışmaların gelişimini tetiklemiştir (Ünver, 2013: 9-12). Bu süreçte artan iş kazaları ve meslek hastalıkları, güvenlik önlemlerinin alınmasını zorunlu kılmıştır (Bhagawati, 2015: 93). İlerleyen yıllarda, çalışanların haklarının korunması ve güvenli çalışma ortamlarının sağlanması ulusal ve uluslararası düzeyde öncelikli bir konu haline gelmiştir (Yalçınkaya & Yalçınkaya, 2024a: 1705). Bu bağlamda, iş sağlığı ve güvenliği yalnızca işyerindeki risklerin azaltılmasını değil, aynı zamanda iş süreçlerinin sürdürülebilirliğini ve verimliliğini de doğrudan etkileyen bir faktör olarak ele alınmaktadır (Çiçek & Öçal, 2016: 108). İç mekân tasarımında iş sağlığı ve güvenliği, ergonomi, ışıklandırma, hava kalitesi, termal konfor ve akustik düzenlemeler gibi fiziksel çevre unsurlarını kapsayan bir perspektifle değerlendirilmektedir. Özellikle ergonomi, kullanıcıların fiziksel sağlığını korumaya yönelik bir yaklaşım sunarken, çalışma ortamlarında konforun artırılması ve uzun vadede oluşabilecek sağlık sorunlarının önlenmesi için kritik bir rol oynamaktadır (Ulukan, 2015). İç mekânlarda risk yönetimi, sadece çalışanların değil, aynı zamanda kullanıcıların da güvenliğini sağlamayı hedefleyen bir süreci ifade eder (Ceylan, 2012: 96). Bu nedenle, iç mekân tasarımında risk analizi ve yönetimi, güvenliğin sağlanması açısından temel bir gereklilik olarak ortaya çıkmaktadır.

Mevcut literatürde, iş sağlığı ve güvenliği konularının eğitim yoluyla bireylere kazandırılması gerektiği sıklıkla vurgulanmaktadır (Pala, 2005: 18-22; Yılmaz, 2009: 109; Yıldırım, 2010: 84; Topgül & Alan, 2017: 588; Koçak & Koray, 2018: 1789). Eğitim, bireylerde güvenlik kültürünün oluşmasında ve davranış değişikliklerinin sağlanmasında etkili bir araçtır (Güler vd. 2018: 313). Özellikle meslekî eğitim programlarında iş sağlığı ve güvenliği derslerinin yer alması, bu bilincin kazandırılmasında kritik bir rol oynamaktadır (Topgül & Alan, 2017: 596). İç mimarlık gibi insan odaklı tasarım disiplinlerinde, öğrencilerin iş sağlığı ve güvenliği bilinci ile yetiştirilmesi, tasarım süreçlerinin daha bilinçli ve kapsamlı bir şekilde yürütülmesini sağlamaktadır (Ulukan, 2015). Bu durum, kullanıcıların sağlık ve güvenlik ihtiyaçlarının karşılanmasında önemli bir katkı sunmaktadır. Literatürde iç mekân tasarımında iş sağlığı ve güvenliğinin farklı boyutları ele alınmış ve bu konunun çok disiplinli bir yaklaşımla incelenmesi gerektiği vurgulanmıştır. Özellikle ergonomik tasarım kriterleri, fiziksel çalışma koşullarının iyileştirilmesi, iç mekânlarda kimyasal ve

biyolojik risklerin önlenmesi, acil durum planlaması ve güvenlik işaretlerinin kullanımı gibi konular ön plana çıkmaktadır (Oral & Bekman, 2021: 169). Bunlar hem tasarım sürecinde hem de iç mekânların kullanımında sağlıklı ve güvenli bir çevrenin oluşturulması için gerekli unsurlar olarak tanımlanmaktadır (Ustaoğlu, 2020: 8). Ayrıca, afet ve acil durum güvenliği gibi özel risk faktörlerinin dikkate alınması, kullanıcıların olası kriz durumlarında güvenli bir şekilde hareket edebilmelerine olanak tanımaktadır.

İç mimarlık literatürü, iş sağlığı ve güvenliğinin tasarım süreçlerinde yalnızca teknik önlemlerle sınırlı kalmaması, aynı zamanda estetik ve işlevsellik boyutlarıyla bütüncül biçimde değerlendirilmesi gerektiğini vurgulamaktadır (Yalçınkaya & Karabina, 2024: 40; Sönmez, 2021: 148). Bu vurgu, İSG'nin iç mimarlık eğitiminde hangi ölçüde ve nasıl yer alması gerektiği sorusunu gündeme getirmektedir. Çalışmanın temel amacı, Türkiye'deki iç mimarlık bölümlerinde verilen iş sağlığı ve güvenliği derslerini incelemek; ders içerikleri ve öğrenme çıktıları üzerinden konunun hangi boyutlarda ve nasıl ele alındığını ortaya koymaktır. Bu kapsamda İSG dersi veren 35 üniversitenin ders içerikleri analiz edilmiştir. Araştırma, İSG'nin iç mimarlık eğitimindeki konumunu görünür kılmayı ve derslerin daha etkin hale getirilmesine yönelik öneriler geliştirmeyi hedeflemekte; böylece hem akademik literatüre katkı sağlamakta hem de eğitim programları için yol gösterici olmaktadır. Sonuç olarak, İSG'nin yalnızca teknik bir gereklilik değil, tasarım sürecinin bütünsel bir parçası olduğu ortaya konulmaktadır.

YÖNTEM

Araştırmanın Hedef ve Soruları

Bu araştırma, Türkiye'deki iç mimarlık bölümlerinde verilen İSG derslerinin mevcut durumunu inceleyerek, ders içerikleri ile öğrenme çıktılarından yola çıkarak geliştirilmesi için öneriler sunmayı amaçlamaktadır. Araştırmanın temel soruları şunlardır:

- Türkiye'deki iç mimarlık bölümlerinde verilen İSG derslerinin içeriklerinde öne çıkan ve göz ardı edilen konular nelerdir?
- İç mimarlık öğrencilerinin güvenlik risklerine dair bilgi edinmesi ve bu bilgiyi tasarımlarına etkin bir şekilde uygulayabilmesi için İSG dersi nasıl olmalı?

Araştırmanın Alanı

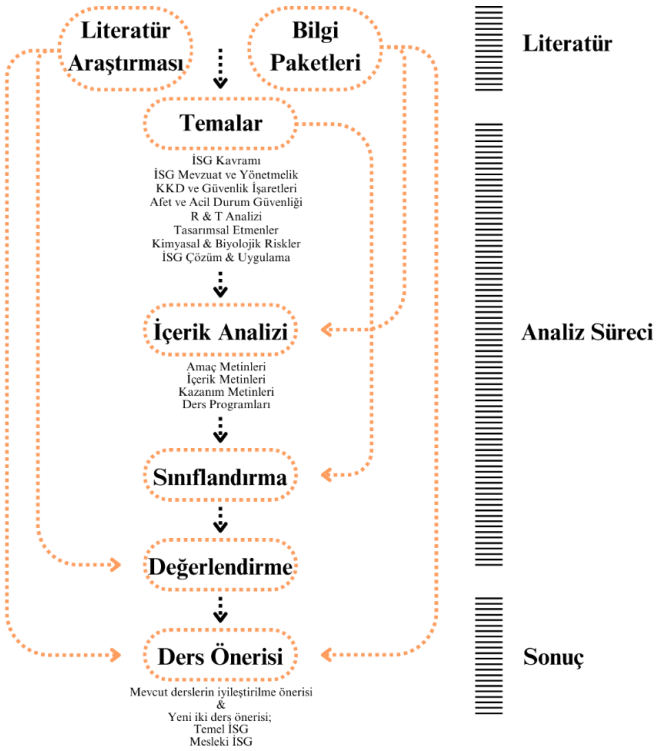
Türkiye'de toplamda 208 üniversite bulunmaktadır (YÖK, 2024) ve bunlardan 76'sında iç mimarlık veya iç mimarlık ve çevre tasarımı bölümleri yer almaktadır. Bu araştırma kapsamında, söz konusu 76 üniversite detaylı olarak incelenmiş ve 35 üniversitede İş Sağlığı ve Güvenliği (İSG) dersinin verildiği tespit edilmiştir. Araştırmanın kapsamı, bu 35 üniversiteyi oluşturmakta olup, bu üniversiteler üzerinde yapılan analizler neticesinde, 10'unun devlet üniversitesi, 25'inin ise vakıf üniversitesi olduğu belirlenmiştir (Tablo 1).

Tablo 1. İş sağlığı ve güvenliği dersi bulunan iç mimarlık- iç mimarlık ve çevre tasarımı bölümlerinin listesi

No	Üniversite Adı	Türü	No	Üniversite Adı	Türü
1	Afyon Kocatepe Üniversitesi	Devlet	19	İstanbul Rumeli Üniversitesi	Vakıf
2	Altınbaş Üniversitesi	Vakıf	20	İstanbul Sabahattin Zaim Üniversitesi	Vakıf
3	Ankara Bilim Üniversitesi	Vakıf	21	İstanbul Yeni Yüzyıl Üniversitesi	Vakıf
4	Ankara Medipol Üniversitesi	Vakıf	22	İstinye Üniversitesi	Vakıf
5	Antalya Belek Üniversitesi	Vakıf	23	Kocaeli Üniversitesi	Devlet
6	Atatürk Üniversitesi	Devlet	24	Konya Gıda ve Tarım Üniversitesi	Vakıf
7	Biruni Üniversitesi	Vakıf	25	Konya Teknik Üniversitesi	Devlet
8	Çankaya Üniversitesi	Vakıf	26	KTO Karatay Üniversitesi	Vakıf
9	Hasan Kalyoncu Üniversitesi	Vakıf	27	Kütahya Dumlupınar Üniversitesi	Devlet
10	Işık Üniversitesi	Vakıf	28	Maltepe Üniversitesi	Vakıf
11	İskenderun Teknik Üniversitesi	Devlet	29	Mimar Sinan Güzel Sanatlar Üniversitesi	Devlet
12	İstanbul Atlas Üniversitesi	Vakıf	30	Necmettin Erbakan Üniversitesi	Devlet
13	İstanbul Aydın Üniversitesi	Vakıf	31	Nuh Naci Yazgan Üniversitesi	Vakıf
14	İstanbul Beykent Üniversitesi	Vakıf	32	Ostim Teknik Üniversitesi	Vakıf
15	İstanbul Esenyurt Üniversitesi	Vakıf	33	Selçuk Üniversitesi	Devlet
16	İstanbul Gedik Üniversitesi	Vakıf	34	Toros Üniversitesi	Vakıf
17	İstanbul Gelişim Üniversitesi	Vakıf	35	Trakya Üniversitesi	Devlet
18	İstanbul Medipol Üniversitesi	Vakıf			

Araştırmanın Tekniği

Bu çalışma, nitel araştırma yöntemleri temelinde kurgulanmış olup, içerik analizi tekniği kullanılarak gerçekleştirilmiştir. Çalışmanın ilk aşamasında, araştırma kapsamında belirlenen temaların oluşturulması ve iç mimarlık bölümlerinde İSG derslerinin mevcut durumunun tespit edilmesi amacıyla kapsamlı bir literatür taraması gerçekleştirilmiştir. Analiz sürecinde, elde edilen veriler doğrultusunda temalar sınıflandırılmış, İSG dersi bilgi paketleri belirli kodlar aracılığıyla analiz edilerek içerik değerlendirmesi yapılmıştır. İçerik analizi, nitel verilerin belirli kategoriler altında sınıflandırılması ve incelenmesi amacıyla kullanılan bir yöntem olup, bu çalışma kapsamında ders içeriklerinin sistematik bir biçimde ele alınmasını sağlamıştır (Hepkul, 2002: 2). Çalışma sonucunda, mevcut derslerin iyileştirilmesine yönelik öneriler sunulmuş ve İSG dersi bulunmayan bölümler için iki aşamalı bir ders modeli tanımlanmıştır (Görsel 1).



Görsel 1. İçerik analizi aşamaları

Verilerin Toplanması

Araştırmada veri toplama süreci aşağıdaki adımlardan oluşmaktadır:

1. Türkiye'deki 35 üniversitenin iç mimarlık bölümlerinde verilen İSG derslerine ait verilere ilgili üniversitelerin resmî web sitelerinden ulaşılması.
2. İlgili derslere ait içerik, amaç, kazanım ve ders programı metinlerinin derlenmesi (Tablo 2).
3. Literatür taraması ile mevcut akademik kaynaklardan İSG eğitimi üzerine ek bilgilerin elde edilmesi

Tablo 2. İçerik, amaç, kazanım ve ders programı metinlerinin derlenmesi örneği

No	Üniversite Adı	Metin	Metin Türü
1	Afyon Kocatepe Üniversitesi	Öğrenme-öğretme etkinliklerini başarıyla tamamlayan öğrenciler; 1. İş yerinde, temizlik, aydınlatma, ısıtma ve ses seviyesinin iş kazalarına ve işçi sağlığına etkisi 2. İş kazalarının oluşmasında etkili olan faktörler (uykusuzluk, aşırı yorgunluk, hastalık, işe uygun olmamak, dikkatsizlik ve tedbirsizlik) 3. Yanma, düşme, zehirlenme, elektrik çarpması, makine kazası, delici/kesici aletlerle yaralanma ve alınacak önlemler 4. Suni solunum, kırık-çıkık, yanma, zehirlenme, kanamayı durdurma, elektrik çarpması olaylarında ilk yardım	İçerik Metni
1	Afyon Kocatepe Üniversitesi	Bu dersin amacı, öğrencilere meslek hastalıkları ve iş güvenliği konularında mesleki davranış kazandırmaktır.	Amaç Metni
1	Afyon Kocatepe Üniversitesi	İlk yardım tedbirlerini almak Çalışma emniyeti sağlamak Yasaları öğrenmek	Kazanım Metni

1	Afyon Kocatepe Üniversitesi	1. İlkyardım eğitimi 2. İlkyardım eğitimi 3. İlkyardım eğitimi 4. İlkyardım eğitimi 5. İlkyardım malzemeleri 6. İlkyardım malzemeleri 7. Ders tekrarı ve Ara sınav 8. Ders tekrarı ve Ara sınav 9. Kişisel emniyet sağlama 10. Kişisel emniyet sağlama 11. Kişisel emniyet sağlama 12. Çalışanların emniyetini sağlama 13. İş ortamı güvenliği sağlama 14. İş ortamı güvenliği sağlama	Ders Programı Metni

Verilerin Analizi

Toplanan veriler, içerik analizi yöntemiyle incelenmiş ve İSG derslerinde öne çıkan temalar belirlenmiştir. Araştırma sürecinde üç bağımsız araştırmacı elde edilen metinleri analiz etmiştir ve kodlama farklılıkları üzerinde uzlaşı sağlamak adına görüşmeler yapılmıştır. Bağımsız analizler araştırmanın güvenilirliğini artırmak amacıyla gerçekleştirilmiştir. Analizler sonucunda sekiz ana tema tespit edilmiştir:

1. İş Sağlığı ve Güvenliği Kavramları ve Tarihsel Gelişimi
2. İç Mimarlıkta İSG Mevzuat ve Yönetmelikler
3. Kişisel Koruyucu Donanımlar (KKD) ve Güvenlik İşaretleri
4. İç Mekânlarda Afet ve Acil Durum Güvenliği
5. Risk ve Tehlike Analizleri
6. İç Mekânlarda Tasarımsal Etkenler
7. Çalışma Ortamında Kimyasal ve Biyolojik Riskler
8. İç Mekân İSG'nin Organize Edilmesi, Çözümleri ve Pratik Uygulamalar

Bu temalar, ders içeriklerinde yer alma sıklığına göre kategorize edilerek aralarındaki ilişkiler detaylı bir biçimde değerlendirilmiştir (Tablo 3).

Tablo 3. Metinlerin kategorize edilmesi örneği

1 Afyon Kocatepe Üniversitesi		
Hafta	**Konu**	**Kodlama**
1	İlkyardım eğitimi	T4-d
2	İlkyardım eğitimi	T4-d
3	İlkyardım eğitimi	T4-d
4	İlkyardım eğitimi	T4-d
5	İlkyardım malzemeleri	T4-d
6	İlkyardım malzemeleri	T4-d
7	Ders tekrarı ve ara sınav	
8	Ders tekrarı ve ara sınav	
9	Kişisel emniyet sağlama	T3-a
10	Kişisel emniyet sağlama	T3-a
11	Kişisel emniyet sağlama	T3-a
12	Çalışanların emniyetini sağlama	T8-b
13	İş ortamı güvenliği sağlama	T8-b
14	İş ortamı güvenliği sağlama	T8-b

İçerik analizi sürecinde elde edilen bulgular, mevcut İSG eğitiminde hangi alanların ön planda olduğu ve hangi konuların eksik kaldığını ortaya koymuştur. Araştırmanın sonuçları, iç mimarlık eğitiminde İSG'ye dair farkındalığın artırılmasına yönelik potansiyel alanların belirlenmesini ve öneriler geliştirilmesini hedeflemektedir.

BULGULAR

Bu araştırmada Türkiye'deki üniversitelerde yer alan 35 iç mimarlık- iç mimarlık ve çevre tasarımı bölümlerinde verilen İSG derslerinin bilgi paketlerindeki iş sağlığı ve güvenliği ile ilgili "amaç, kazanım, içerik ve ders programları" metinleri içerik analizi yöntemiyle değerlendirilmiştir. İç mimarlık eğitiminde yer

alan İSG dersleri ile ilgili sekiz ana tema oluşturulmuştur (Görsel 2). Bu temalar, "İş Sağlığı ve Güvenliği Kavramları ve Tarihsel Gelişimi", "İç Mimarlıkta İSG Mevzuat ve Yönetmelikler", "Kişisel Koruyucu Donanımlar (KKD) ve Güvenlik İşaretleri", "İç Mekânlarda Afet ve Acil Durum Güvenliği", "Risk ve Tehlike Analizleri", "İç Mekânlarda Tasarımsal Etkenler", "Çalışma Ortamında Kimyasal ve Biyolojik Riskler" ve "İç Mekân İSG'nin Organize Edilmesi, Çözümleri ve Pratik Uygulamalar" başlıkları altında toplanmıştır. Temaların içeriğine bakıldığında;

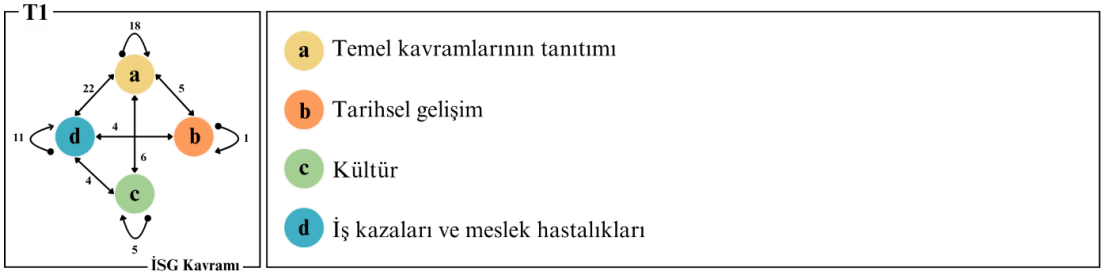
İSG Kavramı İSG; **a)** Temel kavramlarının tanıtımı **b)** Tarihsel gelişim **c)** Kültür **d)** İş Kazaları ve meslek hastalıkları T1	**R & T Analizi** **a)** Tehlike ve riskin tanımlanması **b)** Risk değerlendirme yöntemleri **c)** İç mekânda yapılabilecek risk analizleri T5
İSG Mevzuat ve Yönetmelik **a)** Türkiye'deki İSG mevzuatları **b)** 6331 sayılı İş Sağlığı ve Güvenliği Kanunu **c)** OHSAS 18001 ve ISO 45001 gibi İSG yönetim sistemleri **d)** İç mimarlığın bu yönetmelikler çerçevesindeki sorumlulukları **e)** Farklı alanlarda İSG T2	**Tasarımsal Etmenler** **a)** Ergonomi **a1)** Isıtma ve sıcaklık **a2)** Aydınlatma **a3)** Havalandırma ve hava kalitesi **a4)** Ses ve gürültü seviyesi **a5)** Titreşim **a6)** Malzeme ve ekipman **a7)** Mekân organizasyonu ve hareket alanı **b)** Psikososyal özellik T6
KKD ve Güvenlik İşaretleri **a)** KKD kullanımı **b)** İç mekânda güvenlik işaretleri, iş güvenliği simgeleri ve anlamları T3	**Kimyasal & Biyolojik Riskler** **a)** Kimyasal özellik **b)** Biyolojik özellik T7
Afet ve Acil Durum Güvenliği **a)** İç mekân yangın güvenliği, acil kaçış yolları, yangın söndürme sistemleri **b)** Deprem güvenliği **c)** Acil durum planlaması **d)** İlk yardım T4	**İSG Çözüm & Uygulama** **a)** Gerçek hayat vakaları ve uygulama örnekleri üzerinden risklerin tespiti **b)** İSG için iç mekânda tasarım önerileri/ uygulamaları/ tedbirleri ve önlemleri T8

Görsel 2. İSG kategoriler tablosu

T1- İş Sağlığı ve Güvenliği Kavramları ve Tarihsel Gelişimi

Bu tema altında iç mimarlık öğrencilerinin İSG'nin temel kavramlarını, tarihsel gelişimini, kültürel boyutunu ve iş kazaları ile meslek hastalıklarını kapsamlı bir şekilde anlaması yer almaktadır. Bu tema, İSG dersi ile ilgili öğrencilerin İSG'yi yalnızca bir yasal zorunluluk değil, aynı zamanda etik bir sorumluluk ve tasarım süreçlerinde kritik bir bileşen olarak görmelerini hedefleyen bilgileri içerir. Bunu tema altında yer alan dört alt tema desteklemektedir. Temel kavramların tanımı, İSG'nin temel tanımları ve kavramları tanıtılarak, öğrencilerin bu terimleri tasarım bağlamında kullanma becerisini geliştirmeyi sağlar. Tarihsel gelişim başlığı, İSG'nin sanayi devriminden günümüze kadar geçirdiği süreci ve bunun iç mekân tasarımına etkisini açıklarken, güvenlik kültürü ise İSG'yi bir davranış biçimi ve toplumsal sorumluluk olarak ele alır. İş kazaları ve meslek hastalıkları başlığı ise, öğrencilerin tasarımlarında riskleri önceden belirleme ve güvenli çalışma ortamları oluşturma becerisi kazanmalarını destekler (Görsel 3).

Temanın bilgi paketlerinde yer alma durumu ve birbiri ile ilişkileri analiz edildiğinde; *a- temel kavramların tanıtımı* (18) kategorisinin hem tek başına hem diğer kategorilerle birlikte geçme durumunun baskın olduğu görülmektedir. Özellikle, *a- temel kavramların tanıtımı* ve *d- iş kazaları ve meslek hastalıkları* kategorileri, eğitim içeriklerinde sıklıkla birlikte değerlendirilen konular arasında (22) yer almaktadır. Buna karşın, *b- tarihsel gelişim* (1) kategorisinin, bu tema kapsamında diğer kategorilere göre daha az vurgulandığı dikkat çekmektedir (Görsel 3). Bu tema, İSG'nin mekân tasarımıyla bütünleşmesi için öğrencilere kapsamlı bir altyapı sunarak güvenli, ergonomik ve kullanıcı odaklı tasarım bilinci geliştirmelerini hedefleyen bilgiyi içermektedir.

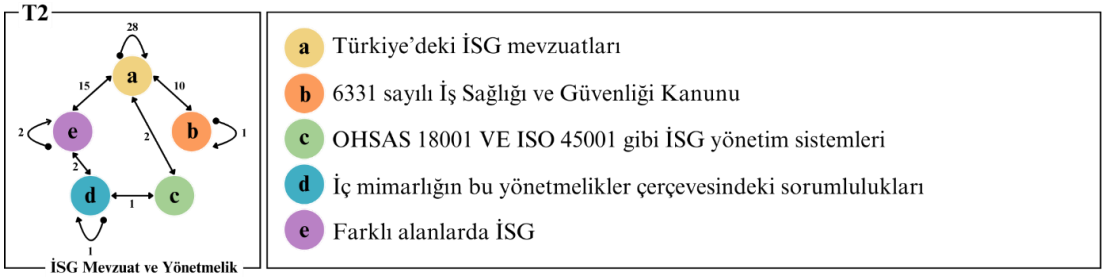


Görsel 3. T1- İş sağlığı ve güvenliği kavramları ve tarihsel gelişimi alt temalarının sıklığı ve ilişkisi

T2- İç Mimarlıkta İSG Mevzuat ve Yönetmelikler

Bu tema altında, iç mimarlık öğrencilerinin iş sağlığı ve güvenliğiyle ilgili yasal düzenlemeleri, standartları ve uygulamaları anlayarak mesleki sorumluluklarının farkına varmaları üzerine olan konulara yer verilmiştir. Tema altında bulunan beş alt tema bu amacı desteklemektedir. Türkiye'deki İSG mevzuatlarının genel yapısı ve 6331 sayılı İş Sağlığı ve Güvenliği Kanunu'nun içeriği, öğrencilerin tasarım süreçlerinde yasal gerekliliklere uygun çözümler geliştirmelerine rehberlik eder. OHSAS 18001 ve ISO 45001 gibi uluslararası İSG yönetim sistemleri, öğrencilerin global standartları öğrenerek bu sistemlerin tasarım süreçlerine nasıl entegre edileceğini kavramalarını sağlar. İç mimarlığın bu yönetmelikler çerçevesindeki sorumlulukları, tasarımlarında güvenliği ön planda tutmalarını desteklerken, farklı alanlarda İSG uygulamaları, çeşitli sektörlerin güvenlik ihtiyaçlarını anlamalarına katkı sağlar (Görsel 4).

Temanın bilgi paketlerinde yer alma durumu ve birbiri ile ilişkileri analiz edildiğinde; *a- Türkiye'de İSG mevzuatları* hem içerik yoğunluğu hem de tekrar sıklığı açısından en fazla vurgulanan konu olarak öne çıkmaktadır. Bu kategori, yalnızca bağımsız bir başlık olarak değil, aynı zamanda *e- farklı alanlarda İSG ile ele alınarak* (15) çok yönlü bir bakış açısı sunmaktadır. Buna karşılık, *c- OHSAS 18001 ve ISO 45001 gibi İSG yönetim sistemleri*, daha teknik bir alan olması nedeniyle en az ele alınan kategori olarak dikkat çekmektedir (Görsel 4). Bu tema, öğrencilerin ulusal ve uluslararası mevzuat bilgilerini öğrenerek, güvenli ve yasalara uygun iç mekânlar tasarlama yetkinliklerini geliştirmeyi hedefleyen bilgiyi içermektedir.



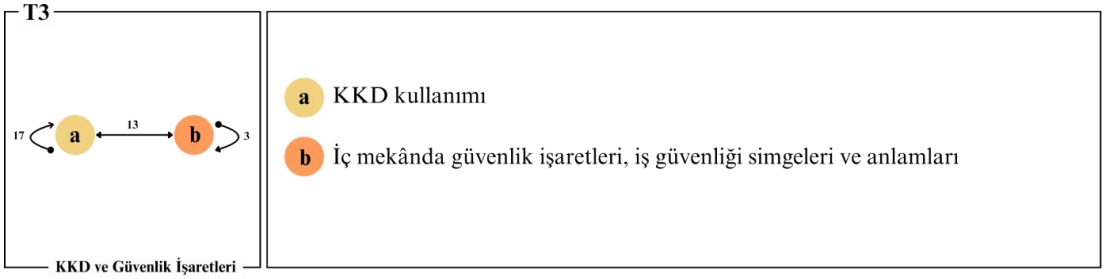
Görsel 4. T2- İç mimarlıkta İSG mevzuat ve yönetmelikler alt temalarının sıklığı ve ilişkisi

T3- Kişisel Koruyucu Donanımlar (KKD) ve Güvenlik İşaretleri

Bu tema altında, iç mimarlık öğrencilerinin güvenli çalışma ortamları oluşturabilmeleri için temel güvenlik araçlarını tanımalarını ve doğru şekilde kullanmaları üzerine olan konulara yer verilmiştir. Tema iki alt tema ile desteklenmektedir. Bu kapsamda, KKD kullanımı, farklı mesleki risklere karşı koruma sağlayan koruyucu gözlükler, eldivenler, baretler gibi donanımların tanıtımı ve kullanım esaslarını kapsar. İç mekânda güvenlik işaretleri, iş güvenliği simgeleri ve anlamları ise tasarım süreçlerinde güvenlik işaretlerinin doğru

yerleştirilmesi ve kullanıcıların bu işaretleri anlaması için gerekli bilgi ve farkındalığı kazandırmayı hedefler (Görsel 5).

Temanın bilgi paketlerinde yer alma durumu ve birbiri ile ilişkileri analiz edildiğinde; *a- kişisel koruyucu donanım (KKD) kullanımı* (17), bağımsız bir konu olarak önemli bir vurgu kazanmıştır. Bununla birlikte, *b- iç mekânda güvenlik işaretleri, iş güvenliği simgeleri ve anlamlarını* içeren kategori, genellikle *a- KKD kullanımı* ile ele alınarak (13) bütüncül bir perspektif sunmaktadır (Görsel 5). Bu tema, öğrencilerin hem güvenlik donanımlarını etkili bir şekilde kullanabilmelerini hem de işaretleme ve yönlendirme sistemlerini güvenli iç mekân tasarımına entegre edebilmelerini sağlayarak, kullanıcıların güvenliğini önceliklendiren tasarım yaklaşımları geliştirmelerini hedefleyen bilgiyi içermektedir.

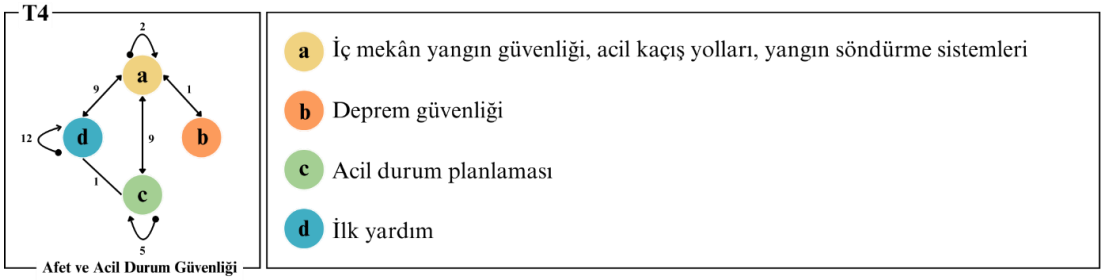


Görsel 5. T3- Kişisel koruyucu donanımlar (KKD) ve güvenlik işaretleri alt temalarının sıklığı ve ilişkisi

T4- İç Mekânlarda Afet ve Acil Durum Güvenliği

Bu tema altında, iç mimarlık öğrencilerine acil durum ve afet risklerini önceden öngörüp, güvenli mekânlar tasarlayabilmeleri için gerekli bilgi ve farkındalığın kazandırması üzerine olan konulara yer verilmiştir. Bu bağlamda tema dört alt temadan oluşmaktadır. İç mekân yangın güvenliği, acil kaçış yolları ve yangın söndürme sistemleri, yangın gibi tehlikeler karşısında güvenli tahliye ve müdahale olanaklarını tasarım sürecine entegre etmeyi hedefler. Deprem güvenliği, yapısal olmayan elemanların güvenliğini sağlayarak deprem sırasında yaralanmaları önlemeyi amaçlar. Acil durum planlaması, kriz anlarında mekân kullanıcılarının hızlı ve organize bir şekilde hareket edebilmesi için gerekli düzenlemeleri kapsarken, ilk yardım, kazalar ve ani sağlık sorunlarında temel müdahale bilgilerini öğrencilerle paylaşmayı hedefler (Görsel 6).

Temanın bilgi paketlerinde yer alma durumu ve birbiri ile ilişkileri analiz edildiğinde; *d- ilk yardım* (12) en sık ele alınan kategori olarak öne çıkmaktadır. Ayrıca, *d- ilk yardım* kategorisinin, *a- iç mekân yangın güvenliği, acil kaçış yolları ve yangın söndürme sistemleri* kategorisi ile sıklıkla vurgulandığı (9) tespit edilmiştir. Öte yandan, *b- deprem güvenliği* konusunun yalnızca bir kez değinildiği ve bu bağlamda sınırlı bir inceleme alanı oluşturduğu görülmektedir (Görsel 6). Bu tema hem kullanıcıların güvenliğini sağlamak hem de mekânların afet ve acil durumlara karşı dayanıklılığını artırmak için gerekli olan bilgiyi içermektedir.



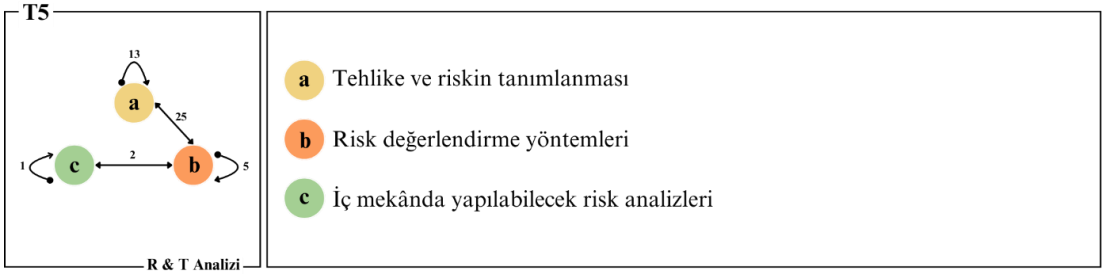
Görsel 6. T4- İç mekânlarda afet ve acil durum güvenliği alt temalarının sıklığı ve ilişkisi

T5- Risk ve Tehlike Analizleri

Bu tema altında, iç mimarlık öğrencilerinin mekân tasarımı sırasında olası tehlikeleri önceden tespit edip, bu tehlikelerin yol açabileceği riskleri değerlendirebilme becerisi kazanmaları üzerine olan konulara yer verilmiştir. Bu beşinci tema üç alt tema ile desteklenmektedir. Bu doğrultuda, tehlike ve riskin tanımlanması, öğrencilere potansiyel tehlikeleri ve bunların olası sonuçlarını anlamaları için temel bir altyapı sağlar. Risk

değerlendirme yöntemleri, öğrencilerin farklı analiz tekniklerini kullanarak tehlikelerin önceliğini belirleyip etkili önlemler alabilmelerini hedefler. İç mekânda yapılabilecek risk analizleri ise, ergonomi, yangın, aydınlatma gibi iç mekâna özgü riskleri inceleyerek güvenli bir tasarım yaklaşımı geliştirilmesine olanak tanır (Görsel 7).

Temanın bilgi paketlerinde yer alma durumu ve birbiri ile ilişkileri analiz edildiğinde; *a- tehlike ve riskin tanımlanması* (13) en sık ele alınan kategori olarak öne çıkmaktadır. Bu tema çerçevesinde dikkat çeken bir diğer önemli husus, *a- tehlike ve riskin tanımlanması* ile *b- risk değerlendirme yöntemleri* kategorilerinin büyük ölçüde birlikte (25) ele alınmasıdır. Buna karşılık, *c- iç mekânda yapılabilecek risk analizleri* (1) kategorisinin bu tema kapsamında oldukça sınırlı bir şekilde yer aldığı gözlemlenmiştir (Görsel 7). Bu tema, öğrencilerin hem kullanıcı güvenliğini hem de mekânın işlevselliğini artıracak sistematik bir düşünce yapısı geliştirmelerini sağlayacak bilgiyi içermektedir.

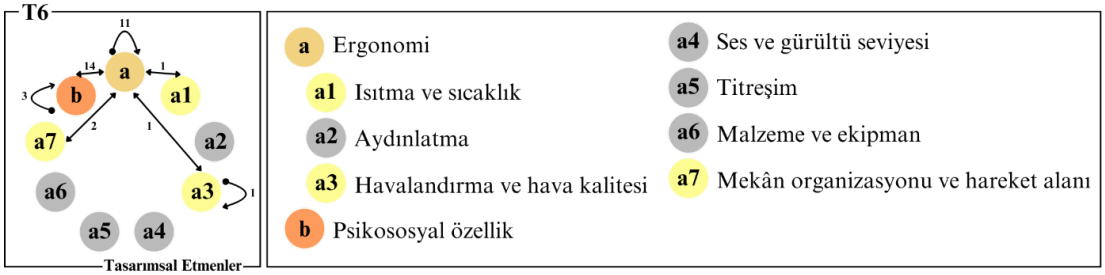


Görsel 7. T5- Risk ve tehlike analizleri alt temalarının sıklığı ve ilişkisi

T6- İç Mekânlarda Tasarımsal Etkenler

Bu tema altında, insanların daha verimli, sağlıklı ve güvenli bir şekilde çalışabilmesi için iç mekanların tasarımında dikkate alınması gereken önemli faktörler üzerine olan konulara yer verilmiştir. Tema iki alt tema ile desteklenmekte olup, bu alt temalardan biri kendi içinde yedi alt başlık altında detaylandırılmaktadır. Ergonomi, bu temanın ana odaklarından biridir ve çalışma ortamlarını insanların biyolojik, psikolojik ve fiziksel ihtiyaçlarına uygun hale getirmeyi amaçlar. Alt başlıklarda, iç mekânlarda ısıtma ve sıcaklık, aydınlatma, havalandırma, ses, titreşim, malzeme ve ekipman gibi fiziksel koşulların yanı sıra, mekân organizasyonu ve hareket alanı gibi faktörler de ele alınır. Bu faktörler, çalışanların rahatlık, verimlilik ve sağlıkları için optimize edilmelidir. Psiko-sosyal özellikler ise, bireylerin iş yerindeki psikolojik ve sosyal ihtiyaçlarını dikkate alarak iş ortamını insan odaklı hale getirmeyi hedefler (Görsel 8).

Temanın bilgi paketlerinde yer alma durumu ve birbiri ile ilişkileri analiz edildiğinde; a- ergonomi sıklıkla bağımsız bir konu olarak ya da b- psikososyal özellik kategorisi ile ele alınan (14) bir başlık olarak değerlendirilmektedir. Bununla birlikte, *a- ergonomi* alt başlıkları arasında yer alan *a2- aydınlatma* (0), *a4- ses ve gürültü seviyesi* (0), *a5- titreşim* (0) ve *a6- malzeme ve ekipman* (0) kategorilerinin hiç vurgulanmamış olması, iç mimarlık disiplini açısından önemli bir eksiklik olarak dikkat çekmektedir (Görsel 8). Bu tema iç mekânların tasarımında fizyolojik ve psikolojik etkenlerin en uygun şekilde bir araya gelmesini sağlayacak bilgiyi içermektedir.



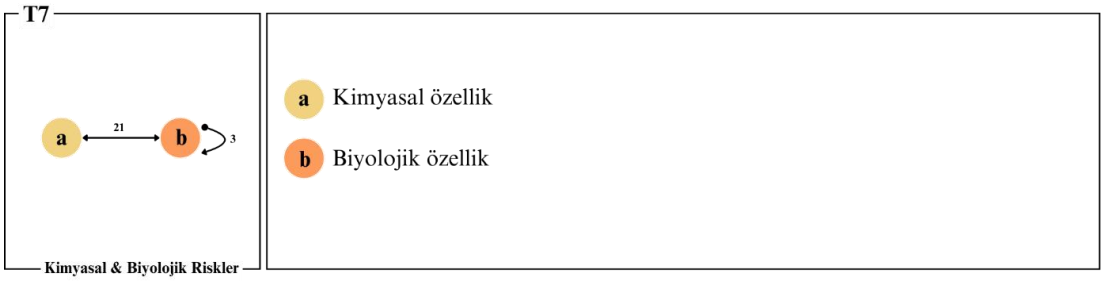
Görsel 8. T6- İç mekânlarda tasarımsal etkenler alt temalarının sıklığı ve ilişkisi

T7- Çalışma Ortamında Kimyasal ve Biyolojik Oluşabilecek Riskler

Bu tema altında, çalışanların sağlıklarını tehdit edebilecek potansiyel kimyasal ve biyolojik tehlikeleri belirlemek ve bu tehlikeleri en aza indirmek üzerine olan konulara yer verilmiştir. Tema altında yer alan iki

alt tema bu amacı desteklemektedir. Kimyasal özellik alt teması, iş yerlerinde kullanılan kimyasal maddelerin, zehirli gazların, buharların veya tozların çalışanlar üzerindeki olumsuz etkilerini analiz eder ve bunların güvenli bir şekilde yönetilmesi için gerekli önlemleri belirler. Biyolojik özellik alt teması ise, mikroorganizmalar, virüsler, bakteriler ve diğer biyolojik etmenlerin çalışma ortamındaki varlığını inceleyerek, çalışanların bu tür risklerden korunması için alınması gereken tedbirleri ortaya koyar (Görsel 9).

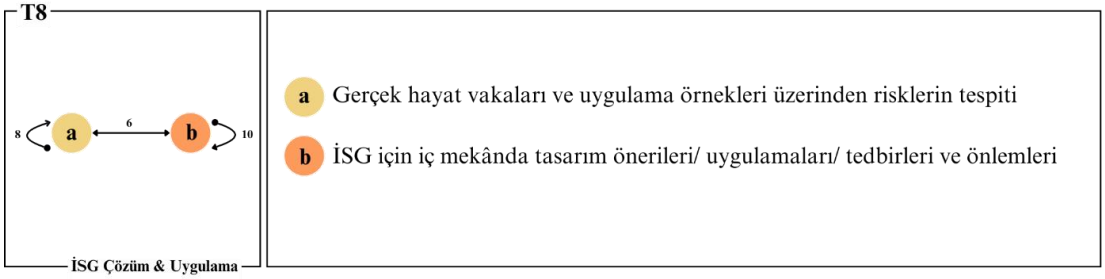
Temanın bilgi paketlerinde yer alma durumu ve birbiri ile ilişkileri analiz edildiğinde; *a- kimyasal özellik* ve *b- biyolojik özellik* kategorilerinin, iç mimarlık bölümlerinde verilen İSG derslerinde büyük ölçüde birlikte (21) ele alındığı tespit edilmiştir (Görsel 9). Bu tema, iş yerinde sağlık risklerinin yönetilmesi ve önlenmesi için bütünsel bir yaklaşım geliştirmeyi amaçlar ve her iki alt tema da çalışanların güvenliği için temel tehditleri tanımlayıp, etkili çözüm yolları sunmayı hedefleyen bilgiyi içermektedir.



Görsel 9. T7- Çalışma ortamında kimyasal ve biyolojik oluşabilecek riskler alt temalarının sıklığı ve ilişkisi

T8- İç Mekân İSG Organize Edilmesi, Çözümleri ve Pratik Uygulamalar

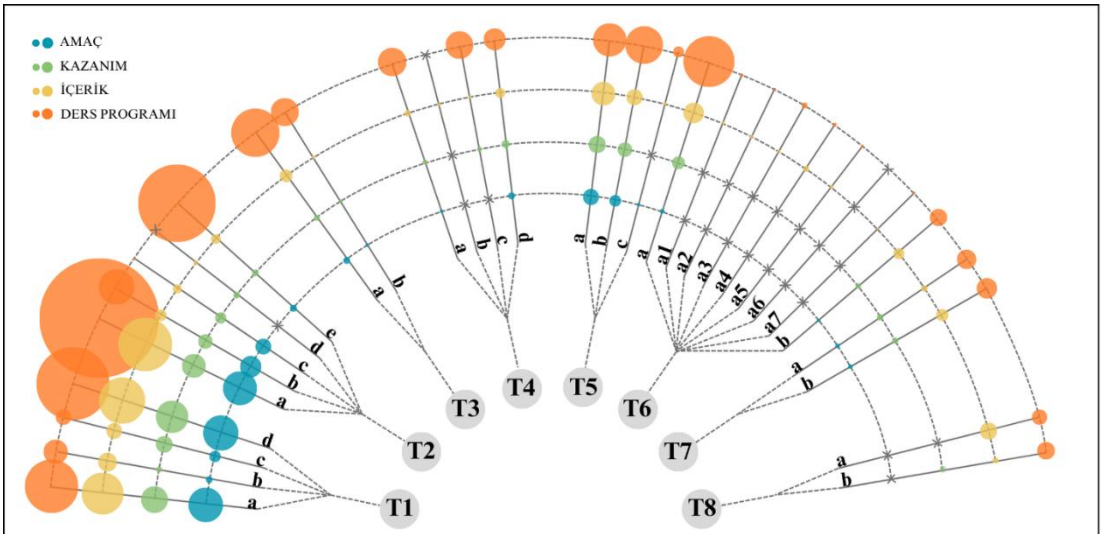
Bu tema altında, İSG ile ilgili iç mekanların daha verimli ve güvenli bir şekilde düzenlenmeleri üzerine olan konulara yer verilmiştir. Tema iki alt temadan oluşmaktadır. İlk alt tema olan gerçek hayat vakaları ve uygulama örnekleri üzerinden risklerin tespiti, mevcut çalışma ortamlarında karşılaşılan İSG risklerinin analiz edilmesini ve bu risklerin hangi uygulama ve çözüm yöntemleriyle ortadan kaldırılabileceğini incelemeyi amaçlar. İkinci alt tema olan İSG için iç mekânda tasarım önerileri ve uygulamalar, iş yerlerinde tasarımın güvenliği artırıcı, riskleri azaltıcı şekilde yapılması gerektiğini vurgular. Bu alt tema, çalışma alanlarında alınacak tedbirlerin ve uygulanacak güvenlik önlemlerinin belirlenmesini sağlar (Görsel 10). Bilgi paketlerinde yer alma durumu ve birbiri ile ilişkileri analiz edildiğinde; *a- gerçek hayat vakaları ve uygulama örnekleri üzerinden risklerin tespiti* (8) ile *b- iş sağlığı ve güvenliği (İSG) için mekânda tasarım önerileri, uygulamaları, tedbirleri ve önlemleri* (10) kategorileri hem bağımsız olarak hem de bir arada (6) ele alınan başlıklar arasında yer almaktadır. Ancak, her iki kategorinin de sınırlı bir şekilde vurgulanmış olması, alan açısından kritik bir eksiklik olarak değerlendirilmektedir (Görsel 10). Bu tema, iş yerlerinde çalışanların sağlığını ve güvenliğini sağlamak için iç mekânların etkin bir şekilde organize edilmesi ve uygun çözümlerle desteklenmesini sağlayacak bilgiyi içermektedir.



Görsel 10. T8- İç mekân İSG organize edilmesi, çözümleri ve pratik uygulamalar alt temalarının sıklığı ve ilişkisi

İSG Ders Plan Analizi

Lisans programlarında derslerin tanımlanmasında amaç, öğrenme kazanımları, içerik ve haftalık ders programı temel belirleyici unsurlar olarak öne çıkmaktadır. Bu bağlamda, İSG dersleri bu unsurlar doğrultusunda tematik açıdan incelendiğinde aşağıdaki bulgular elde edilmiştir (Görsel 11).



Temalar	Amaç	Kazanım	İçerik	Ders Programı	Toplam
T1- İSG kavramları teması	53	46	72	100	271
T2- İSG mevzuat ve yönetmelikler teması	46	36	50	136	268
T3- KKD ve güvenlik işaretleri teması	5	4	9	45	63
T4- Afet ve acil durum güvenliği teması	5	11	13	46	75
T5- Risk ve tehlike analizi teması	17	19	23	46	104
T6- Tasarımsal etmenler teması	4	11	29	54	98
T7- Kimyasal & biyolojik riskler teması	5	8	11	23	47
T8- İSG çözüm & uygulama teması	0	4	13	20	37

Görsel 11. Ders planında yer alan İSG temalarının sıklığı

Derslerin amaçları analiz edildiğinde; T1- İSG kavramları (53) ve T2- mevzuat ve yönetmelikler (46) temalarının diğer temalardan daha fazla yer aldığı görülmektedir. Bu durum, iç mimarlık bölümlerinde verilen İSG derslerinde, genel olarak teorik bilgiye daha fazla odaklanıldığını ve pratik uygulamalara yönelik eksikliklerin olabileceğini işaret etmektedir. Bu iki tema, teorik altyapının ve yasal düzenlemelerin önemini vurgularken, T5- risk ve tehlike analizi (17) ise onları takip etmektedir. Ancak T6- tasarımsal etmenler (4) ve T8- İSG çözüm uygulama (0) gibi pratik uygulamalara dair temaların amaç metinlerinde çok az değinilmesi ve hiç yer almamış olması, iç mimarlık derslerinde İSG konularına dair tasarım ve uygulama odaklı eksikliklere dikkat çekmektedir. Bu tespit, teorik derslerin yanı sıra pratik odaklı içeriklerin de eklenmesi gerektiğini ortaya koymaktadır.

Derslerin kazanım analizinde, T1- İSG kavramları (46) ve T2- mevzuat ve yönetmelikler (36) temaları yine diğer temalara kıyasla daha fazla vurgulanmıştır. Bu, öğrencilerin İSG derslerinden edinmeleri gereken temel bilgilerin, teorik anlamda İSG kavramları ve mevzuat ile ilgili olduğuna işaret etmektedir. Ayrıca, T5- risk ve tehlike analizi (18) teması da kazınım metinlerinde önemli bir yer tutmaktadır, bu da öğrencilerin risk analizi gibi önemli becerilerle donatılmasının gerektiğini göstermektedir. Bununla birlikte, T4- afet ve acil durum güvenliği (11) ve T6- tasarımsal etmenler (11) gibi konulara dair kazanımlar belirli bir ölçüde vurgulansa da bu temaların kazınım metinlerinde daha fazla yer alması gerektiği söylenebilir. T7- kimyasal & biyolojik riskler (8) ve T8- İSG çözüm uygulama (4) temalarının kazanımlar arasında oldukça düşük bir sıklıkta yer alması, pratik ve uygulama odaklı kazanımların güçlendirilmesi gerektiğine işaret etmektedir. Bu durum, derslerde daha çok teorik bilgilere dayalı hedeflerin belirlenmiş olduğunu, uygulamalı becerilere yönelik kazanımların ise yetersiz kaldığını ortaya koymaktadır.

Derslerin içerik analizine göre, T1- İSG kavramları (72) ve T2- mevzuat ve yönetmelikler (50) temaları, en fazla vurgulanan konular arasında yer almaktadır. Bu durum, iç mimarlık bölümlerindeki İSG derslerinde öğrencilere temel teorik bilgilerin ve yasal düzenlemelerin aktarılmasına öncelik verildiğini göstermektedir. T4- afet ve acil durum güvenliği (13), T5- risk ve tehlike analizi (23) ve T6- tasarımsal etmenler (29) temaları da içeriğe dahil edilmiştir, fakat bu temaların sıklığı daha düşük kalmaktadır. Diğer yandan, T7- kimyasal & biyolojik riskler (11) ve T8- İSG çözüm uygulama (13) gibi daha pratik ve uygulamaya yönelik temaların amaç

ve kazanım metinlere kıyasla içerik metinlerinde daha çok yer almıştır fakat bu alanlarda daha fazla bilgilendirme yapılması gerektiğini göstermektedir. Özellikle tasarım süreçlerine yönelik pratik uygulama ve çözümler konusunda eksiklikler olduğu söylenebilir.

Ders programları analizi sonucunda; T1- İSG kavramları (100) ve T2- mevzuat ve yönetmelikler (136) temaları en fazla vurgulanan konular arasında yer almaktadır. Bu durum, iç mimarlık bölümlerinde verilen İSG derslerinde yasal düzenlemeler ve temel kavramların ön planda tutulduğunu ve bu bilgilerin ders programlarının temel yapı taşlarını oluşturduğunu göstermektedir. Ayrıca T5- risk ve tehlike analizi (46) teması da ders programlarında önemli bir yer tutmaktadır, bu da öğrencilere risk analizi ve tehlike değerlendirme süreçlerinin öğretileceğini ortaya koymaktadır. Bununla birlikte T6- tasarımsal etmenler (54) ve T4- afet ve acil durum güvenliği (46) gibi konular ders programlarında yer bulmuş olsa da bu temaların kapsamı daha sınırlıdır. T7- Kimyasal ve biyolojik riskler (23) ile T8- İSG çözüm uygulama (20) temalarının ders programlarında daha az yer alması, pratik uygulamaların ders içeriğinde yeterince vurgulanmadığını göstermektedir. Genel olarak tüm temaların ders programı metinlerinde daha fazla yer bulmuş olmasına rağmen, T6- tasarımsal etmenler (54) ve T8- İSG çözüm uygulama (20) gibi mesleki İSG konularının alt temalarıyla birlikte yeterince ele alınmaması, bu alandaki pratik uygulama ve tasarım odaklı içeriğin güçlendirilmesi gerektiğini işaret etmektedir.

En çok vurgulanan temalar, T1- İş Sağlığı ve Güvenliği Kavramları ve Tarihsel Gelişimi (271) ve T2- İç Mimarlıkta İSG Mevzuat ve Yönetmelikler (268) temaları olmuştur. Bu durum temaların, İSG eğitiminde teorik altyapının temel taşı olarak görüldüğünü ortaya koymaktadır. Bu iki temanın ön planda olması, öğrencilere İSG'nin temel ilkelerini ve hukuki boyutlarını öğretmenin öncelikli bir hedef olduğunu göstermektedir. En çok vurgulanan alt tema, T1- İş Sağlığı ve Güvenliği Kavramları ve Tarihsel Gelişimi kapsamında yer alan a- temel kavramların tanıtımı kategorisi olmuştur. Bu alt tema toplam 18 kez bağımsız olarak vurgulanmış ve bu, İSG eğitiminin temel kavramlarının öğrenilmesine verilen önemin bir göstergesidir. Birlikte en sık ele alınan alt temalar ise T5- Risk ve Tehlike Analizleri kapsamında yer alan a- tehlike ve riskin tanımlanması ile b- risk değerlendirme yöntemleri (a-b) birlikteliği olmuştur. Bu iki alt tema toplamda 25 kez birlikte gündeme gelmiştir ve bu durum risk ve tehlike analizlerinin birbirini tamamlayıcı bir bütünlük içinde ele alındığını göstermektedir. En az vurgulanan tema T8- İç Mekân İSG Organize Edilmesi, Çözümleri ve Pratik Uygulamalar olmuştur. Bu tema altındaki a- risk tespiti ve uygulama örnekleri kategorisi 8 kez, b- tasarım önerileri ve uygulamalar kategorisi ise 10 kez bağımsız olarak vurgulanmış, ancak iki kategori birlikte (a-b) yalnızca 6 kez gündeme gelmiştir. Bu durum, pratik uygulamalar ve çözümlerin teorik konulara kıyasla daha az ele alındığını göstermektedir.

SONUÇ

Bu araştırma, Türkiye'deki iç mimarlık/iç mimarlık ve çevre tasarımı bölümlerinde verilen İSG derslerinin içeriği, amaçları, kazanımları ve ders programlarının analizi üzerine odaklanmıştır. Elde edilen bulgular, mevcut İSG ders programlarının genel olarak sekiz ana temaya dayandığını ve bu temaların her birinin içeriği açısından farklı ağırlıklarla ele alındığını göstermektedir. Ancak, bazı temaların, özellikle KKD ve güvenlik işaretleri (T3), kimyasal ve biyolojik riskler (T7) ve İSG çözüm uygulamaları (T8) gibi konuların sınırlı bir şekilde vurgulanması, iç mimarlık eğitiminde bu konular özelinde boşluk olduğuna işaret etmektedir. Bu durum, İSG derslerinin içeriğinde daha geniş bir kapsam ve derinlik kazandırılması gerektiğini ortaya koymaktadır. Bu çerçevede, iç mimarlık bölümlerindeki İSG derslerine yönelik aşağıdaki öneriler geliştirilmiştir:

Uygulama ve Pratik Yönün Artırılması: İSG derslerinin yalnızca teorik bilgiyle sınırlı kalmaması, pratik uygulamalarla desteklenmesi önemlidir. Bu doğrultuda, öğrencilere gerçek hayatta karşılaşabilecekleri durumları analiz etmeyi ve çözüm üretmeyi öğreten vaka çalışmaları, atölye çalışmaları ve simülasyonlar ders içeriğine entegre edilmelidir. Özellikle tasarım süreçlerinde İSG'nin nasıl uygulanacağına dair uygulamalı eğitimler, öğrencilerin teorik bilgilerini pekiştirmelerine ve pratikte kullanmalarına olanak tanıyacaktır (Yalçınkaya & Yalçınkaya, 2024b: 1724). Bu sayede, öğrenciler İSG farkındalığını içselleştirerek mesleki pratiklerine doğrudan aktarabileceklerdir.

Multidisipliner Yaklaşım ve İş birliği: İSG ders içeriğinin çok yönlü bilgiyi içermesi nedeni ile İSG dersleri sadece iç mimarlık öğrencilerine yönelik değil, aynı zamanda diğer disiplinlerle de iş birliği yapılarak çok yönlü bir eğitim ortamı oluşturulabilir (Yalçınkaya & Tunar, 2024: 2). Örneğin, İSG uzmanları ve mühendislerle yapılan atölyeler veya interaktif seminerler, öğrencilerin farklı perspektiflerden İSG'yi ele almalarını sağlayacaktır. Bu tür iş birlikleri, öğrencilerin güvenli tasarımlar konusunda daha kapsamlı bir anlayış geliştirmelerine olanak tanıyacaktır.

İç Mekân Tasarımında İSG'nin Kapsamının Genişletilmesi: İç mimarlık bölümlerinde verilen İSG derslerinde genellikle teorik bilgilere (T1-İSG Kavramları, T2-Mevzuat ve Yönetmelikler) odaklanıldığı görülmektedir. Ancak ders içeriklerinde risk ve tehlike analizi (T5), afet ve acil durum güvenliği (T4), tasarımsal etmenler (T6), kimyasal ve biyolojik riskler (T7) ve İSG çözüm & uygulama (T8) gibi mesleki uygulamalara yönelik konuların daha sınırlı yer aldığı tespit edilmiştir. Özellikle ergonomi (T6a) ve psikososyal etmenler (T6b) çalışma ortamlarının hem fiziksel hem de zihinsel sağlık üzerindeki etkileri nedeniyle kritik öneme sahiptir. Bu nedenle, ergonomi ve psiko-sosyal etmenler özellikle aydınlatma, gürültü seviyeleri ve malzeme seçimi gibi alt başlıklarla daha fazla vurgulanmalıdır. Bu temaların eğitimde daha fazla yer bulması öğrencilerin, çalışanların fiziksel ve psikolojik ihtiyaçlarına uygun tasarımlar yapabilmelerini sağlayacaktır. Bununla birlikte, iç mimarlık eğitiminde yalnızca kullanıcıların güvenliği değil, aynı zamanda tasarım ve uygulama süreçlerinde görev alan çalışanların güvenliği de göz önünde bulundurulmalıdır. Dekonstrüktif ya da deneysel tasarım uygulamaları gibi süreçlerde yüksekten düşme, elektrik çarpması, patlama riski gibi çalışanların maruz kalabileceği riskler ders içeriklerinde özel olarak ele alınmalıdır. Bu bağlamda, kişisel koruyucu donanımlar (KKD) ve güvenlik işaretlerinin (T3) tanıtımı, farklı çalışma senaryolarında alınması gereken önlemlerle desteklenerek öğretilmeli ve öğrencilerin bütüncül bir güvenlik anlayışı geliştirmeleri sağlanmalıdır. Bunun yanı sıra, kimyasal ve biyolojik riskler (T7), risk ve tehlike analizleri (T5) ve İSG çözüm & uygulama (T8) gibi konuların da ders programlarında daha fazla yer bulması gerekmektedir. Bu yaklaşım, öğrencilerin yalnızca İSG mevzuatına hâkim olmasını değil, aynı zamanda iç mekân tasarımlarında güvenlik odaklı çözümler üretebilmesini sağlayacaktır. Bu nedenle, ders içerikleri pratik uygulamalar, vaka analizleri, simülasyonlar ve tasarım odaklı projelerle desteklenmelidir.

İSG Eğitiminin Sürekli Güncellenmesi ve Yenilikçi Yöntemlerle Desteklenmesi: İSG eğitimi, sadece mevcut mevzuat ve teorik bilgilerle sınırlı kalmamalıdır. Teknolojik gelişmeler ve yeni güvenlik standartlarına dair güncel bilgiler, ders içeriklerine entegre edilmelidir. Ayrıca sanal gerçeklik (VR) veya artırılmış gerçeklik (AR) gibi teknolojiler, öğrencilerin potansiyel tehlikeleri deneyimlemeleri ve tasarım süreçlerinde güvenlik önlemlerini görselleştirmeleri için etkili bir araç olabilir. Bu tür yenilikçi eğitim yöntemleri, öğrencilerin İSG'yi daha iyi anlamalarına ve uygulamalı bir yaklaşım geliştirmelerine yardımcı olacaktır.

Sonuç olarak, iç mimarlık bölümlerinde verilen İSG derslerinde bazı temaların diğerlerine göre daha az vurgulandığı görülmektedir. Bu durum, ders içeriklerinin kapsamlı bir şekilde yeniden değerlendirilmesi gerektiğine işaret etmektedir. İç mimarlık bölümleri için İSG dersinin önemi belirlenerek, bu bağlamda ortaya konulan kazanımlar çerçevesinde temaların ağırlığına karar verilmesi gerekmektedir. Mevcut ders içeriklerine ek olarak, iç mimarların İSG kapsamında edinmesi gereken bilgilerin tespiti için daha geniş kapsamlı araştırmalar yapılmalı ve eksik bırakılan başlıklar tamamlanmalıdır. Sadece mevcut derslerin analizi ile karar verilmemesi gerektiği, ancak bu analizlerin önemli bir veri kaynağı oluşturduğu da unutulmamalıdır. Bu doğrultuda, İSG eğitimini daha etkili ve kapsamlı hale getirebilmek için derslerin iki aşamalı bir yapıya dönüştürülmesi önerilmektedir:

1. **Temel İş Sağlığı ve Güvenliği**: Genel İSG kavramları, mevzuatlar, risk analizi ve tarihsel gelişim gibi temel konuların ele alındığı bir ders.
2. **Mesleki İş Sağlığı ve Güvenliği**: İç mimarlık mesleğine özgü tehlikeler, tasarımsal riskler, ergonomi, malzeme seçimi ve uygulamalı çözümler gibi spesifik bilgilerin uygulamalı olarak işlendiği bir ders.

Bu yapı, öğrencilerin hem genel farkındalık düzeylerini artırmada hem de mesleki bilgi ve teknik beceriler kazanmalarında etkili olacaktır. Ayrıca, bu yaklaşım, ders içeriklerinin kapsamlı ve dengeli bir şekilde yapılandırılmasını sağlayarak, mezunların çalışma hayatında karşılaşabilecekleri çeşitli İSG risklerini anlama ve yönetme yetkinliklerini geliştirecektir.

Authors' Contributions

The authors contributed equally to the study.

Competing Interests

There is no potential conflict of interest.

Ethics Committee Declaration

This study does not require ethics committee approval.

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Authors' Biographies

Beyza Nur Azmanoğlu completed her undergraduate studies in 2020 at the Faculty of Engineering and Architecture, Avrasya University. In 2022, she commenced her master's degree in the Department of Interior Architecture at Karadeniz Technical University. Between her undergraduate and graduate studies, she gained professional experience working as an interior architect in the private sector. Currently, she continues her academic work as a master's student. Her research interests include occupational health and safety, cultural heritage, urban studies, and metaphor.

İrem Zülal Karabina completed her undergraduate studies in 2022 at the Faculty of Fine Arts, Marmara University. In 2023, she began her master's degree in the Department of Interior Architecture at Karadeniz Technical University. Between her undergraduate and graduate studies, she worked as an interior architect in the private sector. She is currently continuing her academic pursuits as a master's student. Her research interests include occupational health and safety, cultural heritage, urban studies, and metaphor.

Şengül Yalçınkaya completed her undergraduate degree at Karadeniz Technical University, Faculty of Engineering and Architecture (2001), and her master's degree (2005) and PhD (2011) at Karadeniz Technical University, Institute of Science, Department of Architecture. She is currently a professor at the Faculty of Architecture at Karadeniz Technical University. She continues her research in the field of environmental psychology, with publications focusing particularly on child users, healthcare facilities, and stress in spaces.

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Research Article

Analyzing Indian cafes through social media: Spatial attributes and user perceptions of third places

Upendra Vinay Joshi[1*], Asst. Prof. Dr. Sunny Bansal[2]

[1]Anant National University, Ahmedabad, India.
Upendra.joshi.phd21@anu.edu.in

[2]Anant National University, Ahmedabad, India.
sunny.bansal@anu.edu.in

*Corresponding Author

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Abstract
In the evolving landscape of urban public places, cafes have emerged as significant third places, providing social, cultural, and functional value to users. They are the places where people socialize, relax, and engage in various activities, making them critical to understanding urban life. This research analyses Indian urban cafes through social media platforms, particularly Instagram, as a primary research tool. It aims to analyze how spatial qualities—such as design, layout, and ambiance—impact user experiences and interactions. By analyzing images, posts, and comments related to 100 cafes across India, the key spatial attributes that influence user engagement and satisfaction as well as shape their perceptions. The research employs a quantitative approach that allows for structured and data-driven insights, providing statistical validation to the outcome. By analyzing the collected data, the spatial attributes that resonate most with users and understand how these interactions reflect broader trends in urban design and social behavior in Indian metropolitan cities. This study highlights the importance of these key attributes in creating places that meet the changing preferences of a digitally connected society and gives readers a better understanding of their geographical and cultural context.

Keywords: Indian cafes, Third place, Spatial attributes, User perceptions, Instagram

Extended Abstract

Introduction: In the evolving landscape of contemporary urban environments, third places—informal public gathering places outside of home and work—have garnered renewed attention for their social, cultural, and economic relevance. Among these, urban cafes have emerged as prominent nodes of social interaction, informal community-building, and everyday leisure. Especially in Indian metropolitan cities, cafes serve not just as spaces to consume food and beverages but also as arenas for social bonding, creative expression, co-working, and digital engagement. In a country experiencing rapid urbanization, digital transformation, and demographic shifts, the role of such Places in shaping public life is increasingly critical. This study explores urban cafes in India as third places, focusing on their spatial attributes and user perceptions through the lens of social media analysis. By utilizing Instagram—a platform that has become a cultural touchstone and visual diary for users—the research identifies and analyzes user-generated content to understand how spatial qualities such as design, layout, and ambiance influence user engagement, perception, and satisfaction. The investigation is grounded in urban theory, spatial analysis, and behavioral studies, drawing upon the works of scholars such as Ray Oldenburg, Henri Lefebvre, and William H. Whyte to frame the significance of third places in the urban fabric.

Purpose and scope: The purpose of this research is to evaluate how the spatial design of urban cafes in Indian cities contributes to their effectiveness as third places and how such places are perceived by users in the digital realm. The study responds to the growing importance of hybrid physical-digital experiences, particularly in post-pandemic urban societies where social media often mediates how people discover, use, and remember urban places. The scope of the study is limited to 100 urban cafes across diverse metropolitan contexts in India, including cities like Delhi, Mumbai, Bengaluru, Kolkata, Hyderabad, Pune, and Ahmedabad. The selected cafes are situated in urban pockets of cities, although they vary

in scale, design language, clientele, and urban context. The study draws conclusions that reflect broader trends in Indian urban life, design culture, and social behavior. The key research questions include:

- What spatial attributes are most frequently associated with user satisfaction and engagement in urban cafes?
- How do design and ambiance features impact the way people perceive and interact within these spaces?
- What do digital traces—such as Instagram posts, images, hashtags, and comments—reveal about user behavior, preferences, and spatial values?

Method: This research employs a quantitative content analysis approach, leveraging publicly available data from Instagram posts, images, captions, hashtags, and user comments related to 100 urban cafes. The method involves collecting and coding visual and textual data based on pre-defined spatial attributes. Six spatial dimensions—physical, perceptual, functional, social, temporal, and visual—serve as the analytical framework, each broken down into sub-attributes such as accessibility, seating layout, lighting, visual aesthetics, and sensory experience, to name a few. To ensure objectivity and rigor, the study utilizes frequency analysis, Pearson's correlation, and ANOVA tests to explore relationships between spatial features and user responses. User engagement metrics—such as likes, shares, and comment sentiment—are analyzed alongside visual indicators like seating arrangements and indoor-outdoor transitions. The methodology was chosen for its ability to handle large-scale visual and textual data systematically and for its relevance in analyzing the digital footprints of spatial experience—a relatively underexplored yet increasingly significant area of urban studies and architectural research.

Findings and conclusion: The analysis reveals that spatial attributes have a great influence on the way people perceive, interact with, and experience urban cafes. Key findings include: physical and functional dimensions are of paramount importance in user perceptions. Accessibility, furniture design, and spatial layout are consistently associated with improved participation and fulfillment. Café with easy access from a transit stop or urban street is more likely to generate repeated visits, along with digital photography as memories. Functional factors such as reliable Wi-Fi, charging stations, and multi-functional seating arrangements are substantially connected to positive Instagram mentions, indicating that utility and comfort go hand in hand with ambiance. Flexible spatial layouts that include movable furniture, hybrid indoor-outdoor spaces emerge as key contributors to user satisfaction. Informal, adaptable seating allows a variety of activities such as solo study sessions, group meetups, creative workshops, and even informal business meetings. Café that offers such diversity is celebrated as a versatile and user–friendly place, Oldenburg's principle of accessibility and neutrality. Perceptual cues such as lighting design, material palette, and greenery are often highlighted by users as "cozy corners' or "Instagram-worthy" backdrops, underscoring the important linkage between perceptual design elements and affective user engagement. The conclusion affirms that the café that balances practical needs such as accessibility and flexible layout, along with perceptual richness through atmosphere, aesthetics, and sensory qualities, is the most successful in fostering satisfaction, inclusivity, and prolonged engagement. It informs practitioners of the importance of incorporating spatial quality attributes into the design process. At a broader level, this study adds to the discourse of urban studies and architectural design by emphasizing the interrelationship between spatial qualities and user perceptions in a rapidly urbanizing society.

Keywords: Indian cafes, Third place, Spatial attributes, User perceptions, Instagram

INTRODUCTION

In the digital age, social media has profoundly transformed how individuals perceive and engage with public places. Platforms like Instagram, Facebook, Twitter, and others have become integral to the way people share experiences, express opinions, and form collective understandings of the environments they inhabit. Unlike traditional media, social media offers a dynamic and participatory platform where users contribute to the ongoing narrative of public places through photos, videos, comments, and reviews. This user-generated content provides real-time insights into how places are used, perceived, and valued, offering a rich source of data for understanding public experiences. As Ioannou et al. (2021) mention, the way the physical place is shaped by urban design and planning may be impacted by priorities, attitudes, and expectations centered around "connectivity" as the fundamental value of digital culture. The influence of social media on public places is multifaceted. It not only shapes individual perceptions but also influences broader public opinion, often driving trends in urban design, architecture, and public policy. Moreover, social media allows for a democratization of voices in the discourse surrounding urban third places. Individuals from diverse backgrounds can share their experiences, bringing attention to aspects of third places that might otherwise be overlooked by traditional evaluation methods. As social media continues to evolve and allows for the collection of organic, spontaneous

expressions of sentiment from a wide audience, its role in shaping the perceptions and experiences of public places is likely to grow, offering new opportunities for feedback, innovation, and community engagement in the creation and maintenance of our urban environments. This shift has significant implications for the design and management of these places, as it provides a more inclusive understanding of what makes urban third places successful, comfortable, and engaging for all users. Consequently, both human and non-human entities collaboratively generate, disseminate, and redefine the content of digital platforms, thereby transforming conventional urban places (Handlykken, 2012).

Instagram, with its visual focus and global reach, has become a powerful medium for sharing and experiencing urban spaces. Users document places through photos, stories, and comments, shaping a collective narrative that influences how others perceive and engage with locations like cafes and parks. This instant sharing highlights the growing importance of aesthetic appeal and functional design in public and semi-public spaces. Thus, social media is an interactive environment that focuses on human interaction and can enhance the overall experience design. This is achieved by utilizing the content provided by actual users that pertains to local experiences (Gon, 2021). In this context, Instagram is not merely a platform for social interaction but a crucial tool for understanding contemporary urban life and the evolving dynamics of public places. It significantly influences individuals' daily lives across various dimensions—socially, culturally, economically, and politically—creating an ideal environment for studies in academia (Caliandro & Graham, 2020).

As urban third places, cafes offer accessible, flexible, and culturally resonant places that foster social interaction and community attachment. Their adaptability to changing work patterns, communication styles, and urban dynamics makes them vital to contemporary city life. As Lukito and Xenia (2018) claim, conversation remains the primary activity, but many individuals use their digital devices in addition to face-to-face conversations. Third places also provide the opportunity to interact with others and allow others to observe you, both physically and virtually. With the rise of freelance work, digital nomadism, and the increasing need for informal, adaptable workplaces, cafes have become key urban nodes where professional and personal life intersect. As a result, some cafes have become the critical infrastructure of new urban culture (Zukin & Kosta, 2004) and a conspicuous indicator of gentrification in particular neighborhoods (Zukin et al., 2009).

Problem Statement, Research Gap, and Objectives

Traditional methods of evaluating public places often rely on surveys and in-person observations, which may not fully capture the dynamic and diverse interactions that occur within these environments. In this scenario, Instagram serves as a rich source of user-generated content, offering deeper insights into the patrons' use and value of cafes. Social media data is increasingly being used in urban environment quality studies to analyze social activities and individual behaviors from the users' perspective (Li et al., 2021). However, the potential of this new form of data for analyzing spatial attributes and user perceptions with the help of a quantitative approach in an Indian context remains underexplored. To address this gap, the study examines Instagram data to determine the relationship between spatial attributes and user preferences in Indian urban cafes. The study aims to:

To determine the potential impact of spatial attributes on user preferences.

To identify the prominent spatial attributes that users of cafes associate the most with across India.

To analyze the association between spatial attributes and user preferences.

LITERATURE REVIEW

Social Media in Urban Studies

Social media has significantly influenced how urban environments are researched, interpreted, and experienced in contemporary society. This transformation is being observed, particularly at the individual level, with digital platforms like Instagram becoming integral to daily life. As Wang (2024) claims, the attributes of urban environments have a strong connection to individual-level perceptions and user-generated data, enabling

researchers to integrate subjective viewpoints with objective measurements for a thorough spatial assessment. Another important component that social media addresses is new forms of connectivity. It ranges from global reach and instant communication, building and maintaining relationships, personal expression and identity formation, access to diverse perspectives and information, to enhanced networking opportunities. As Either (2016) asserts, the emergence of digital media is significantly responsible for these new urban practices. As a result, urban culture is highly influenced by these new urban practices, shaping urban places in the context of contemporary needs. It demarcates the need for the inclusion of social media data in urban studies that may reflect the complexities of urban life, offering real-time data, diverse perspectives, and new avenues for public engagement.

As digital platforms have significantly established their presence in everyday urban life, researchers have also started to investigate how user-generated data on social media impacts the perception, use, and value of public and semi-public places. Instagram, in particular, plays a multi-faceted role: it not only gathers user preferences, but it also shapes spatial practices by encouraging visual, aesthetic, and social cues. Researchers like Wagiri et al. (2024) explore how Instagram's features, such as geo-tagging, filters, and hashtags, enhance users' sensory and temporal engagement with architecture. Their phenomenological study shows that Instagram does more than just reflect architectural space; the platform's visual logic determines which spatial features are recognized, shared, or valued. Wang (2024) has conducted another recent study on user perceptions at Kampong Glam and Haji Lane, integrating Instagram posts and street view photographs to analyze how people perceive urban places. The findings suggest that combining perceptual data (from user posts) with physical data (from built form and street views) provides greater insights into the characteristics that users value, such as walkability, visual amenity, façade design, and vegetation.

However, in India, research related to social media content, spatial design, and user behavior is still in its early stages. Gupta et al. (2023), for example, have studied the impact of social media platforms on tourists' perceptions of food outlets in Delhi (NCR), India. Their research reveals that visual content and user reviews on digital platforms have an immense effect on perceptions and preferences, particularly in the food and leisure setting. While not specifically addressing the café as a third place, the study demonstrates how digital traces shape spatial decision-making in the Indian urban milieu. These insights highlight a growing acknowledgment of social media as a methodological tool and a cultural force in urban research.

In the context of this study, Instagram is given prominence as its characteristics are strongly related to the objectives of exploring spatial attributes, user perceptions, and experiences of café as an urban third place. Unlike a text-based platform, Instagram is predominantly visual, allowing for the documentation of architectural and interior characteristics such as spatial layout, lighting, furniture, textures, and mood. As a result, users are inclined to highlight aesthetically pleasing and socially engaging features in their posts. Instagram encourages user engagement by offering engagement mechanisms such as likes, comments, shares, and saves. They serve as behavioral indicators of user preference and satisfaction, generating measurable data for quantitative analysis (Wibowo et al., 2024). The platform's geotagging and hashtag functions include geographical metadata, helping users to connect their content to specific places. This feature enables researchers to map spatial preferences across geographic contexts, supporting for detailed investigation of where and how people interact with particular surroundings. Instagram's features, such as filters, visual framing, algorithmic feeds, and story formats, shape the way places are represented and shared. These features are frequently used to curate the built environment and urban place, amplifying their symbolic and aesthetic appeal (Shuyu & Gong, 2025). Thus, Instagram offers real-time, large-scale, identity-based data. Posts are created in high volumes, reflect current social trends, making them useful for documenting evolving perceptions of urban life. Furthermore, it plays an important role in lifestyle and identity formation; users intentionally curate their experiences in the café and public place as part of their own identity, making the platform particularly valuable for understanding the social and cultural dimensions of third place (Masciantonio & Bourguignon, 2023). Together, these features make Instagram particularly adapted to gather both objective spatial attributes (by visual evidence) and subjective user perceptions (via interaction, descriptions, and hashtags). Therefore, its integration of visual representation, interactivity, and spatial metadata offers a methodological advantage over other platforms, justifying its selection for the study.

From another perspective, on an epistemological background, a key issue in using Instagram data is the disparity between what users post and what they experience. The two may not always align. When sharing pictures, individuals often highlight selective, or idealized, aspects of the café, while overlooking less attractive or common features. Similarly, captions, hashtags, or comments may not be objective reflections of the user experience. Instead, they might be performative acts in which users portray themselves and the café in ways that reflect social trends, peer expectations, or personal identity. This means Instagram content reflects not only individuals' perception of the cafe, but also how they wish to be perceived by others. However, these selective and performative acts are purposeful rather than restrictive. The act of curating and exhibiting certain features of a café reflects what users value as memorable, shareable, and associated with their personal and social identity. What is chosen to be highlighted frequently indicates which spatial features, such as ambiance, layout, lighting, or aesthetic details, are considered more memorable, desirable, and socially valuable. In this way, even idealized or filtered content serves as an indirect measure of spatial preference, uncovering the symbolic and experiential components of the cafe environment. It provides an insight into what is collectively celebrated and shared. When combined with other empirical methods such as surveys and case studies, the analysis of Instagram may become an effective tool for analyzing both spatial perception and the social meaning, along with the cultural practice embedded in it.

Cafes as urban third places

Cafes as urban third places play a significant role in the socio-cultural life of cities. The concept of a "third place" was popularized by sociologist Ray Oldenburg in his book, *The Great Good Place,* where he described third places as informal public gathering spaces that are neither home (the first place) nor work (the second place). As Oldenburg (1989) mentions, third place is a generic term for a vast range of public venues hosting the regular, voluntary, casual, pleasantly expected meetings of people outside of the boundaries of home and business. It is simply an informal urban gathering place that promotes "inclusive sociability". It refers to a human-centric urban approach. As a result, it becomes vital to construct a third place that not only enables but also responds to the social demands of occupants while also providing a sensible "human" element to the setting. Cities stand out for their diversity (Jacobs, 1961), which is nurtured by café culture and a more lively street life (Montgomery, 1997).

Cafés in cities provide a wide range of functions. They serve as gathering places for social interactions, workspaces for individuals and organizations, places for cultural or artistic events, and informal networking areas. The attraction of these venues stems from their versatility, as they cater to various user demands throughout the day, creating an inclusive atmosphere for people of all ages, backgrounds, and interests. Cafes, with their unique blend of public and private traits, exemplify the balance of interaction with others and personal privacy, making them excellent urban third places. A café's inclusive approach to all aspects of life, combined with technological advancements, makes it even more vital in the twenty-first century. It has been one of the first places to seamlessly integrate technology into people's lives, encouraging all kinds and channels of contact to meet users' basic communication and socialization needs. The formation and sustainability of these third places are deeply influenced by spatial dimensions. Understanding how these spatial dimensions interact and contribute to the creation and maintenance of urban third places is essential for urban designers and planners. As Waxman (2006) states, every person has a different experience of a place, which is closely tied to their life experiences. Mapping and analyzing these subjective experiences towards cafes can reflect the most crucial associations and perceptions of users that address the relevance of urban third places in a contemporary urban setting.

Edward Soja, an influential urban theorist, proposes the concept of "third space" (1996), which is particularly useful in understanding the cultural and experiential role of third places like cafés. It extends beyond the distinction between first space (physical, material space that can be empirically measured) and second space (an imagined, representational space). He contends that urban life is also influenced by a third space: a lived, hybrid, and dynamic space in which material form, social activity, and cultural meaning intersect. This perspective emphasizes that a café is a lived space where people negotiate identity, belonging, and community. He underscores the characteristics of third space, such as fluidity, multiplicity, and inclusivity, which also resonate with Oldenburg's perspective of third place.

Spatial attributes of urban third places

Urban third places are characterized by the physical, social, cultural, emotional, and psychological experiences they facilitate. Individuals present in these places serve as the principal source of these varied exposures. Users may derive enjoyment from the sheer presence of others, whether through direct interaction or indirectly by witnessing their behaviors, conversations, and activities. The efficacy of urban third places predominantly rely on the interplay between individuals and places. As Yuen & Johnson (2017) claimed, diversity is the most relevant feature when considering third places as a medium for community participation because the people participating and the experience they provide are the main factors that drive and enhance one's encounter. As a result, these places allow cities to flourish as hubs of human-centric design and collective urban experience.

This urban experience includes not only the external form, aesthetic qualities, and surface-level appearances of third places but also a spatial understanding of places, enabling us to consider the physical qualities of the environment, such as how it is organized, how people move through it, how it accommodates different functions, and how it responds to human needs. This approach is supported by Ali Madanipour in his book, *Design of Urban Spaces*, where he states that if the awareness of users is restricted to a visual perspective, their focus solely remains on forms. However, if users transcend mere appearances, they can initiate a spatial comprehension along with a three-dimensional experience, enabling them to inhabit the place rather than just observing it. They do not fabricate superficial appearances but rather create places that can be utilized for various purposes (Madanipour & Madani, 1996).

Spatial design is multifaceted and encompasses various dimensions, elements, and considerations that come together to create meaningful places. It ranges from physical form and functionality to emotional impact and cultural relevance. These factors play a critical role in how these urban third places are experienced and perceived by their users. A spatial design involves a multi-sensory experience that creates a holistic understanding of the environment. In the context of cafes, for example, it is not just about the visual appeal of interior design but the combination of aroma, warmth, sound, and comfort that prompts you to perceive a café as relaxing, welcoming, and stimulating. Thus, it is important to note that our perception of place is typically derived from a synthesis of multiple senses (Shaftoe & International Institute for Environment and Development, 2008).

Therefore, it is apparent that a comprehensive analysis of the spatial attributes of urban third places necessitate an integrated approach. It is made to analyze through the lenses of Matthew Carmona in his book, *Public Places—Urban Spaces—The Dimensions of Urban Design*, where he categorizes them into six dimensions: physical, perceptual, social, visual, functional, and temporal, respectively, as mentioned in Figure 1. While asserting that urban design is holistic only when all dimensions are concurrently explored, he also clarifies that this categorization is only for the sake of clarity in interpretation and analysis. Carmona also states that it is crucial to recognize that urban design is a process that occurs at and across a variety of spatial dimensions rather than at any one specific scale (Carmona et al., 2021). Although considering the nature of these dimensions related to daily life, spatial understanding in this research is conducted at the human scale.

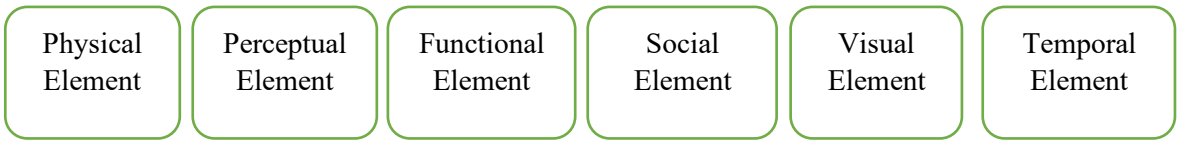


Figure 1. Framework of spatial attributes

METHOD

Data Collection

This study analyses one hundred cafes throughout India, evenly distributed among the four principal geographic regions: North, South, West, and East. This division is for statistical convenience. The cafes chosen are located in the urban pockets of the metropolitan cities, where café culture is thriving due to the concentration of social activities and higher footfall. These are popular establishments known for their social

atmosphere, design, and role as community gathering places with a notable presence on Instagram. Twenty-five cafes from every region ensure equal representation across different cultural and spatial contexts in India, allowing the capture of diverse spatial attributes and user perceptions from different parts of the country. Data is gathered from Instagram posts geotagged to each of the hundred cafes using relevant hashtags that include images, captions, and comments. This form of real-time data is being utilized more frequently to map spatial activities in urban areas, underscoring the importance of social media data in urban studies (Lin & Geertman, 2019).

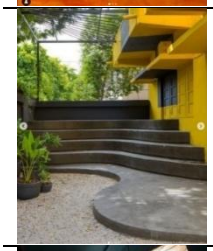
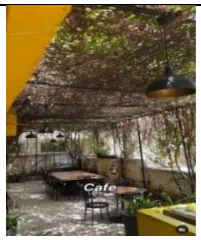
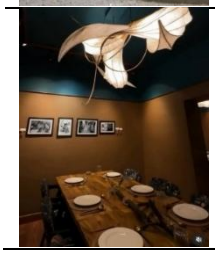
	Furniture design, placement, & orientation Mixed use seating (solo, study, work)		Convenient access with shorter distance Visual appeal through exterior décor, café branding, local materiality
	Sensory experience through colour, textture, materiality, light Integration of art elements		Visual connection between Inside & Outside
	Spatial layout & organization; Opportunity for social gathering & community events Planning at human scale Multi-functional use		Well-proportionate transition zone Spatial layout Furniture arrangement Planning at human scale Visual connection between inside & outside
	Sensory pleasure and experience through lighting design Community tables		Well-proportionate transition zone Spatial layout Furniture arrangement Planning at human scale

Figure 2. Observed spatial design elements (Example for "The Project Café"- Ahmedabad, India)

Data analysis

The data analysis consists of a frequency distribution of user responses across India, as shown in Table 1. It helps to summarize the data region-wise, as mentioned earlier. It is obtained by using NVivo as qualitative data analysis software. A chi-square test is employed to explore if spatial attributes have a measurable impact on how users perceive and prefer cafes. A single-factor ANOVA deepens the knowledge and informs us about the most preferred attributes among users across India. It reveals that not all attributes are equally valued, implying that some spatial aspects have a greater influence on creating user experience. Tukey's HSD post hoc test investigates whether these most preferred attributes vary in influencing user preferences in all regions. In other words, it assesses if user preferences are consistent nationwide or differ based on location. As part of the next step, Pearson's correlation analysis explores the extent to which spatial attributes and user preferences are interdependent. This multi-layered analysis offers insights into the design elements that are most essential in optimizing cafes as a third place, improving user experience, and ensuring that spatial design is in accordance with user expectations.

Table 1. Frequency distribution table of user responses

Spatial Attributes/ User Responses (In Count)	West	North	East	South
Physical element	**343**	**515**	**658**	**673**
Convenient access with shorter distance	10	36	81	78
Furniture design, placement & orientation	158	225	251	228
Spatial organization & layout	134	161	232	234
Well-proportioned transition areas	41	93	94	133
Perceptual element	**346**	**570**	**612**	**511**
Feeling of comfort & security	147	218	265	147
Sensory experience promoting well-being	199	352	347	364
Functional elements	**371**	**433**	**397**	**730**
Opportunities for seeing, hearing, and conversing	123	155	152	245
Pedestrian and age-friendly design	65	64	72	122
Diverse mix of urban activities	183	214	173	363
Social element	**300**	**372**	**289**	**615**
Spaces for self-expression and identity	81	107	81	220
Platforms for social interaction & engagement	124	161	143	235
Fostering a sense of community	95	104	65	160
Temporal element	**278**	**332**	**307**	**529**
Adaptability to changes in the built environment	160	146	155	299
Opportunity for social gatherings and celebrations	118	186	151	230
Visual element	**200**	**324**	**343**	**300**
Human scale physical planning	111	195	197	176
Clear visual connectivity between indoor and outdoor	89	129	146	124

Data analysis is conducted in three stages as per the mentioned objectives. All three stages are utilized as parts of a single analytical approach.

Stage 1: To determine the potential impact of spatial attributes on user preferences.

The Chi-square Test of Independence is a statistical instrument for determining whether both category variables are significantly interrelated. It does not inform how closely these variables are associated (Rana & Singhal, 2015). It is an appropriate method to determine the possibility of a significant association so that spatial attributes contribute to shaping user experiences in cafes. In this test, two hypotheses are defined.

Null Hypothesis (H_0)- Spatial attributes do not have a significant effect on user preferences. Alternative Hypothesis (H_1): Spatial attributes have a significant effect on user preferences.

Chi-square is measured by: $X^2 = \sum (O-E)^2 / E$…where, O- represents the observed frequency & E- represents the expected Frequency.

Degrees of Freedom- (d.f) = n-1…where n= No. of items, Significance of level (α=0.05), Critical value is obtained from chi-square distribution table.

A chi-square test is represented in Table 2. It is performed across the west, north, east, and south regions of India. If the value of X^2 is greater than the critical value, an association can be considered significant. If the value of X^2 is less than the critical value, it will be considered insignificant.

Table 2. Chi-square test of independence

West Region						
Elements	Spatial Attributes	Observed frequency	Expected frequency	Difference between observed and expected frequency	Squared difference between observed and expected frequency	Squared difference divided by expected frequency
Physical	Convenient access with shorter distance	10	85.75	-75.75	5738.06	66.91

	Furniture design, placement & orientation	158	85.75	72.25	5220.06	60.87
	Spatial organization & layout	134	85.75	48.25	2328.06	27.14
	Well-proportioned transition areas	41	85.75	-44.25	2002.56	23.35
	X^2 =78.27 > Threshold value = 7.815					
Visual	Human scale physical planning	111	100	11	121	1.21
	Clear visual connectivity between indoor and outdoor	100	100	-11	121	1.21
	X^2 = 2.42 < Threshold value = 3.841					
Perceptual	Feeling of comfort and security	147	173	-26	676	3.90
	Sensory experience promoting well-being	199	173	-26	676	3.90
	X^2 = 7.8 > Threshold value=3.841					
Functional	Opportunity for seeing, hearing & conversing	123	123.66	-0.66	0.43	0.003
	Pedestrian & age-friendly design	65	123.66	58.66	3440.99	27.82
	Diverse mix of urban activities	183	123.66	59.34	3521.23	28.47
	X^2 = 56.29 > Threshold value = 5.991					
Social	Spaces for self-expression & identity	81	100	-19	361	3.61
	Platforms for social interaction & engagement	124	100	24	576	5.76
	Fostering a sense of community	95	100	-5	25	0.25
	X^2 = 9.62 > Threshold value = 5.991					
Temporal	Adaptability to changes in the built environment	160	139	21	441	3.17
	Opportunity for social gatherings and celebrations	118	139	-21	441	3.17
	X^2 = 6.34 > Threshold value = 3.841					

North Region						
Elements	Spatial Attributes	Observed frequency	Expected frequency	Difference between observed and expected frequency	Squared difference between observed and expected frequency	Squared difference divided by expected frequency
Physical	Convenient access with shorter distance	36	128.75	-92.75	8602.56	66.81
	Furniture design, placement & orientation	225	128.75	96.25	9264.06	71.95
	Spatial organization & layout	161	128.75	32.25	1040.06	8.07
	Well-proportioned transition areas	93	128.75	-35.75	1278.06	9.92
	X^2 = 156.75 > Threshold value = 7.815					
Visual	Human scale physical planning	195	162	33	1089	6.72
	Clear visual connectivity between indoor and outdoor	129	162	-33	1089	6.72
	X^2 = 13.44 > Threshold value= 3.841					
Perceptual	Feeling of comfort and security	218	285	-67	4489	15.75
	Sensory experience promoting well-being	352	285	67	4489	15.75
	X^2 = 31.50 > Threshold value= 3.841					
Functional	Opportunity for seeing, hearing & conversing	155	144.33	10.67	113.84	0.78
	Pedestrian & age-friendly design	64	144.33	-80.33	6452.90	44.70

	Diverse mix of urban activities	214	144.33	69.67	4853.90	33.63
	X^2 = > Threshold value= 5.991					
Social	Spaces for self-expression & identity	107	124	-17	289	2.33
	Platforms for social interaction & engagement	161	124	37	1369	11.84
	Fostering a sense of community	104	124	-20	400	3.22
	X^2 = 16.59 > Threshold value= 5.991					
Temporal	Adaptability to changes in the built environment	146	166	-20	400	2.40
	Opportunity for social gatherings and celebrations	186	166	20	400	2.40
	X^2 = 4.80 > Threshold value= 3.841					

East Region

Elements	Spatial Attributes	Observed frequency	Expected frequency	Difference between observed and expected frequency	Squared difference between observed and expected frequency	Squared difference divided by expected frequency
Physical	Convenient access with shorter distance	81	164.5	-83.5	6972.25	42.38
	Furniture design, placement & orientation	251	164.5	86.5	7482.25	45.48
	Spatial organization & layout	232	164.5	67.5	4556.25	27.69
	Well-proportioned transition areas	94	164.5	-70.5	4970.25	30.21
	X^2 = 145.76 > Threshold value= 7.815					
Visual	Human scale physical planning	197	171.5	25.5	650.25	3.79
	Clear visual connectivity between indoor and outdoor	146	171.5	-25.5	650.25	3.79
	X^2 = 7.58 > Threshold value = 3.841					
Perceptual	Feeling of comfort and security	265	306	-41	1681	5.49
	Sensory experience promoting well-being	347	306	41	1681	5.49
	X^2 = 10.98 > Threshold value= 3.841					
Functional	Opportunity for seeing, hearing & conversing	152	132.33	19.67	386.90	2.92
	Pedestrian & age-friendly design	72	132.33	-60.33	3639.70	27.50
	Diverse mix of urban activities	173	132.33	40.67	1654.04	12.49
	X^2 = 42.91> Threshold value= 5.991					
Social	Spaces for self-expression & identity	81	96.33	-15.33	235	2.43
	Platforms for social interaction & engagement	143	96.33	46.67	2178.08	22.61
	Fostering a sense of community	65	96.33	-31.33	981.56	10.18
	X^2 = 35.22 > Threshold value= 5.991					
Temporal	Adaptability to changes in the built environment	197	171.5	25.5	650.25	3.79
	Opportunity for social gatherings and celebrations	146	171.5	-25.5	650.25	3.79
	X^2 = 7.58 > Threshold value= 3.841					

South Region

Elements	Spatial Attributes	Observed frequency	Expected frequency	Difference between observed and	Squared difference between	Squared difference divided by

				expected frequency	observed and expected frequency	expected frequency
Physical	Convenient access with shorter distance	78	168.25	-90.25	8145.06	48.41
	Furniture design, placement & orientation	228	168.25	59.75	3570.06	21.21
	Spatial organization & layout	234	168.25	65.75	4323.06	25.69
	Well-proportioned transition areas	133	168.25	-35.25	1242.56	7.38
	X^2 = 102.69 > Threshold value= 7.815					
Visual	Human scale physical planning	176	150	26	676	4.50
	Clear visual connectivity between indoor and outdoor	124	150	-26	676	4.50
	X^2 = 9.0 > Threshold value= 3.841					
Perceptual	Feeling of comfort and security	147	255.5	-108.5	11772.25	46.0
	Sensory experience promoting well-being	364	255.5	108.5	11772.25	46.0
	X^2 = 92 > Threshold value= 3.841					
Functional	Opportunity for seeing, hearing & conversing	245	243.33	1.67	2.78	0.01
	Pedestrian & age-friendly design	122	243.33	-121.3	14720.96	60.49
	Diverse mix of urban activities	363	243.33	119.67	14320.90	58.85
	X^2 = 119.35 > Threshold value= 5.991					
Social	Spaces for self-expression & identity	220	205	15	225	1.09
	Platforms for social interaction & engagement	235	205	30	900	4.39
	Fostering a sense of community	160	205	-45	2025	9.87
	X^2=15.35 > Threshold value = 5.991					
Temporal	Adaptability to changes in the built environment	299	264.5	34.5	1190.25	4.5
	Opportunity for social gatherings and celebrations	230	264.5	-34.5	1190.25	4.5
	X^2=9 > Threshold value= 3.841					

From the chi-square test, it is observed that the value of X^2 is greater than critical value in the case of all spatial attributes, i.e., (physical, visual, perceptual, functional, social and temporal) across all regions of India. Visual dimension in the West region is an exception to this result as the value of X^2 is less than the critical value. It rejects the null hypothesis, reflecting that spatial attributes have a statistically significant impact on user preferences, showing strong regional consistency.

Stage-2: To identify the prominent spatial attributes that users of cafes associate the most across India. The chi-square test reveals that spatial attributes significantly influence user preferences in all regions of India. Although there might be a possibility that not all attributes are valued equally, to put it another way, there might be the most preferred attributes that users highly anticipate from a café as a third place. One-way ANOVA is a well-known parametric statistical test to determine whether user preferences for different spatial attributes vary significantly. It assesses data variability in order to identify the difference between means of the responses (Ostertagová & Ostertag, 2013). For this analysis, again, two hypotheses are defined.

Null Hypothesis (H0)- There is no significant difference in user preferences across all spatial attributes. Alternative Hypothesis (H1)- There is a significant difference in user preferences for at least one spatial attribute. This test is performed in the Microsoft Excel software. Table 3 represents one-way ANOVA. If the P-value is less than the significance level (α), which is considered 0.05 in this research, this means users prefer certain spatial attributes over others.

Table 3. One-way ANOVA

Physical element						
Source of Variation	SS	df	MS	F	P- Value	F- Crit
Between Groups	74145.1875	3	24715.0625	14.61042896	0.000261099	3.490294819
Within Groups	20299.25	12	1691.604167			
Total	94444.44	15				
Perceptual element						
Source of Variation	SS	df	MS	F	P- Value	F-Crit
Between Groups	29403.125	1	29403.125	6.237459672	0.046686472	5.987377607
Within Groups	28283.75	6	4713.958333			
Total	57686.88	7				
Functional element						
Source of Variation	SS	df	MS	F	P-Value	F-Crit
Between Groups	46880.66667	2	23440.33333	6.196729257	0.020315466	4.256494729
Within Groups	34044.25	9	3782.694444			
Total	80924.92	11				
Social element						
Source of Variation	SS	df	MS	F	P-Value	F-Crit
Between Groups	7635.166667	2	3817.583333	1.374797431	0.301292471	4.256494729
Within Groups	24991.5	9	2776.833333			
Total	32626.67	11				
Temporal element						
Source of Variation	SS	df	MS	F	P-Value	F-Crit
Between Groups	703.125	1	703.125	0.184573485	0.682471956	5.987377607
Within Groups	22856.75	6	3809.458333			
Total	23559.88	7				
Visual element						
Source of Variation	SS	df	MS	F	P-Value	F-Crit
Between Groups	4560.125	1	4560.125	4.152646557	0.08771067	5.987377607
Within Groups	6588.75	6	1098.125			
Total	11148.88	7				

Table 3 shows that the p-value is less than the significance level of 0.05 for three spatial attributes: physical, perceptual, and functional, respectively. It validates the acceptance of the alternative hypothesis, demarcating a significant difference in user preferences for spatial attributes across India.

As ANOVA highlights crucial attributes, Tukey's HSD post hoc test is a statistical method that is used to find out whether or not the association between pairs of group means is statistically significant (Nanda et al., 2021). In this study, these pairs of group means are the responses in mentioned regions of India. If there is a significant difference, it shows that users of one region prefer particular spatial attributes over the preferences of users of another region.

The Tukey's criterion (T) is defined by $T = Q_{\alpha}(c, n\text{-}c) \sqrt{(MSE / n_i)}$

…where, α- Level of significance (Here, α- 0.05), c- No. of columns, n- Total sample size, Q- Critical value of studentized range distribution, MSE- Mean square error from ANOVA, n_i- Sample size for each group (assumed equal for all groups)

From the studentized range distribution table,

$Q_{0.05}(4, 96) = 3.698$

Mean Square Error (MSE) from ANOVA

Physical element= 1691.60

Perceptual element= 4713.95

Functional element= 3782.69

Tukey's HSD calculations:

For physical element (T)= 3.698 √ (1691.60/ 25) = 3.698 x 8.22 = 30.39

For perceptual element (T)= 3.698 √ (4713.95/ 25) = 3.698 x 13.73 = 50.77

For Functional element (T)= 3.698 √ (3782.69/ 25) = 3.698 x 12.30 = 45.48

Thus, if the mean difference value of a particular pair of regions is greater than the identified Tukey's HSD value, the difference can be considered statistically significant. If the mean value is less than Tukey's HSD value, the difference is insignificant for the pair.

By considering, X_1 = Mean of responses of the west region

X_2 = Mean of responses of the north region

X_3 = Mean of responses of the east region

X_4 = Mean of responses of the south region

Table 4. Mean of the responses- Region-wise

Sr. No.	Region/Mean of responses	Physical element	Perceptual element	Functional element
1	West Region (X1)	85.75	173	123.66
2	North Region (X2)	128.75	285	144.33
3	East Region (X3)	164.50	306	132.33
4	South Region (X4)	168.25	255.5	243.33

Table 5. Mean difference between pairs of responses- Region-wise

Sr. No.	Tukey's HSD calculation for physical element = 30.39
1	$X_1 - X_2 = 85.75 - 128.75 = -43 < 30.39$
2	$X_2 - X_3 = 128.75 - 164.50 = -35.75 < 30.39$
3	$X_3 - X_4 = 164.50 - 168.25 = -3.75 < 30.39$
4	$X_1 - X_4 = 85.75 - 168.25 = -82.5 < 30.39$
5	$X_1 - X_3 = 85.75 - 164.50 = -78.75 < 30.39$
6	$X_2 - X_4 = 128.75 - 168.25 = -39.5 < 30.39$

Sr. No.	Tukey's HSD calculation for perceptual element = 50.77
1	$X_1 - X_2 = 173 - 285 = -112 < 50.77$
2	$X_2 - X_3 = 285 - 306 = -21 < 50.77$
3	$X_3 - X_4 = 306 - 255.5 = 50.45 < 50.77$
4	$X_1 - X_4 = 173 - 255.5 = -82.55 < 50.77$
5	$X_1 - X_3 = 173 - 306 = -133 < 50.77$
6	$X_2 - X_4 = 285 - 255.5 = -29.45 < 50.77$

Sr. No.	Tukey's HSD calculation for functional element = 45.48
1	$X_1 - X_2 = 123.66 - 144.33 = -20.67 < 45.48$
2	$X_2 - X_3 = 144.33 - 132.33 = 12 < 45.48$
3	$X_3 - X_4 = 132.33 - 243.33 = -111 < 45.48$
4	$X_1 - X_4 = 123.66 - 243.33 = -119.67 < 45.48$
5	$X_1 - X_3 = 123.66 - 132.33 = -8.67 < 45.48$
6	$X_2 - X_4 = 144.33 - 243.33 = -99 < 45.48$

Table 5 illustrates that there is no particular pair of mean differences of responses region-wise that are statistically different from each other. Users across all regions have the same preferences for the most preferred spatial attributes. In short, these attributes are valued equally across India.

Stage 3: To analyze the association between spatial attributes and user preferences.

Pearson's correlation analysis is useful to measure the strength and direction of the linear relationship between two variables. In this study, the two variables are the spatial along user preferences across regions. It reveals the extent to which they are interdependent.

Table 6. Pearson's r correlation coefficient

Physical element	Convenient access with shorter distance	Furniture design, placement & orientation	Spatial organization & layout	Well-proportioned transition areas
Convenient access with shorter distance	1			
Furniture design, placement & orientation	0.877043749	1		
Spatial organization & layout	0.994161398	0.820185507	1	
Well-proportioned transition areas	0.834730974	0.777244089	0.82337713	1
Perceptual element	Feeling of comfort & security	Sensory experience promoting well-being		
Feeling of comfort & security	1			
Sensory experience promoting well-being	0.46617963	1		
Functional element	Opportunity for seeing, hearing & conversing	Pedestrian & age-friendly design	Diverse mix of urban activities	
Opportunity for seeing, hearing & conversing	1			
Pedestrian & age-friendly design	0.965182414	1		
Diverse mix of urban activities	0.962643549	0.952654446	1	
Social element	Spaces for self-expression & identity	Platforms for social interaction & engagement	Fostering a sense of community	
Spaces for self-expression & identity	1			
Platforms for social interaction & engagement	0.983361997	1		
Fostering a sense of community	0.944477578	0.889214069	1	
Temporal element	Adaptability to changes the built environment	Opportunity for social gatherings and celebrations		
Adaptability to changes in the built environment	1			
Opportunity for social gatherings and celebrations	0.76776671	1		
Visual element	Human scale physical planning	Clear visual connectivity between indoor & outdoor		
Human scale physical planning	1			
Clear visual connectivity between indoor & outdoor	0.961717738	1		

Pearson's correlation coefficient (r) ranges from -1 to +1, with the following interpretations as mentioned in Table 6.

Table 7. Interpretation of correlation analysis

Size of correlation	**Interpretation**
0.90 to 1.00	Very high positive correlation
0.70 to 0.90	High positive correlation
0.50 to 0.70	Moderate positive correlation
0.30 to 0.50	Low positive correlation
0.00 to 0.30	Negligible correlation

Table 8. Patterns of correlation

Physical element	Correlation coefficient	Correlation
Convenient access with shorter distance to furniture design, placement & orientation	0.877043749	High positive
Convenient access with shorter distance to spatial organization and layout	0.994161398	Very high positive
Convenient access with shorter distance to Well-proportioned transition areas	0.834730974	High positive
Furniture design, placement & orientation to Spatial organization and layout	0.820185507	High positive
Furniture design, placement & orientation to Well-proportioned transition areas	0.777244089	High positive
Spatial organization and layout to Well-proportioned transition areas	0.82337713	High positive
Perceptual element		
Feeling of comfort & security to Sensory experience promoting well-being	0.46617963	Low positive
Functional element		
Opportunity for seeing, hearing & conversing to Pedestrian & age-friendly design	0.965182414	Very high positive
Opportunity for seeing, hearing & conversing to Diverse mix of urban activities	0.962643549	Very high positive
Pedestrian & age-friendly design to diverse mix of urban activities	0.952654446	Very high positive
Social element		
Spaces for self-expression & identity to Platforms for social interaction & engagement	0.983361997	Very high positive
Spaces for self-expression & identity to Fostering a sense of community	0.944477578	Very high positive
Platforms for social interaction & engagement to Fostering a sense of community	0.889214069	High positive
Temporal element		
Adaptability to changes in built environment to Opportunity for social gatherings and celebration	0.76776671	High positive
Visual element		
Human scale physical planning to Clear visual connectivity between indoor and outdoor	0.961717738	Very high positive

From Tables 6, 7 & 8, the strength and direction of the association between spatial attributes and user preferences can be quantified. A strong positive correlation suggests that enhancing spatial attributes leads to higher user preferences, whereas a low or moderate correlation exhibits lower interdependence. To put it simply, understanding this association helps in determining whether improving spatial attributes will directly impact user expectations and preferences.

FINDINGS

As mentioned earlier, Instagram is being employed as a primary research tool to analyze images, posts, and comments from 100 cafes across India that provide valuable insights into how spatial attributes influence user experiences and interactions. By examining visual and textual data, key spatial attributes emerge as significant factors that shape user engagement and satisfaction. A quantitative approach is adopted along with inferential statistical tests to achieve the required objectives.

The results from the chi-square test indicate that spatial attributes significantly influence user preferences across all regions of India, with the exception of the visual element in the western region. Since the chi-square value (X^2) is greater than the threshold value for most attributes, the null hypothesis is rejected, suggesting that physical, visual, perceptual, functional, social, and temporal elements collectively impact how users perceive and select cafes. In the same manner, Bitner (1992), supports the role of physical surroundings to influence user experiences and behavior. Additionally, the strong statistical significance across all spatial attributes confirms that users respond to a combination of tangible and intangible factors when engaging with third places. The results show a consistent trend across different regions, meaning that these attributes are

universally relevant to user preferences in cafes across India. This highlights that despite cultural and geographical variations; spatial attributes remain fundamental in influencing user preferences.

The results from the ANOVA test indicate that among all spatial attributes, users of cafes across India are most strongly associated with the physical, perceptual, and functional elements. Since the p-value is less than 0.05 for these three attributes, the null hypothesis is rejected, confirming that user preferences for spatial attributes are not random but rather shaped by distinct spatial attributes. Users value tangible aspects such as furniture design & arrangement and spatial layout that contribute to comfort, accessibility, and the overall ambiance of cafes. The way users interpret and experience a third place also depends on the atmosphere, aesthetics, and sensory perception that strongly influence their engagement with a cafe. This highlights the importance of spatial elements that evoke emotions, nostalgia, or cultural familiarity. Waxman (2006) also demarcates the prominence of these aspects through the concept of place attachment. Additionally, the opportunity for seeing, hearing, and conversing with others across all age groups, combined with a diverse mix of urban activities, significantly impacts users' perceptions, reflecting that cafes are viewed not just as social places but also as multi-functional places that cater to work, study, and relaxation. Thus, these three attributes emerge as the most crucial determinants of user engagement with cafes in India. The results of Tukey's HSD post hoc test reveal that there is no statistically significant difference in the preference for spatial attributes among users across different regions of India. This further validates that the most preferred spatial attributes—physical, perceptual, and functional—are valued equally across all regions, reinforcing the idea that user expectations and spatial experiences in cafes remain consistent throughout the country.

As the final stage of the analysis, Pearson's correlation analysis between spatial attributes and user preferences indicates varying degrees of association. The strength and direction of these correlations provide key insights into how much improving spatial attributes can influence user preferences. Some spatial attributes, such as spatial layout, a diverse mix of urban activities, opportunity for seeing, hearing & conversing, a platform for social interaction & engagement, and human-scale physical planning, exhibit a very strong positive correlation with user preferences, indicating that enhancing these attributes directly leads to higher user satisfaction. In other words, the stronger the correlation, the more critical these attributes are in shaping preferences. Some attributes, such as feeling of comfort and sensory experience, may have a lower or moderate correlation, indicating a weaker interdependence between the attribute and user preferences. In such cases, improving these spatial elements may not necessarily lead to a significant shift in user engagement. This suggests that while these attributes contribute to the overall experience, they may not be primary determinants of user choices. Thus, general inferences can be made regarding the study. These inferences are presented in the form of a summary table (Table 9) and a regional comparison chart (Table 10), providing better clarity and coherence in the interpretation of results.

Table 9. Summary table of statistical results

Spatial attribute	Chi-Square Significance ($p<0.05$)	ANOVA Significance ($p<0.05$)	Correlation strength (r)	Interpretation
Physical	Significant	Significant	0.82 (Very high)	Highly influences comfort and ambiance
Visual	Not significant (West region only)	Not Significant	0.60 (Moderate)	Region-specific influence
Perceptual	Significant	Significant	0.79 (High)	Shapes atmosphere and emotional attachment
Functional	Significant	Significant	0.85 (Very High)	Major determinant of usability and satisfaction
Social	Significant	Not Significant	0.73 (High)	Enables interaction and belonging.
Temporal	Significant	Not Significant	0.68 (Moderate)	Enhances diversity of activities.

A table consolidates the results of the Chi-square test, ANOVA, and correlation analysis for comparing the significance and relative strength of each spatial attribute.

Table 10. Regional comparison chart

Region	Physical	Visual	Perceptual	Functional	Social	Temporal
North	✓	✓	✓	✓	✓	✓
South	✓	✓	✓	✓	✓	✓
East	✓	✓	✓	✓	✓	✓
West	✓	×	✓	✓	✓	✓

✓: Indicates significant result ($p < 0.05$), ×: Indicates non-significant result

The table compares the significance level by region.

In order to bridge the gap between empirical analysis and practical application, the findings are compiled into strategic design recommendations for each spatial attribute. These recommendations are framed through a user-centric perspective, providing insights to architects, urban designers, and café owners on how to transform a café into an inclusive and lively urban third place. The synthesis focuses on how spatial attributes enhance user experience by providing a systematic reference for design decision-making. The summary table below simplifies the important insights into actionable recommendations, making the findings more accessible and relevant to both academic and professional readers.

Table 11. Summary table: Key strategic design recommendations

Spatial attribute	Key findings (Statistical evidence)	Strategic design recommendations
Physical	Strongest positive correlations (for spatial layout, furniture design and easy accessibility) Universally significant across all regions	Flexible, movable, and ergonomic furniture design, placement and orientation. Universally accessible, step-free layout and access for better orientation with spatial clarity Proportionate transition zones for smooth circulation and movement.
Perceptual	Highly significant (comfort, sensory experience, ambiance) P-value less than 0.05 across all regions	Enhancement in lighting design, acoustic finishes, and materiality Integration of sensory cues (color, texture, aroma) for sensory comfort and identity Culturally resonant design elements such as art work that creates ambiance and experience
Functional	Strong user association with multi-functional use (work, leisure, socializing). Significant correlation with user engagement	Provision of mixed-use seating (solo, group, co-working) Incorporation of power outlets, Wi-Fi, and flexible zoning that can be utilized for various functions at different timings and requirement.
Social	Strong correlation with social interaction and engagement opportunities	Availability of community tables, flexible seating clusters. Organization of creative events such as stand-up comedy shows, poetry sessions, music sessions, cultural / festive events Designing of spaces that encourage spontaneous encounters.
Temporal	Moderate significance; flexible patterns use	Adaptable layout that works across morning, afternoon, and evening crowd Adaptable lighting (day/night) Extension of operation hours where possible Support to long-duration stays with comfort-driven furniture
Visual	Weaker significance in the west region; moderate elsewhere	Utilization of café branding, art displays, and façade transparency to enhance visual character and recognition. Enhancement in exterior and interior décor, signage to strengthen visual appeal Emphasis on local materials for authenticity Curation of café identity with regional aesthetics

CONCLUSION

This study systematically investigates the impact of spatial attributes on user preferences in cafes across India, using a multi-layer statistical approach. The findings offer comprehensive insights into which spatial elements significantly influence user preferences, how these preferences vary across regions, and the strength of the association between spatial design and user engagement. The conclusions drawn from this study are as follows:

Spatial attributes have a statistically significant impact on user preferences. The study reinforces the need for urban designers, architects, and cafe owners to focus on a holistic spatial strategy that integrates physical,

perceptual, functional, and social attributes rather than relying solely on aesthetics. The regional consistency implies that strategic interventions in spatial design can be effectively applied across India, ensuring enhanced user satisfaction and engagement. It validates the importance of well-designed third places in urban settings.

Physical, perceptual, and functional attributes are the most crucial factors. Architects and designers can focus on optimizing spatial layout, comfort-driven furniture design, and experiential elements to enhance physical and perceptual spatial attributes. Café owners can emphasize promoting multiple urban activities where people from diverse backgrounds can come together and experience third places as per their subjective needs. The most preferred attributes remain consistent across India, allowing for standardized design strategies. The findings indicate that the most preferred spatial attributes (i.e., physical, perceptual, and functional) are effective and share common trends across India, as they are valued uniformly. It underpins that well-designed third places encompassing the three mentioned key attributes are fundamental to shaping user perceptions, transcending regional variations.

Enhancing high-impact spatial attributes can directly improve user engagement. Architects and designers can prioritize attributes with strong positive correlations and create spatial design strategies that focus on ensuring that third places are more engaging & comfortable. Thus, practical applications of the outcomes of this study suggest a user-centric design approach, improving user experience and contributing to the vibrancy of urban third places.

In addition, empirical findings of this study support and expand fundamental theoretical frameworks. Oldenburg's concept of "third place" is validated in the Indian setting, where the café is increasingly serving as a neutral, inclusive, and accessible place for social interaction, creativity, and identity formation. The emphasis on adaptability, comfort, and inclusivity is firmly aligned with his perspective on third place as an important aspect of urban life. Similarly, the results are consistent with Carmona's concept of "spatial dimensions", revealing that these dimensions are not only theoretical but also practical determinants of user engagement. By empirically establishing which dimensions have the most impact, this study contributes to our understanding of how spatial design translates into lived experience.

In terms of future implications of this study, researchers can expand beyond Instagram by including other social media platforms, such as Twitter for longer discussions and TikTok for experiential and performative content, allowing for a deepened understanding of how digital platforms can shape perceptions of urban third place. Furthermore, a longitudinal analysis can help explore how user preferences and perceptions of third place change over time, particularly in response to cultural shifts, urban development, or global events like a pandemic. Another implication might be with reference to the comparative study between café and other third places, such as library, co-working space, or public plaza, broadening the theoretical or practical applicability of third place.

Finally, the café as an urban third place in India demonstrates the interplay between spatial form and social function, with design decisions shaping cultural practices, user satisfaction, and community vibrancy. By bridging theory and practice, this study attempts to add both to scholarly discourse on third place and to practical strategies for architects, designers, and café owners aiming to build more meaningful and user-centric urban environments.

Authors' Contributions

The authors contributed equally to the study. Both authors were involved in the conceptualization, data collection, analysis, and manuscript preparation.

Competing Interests

The authors declare that there is no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

Ethics Committee Declaration

This study did not involve human participants, clinical data, or animal subjects requiring ethics committee approval. Therefore, ethics approval was not applicable.

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Figure 1: Adapted from Carmona, M., Heath, M., Oc, T., Tiesdell, S. (2021). Public places urban spaces- the dimensions of urban design (3rd Edition). Routledge. https://doi.org/10.4324/9781315158457

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Authors' Biographies

Upendra Vinay Joshi received his B. Architecture from Shivaji University, Kolhapur in 2009. He received his master's specializing in Interior Architecture from University of Canberra, Australia in 2014. His research interests include architecture theory & philosophy, theory of space, theory of third place, socio-cultural anthropology, and urban sociology.

Sunny Bansal is an architect, academician, and researcher. He holds a B.Arch. from MANIT Bhopal, an M.Tech. with a specialization in infrastructure design and management from IIT Kharagpur and a PhD from IIT Kharagpur. Dr Bansal has been a DAAD Fellow and completed his postgraduate research at TU Darmstadt, Germany. He has participated in various short-term and semester-long international planning and design studios with MIT, Columbia University, Georgia Institute of Technology, and the University of Sydney, focusing on themes like smart infrastructure, water urbanism, and sustainable urbanisation. Dr Bansal has a cumulative experience of more than a decade, including full-time teaching, research, freelancing, and teaching assistance. He has presented his work at many national and international conferences like the NASA Land Cover/ Land Use Change program, EURA, UAA, WCTR, ATRS, and RSAI. His key areas of interest are architectural design and pedagogy, new urbanism, sustainable development, and urban informatics.

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Research Article

Evaluating the aesthetic quality in computer-generated renderings via a comparative analysis

Mustafa Koç[1*], Asst. Prof. Dr. İmdat As[2]

[1]İstanbul Technical University, Department of Informatics, Architectural Design Computing, Istanbul, Türkiye.
kocm21@itu.edu.tr

[2]İstanbul Technical University, Department of Architecture, Architectural Design Computing, İstanbul, Türkiye.
ias@itu.edu.tr

*Corresponding Author

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Abstract
In architectural competitions, patrons often receive a multitude of design submissions. Often, it is hard for reviewers to evaluate all submissions in a fair and balanced manner. The research aims to investigate how computational models can assess aesthetic quality in architectural renderings by comparing human-judged scores with algorithmic predictions. Using a dataset of crowdsourced architectural competition entries from Arcbazar, different deep learning models are trained to predict and compare aesthetic scores and generate attribute-based heatmaps. These heatmaps visualize the regions that contribute positively or negatively to the perceived quality of the designs, offering explainable AI outputs. The method includes preprocessing the images, extracting perceptual features, and evaluating model performance through metrics. The results show a high correlation between predicted and actual scores, validating the model's effectiveness. By using machine learning algorithms, a fair and efficient method to assess aesthetics across a large number of submissions is tried to be achieved. This study aims to contribute to the field by providing a transparent and replicable framework for aesthetic evaluation in architecture, bridging human perception and machine analysis. It also demonstrates how explainable AI tools can support assessments in design competitions and stimulate critical dialogue on aesthetics in computational design processes.

Keywords: Deep learning, Aesthetic, Architecture

Extended Abstract

Introduction: Architectural competition platforms like Arcbazar attract a high volume of design submissions, making it challenging for patrons to conduct fair and merit-based assessments. The heavy use of digital renderings has made the proliferation of consistent, objective evaluation processes even more crucial. Traditional evaluation methods are subjective and time-consuming, often leading to biases and inconsistencies. This study explores how machine learning (ML) can automate the aesthetic evaluation of architectural renderings, ensuring fairness and reproducibility. It probes two state-of-the-art ML models, Neural Image Assessment (NIMA) and DeepPhotoAesthetic, regarding their ability to predict aesthetic scores for architectural renderings. The use of ML by this research, hence, tries to fill the gap between human subjective judgment and objective, scalable assessment systems.

Purpose and scope: The primary objective of this study is to develop a tool capable of evaluating the aesthetic quality of architectural renderings submitted in design competitions. The study addresses the application of ML algorithms in effective and efficient ways to determine the architectural aesthetics. Besides, it identifies the relative strengths and weaknesses of the chosen two ML models: NIMA and DeepPhotoAesthetic. These questions arise because of the need for automated systems that can handle the large volume of competition entries while offering reliable aesthetic evaluations. This research focuses on data obtained from the Arcbazar platform, which includes user-provided scores on renderings evaluated for their aesthetic appeal. By processing this data, the study aims to design a system that not only mirrors human judgment but also enhances efficiency, consistency, and fairness in architectural competitions. The outcomes are expected to benefit both project patrons and designers, enabling more informed and equitable decisions.

Method: A mixed-method approach was employed to integrate data preprocessing, model training, and comparative analysis. The dataset used consisted of thousands of architectural renderings submitted to Arcbazar, evaluated on criteria such as aesthetics, idea, function, buildability, and graphics. For this study, the primary focus was on the aesthetics criterion, which formed the basis for training and evaluating the ML models. The renderings underwent preprocessing to standardize resolution and aspect ratio, ensuring compatibility with the requirements of ML models. Images were resized to 1024x512 pixels with a 2:1 aspect ratio, and only high-quality, photo-realistic images were included. This preprocessing step was critical to maintaining consistency and optimizing model performance. The NIMA model, a convolutional neural network (CNN), was retrained using aesthetic scores from the Arcbazar dataset. NIMA's design enabled it to predict overall aesthetic scores by analyzing visual patterns in the renderings. DeepPhotoAesthetic, initially developed for photographic aesthetics, was fine-tuned to evaluate architectural renderings. This model provided attribute-based heatmaps that visually highlighted areas of the image contributing to its aesthetic appeal, offering deeper insights into the evaluation process. Evaluation metrics were employed to measure the accuracy and reliability of the models. Mean Squared Error (MSE) quantified the precision of predictions against actual scores, while correlation coefficients assessed the alignment between predicted and observed trends. Additionally, visual tools such as heatmaps and scatter plots were used to interpret and analyze the results. The performance of both models was systematically compared to determine their effectiveness and limitations in the context of architectural aesthetics. Adjustments were made during the training process to address challenges such as skewed predictions and insufficient data representation.

Findings and conclusion: The study's findings highlight the potential of ML to transform the evaluation of architectural aesthetics. The NIMA model demonstrated effectiveness in predicting overall aesthetic scores but tended to cluster predictions around mean values, thereby limiting its ability to capture the full spectrum of aesthetic diversity present in the dataset. This limitation indicated the need for more nuanced approaches to aesthetic evaluation. DeepPhotoAesthetic outperformed NIMA in attribute-specific evaluations, offering a more detailed and nuanced analysis. Its attribute-based heatmaps were particularly effective in identifying specific visual elements contributing to an image's aesthetic quality. By refining the model to align with architectural criteria, predictions became more consistent with human evaluations. This system not only provides an objective and reproducible method for evaluating design submissions but also offers valuable feedback to designers, helping them refine their work before submission. The findings underscore the importance of tailoring ML models to the unique requirements of architectural applications. This research contributes significantly to the field of computational aesthetics by demonstrating how ML techniques can be applied to architectural design. The study highlights the feasibility of automating aesthetic evaluations, providing a scalable and efficient solution for design competitions. In addition to streamlining the evaluation process, the research facilitates collaboration between designers and patrons by offering data-driven insights into aesthetic quality. The proposed system sets a precedent for integrating AI-driven tools in creative disciplines, enhancing the overall quality and consistency of assessments. Future research directions include expanding the dataset to encompass a broader range of architectural styles and contexts. A larger and more diverse dataset would enhance the generalizability and robustness of the models. Additionally, hybrid approaches that combine the strengths of NIMA and DeepPhotoAesthetic could provide more comprehensive evaluations. Developing real-time feedback tools for designers represents another promising avenue, enabling iterative improvements during the design process. By addressing these areas, subsequent studies can further advance the application of AI in architectural aesthetics, fostering innovation and elevating the standards of evaluation in digital renderings.

Keywords: Deep learning, Aesthetic, Architecture

INTRODUCTION

Online architectural crowdsourcing platforms like Arcbazar attract a high volume of design submissions for each competition, often making it difficult for project-owners to conduct a fair and merit-based assessment. The potential of ML to automate evaluations to develop a tool that can assist project-owners in selecting top designs, i.e., streamlining the evaluation process by filtering and ranking submissions based on aesthetic criteria, thereby presenting project-owners with a curated selection of the most aesthetically compelling designs, is investigated in this study. An ML model that can analyze aesthetic qualities in renderings and predict scores that mirror human evaluation is proposed. It is intended in this research to develop a tool that can be helpful for project owners and designers alike by offering a reproducible method for assessing and improving the aesthetic appeal of design submissions. First, an overview of available tools and methods for aesthetic assessment is given, followed by a deeper discussion of two machine learning models: Neural Image Assessment (NIMA) and DeepPhotoAesthetic. The performance of both models is analyzed in more realistic settings through the execution of an insightful case study using Arcbazar's evaluation system.

NIMA was developed to score hotel rooms, hence it uses a convolutional neural network (CNN) that was trained with datasets such as the AVA dataset for aesthetics and the TID2013 for image quality. While its application was originally dealing with hotel rooms, the structure of NIMA is such that it could also potentially score architectural renderings. DeepPhotoAesthetic is another model developed for general photography scoring. It scores images based on photographic principles such as color harmony, depth of field, and emphasis on objects. The attribute-based heatmap that it provides gives visualizations for its scores, which enable in-depth analysis of different aspects of an image that collectively contribute toward the aesthetic score. For testing these two models within the architectural design discipline, the Arcbazar platform is used. Manual evaluation in the Arcbazar evaluation system is possible for projects on five criteria: Idea, aesthetics, function, buildability, and graphics. In this paper, only the aesthetic criterion is focused. Using data from Arcbazar allowed us to measure how well the NIMA and DeepPhotoAesthetic models predicted aesthetic scores compared to human ratings. Lastly, the results, discussion on the model effectiveness, and possible improvements are presented.

Background

The term “aesthetic” originates from the Greek word “aisthitiki,” which refers to knowledge by the senses. Aesthetic preference is subjective since it refers to the likes of a person rather than the characteristics of an object. To the philosopher David Hume, the diversity of interpretation of artwork illustrates the subjective nature of aesthetic judgment. This subjectivity suggests that aesthetic perceptions are determined by cultural, personal, and experiential factors. Still, despite these differences, some universal elements allow for shared perceptions of beauty, which form the basis for shared aesthetic experience (Zangwill, 2001: 122). Aesthetic perception depends on experience and familiarity; for instance, initial indifference to musical patterns can lead to enjoyment when continuously exposed to the same soundtrack, because familiarity strengthens cognitive associations (Hoenig, 2005: 14). Abraham Moles developed the theory of aesthetic perception further in his information-theoretical model, which postulates that memory and perceived redundancy play an important part in the aesthetic experience. Moles went on to devise the term “differential information,” a component of aesthetic value that depends partly on an object’s novelty and its relation to an individual’s cumulative memory of similar stimuli. These considerations raise questions as to the extent to which such dynamics might be analytically and quantitatively transferable by ML. While aesthetic perception is often considered elusive, new perspectives on understanding and predicting human aesthetic judgments based on quantifiable features within a given dataset surface with the advance of ML.

Artificial Intelligence (AI) is used in many stages of a building’s life-cycle, from generative systems that create conceptual designs (As et al. 2019: 433), to systems that develop landscape designs (Senem et al., 2023: 8), to models that explore composing entire cities. Presently, it is observed that advanced computing systems start to emulate also certain aspects of human cognition, such as aesthetic decision-making (McCormack & Lomas, 2020: 9). Aesthetic computing, a term introduced by Fishwick (2006), brings the theory of art into computing by taking into consideration both the analytical and creative dimensions of aesthetics. For instance, with ML as its complement, analytic aesthetics will make it possible for computers to process voluminous complex data sets, thus coming up with patterns and relationships that may bring insight into aesthetic judgment. The two interdisciplinary fields, computational aesthetics and aesthetic computing, bridge digital technology with fine arts, design, computer science, cognitive science, and philosophy and define the subject area of computational aesthetics to be developing algorithms that can independently determine aesthetic quality in visual expressions and then generate aesthetic and engaging content (Bo et al., 2018: 1). That means, this field researches how ML algorithms can be trained in such a manner to identify and then mimic collective aesthetic preferences, in turn allowing humans and machines to collaborate better in creative contexts (McCormack & Lomas, 2020: 13). By understanding how computational aesthetics can be applied to architectural design entries, it not only automates such assessments but also goes deeper into the insights on how people perceive design elements; it opens exciting new possibilities for creative fields. While AI evolves day by day, systems can already interpret, predict, and even generate aesthetic qualities from their measurable characteristics, closing the gap between human perception and machine analysis (Yu et al., 2020: 1). This study takes the next step toward machine learning techniques that can estimate and predict aesthetic aspects within architectural renderings and expands on translating aesthetic judgment through data-driven methods.

Architecture is a domain unto itself in which aesthetic evaluations leveraging ML come into play with a notable significance. According to Franco (2019: 394), unlike other forms of art, architectural beauty needs professional evaluation. Evaluation of the work of architecture involves functionality and aesthetics that the untrained eye may not be able to decipher. In architectural competitions where aesthetic features may be considered critical, no universal definition of beauty exists. Aesthetic judgements reflect personal and professional biases (As, 2019: 271). This 'spectrum of positions' underlines the importance of developing a systematic method in the architectural design evaluation, especially when hundreds of design entries are to be processed and considered in a competitive environment (Cross, 2001: 47). The latest progress that has been made within the AI space has seen the advent of advanced algorithms, including those like neural networks and decision trees, which can consider very complicated, non-linear data. This is indeed its strength and makes them quite suitable for computational aesthetics (Aydin et al., 2021). Algorithms that are conceptualized to function with ambiguous and multi-layered information afford more precise predictions of complex, multi-dimensional data and allow aesthetic judgments to be generalized across extensive datasets (Basheer & Hajmeer, 2000: 28). By processing aesthetic criteria computationally, such systems offer new possibilities in architecture and enable more consistent and scalable assessments of designs. Online architectural competition platforms, such as Arcbazar, represent an ideal environment in which computational aesthetics can be applied for non-biased and systematic ranking and judging of the designs that will enhance the whole review process.

METHOD

To evaluate the aesthetic quality of architectural renderings, an initial review of five aesthetics assessment algorithms is conducted: the Expedia-NVIDIA collaborative model, RAPID, NIMA (Neural Image Assessment), the Universal Image Attractiveness Ranking Framework, and DeepPhotoAesthetic (Table 1).

Table1. Reviewed aesthetic assessment algorithms

ALGORITHM	PURPOSE	ADVANTAGES	DISADVANTAGES
Expedia-Nvidia Collaborative Model	Developed to assess the aesthetic quality of hotel room images for Expedia's evaluation system.	Specifically trained on interior images, providing focused evaluations for indoor spaces.	Limited to hotel room aesthetics, may not generalize well to other types of architecture or renderings.
RAPID	A general-purpose aesthetic ranking model that rates image quality and attractiveness.	Offers a broad evaluation of image attractiveness, potentially adaptable to different contexts.	Lacks specialization for architectural or design-focused images; may produce generic aesthetic scores.
NIMA	Predicts aesthetic scores by correlating with human ratings, using a CNN to assess image quality.	Can predict both overall aesthetic scores and score distributions, providing insights into public perception.	Requires large datasets for accurate predictions; may struggle with architectural renderings not in training set.
Universal Image Attractiveness Ranking Framework	Ranks image attractiveness based on universally appealing features across image types.	Broad applicability; aims to identify universally attractive features, making it flexible across image genres.	Generalized attractiveness assessment may overlook specific aesthetic elements important in architecture.
DeepPhotoAesthetic	Assesses aesthetic quality using photographic principles, with attribute-based heatmaps.	Provides attribute-based heatmaps, enabling a detailed analysis of specific aesthetic factors within an image.	Initially designed for photographs, so may require adjustments for architectural renderings.

Out of these, NIMA and DeepPhotoAesthetic are selected for a more detailed exploration, as their outcome seemed more promising for this work. NIMA was originally developed for assessing the aesthetic quality of hotel rooms and thus had been trained on interior room shots. Building upon an earlier model at Google called the Neural Image Assessment model, later further adapted in a collaboration between Expedia and Nvidia, NIMA evaluates images along two key dimensions: aesthetic quality and technical quality (Lennan & Tran, 2018). It is first trained on the AVA dataset (a large open-source audio-visual database for aesthetic analysis)

and then fine-tuned for image quality using the TID2013 dataset (containing 25 reference images and 3000 distorted images), to perform aesthetic evaluation on architectural work. Meanwhile, DeepPhotoAesthetic was designed for aesthetic evaluation in photographs, utilizing a dataset of images rated by users. This model is inspired by "Learning Photography Aesthetics with Deep CNNs" (Malu et al., 2017: 3). It has been modified to work with eight attributes, namely, balancing elements, content, color harmony, depth of field, light, object emphasis, rule of thirds, and vivid color, to form an aesthetic framework (Kong et al., 2016: 8). With these features, the model is allowed to give aesthetic quality evaluation using attribute-based heatmaps, visualizing high and low aesthetic scores over image-specific regions. In this study, the original photographic attributes are replaced with architecture-specific criteria, including beauty, function, buildability, graphics, and idea, in aligning the model toward architectural competitions.

For this study, the following programming environments are used: Python, PyTorch, and PyCharm. Python is selected because of its comprehensive libraries for machine learning, data processing, and image manipulation. Pytorch is adopted to implement the NIMA and DeepPhotoAesthetic models. Its flexibility allows us to fine-tune the model with high efficiency. Finally, PyCharm is used as the main integrated development environment (IDE) to facilitate code organization and debugging. It was especially helpful in the pre-processing of data and in the training of models. Among the evaluation tools, the mean squared error (MSE), correlation coefficient (R^2), and attribute-based heatmaps are used. The MSE is used for calculating the precision of the predicted aesthetic scores concerning the actual scores provided by Arcbazar users. This metric quantifies the average squared differences between predicted and actual values; thus, it allows for a precise assessment of model performance. R^2 is used to find out the level of similarity in the scores between predicted ones and actual ones, hence estimating how well these models captured the aesthetic trends present within the user evaluations. Finally, attribute-based heatmaps are used to visualize those regions within an image that contribute to a higher or lower aesthetic score. These heatmaps were most useful in understanding which attributes affected the aesthetic evaluations for architectural work. In this context, the statistical tools used in this study were descriptive statistics and comparative analysis (t-test). Descriptive statistics entails basic statistical analyses, such as the calculation of means, medians, and standard deviations. It is applied to both the predicted and actual scores to summarize the distribution of scores and find patterns in the model's predictions. Then a t-test is run on the differences of NIMA and DeepPhotoAesthetic's predicted scores against Arcbazar users' true scores to see for each model whether the differences between the pairs of scores were statistically significant. This will let us judge the precision with which the models reflect human aesthetic judgments.

The visualization tools were Matplotlib, Seaborn, and attribute activation maps. Matplotlib is a very handy library to plot model performance metrics such as the prediction vs. actual score distribution and training loss trends. This made it possible to create comparative visualizations, which shed light upon the consistency of the model's predictions. On the other hand, advanced statistical visualizations are powered by Seaborn. Complementing Matplotlib, it offered more intuitive correlation heat maps, where it could be easier to see relationships between predicted and actual scores and to get an idea of the overall spread of data points. And finally, attribute activation maps are used to visually highlight image regions associated with higher aesthetic scores. These maps helped interpret the model's focus areas, which basically underlined the understanding of architectural images of varied visual impact across different regions. The main cloud computing and hardware resources were Google Colab and NVIDIA GPUs. All model training is done on Google Colab using its cloud-based environment to avail the power of NVIDIA GPUs to speed up the training processes. This enabled larger batch processing and provided enough computational resources to fine-tune such large models as in DeepPhotoAesthetic, which needs heavy processing because it does attribute-based analysis of architectural renderings.

Scoring benchmarks, e.g., scores received from project-owners, designers, and experts through crowdsourced data received from Arcbazar, are prepared to be able to compare the automated results with human evaluations. These scores gave a benchmark against which ML models were trained, and their output was evaluated. This has allowed the generalization of aesthetic judgment because the diversity of user feedback allows for the prediction of a wide range of scoring preferences in architectural competitions. Figure 1 illustrates the workflow diagram for this study.

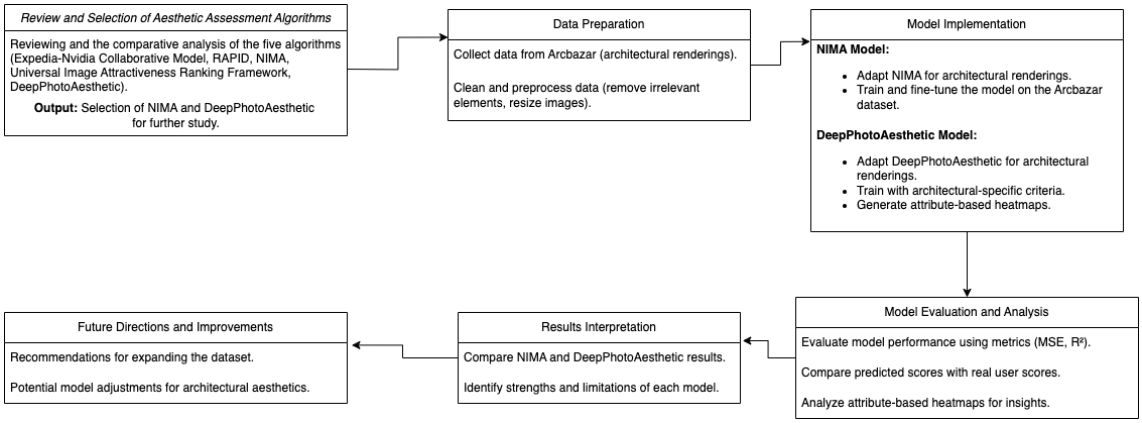


Figure 1. Flowchart of the workflow

Case Study: Evaluating competition entries at Arcbazar

The evaluation of design entries to architectural competitions has major challenges, most importantly, the sheer number of submissions per competition and the subjectivity in human assessments. For example, the Opera National de Paris building competition in 1983 received 756 design entries (As et al., 2019). These large numbers are not uncommon for many popular design competitions. It is humanly impossible for a limited number of jurors to assess all submissions consistently and fairly. Also, aesthetic judgment is subjective by nature, and variations between reviewers could lead to "unfair" decisions. For this purpose, developing an ML system that can automate some of the ratings and rankings of projects is aimed. For this purpose, ML models were trained on large amounts of architectural images, with the hypothesis that they would be capable of automating aesthetic scores for architectural projects. This may enable a more objective ranking process. Moreover, the system would not only help to rank vast numbers of design submissions but also could give valuable feedback to designers about their own work before the submission deadline and thus empower them to refine their work before their final submissions.

In this study, the evaluation scores from different user groups on Arcbazar, including project-owners, experts, and general users, are considered. Submissions were evaluated across five criteria: Idea, aesthetics, function, buildability, and graphics (As & Nagakura, 2016: 71). The analysis specifically focused on the aesthetics criterion to develop a targeted aesthetic assessment model. Users, who include project-owners, experts, and general users, on the Arcbazar system rate the images of the designs presented. These scores are on a scale of 1-10 and treated as ground truth for model training. The scores are normalized for the ML models to ensure standardization. The data received from Arcbazar is preprocessed and standardized for the use of ML models. This ensured that the data used for training and evaluation was uniform. First, the NIMA model is trained with a subset of renderings that are aligned with the Arcbazar scoring criteria. Then, the DeepPhotoAesthetic is tested with its pre-trained model and fine-tuned with the interior and exterior architectural images from the dataset to align them with the aesthetic standards of Arcbazar. Each of the ML models was tailored to Arcbazar's criteria and targeted only aesthetics. While NIMA produced only scoring predictions, DeepPhotoAesthetic provided further detail via attribute activation maps, which visually indicated how aesthetic scores were distributed across different regions of an image. Based on the performance of these models, a prototype system that automatically evaluates and ranks renderings submitted on Arcbazar has been developed. This case study demonstrates the potential of ML-driven aesthetic evaluation in online architectural competitions, providing a scalable solution to challenges associated with high submission volumes and subjective judgment. By implementing and fine-tuning NIMA and DeepPhotoAesthetic for architectural renderings, how ML can contribute to fairer and more systematic aesthetic assessment processes is illustrated.

Testing NIMA

The NIMA system, developed by Google, is a pre-trained model on millions of hotel images rated by a diverse population of regular hotel-goers worldwide. NIMA uses a convolutional neural network (CNN) to assess images based on predicted aesthetic scores, with the objective of achieving a high correlation with human ratings rather than a binary classification of low or high scores (Talebi & Milanfar, 2018). One of the strong

points of NIMA is its flexibility-it can be trained on datasets that capture both aesthetic and pixel-level qualities, thus finding wide applications in aesthetic evaluation tasks. In the present work, NIMA is adapted and retrained using the dataset comprising architectural renderings scored with user evaluations from Arcbazar. This retraining was iteratively done to bring NIMA's predictive capability in line with the specific aesthetic criteria of this study. The re-trained NIMA model tended to predict scores close to the average aesthetic ratings of the repository without extreme deviations, thus aligning with the general aesthetic consensus in the dataset.

The image dataset had to undergo preprocessing to make it fit the input requirements of NIMA. Each design submission in Arcbazar contains several renderings in various styles and formats, such as monochromatic sketches, colored plans, or hyper-realistic visualizations. In the original experimentation of NIMA, only photograph-like, hyper-realistic renderings and well-composed furnished interior views were included since this more closely aligned with the types of images that the model was originally trained on. High-fidelity architectural images that better reflect aesthetic qualities are selected, and all renderings were standardized regarding resolution (1024x512 pixels), and aspect ratio (2:1) to ensure the quality of the input was consistent. Such pre-processing was an important step in making sure that the model performed optimally in its prediction results. For augmenting and increasing the number of images in the training dataset, techniques like flipping, rotating images, or applying various distortions are used (Figure 2).

Figure 2. Augmentation: Image transformations

The assumption is that the aesthetic appeal of hotel rooms, rated by NIMA, could translate well to residential settings, assuming aesthetic principles are similar between the interior design of hotels and the design projects on Arcbazar. While testing the "out-of-the-box" NIMA model on architectural renderings from the dataset, an inclination toward mean values is noticed for aesthetic assessment scores; this often led to low scores versus the actual rating in the repository. Figure 3 shows that a comparison of regular users and expert votes indicates regular users tend to vote similarly to experts for extreme scores. However, for less extreme scores, the distribution becomes highly divergent, with regular-user ratings greatly differing from those of experts.

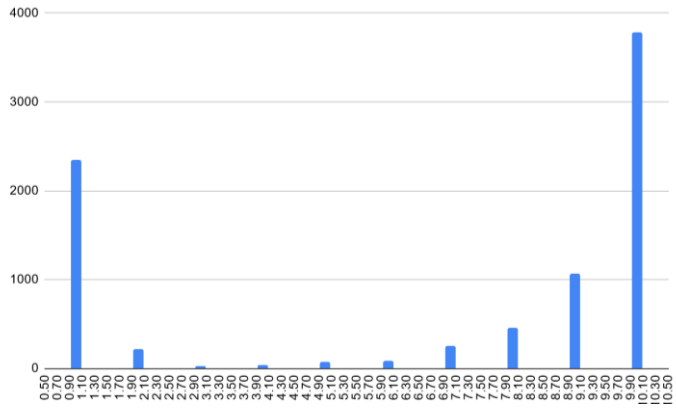


Figure 3. Degree of similarity between designer vs expert votes

Figure 4 presents the aesthetic scores predicted by the NIMA model, indicating a tendency for scores to cluster around the average. This is further elaborated in Figure 5, i.e., the difference between high and low predicted scores is minimal. While NIMA performs well in predicting scores around the mean of the dataset, it does not capture the full distribution of real scores, which range from minimum to maximum values.

Figure 4. High-Quality Scoring & Low-Quality Scoring

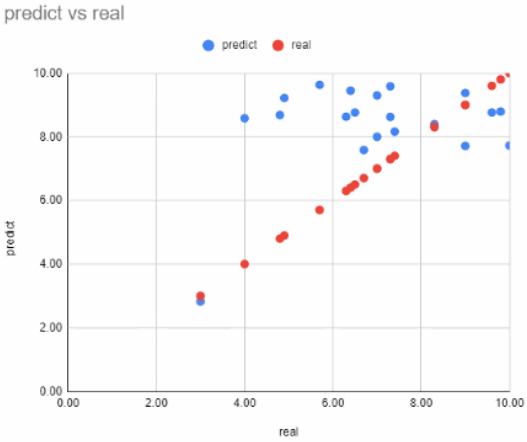


Figure 5. Nima score predictions

Therefore, this model could not predict aesthetic criteria at a satisfactory level to evaluate the characteristics of architectural work, since its predictions could not represent diversity and range as real human evaluations do. With these limitations, the DeepPhotoAesthetic is selected for testing to get closer to a more nuanced approach for aesthetic assessment.

Testing DeepPhotoAesthetics

The existing computational models for aesthetic evaluation typically focus on a single aesthetic score or class, and do not provide any insight into the specific attributes that add up to a particular image's quality. DeepPhotoAesthetic attempts to overcome this limitation by predicting an overall aesthetic score with human-interpretable explanations based on multiple aesthetic aspects (Malu et.al., 2017: 3). The model leverages a multi-task deep convolutional neural network (DCNN) that learns simultaneously multiple aesthetic criteria along with the total score, hence enhancing accuracy and interpretability. It is trained to evaluate images based on eight attributes commonly associated with photographic quality: Balancing elements, content, color harmony, depth-of-field, light, object emphasis, rule of thirds, and vivid color. In the first iteration of the test, a few elements, such as balancing elements, light, rule of thirds, had minimal impact on the overall aesthetic score for architectural renderings. As a result, these attributes were eliminated from the evaluation to divert this model's focus on characteristics that are closer to architecture.

Within the model, heatmaps are utilized as a form of visual interpretability to determine which areas of an image contribute most to the model's predicted aesthetic score. Heatmaps are generated through a process that involves gradient-based class activation mapping (Grad-CAM). After the image passes through the convolutional layers, gradients of the output (aesthetic score) are computed with respect to the last convolutional layer feature maps. These gradients are then weighted and averaged to produce a coarse localization map indicating important regions. In architectural renderings, this enables a designer or critic to visually understand which spatial components (such as facade articulation, lighting, texture detailing, or perspective depth) the model considers aesthetically significant. The generated heatmaps are upsampled and overlaid on the original renderings, offering intuitive, human-interpretable feedback that bridges the gap between machine prediction and human visual reasoning.

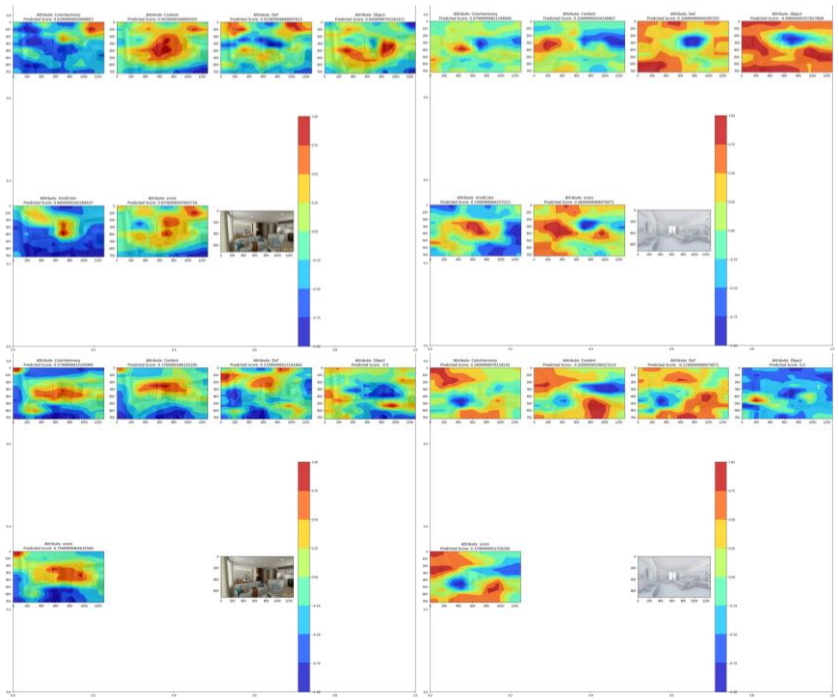


Figure 6. Results from a pre-trained model of DeepPhotoAesthetics with different parameters

Figure 6 shows the output of DeepPhotoAesthetic's pre-trained model on architectural renderings with its own original attributes. Initial results using its default parameters were poor. The results showed that, for example, "vivid color" always showed a low score and contributed little to the model's predictive ability on the data. Thus, this attribute is excluded in a subsequent run, and the algorithm is retrained with the remaining four attributes: content, color harmony, depth-of-field, and object emphasis. This resulted in a sharp increase in improvement within the predicted scores, yielding results that more closely fit within the range of maximum and minimum scores shown in the original data. The refined model displayed a better distribution of aesthetic

scores, enhancing its capability to differentiate high-quality renderings from lower-quality ones based on architectural aesthetic criteria.

The DeepPhotoAesthetic model is trained with a dataset of 2,000 architectural renderings, which increases the model's ability for better prediction and evaluation of aesthetic scores. According to the results of the preliminary experiment, the dataset is divided into two major categories: interior and exterior renderings. This separation was done to enhance the accuracy of its prediction, since aesthetic features and visual characteristics differ between interior and exterior images. One of the key advantages of DeepPhotoAesthetic is that it produces heatmaps for individual attributes, thus giving a visual representation of the distribution of aesthetic scores in different regions of an image. This was particularly helpful in the study because it allowed us to tell which parts of the score were most contributing to the overall score (Figure 7).

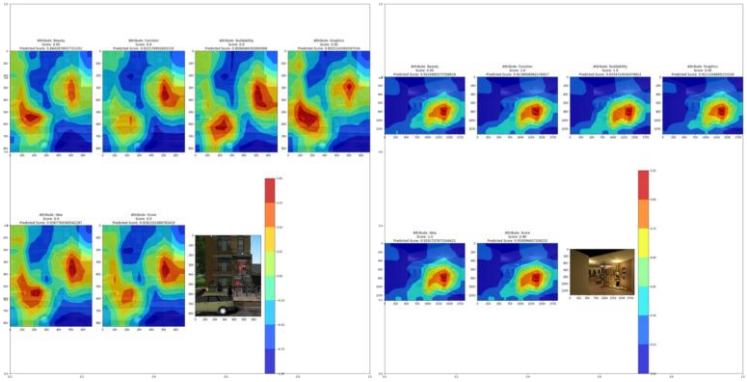


Figure 7. Heatmaps of exterior and interior images with the DeepPhotoAesthetic model

The results from the DeepPhotoAesthetic model outperformed both the NIMA model and the pre-trained DeepPhotoAesthetic model. Yet even with this progress, there was still a significant gap between the real scores and the model's predictions. To further improve the performance, some parameter tuning work is done, such as input shape and optimizer, to adapt the training to the architectural rendering dataset.

Figure 8 shows the process of data preparation. First, the data from the online repository is collected, and the images are cleaned manually using Adobe Photoshop to maintain consistency in their quality. Then, the images are resized to 512x256 pixels using PyCharm, a Python IDE, to decrease training time but without sacrificing important image features. After resizing, packages and parameter settings are modified on PyCharm to fine-tune the algorithm to the architectural renderings. One was scaling the loss function to allow the data's score range of 0-10 and matched it with the -1 to 1 scale of the original DeepPhotoAesthetic. For initial testing, the model is exclusively trained on interior renderings so that results may be directly compared with the NIMA model. Table 2 depicts the outcomes of training for interior renderings using losses that were recorded for every attribute across epochs, indicating a significant reduction over 20 epochs.

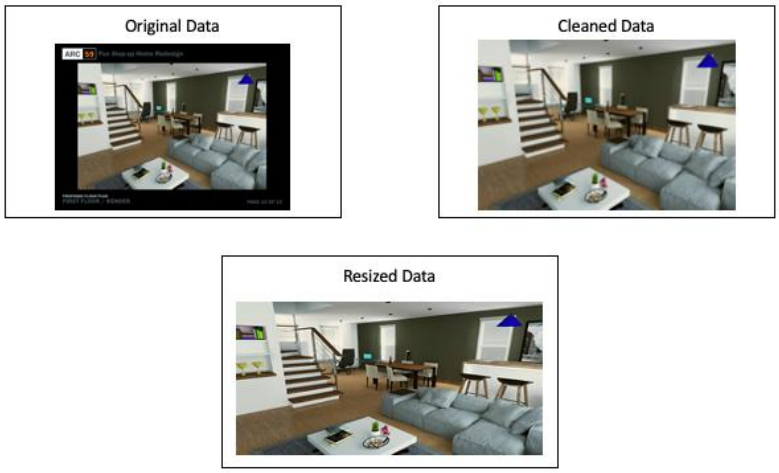


Figure 8. Data preparation

Table 2. Output of training DeepPhotoAesthetic model with interior renderings across 20 epochs

Epoch	Beauty	Function	Buildability	Graphics	Idea	Score	Total Loss
0	0.031129	0.031154	0.030242	0.031635	0.021784	0.043113	0.189056
19	0.011930	0.012033	0.014218	0.011471	0.005830	0.010392	0.065876

The low loss values indicate that adjustments to the algorithm were effective in adapting it for architectural renderings (Figure 9).

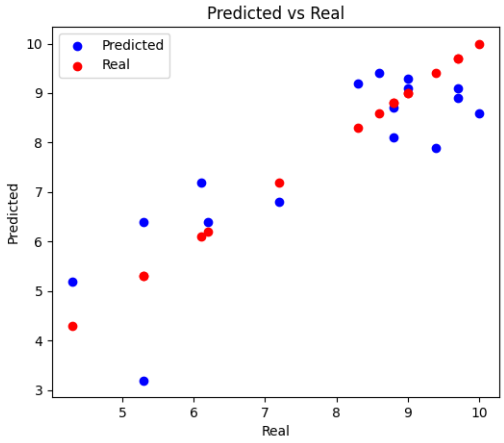


Figure 9. DeepPhotoAesthetic predictions (blue) vs real scores (red)

Although promising, the dataset remains relatively small. However, these results confirm that an adapted ML model can be used to estimate attribute-specific aesthetic scores and overall aesthetic scores.

FINDINGS

Compared to architectural renderings evaluation, aesthetic assessment scores produced by the off-the-shelf NIMA model were always lower and tended towards the mean, i.e., were far from scores obtained from Arcbazar. Scores of NIMA were limited toward the average score and maximum value in the dataset and failed to reflect the whole spectrum of aesthetic scores as observed in real evaluations. On the other hand, the tests of architectural renderings with the DeepPhotoAesthetic model, using its original photographic criteria, yielded more accurate overall score predictions. Additionally, DeepPhotoAesthetic's heatmap feature offered valuable insights into the aesthetic aspects that influenced each image's score. Training DeepPhotoAesthetic with architectural images demonstrated that, even with a relatively small dataset, the model could predict attribute scores closely aligned with actual user evaluations. The NIMA system has certain advantages, such as predicting both overall aesthetic scores and the distribution of human opinion scores. However, the available data for this study limited NIMA's effectiveness, as it was insufficient to fully train the model. Furthermore, to align with NIMA's intended use, the training is restricted to interior images from specific perspectives, which imposed significant limitations. Despite these adjustments, NIMA's predicted scores remained higher than actual scores, and the distribution was constrained to average and maximum scores only, diverging from the true spread of user evaluations. In contrast, DeepPhotoAesthetic operates on a pre-trained model developed for photography, which, although not fully optimized for architectural images, outperformed NIMA in accuracy. The model's ability to separate attribute scores and display them via heatmaps aligned well with the goals of this study. Upon applying DeepPhotoAesthetic to interior images, the predictions came somewhat closer to the real scores compared to NIMA results (Figure 10). Attribute-specific heatmaps intuitively determined aesthetic elements, which made a more in-depth visual analysis of architectural renderings with photographic attributes possible. The more additional training on architectural images was done, the more meaningful the scores as well as heatmaps from the DeepPhotoAesthetic became, empowering the model in its ability to assess the aesthetics of the renderings. This research indeed reveals what attribute-based analysis by DeepPhotoAesthetic can do in terms of assessing the aesthetics of architecture.

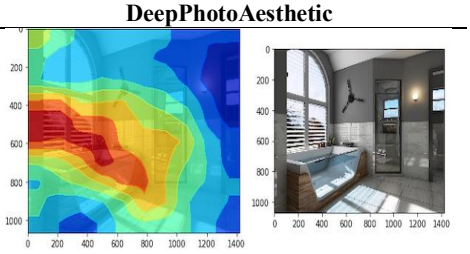
Arcbazar Data	NIMA Result	DeepPhotoAesthetic
		
Real Score: 8	Predicted Score: 5.71	Predicted Score: 8.1

Figure 10. Comparison of the results from NIMA and DeepPhotoAesthetics against the real score

CONCLUSION

In this paper, the challenges of assessing aesthetic qualities in architectural projects submitted to design competitions are explored. A high volume of submissions, together with the inherently subjective nature of human judgment, makes it difficult to conduct fair and consistent evaluations. Therefore, two machine learning models, NIMA and DeepPhotoAesthetic, are tested to train a prototype model that can automatically evaluate and rank renderings with respect to aesthetics. Testing and refinement showed that both models were indeed helpful, but the attribute-based heatmaps from DeepPhotoAesthetic allowed for a finer understanding of aesthetic qualities due to the capture of specific visual attributes relevant to architectural renderings. NIMA, though effective in scoring overall aesthetics, showed limitations in predicting a broader range of scores, since predictions from this model tended to center around mean values. Together, these models have demonstrated how ML can support aesthetic scores to standardize the evaluation process. The work has several limitations in terms of dataset size, data quality, evaluation criteria, and model constraints. The dataset was relatively small, which reduces the model's generalization ability and affects its accuracy. A large and diverse dataset will increase the robustness of the prediction made by the system. The image quality and style variations within the dataset may affect the model performance, the performance of NIMA, for example, is sensitive to resolution and clarity. Moreover, the research focused only on aesthetics, but it could be improved by the incorporation of further criteria such as function and buildability. Moreover, NIMA and DeepPhotoAesthetic were originally designed for general photographic aesthetics rather than architectural renderings, which may limit their effectiveness. Based on these findings, future studies in this area could expand on these shortcomings. Incorporating data from various architectural styles and sources may help improve model accuracy and generalizability. Also, the introduction of new, architecture-specific criteria, such as spatial dynamics or material qualities, may be more congruent with the evaluation of architectural aesthetics.

This paper opens many possibilities for AI to have a more active role in the evaluation and perhaps even help in the process of design production in architectural competitions. It is envisioned that future models will bridge the gap between subjective human judgment and objective machine analysis, contributing to a much fairer, more consistent, and insightful assessment of architectural work. It is foreseen that, in the long run, an AI system can design architectural projects or be used as a tool to provide template designs and alternatives that other designers can continue to work with. The aesthetic values these AI-generated designs will have, how these values are formulated, and what relationships the machine will establish in them are crucial. The ML model developed and tested herein will play a part in that understanding of these values and relationships. A system that can predict the aesthetic value of an architectural project could support such understanding significantly. As Cross (2001: 44) noted, the use of computers to understand human design processes has been done throughout history. While this perspective remains valid, computers could extend beyond this role, evolving into essential tools for perceiving and exploring complex design concepts such as "aesthetics."

Authors' Contributions
The authors contributed equally to the study.

Competing Interests
There is no potential conflict of interest.

Ethics Committee Declaration
The study does not require ethics committee approval.

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Authors' Biographies

Mustafa Koç is an engineer who works in inter/trans disciplinary studies. After graduated from Bilkent University, completed his master's degree in both engineering and architecture in TOBB University of Economics and Technology. During his graduate studies, he focused on machine learning and its applications in various disciplines. Currently he is a Ph.D. candidate at İstanbul Technical University in Architectural Design Computing. He is studying machine learning, synthetic data, and decision support systems.

İmdat As is an architect, entrepreneur, academician, and the recipient of the prestigious Turkish Scientific Research Council (TUBITAK) 2232 Grant and Fellowship. He leads the City Development through Design Intelligence (CIDDI) lab at Istanbul Technical University (ITU). His work focuses on new technologies that shape the morphology of the future city. He received his doctoral degree from the Harvard University Graduate School of Design (GSD), his M.Sc. in architecture from the Massachusetts Institute of Technology (MIT), and his B.Arch. from the Middle East Technical University (METU) in Ankara, Turkey. He co-authored, Dynamic Digital Representations in Architecture: Visions in Motion (Taylor & Francis, 2008), and two books on AI in Architecture (Taylor & Francis, 2021 and Elsevier, 2022). He founded Arcbazar.com in 2011- a crowdsourcing platform for architectural design. Arcbazar has been featured as one of the "Top 100 Most Brilliant Companies" by Entrepreneur Magazine.

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Research Article

Stylized architecture in 3D animated films: Aesthetic and narrative perspectives

Dr. Erdem Köymen[1*]

[1]Zaim University, Faculty of Engineering and Natural Sciences, Department of Architecture, Türkiye.
erdem.koymen@izu.edu.tr

*Corresponding Author
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Abstract
This study explores the stylization of architectural elements in 3D animated films, emphasizing their crucial role in visual storytelling. Using qualitative research methods, 10 films were analyzed, showcasing diverse periods, cultural themes, and aesthetic styles. The findings reveal that architectural elements are not just passive backgrounds but active narrative components that shape emotional and visual dynamics. Real-world architectural references are reinterpreted through historical or futuristic stylizations, manipulating form, texture, material, and lighting to create immersive atmospheres. By exaggerating proportions, simplifying structures, or using abstract forms, stylization visually reflects characters' psychological states and enhances the dramatic flow of the story. The research highlights that stylized architecture enriches the visual experience while reinforcing the narrative structure, drawing viewers more deeply into the animated world. The concept of "hyperreality" helps explain how animated films use stylization to transcend physical realism, unlocking greater creative freedom. This process allows architecture to shape the film's atmosphere, guide audience perception, and establish a cohesive visual language that amplifies storytelling. Ultimately, the study demonstrates that architectural stylization is not merely an aesthetic choice but a powerful narrative device. The findings propose narrative-driven design as a new approach for creating emotionally resonant spaces in both animation and architectural practice.

Keywords: Stylized architecture, 3D animated films, Narrative design, Aesthetic perspectives, Digital spatial storytelling

Extended Abstract

Introduction: 3D animated films have emerged as a dynamic medium where architectural design plays a significant role in shaping visual storytelling. These films push the boundaries of conventional spatial representation, transforming architecture from a static background element into an integral narrative tool. The concept of stylized architecture in animation allows for creative reinterpretations of real-world references, leading to immersive cinematic experiences. Stylization techniques, including exaggeration, abstraction, and simplification, reshape architectural forms to complement character emotions, enhance atmospheric depth, and establish distinctive aesthetic identities within the animated world. Animated films employ architectural stylization not only as a means of artistic expression but also as a strategic tool to reinforce storytelling. Architectural elements are often manipulated to align with the tone and themes of the film, using form, texture, material, proportions, and lighting to evoke emotional responses or highlight symbolic meanings. For example, towering, asymmetrical buildings can represent chaos or instability, while smooth, flowing structures might symbolize harmony or fantasy. Through stylized representation, animated spaces are freed from the constraints of realism, allowing for hyperreal environments that enrich narrative engagement. This study explores how stylized architecture in 3D animation contributes to the emotional, aesthetic, and structural dimensions of storytelling by analyzing its function in a selection of animated films with varied artistic approaches.

Purpose and scope: This study aims to investigate the role of architectural stylization in 3D animated films, focusing on its contributions to visual storytelling, audience engagement, and emotional depth. It examines how stylized spaces interact with character development and how they establish thematic coherence within animated worlds. The research seeks to answer the following questions: How does architectural stylization function as a narrative device in 3D animated films? What visual and structural techniques are employed to create stylized environments? How do exaggerated, simplified, or abstracted architectural elements shape audience perception and immersion? The study encompasses a wide

range of 3D animated films that utilize distinct stylization techniques, including those inspired by historical, futuristic, and fantastical architecture. The findings contribute to both animation studies and architectural theory, offering insights into the interplay between space, aesthetics, and narrative in digital environments.

Method: This research adopts a qualitative content analysis approach to examine the architectural stylization techniques in 3D animated films. Ten films were selected based on their representation of diverse periods, cultural themes, and aesthetic styles, ensuring a comprehensive exploration of different architectural expressions. The selection criteria focused on animated productions where architecture plays a central role in the narrative structure and employs distinct visual stylization. The study evaluates stylized architecture through key parameters such as: *Form and structure:* How buildings are exaggerated, abstracted, or reimagined to convey symbolic meaning or enhance narrative tension. *Texture and materiality:* How surfaces are stylized to reflect thematic moods, character emotions, or cultural symbolism. *Lighting and color palettes:* How light and color are used to reinforce atmospheric tones, guide visual focus, or establish contrasting narrative spaces. *Scale and proportions:* How architectural elements are resized, distorted, or reshaped to intensify the visual and emotional impact of storytelling. Furthermore, the research incorporates theoretical perspectives on hyperreal environments (Bridges & Charitos, 1997) and enabling constraints in design (McDonnell, 2023) to frame how animation balances creative freedom with narrative coherence. This interdisciplinary approach allows for a deeper understanding of how architectural stylization shapes the cinematic experience, revealing the intentional design processes behind animated worlds.

Findings and conclusion: The systematic analysis of ten films demonstrates that architectural stylization in 3D animated films functions as a powerful narrative device. The findings, structured around form, texture, lighting, and scale, reveal how stylized spaces shape emotional resonance, enhance immersive world-building, and actively structure narratives. For instance, contrasting scales can evoke comedy or grandeur, while symbolic textures can define a character's world, as seen in the personified architecture of Monster House, the automotive-scale world of Cars, and the metaphysical realms in Soul. The study establishes that these techniques collectively enable a form of spatial storytelling where architecture transcends its background role to become an active narrative agent. This narrative potency, analyzed through the lens of hyperreality, suggests a move beyond traditional functionalism in design. Consequently, the research introduces "narrative-driven design" as a conceptual framework derived from animation, proposing how its principles can be translated into architectural practice to create more emotionally engaging and meaningful human-centric spaces, both physical and digital. This opens new avenues for interdisciplinary exchange between animation and architecture, particularly for the design of future immersive environments.

Keywords: Stylized architecture, 3D animated films, Narrative design, Aesthetic perspectives, Digital spatial storytelling

INTRODUCTION

3D animated films present creative production processes that push the boundaries of visual storytelling, offering aesthetic approaches with a profound impact on audiences. These films contribute to storytelling not only through characters and events but also through the design of spaces. Architectural elements in such films are stylized to create specific atmospheres, establish connections with characters, or guide the audience toward particular emotional experiences. Stylization involves reinterpreting real-world forms by emphasizing, exaggerating, or simplifying certain features. This process gives animated films a unique visual language while also stimulating the viewer's imagination.

Stylized 3D animation simplifies details, exaggerates proportions, and transforms forms into more dynamic or minimalistic shapes. Bridges & Charitos (1997) describe "hyperrealities" as creatively liberated spaces that transcend physical realism, a concept closely mirrored in how animated films construct visually striking, stylized worlds. These hyperreal environments amplify creative freedom, enabling stylized spaces to evoke immersive narratives. By moving away from realism, stylization highlights the boundless creativity of animation, detaching audiences from reality and making character and space designs more captivating and memorable (Köymen, 2008). Architectural elements, reinterpreted through futuristic or historical themes, provide viewers with fresh perspectives and establish distinctive atmospheres within animated universes (Tulum Okur & Gezer Çatalbaş, 2022). Stylized architectural elements stand out as components that enhance storytelling and enrich the film aesthetically. Symbolic and abstract architectural structures reflect the dynamics and moods of the worlds depicted in the films, becoming integral parts of the visual narrative. Their stylization pushes the audience to the limits of imagination, allowing the film's world to break away from reality and adopt a unique aesthetic understanding. As an expression of graphic design and animation,

stylization aims to offer viewers not only an aesthetic experience but also an emotional impact. Stylized architectural forms provide a visual cohesion that aligns with the characters' world, drawing the audience deeper into the narrative (Winkenbach & Salesin, 1994). Abstraction and stylized design have played a critical role in the evolution of 2D animation into 3D animated films. This process, which brought the artistic forms of 2D animation into the digital realm, has enabled the emergence of more creative, unique, and expressive visual experiences in space design (Bénard et al., 2013). The technical capabilities of 3D animation allow architectural elements to be designed with greater freedom. Stylization is not merely an aesthetic choice but also a strategic tool to enhance the narrative's impact (DeCarlo & Santella, 2002). Particularly, the stylization of architectural elements is used to convey emotional messages and create an atmosphere that transcends the boundaries of time and space (Köymen, 2008).

In this context, the role of stylized architectural elements in storytelling enhances the visual perception of spaces and strengthens the audience's engagement with the narrative. The way stylization highlights relationships between characters and spaces in 3D animated films offers viewers a more profound emotional and aesthetic experience (Çakmak & Karoğlu, 2020). These techniques demonstrate how architecture in animated films functions not just as a background element but as an essential part of the narrative.

Stylization

Stylization is a widely used concept in the realms of art and design, defined as the exaggeration, simplification, or reinterpretation of certain features of an object or form. Its primary purpose is to highlight the characteristic features of real-world forms, transforming them into a medium for artistic expression. Stylization conveys powerful emotional messages to viewers by emphasizing or simplifying forms (Winkenbach & Salesin, 1994; Köymen, 2008). This technique allows the identity of an object or structure to be preserved while integrating the artist's vision. Consequently, the viewer perceives both the original identity of the model and the artist's stylized interpretation simultaneously. In the stylization process, the artist preserves the essential contours of the model while reinterpreting it in a unique way. Etymologically, stylization is defined as "simplifying by removing details and reconfiguring the form" (Barba & Savarese, 2003). This process serves as a tool for reconfiguration, carrying functional and aesthetic significance in many fields, including architecture. Russian director and theater theorist Vsevolod Meyerhold viewed stylization as a process that reveals the internal synthesis of a period or phenomenon. According to him, stylization involves any expressive tool used to uncover hidden features within the style of an artwork and convey them through symbols (Barba & Savarese, 2003). This perspective frames stylization not merely as a visual aesthetic choice but also as a narrative technique and intellectual process. In summary, stylization is a crucial technique that emphasizes the characteristic features of objects, incorporates the artist's creative perspective into the form, and conveys both aesthetic and emotional messages to the audience. In both art and architecture, stylization processes continue to enrich the symbolic and aesthetic meanings of forms.

Examples of Stylization Applications

Stylization, as a versatile technique, appears in various art forms where aesthetic elements are reinterpreted to become more appealing and meaningful. In fashion design, for instance, this technique is frequently employed to enhance the visual appeal of garments and figures (Figure 1a). By exaggerating or simplifying natural forms, both uniqueness and visual impact are highlighted (Barnard, 2014). Stylization allows the redesign of garments' form, color, and details to align with the artist's vision, resulting in more striking aesthetics (Kawamura, 2018). This process fosters original and captivating designs in fashion trends, attracting consumer interest and strengthening the market position of garments.

In the visual and auditory arts, such as painting, music, and sculpture, stylization frequently manifests as a means for artists to reflect their vision by exaggerating or simplifying certain elements. In these fields, objects or sounds are presented not in their natural states but as stylized forms shaped by the artist's creative outlook. For instance, the exaggeration of colors or shapes in painting, the idealization or abstraction of forms in sculpture, and the repetition of specific melodies or rhythms in music represent fundamental examples of stylization (Gombrich, 1995). Similarly, in the performing arts, such as cinema and theater, stylization emerges as a significant technique. Exaggerated gestures and expressions in theater or stylized visuals in cinema are employed to make the narrative more impactful and striking (Laughlin, 1988). Stylization thus serves not only

as an element that enhances visual or auditory aesthetics but also as a tool for delivering a more profound artistic and emotional experience to the audience.

In traditional Turkish arts such as miniature painting, tilework, and ornamentation, stylization involves simplifying and reinterpreting figures and motifs (Figure 1b). These motifs, created through this technique, often feature geometric arrangements, forming a distinctive style (Üçer, 2019). Particularly in Islamic art, where figurative depictions are rare, stylized motifs gain prominence (Grabar, 1987). Flowers such as roses and carnations are drawn in a stylized manner, often depicted from a bird's-eye view (Fikriyat, 2019). Turkish handicrafts, particularly in carpet and kilim weaving, also place significant emphasis on stylization (Figure 1c). Geometric, botanical, and animal motifs used in weaving appear in both naturalistic and stylized forms (Tecir, 2024). The motifs contribute to the unique identity of Turkish art, being rearranged into geometric shapes or simplified botanical patterns through stylization. In graphic design, stylization is most commonly seen in everyday life through pictograms (Figure 1d). Traffic signs, airport symbols, and guidance signs at Olympic venues are examples of stylized symbols (Deniz & Öztürk, 2022). Pictograms simplify the forms of tangible objects into symbols, while abstract concepts are stylized to become more visually comprehensible. Architectural stylization, on the other hand, involves the simplification and exaggeration of forms to imbue them with symbolic and aesthetic meanings. This process preserves the character of a structure while offering viewers a novel visual experience. Art Nouveau is an architectural and artistic movement that emphasizes the stylization of botanical forms inspired by nature. This movement transforms botanical motifs into structural elements, characterized by asymmetrical, flowing lines and curves (Figure 1e). Antoni Gaudi's works (Figure 1f) are among the most prominent examples of this style (Baytar, 2019). Additionally, Art Nouveau structures in cities like Istanbul and Baku reflect concrete examples of this stylization (Burnak, 2021).

Another example of stylization in architecture can be seen in the historic Diyarbakır city walls, adorned with botanical motifs (Figure 1g). These motifs, stylized into semi-naturalistic forms, are carved into stone to enhance the structural aesthetics of the walls. Additionally, the lion figure on the walls serves as another stylized example (Figure 1h), redesigned to convey a sense of movement and dynamism (Yariş, 2024). Architectural presentations and model-making often employ stylization to highlight the aesthetic and functional characteristics of structures in a more simplified and impactful way (Figure 1i). Techniques like watercolor and gouache painting frequently involve stylization, simplifying essential details of structures to express their character. For instance, roof and window details in models of traditional Turkish houses are stylized and simplified (Figure 1j). This approach makes the models more visually appealing and meaningful. Stylization approaches exemplified across various fields are also encountered in 3D animated films, the primary focus of this study. This topic is elaborated upon in detail below with relevant examples.

Figure 1. Examples of stylization across various disciplines
(a) Fashion design with exaggerated silhouettes, (b) Traditional Turkish miniature art, (c) Kilim weaving motifs, (d) Pictograms in graphic design, (e) Art Nouveau architectural details, (f) Gaudi's organic forms, (g) Diyarbakır wall motifs, (h) Stylized lion figure, (i) Architectural watercolor rendering, (j) Simplified Turkish house model.

Stylization in 3D Animated Films

In 3D animated films, stylization elevates architectural elements beyond mere background features, transforming them into aesthetic and narrative tools. The primary goal of stylization is to reinterpret real-world architectural forms, offering viewers a unique and striking experience. Exaggeration of real-world proportions, simplification of forms, and abstraction of structural elements are defining characteristics of stylized 3D architecture (Winkenbach & Salesin, 1994). This approach establishes an aesthetic language where spaces and structures are designed to support the narrative rather than adhere to realism. According to animator Chris Maraffi, determining the style -whether "stylized" or "realistic" (photorealistic)- is a critical step before designing elements such as characters and architectural features. In stylized techniques, characters and environments are exaggerated or simplified, allowing greater creative freedom for the audience. In contrast, photorealistic techniques aim for a high level of detail and closeness to reality, appealing to the viewer's sense of realism (Maraffi, 2003).

In realistic styles, characters and architectural elements are modeled based on real-world references, emphasizing intricate details. For instance, the asymmetry of a human face is carefully modeled in 3D animation to achieve a photorealistic effect. Stylized styles, on the other hand, present architectural elements and characters in simplified and exaggerated forms, offering greater flexibility and creativity to the narrative. When used as a narrative device, stylized architecture helps reflect characters' personal worlds, emotional states, and environments. In animated films, the stylization of spaces and architecture immerses the audience more deeply into the story's world. Films like Chicken Little and Cars use stylized buildings and environments to depict the characters' worlds. Such structures are exaggerated or simplified through aesthetic choices to better convey the essence of the characters and events (Bénard et al., 2013). Stylization emphasizes specific architectural elements to capture the audience's attention and support the narrative.

In this context, stylized architectural elements enhance a film's atmosphere and add new dimensions to the narrative. For example, in Chicken Little, the characters inhabit a fully stylized environment where exaggerated architectural forms directly reflect the film's comedic tone. Similarly, Cars extends this approach by reshaping architectural elements through an automotive lens, creating a cohesive, stylized world. In contrast, the analysis reveals how films like Open Season employ more restrained stylization to maintain a semi-realistic wilderness atmosphere, demonstrating the spectrum of approaches between full stylization and photorealism. This strategic use of architectural stylization allows animated films to create distinctive visual identities that support their unique narrative requirements. Stylized architectural forms in 3D animated films are frequently reinterpreted to contribute to the narrative's visual language. Although architectural elements are carefully designed to remain recognizable, they are often reshaped to align with the characters' worlds. The stylization of real-world buildings and structures allows viewers to engage with the characters' environments in more imaginative and emotional ways (Baxter et al., 2004). This approach ensures that the aesthetic of the architecture complements character designs, creating a unified artistic vision.

This stylization process typically involves exaggeration, simplification, or abstraction of spaces. For instance, colossal buildings or asymmetrical structures can symbolize characters' inner worlds, helping the audience understand their psychological states (Bénard et al., 2013). In particular, fantastical 3D animated films use stylized spaces and structures to provide viewers with visual experiences that are impossible in the real world. These experiences amplify the emotional intensity of the story (Baxter et al., 2004). Köymen (2023) emphasizes that stylized architecture is not only an aesthetic choice but also a powerful tool for understanding the characters' worlds. When stylizing architectural elements, a delicate balance is maintained between realism and abstraction. While real-world references are preserved, these references are abstracted to deepen the audience's connection to the narrative. Stylization aims to enhance the impact of architectural elements on both aesthetics and storytelling (Köymen, 2008). This balance allows architectural elements to remain recognizable while offering the audience a deeper aesthetic experience. For example, in The Monster House, a house is portrayed as both a realistic building and an abstract character. Through stylization, the house's role in the story gains dramatic significance, enabling the audience to recognize and rediscover familiar elements of the real world (Bénard et al., 2013). In this context, stylized architectural forms amplify the visual and narrative power of animated films. By reinterpreting familiar elements, stylization allows viewers to engage more deeply with the characters' worlds. The balance between abstraction and realism ensures that

architectural forms leave both an aesthetic and emotional impression on the audience (Winkenbach & Salesin, 1994; Baran, 2023; Köymen, 2023).

METHODOLOGY

This study adopts a qualitative research approach to explore how architectural stylization influences the narrative structure of 3D animated films. Given that stylization in animated architecture is an artistic and interpretive phenomenon, qualitative content analysis was selected as the primary method to assess how visual elements contribute to storytelling.

Film Selection Criteria

A total of ten films were selected for analysis, representing diverse periods, cultural themes, and aesthetic styles. The films analyzed are: Chicken Little (Dindal, 2005), Monster House (Kenan, 2006), Open Season (Allers et al., 2006), Cars (Lasseter, 2006), Monsters, Inc. (Docter, 2001), Spider-Man: Into the Spider-Verse (Persichetti et al., 2018), Soul (Docter & Powers, 2020), The Mitchells vs. The Machines (Rianda, 2021), Encanto (Howard & Bush, 2021), and Puss in Boots: The Last Wish (Crawford, 2022). The selection criteria were determined based on the following aspects:

- Architectural Prominence: The films had to include architectural elements as an essential component of their world-building and narrative structure.
- Stylization Techniques: The films had to exhibit clear stylization techniques such as exaggeration, simplification, or abstraction in their architectural designs.
- Cultural and Historical Representation: The films were chosen to reflect various cultural, historical, and futuristic interpretations of architecture to provide a broad perspective on stylization.
- Narrative Integration: The architectural elements needed to serve as more than just a backdrop, actively contributing to the narrative, character emotions, or thematic depth.

The selected films were examined in their entirety, including their set designs, environments, and how the architecture interacts with the characters, themes, and storytelling techniques.

Data Collection and Analysis

The primary data for this study were collected through a detailed visual analysis of the films. This process involved a close reading of key architectural scenes and sequences, identifying how stylized spaces functioned within the narrative. Supporting materials such as production design books, director interviews, and animation industry reports were also consulted to understand the artistic intent behind the stylized designs. The content analysis followed a structured approach, focusing on the following key visual parameters:

- Form & Structure: How buildings and environments are exaggerated, abstracted, or reimagined to align with the storytelling.
- Texture & Materiality: The stylization of surfaces, materials, and environmental elements to reinforce the thematic mood.
- Lighting & Color Palette: How lighting choices and color schemes shape emotional engagement and narrative progression.
- Scale & Proportions: The degree to which buildings, interiors, and landscapes deviate from real-world proportions to create a heightened visual effect.

Discussion and Interpretation of Data

Each film was analyzed individually to assess the unique approaches to architectural stylization. The findings were then compared and contrasted across different films to identify common trends, recurring motifs, and distinctive narrative functions of stylized architecture. To ensure a rigorous interpretation, the study integrates theoretical frameworks from both architecture and animation studies. Additionally, narrative theories on spatial storytelling were applied to interpret how architectural stylization enhances dramatic tension, character development, and audience perception.

FINDINGS

Examining the Narrative Contributions of Architectural Stylization in 3D Animated Films

This section analyzes 10 examples of 3D animated films produced at different times, interpreting them with a focus on the stylized approaches used in their architectural designs. These films were specifically selected to understand the impact of architectural stylization in 3D animation and uncover their narrative functions. The selection spans a wide range of periods, cultural themes, and aesthetic styles, demonstrating how architectural design is reinterpreted through animation and presented to audiences. Each film is significant for its distinctive architectural elements, use of unique stylization techniques, and ability to integrate narrative and visuals. In architecture, human ergonomics and proportions play a critical role in design. Le Corbusier's "Modulor" system, based on human body proportions, provides a human-centered approach to functionality in architecture (Ching, 2007). However, in 3D animated films, architectural structures are shaped through stylization processes, often diverging from human scale to align with the exaggerated or simplified characteristics of the characters. This approach reimagines architecture to complement the stylization of characters and enhance the narrative.

In Chicken Little (Dindal, 2005), it is observed that the stylized animal characters reflect a contemporary lifestyle. The architectural structures in the film are presented through exaggerated and simplified forms. Parallel lines are intentionally avoided, and oversized façade elements along with vibrant color tones are employed to create an aesthetic suited to the film's narrative world. To enhance the tactile feel of this world, surfaces are often rendered with smooth, almost plastic-like textures, reinforcing the cartoonish and artificial nature of the environment. This vibrant and consistently bright color palette is complemented by a lighting scheme that avoids harsh shadows, using even, high-key illumination to maintain the film's energetic and comedic tone. This approach aligns with what Furniss (2007) describes as "exaggerated aesthetics" in animation, a technique that immerses the audience in a world that is unrealistic yet visually compelling. Wells (2002) also notes that such stylizations reinterpret architectural elements not merely as visual tools but as integral parts of the narrative. In Chicken Little, adhering to this perspective, visual appeal takes precedence over functionality, resulting in an aesthetic environment that aligns with the exaggerated nature of the characters (Figure 2).

Figure 2. Still images from Chicken Little showcase its stylized architectural forms

In the film, the stylization of architectural structures is achieved through the simplification or exaggeration of structural systems. Columns, arches, and other architectural elements are designed not merely for functionality but to create an aesthetic cohesion that supports the film's narrative. The materiality of these structures is

simplified, featuring smooth, cartoonish surfaces that avoid complex textures, which reinforces the film's non-realistic and playful aesthetic. This is complemented by a lighting scheme that relies on bright, high-key illumination and a vibrant color palette, enhancing the comedic and energetic tone while ensuring visual clarity. This approach demonstrates how architectural forms contribute to storytelling and how structural details can become powerful aesthetic tools. For instance, the exaggerated dimensions and abstracted geometric shapes of buildings in the film reflect its energetic and comedic tone. Such stylizations push the boundaries of architectural design, transforming structures into vital storytelling devices. The stylized structural details captivate the viewer's attention, creating both aesthetic and dramatic effects. Additionally, the nature of these stylized architectural elements serves as a compelling backdrop that enhances the narrative of the characters, immersing the audience more deeply into the world of the film (Desowitz, 2005; Thomas, 1991) (Figure 3).

Figure 3. Examples of stylized structural systems in Chicken Little

In Monster House (Kenan, 2006), the house is stylized as a monster and functions as a character within the narrative. This architectural approach reinterprets the house not merely as a setting but as an active part of the story. The depiction of the house through exaggerated and abstract forms draws the audience into a dramatic atmosphere, transforming it into a narrative tool rather than a simple structure. The materiality of the house is crucial to its monstrous character; weathered wood, peeling paint, and a generally coarse, decaying texture dominate its exterior, visually communicating age, neglect, and a lurking menace. This is amplified by the distorted scale and proportions of the building itself. The house looms over the neighborhood with an unnaturally tall and bulky silhouette, while its windows are asymmetrically placed like scowling eyes and the porch juts out like a gaping maw, directly linking architectural form to monstrous anatomy. The personification of spaces in animated films fosters an emotional connection with the audience, while stylization enhances this bond (Furniss, 2007; Wells, 2013). The stylization of the house as a "monster" serves as a strategy that immerses viewers in the story and highlights the dramatic elements of the space. This design also provides a compelling example of how space can be personified in animation cinema. The house's behaviors and physical features reinforce the emotions of fear and suspense within the story, while its architectural elements add narrative depth. This unique approach in the film demonstrates how animation can strengthen the interaction between space and storytelling (Furniss, 2008; Pilling, 2012; Wells, 2013) (Figure 4).

Figure 4. The "house" character's stylization in Monster House

In Open Season (Allers et al., 2006), the characters are observed to be stylized in a manner closely resembling realistic human forms. The simplified facial features and body proportions of the characters are designed to align with the film's aesthetic structure. Similarly, the architectural structures are shaped with a simplified

aesthetic, presented in harmony with the characters' visual style. The lighting scheme employs a naturalistic and soft color palette, dominated by earthy tones and forest greens, which reinforces the outdoor wilderness setting. The use of warm, diffused sunlight in camp scenes creates a friendly and safe atmosphere, while cooler tones and sharper shadows are occasionally introduced to signal danger or tension during confrontations subtly. Architectural proportions, though simplified, remain grounded and relatable, adhering to a familiar human scale that contrasts with the more exaggerated scales seen in films like Chicken Little. This deliberate choice in scale helps anchor the story in a semi-believable wilderness environment, making the anthropomorphic characters' interactions with human spaces -like the park ranger station or the country store- feel more integrated and narratively coherent. This approach allows simplified architectural forms to function as narrative tools, reflecting the understated nature of the characters. While the buildings in the film resemble real-world architectural products, they are modeled with simplified geometric forms and minimal openings. For instance, materials such as wood and brick are reinterpreted with a pared-down aesthetic, free from intricate details. This process of stylization contributes to the film's world by providing an aesthetic form without compromising functionality (Beiman, 2013; Sunshine, 2006; Thomas & Johnston, 1995) (Figure 5).

Figure 5. Stylized architectural elements from Open Season

In Cars (Lasseter, 2006), the world of anthropomorphized vehicles is meticulously crafted through stylization. The cars are personified with human-like features, such as eyes and mouths, allowing them to convey emotional expressions. This characterization reimagines the automotive world within an aesthetic and narrative framework, offering viewers a unique experience. The architectural structures in the film are similarly stylized to align with the cars' world, creating a distinct narrative that diverges from the traditional human-architecture relationship. The materiality of this world is defined by automotive and roadside aesthetics. Buildings feature sleek, metallic surfaces reminiscent of car bodies, rubber-like detailing that evokes tires, and asphalt-textured elements, creating a visual continuity between the characters' identity and their environment. The lighting and color palette further enhance this theme. Radiator Springs is bathed in the warm, nostalgic glow of neon signs and sunset tones, which fosters a cozy, communal atmosphere. In contrast, the modern highway is depicted with cold, blue-tinged lighting and sterile colors, establishing a visual contrast that underscores the narrative conflict between tradition and progress. For instance, a repair shop is designed to resemble a medical clinic, with car repair processes symbolically associated with medical treatment. The interior features equipment resembling medical tools, further enhancing the stylized analogy to healthcare services. Externally, architectural details inspired by medical buildings serve as symbolic narrative tools (Paik, 2006; Solomon, 2006). Stylized architecture combines functionality and aesthetics, enriching the film's world-building. For example, a gas station is reinterpreted with forms reminiscent of a car engine, presenting a thematic aesthetic that integrates seamlessly into the narrative. The piston-like elements used in its design demonstrate how architecture can merge with the film's characters, reinforcing thematic cohesion. Furthermore, the "Wheel Well" motel exemplifies the integration of landscape and architecture with the car theme, showcasing stylization as a tool for aesthetic and narrative unity. Such design choices highlight how architecture can significantly contribute to storytelling, strengthening the thematic and visual consistency of the animated world (Paik, 2006; Wallis, 2006) (Figure 6).

Figure 6. Stylized architectural examples and concept designs from Cars

In Monsters Inc. (Docter, 2001), columns, beams, and other structural elements are stylized, reinterpreting them in both functional and aesthetic contexts. The architectural components retain their functionality while being presented in an exaggerated and dynamic manner, aligning with the film's whimsical and fantastical tone. The materiality reflects an industrial yet fantastical setting. Surfaces combine cold, metallic textures of factory equipment with brighter, colored plastics and rubberized elements, creating an environment that feels both functional for a large corporation and visually engaging for a world of monsters. The lighting design plays a crucial role in defining spaces within the factory. Vast, high-ceilinged areas are often lit with a cool, functional, and slightly sterile overhead illumination, emphasizing the scale and industrial nature of the work. In contrast, more intimate or secretive spaces, like Boo's bedroom door station, are bathed in warmer, localized pools of light, shifting the atmosphere to one of mystery and emotional connection. For instance, architectural details reflecting the industrial nature of factories are redesigned to complement the film's humorous and imaginative narrative (Bendazzi, 2016). This demonstrates how architectural elements can serve as both aesthetic and narrative tools through stylization. In contrast to real-world architecture, which is typically constrained by structural and functional limitations, Monsters Inc. transcends these boundaries through 3D animation. The construction systems are reimagined primarily as aesthetic devices rather than purely functional ones (Wells, 2002). Through stylization, architectural forms are dramatically reshaped, drawing viewers into the narrative more effectively and elevating architecture beyond a mere visual element. For example, expansive openings and towering columns create an iconic aesthetic (Furniss, 2008) that represents the dynamic world inhabited by the characters (Figure 7).

Figure 7. Stylized use of architectural components in Monsters Inc.

Spider-Man: Into the Spider-Verse (Persichettti et al., 2018) brings together Spider-Man characters from different universes, each with its own distinct stylized architecture under one narrative framework. The film reimagines New York City's towering buildings and neon lights to reflect the unique visual style of each universe. The architecture is shaped with sharp lines and vivid colors, reflecting the comic book aesthetic (Robertson, 2018). The lighting is equally stylized, employing dramatic contrasts and vibrant, often unnatural color glows that emulate the dynamic ink and color palette of printed comics, further breaking from cinematic realism. Cityscapes inspired by comic book panels are frequently employed to enhance the dramatic impact of scenes (Bramesco, 2019). The scale and proportions of the city are manipulated to serve the narrative; buildings often stretch into impossibly tall, elongated silhouettes to emphasize the superheroic scale of the action and the vertiginous experience of swinging through the city, while compressed perspectives in alleyways create a sense of intimate tension. The stylized buildings not only support the characters' actions but also immerse the viewer more effectively into the comic book world (Doğru, 2020). This stylization creates a visually striking yet unreal world that deeply engages the audience in the narrative flow (Figure 8).

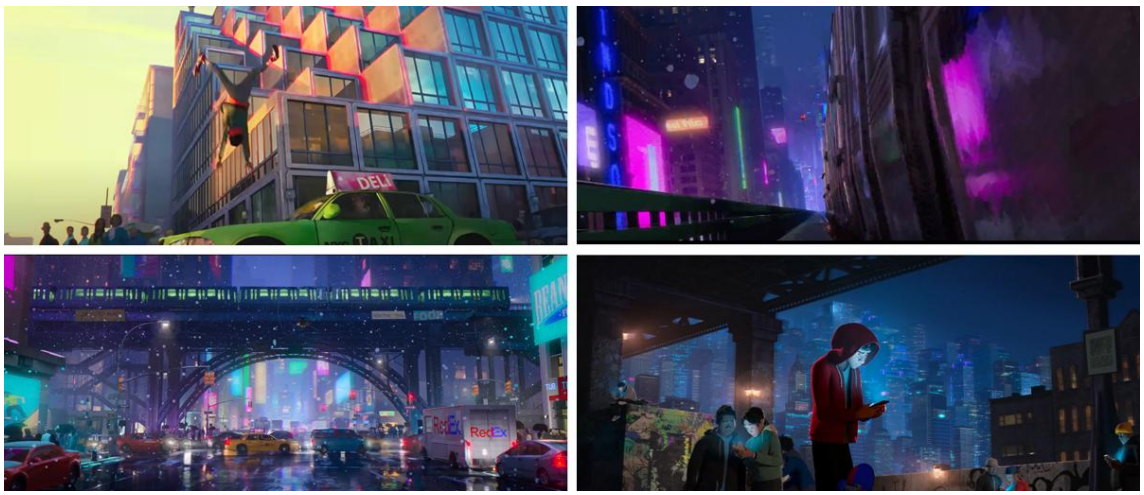

Figure 8. Visuals from Spider-Man: Into the Spider-Verse

The film Soul (Docter & Powers, 2020) visually supports its narrative by presenting two contrasting worlds through architectural stylization. The film highlights two primary aesthetic approaches: the real world and the spiritual world. A detailed, layered, and textured recreation of New York City characterizes the real world. Director Pete Docter and co-director Kemp Powers describe New York as "the heart of jazz," adding spatial dynamism to the story. This realistic depiction reflects the city's complex and vibrant structure, forming a strong connection with Joe Gardner's passion for jazz. In contrast, the spiritual world is defined by minimal, abstract, and fluid forms that create a metaphysical atmosphere. Spaces such as "The Hall of Everything," where new souls gain their personalities, symbolize this ethereal realm. These abstract environments are designed with flowing, soft lines, stripped of rigid geometric shapes. A key distinction lies in the scale and proportions of these worlds. The real world adheres to familiar, human-scale proportions, grounding Joe's story in a relatable reality. Conversely, the spiritual world employs vast, seemingly infinite scales and non-Euclidean geometries, with spaces that shift and expand beyond measurable proportions to evoke a sense of the sublime and the unknowable. Pixar's production designers aimed to visualize the purity and natural essence of souls by incorporating "glowing particles and organic forms" (Pixar Animation Studios, 2020). The aesthetic contrast between these two worlds enhances the film's thematic narrative. The rich textures of the real world align with Joe's tangible reality and passion for jazz, while the spiritual world's fluid design represents a metaphysical dimension that reflects the characters' inner journeys. This stylization enables the spatial representation of a spiritual transformation process, offering viewers both a visual and emotional experience (Arı & Bingöl Öz, 2023). Through this duality, Soul employs architectural elements as a dramatic storytelling tool, juxtaposing the detailed, concrete aesthetics of the real world with the minimal, abstract forms of the spiritual world. This contrast deepens the narrative's spatial layers, inviting the audience into both a tangible urban atmosphere and an abstract spiritual journey (Figure 9).

Figure 9. Visuals from Soul

The Mitchells vs. The Machines (Rianda, 2021) stands out with its absurd humor and strong visual stylization. While telling the story of a family's struggle against a robot uprising, the film creates striking aesthetic contrasts through spatial designs. By combining hand-drawn effects with digital 3D animation, it presents the family's spaces with a warm, chaotic aesthetic, whereas the robots' world is depicted as cold, sterile, and mechanical (Rianda, 2021; Animation Mentor, 2021). This contrast is further emphasized through the manipulation of scale and proportions. The Mitchell family's environments often feel slightly distorted and off-kilter, with exaggerated domestic scales that reflect their chaotic and emotionally vibrant life. In stark contrast, the robot spaces are characterized by vast, impersonal, and repetitively modular scales, designed to dwarf human presence and convey the cold efficiency of a technological takeover. The design of the robots incorporates fragmentation effects inspired by the T-1000 character's transformation sequences from Terminator 2: Judgment Day (The Mitchells vs. the Machines, 2021). This visual contrast enhances the film's comedic and dramatic structure, demonstrating how architectural elements function as aesthetic and narrative tools (De Wit, 2021) (Figure 10).

Figure 10. Visuals from The Mitchells vs. The Machines

Encanto (Howard & Bush, 2021) offers a visually rich narrative that combines magical realism with architectural stylization, drawing inspiration from Colombian culture. The Casa Madrigal functions not just as a structure but as a living entity that actively participates in the story. Architectural elements are enriched with magical rooms that reflect the identities of family members, such as Isabela's nature-filled space and Luisa's stone-themed, robust room, visually emphasizing their personalities and adding depth to the narrative (Grønn & Svenhard, 2023; Alvarado et al., 2024). The lighting and color palette are instrumental in establishing the film's emotional tone. The Casita is typically bathed in warm, golden sunlight and vibrant, saturated colors that enhance its welcoming and magical atmosphere. This warm illumination contrasts with the cooler, flatter lighting and muted color scheme used during the house's weakening and eventual collapse, visually mirroring the family's emotional turmoil and the loss of their magic. Inspired by Colombia's Neogranadian colonial architecture, the film employs vibrant colors and intricate details while carefully crafting contrasts between spaces. The lively and dynamic atmosphere of the Casita contrasts with the natural and static external environment. Furthermore, the disintegration and reconstruction of the house visually symbolize the Madrigal family's unity and conflicts, serving as a metaphor for their emotional journey (Zornosa, 2022). Ultimately, Encanto merges architectural stylization with magical realism, transforming space into a narrative device that invites viewers on both an aesthetic and culturally emotional journey (Figure 11).

Figure 11. Visuals from Encanto

Puss in Boots: The Last Wish (Crawford, 2022) combines classic fairy tale aesthetics with modern animation techniques, offering a visually captivating experience. Inspired by Sony Pictures Animation's Spider-Man: Into the Spider-Verse (Persichetti et al., 2018), the film adopts a storybook illustration style that enhances its magical atmosphere and immerses viewers in an enchanting world (Croll, 2022; Spry, 2022). The film's lighting and color palette are key to its storybook aesthetic. It utilizes a painterly approach to light and shadow, with bold, expressive color zones often taking precedence over realistic rendering. The color saturation shifts dynamically to reflect the narrative's emotional tone, becoming more vibrant and hopeful in uplifting moments and desaturated in moments of danger or despair. Utilizing new technologies, the production team achieved a painterly visual style that sets the film apart from previous Shrek installments, presenting a unique fairy tale world where characters and environments appear more vivid and dynamic (Croll, 2022). The architectural designs reflect traditional elements of European fairy tales, enriched by a distinct color palette and intricate details that give each setting its own unique identity. The scale and proportions of the architectural elements are often exaggerated to evoke a sense of fairy-tale wonder and peril. Structures like the giant's castle employ immense, oversized scales to emphasize the protagonist's vulnerability, while more intimate spaces, such as the home of the Mama Bear family, use distorted, almost caricatured proportions to enhance their thematic resonance and visual distinctiveness within the stylized world. Notably, the diverse realms and structures encountered during Puss in Boots' adventures provide a rich and varied visual journey for the audience (Fleming, 2022). In conclusion, the film effectively blends architectural stylization with innovative animation techniques, successfully capturing the essence of fairy tale aesthetics while delivering both a nostalgic and contemporary experience for viewers (Figure 12).

Figure 12. Visuals from Puss in Boots: The Last Wish

Comparative Analysis of Stylized Architecture in 3D Animated Films

To systematically synthesize the findings across all ten films, Table 1 provides a comparative overview of how the four key parameters of architectural stylization -Form & Structure, Texture & Materiality, Lighting & Color Palette, and Scale & Proportions- function narratively in each film. This matrix not only highlights the diverse applications of stylization but also reveals recurring patterns where similar techniques are employed to achieve distinct narrative goals.

Table 1. Comparative Analysis of Architectural Stylization in 3D Animated Films

Film	Form & Structure	Texture & Materiality	Lighting & Color Palette	Scale & Proportions
Chicken Little	Exaggerated and simplified forms; avoidance of parallel lines; simplification or exaggeration of structural systems.	Smooth, cartoonish, plastic-like surfaces; lack of complex textures.	Bright, high-key illumination; vibrant and energetic color tones.	Oversized façade elements; distorted proportions for comic absurdity.
Monster House	Personified, living structure; abstract and menacing forms.	Weathered wood, peeling paint; decaying, coarse textures.	Harsh shadows, abrupt lighting shifts; suspenseful and ominous atmosphere.	Overly large and dominant silhouette; windows and entrance distorted to resemble facial features.
Open Season	Simplified geometric aesthetic; forms closely resembling realistic references.	Simplified interpretation of natural materials like wood and brick; lack of intricate details.	Natural and soft lighting; earthy, natural color palette dominated by forest tones.	Relatable, human-scale proportions; grounded and familiar.

Cars	Real-world structures reinterpreted through automotive anatomy and perspective.	Metallic, rubber-like, and asphalt textures; surfaces integrated with vehicle identity.	Warm, nostalgic neon lighting (Radiator Springs); cold, blue-tinged sterile lighting (modern highway).	Fully divorced from human scale; shaped to the size and movement of vehicles.
Monsters, Inc.	Exaggerated and dynamic stylization of industrial elements (columns, beams).	Industrial metallic surfaces combined with fantastical details like plastic and rubber.	Cold, functional overhead lighting (factory); warm, localized lighting (private spaces).	Massive, imposing factory interiors; wide openings emphasizing character scale.
Spider-Man: Into the Spider-Verse	Sharp lines, comic-book aesthetic; universe-specific forms.	Graphic textures: halftone dots, bold outlines mimicking printed comics.	Dramatic contrasts, vibrant non-diegetic color glows; dynamic comic-book effect.	Elongated, exaggerated building silhouettes to emphasize heroism and vertigo.
Soul	Real World: Complex, layered. Spiritual World: Minimal, abstract, fluid.	Real World: Rich, detailed textures. Spiritual World: Soft, glowing, non-tactile surfaces.	Real World: Warm, complex, jazz-toned. Spiritual World: Gentle, glowing, serene illumination.	Real World: Human, familiar scale. Spiritual World: Immeasurable, vast, sublime scale.
The Mitchells vs. The Machines	Family: Chaotic, organic. Robots: Cold, geometric, sterile.	Family: Hand-drawn, warm textures. Robots: Smooth, metallic, cold surfaces.	Family: Lively, warm, exaggerated colors. Robots: Cold, blue-toned, uniform lighting.	Family: Distorted, childish, personal scale. Robots: Overwhelming, massive, anonymous scale.
Encanto	"Living", responsive structure; magical rooms reflecting family members' identities.	Vibrant colors; intricate details and textures inspired by Colombian architecture.	Warm, golden sunlight and vibrant colors (magical); pale, cool colors (magic fading).	Inviting scale reflecting family warmth; variable internal scales in magical rooms.
Puss in Boots: The Last Wish	Painterly forms inspired by European fairy tale architecture.	Rich color palette; complex, location-specific detailing.	Painterly, expressive light and shadow; color saturation tied to emotional narrative rhythm.	Exaggerated scales for fairy-tale grandeur and peril; distorted proportions for thematic emphasis.

The following detailed discussion, structured by the four core parameters, elucidates the specific narrative mechanisms behind these stylistic choices as summarized in Table 1.

The narrative function of form and structure: Stylization of form is the most prominent tool for placing architecture at the center of the narrative. The examined films reveal how form can be transformed to serve distinct narrative purposes. Films like Chicken Little and The Mitchells vs. The Machines employ exaggerated and simplified forms to reinforce a comedic and chaotic tone. In contrast, in Monster House, form is distorted to transform a house from a physical structure into a living antagonist, embodying fear and childhood trauma. In Cars, form is adapted to the anthropomorphized world of vehicles; gas stations and motels are reimagined with shapes derived from automotive anatomy, achieving a humorous and thematic coherence. Soul and Encanto, meanwhile, use form as a metaphorical tool. In Soul, the contrast between the complex forms of the real world and the minimal, fluid forms of the spiritual realm visualize existential themes. In Encanto, the "living" and responsive form of Casa Madrigal, which physically reacts to the family's emotional states, turns architecture into a concrete metaphor for family dynamics.

The role of texture and materiality in spatial storytelling: The stylization of surfaces and materials defines the tactile quality of a space, guiding the audience's emotional positioning. Films such as Chicken Little and Open Season use smooth, toy-like, or simplified textures to construct an inviting and comfortable atmosphere distanced from realism. Conversely, the weathered, decaying textures of Monster House evoke a threatening and unsettling feeling. Spider-Man: Into the Spider-Verse utilizes graphic textures like halftone dots and bold outlines that mimic comic book aesthetics, pulling the viewer away from traditional cinematic realism into a graphic universe. Films like Cars and Monsters, Inc. use texture and materiality to ensure the thematic consistency of their worlds. In Cars, metallic, rubber-like, and asphalt textures fuse the architecture with the characters' identities. In Monsters, Inc., industrial metallic textures emphasize the functionality of the factory setting while, combined with fantastical elements, create a unique universe.

The emotional and thematic contribution of lighting and color: Lighting and color are among the most powerful tools for carrying the emotional weight and thematic contrasts of a narrative. The bright, high-key lighting and vibrant colors in Chicken Little perpetually maintain its comedic and energetic tone. Soul exhibits the most pronounced contrast in this parameter: the warm, complex lighting and jazz-infused tones of the real world represent the vibrancy of life, while the soft, glowing, and serene illumination of the "Great Beyond" creates a metaphysical sense of tranquility. A similar contrast is established in The Mitchells vs. The Machines

between the warm, chaotic colors of the family and the cold, sterile, blue-toned lighting of the robots, visualizing the conflict between humanity and technology. Encanto and Puss in Boots: The Last Wish use light and color on a more symbolic and emotional level. In Encanto, the golden light and warm colors of the Casita represent magic and family warmth; as the magic fades, the colors desaturate and cool. In Puss in Boots, a painterly, expressive use of light and shadow is directly tied to the emotional rhythm of the narrative.

The narrative effects of scale and proportion manipulation: Consciously deviating from architectural scale and proportions is a powerful way to emphasize characters' internal states and their position within the story. Films like Chicken Little distort proportions to create a sense of comic absurdity. Spider-Man: Into the Spider-Verse and Puss in Boots: The Last Wish use elongated building silhouettes and colossal structures to convey heroic grandeur and the scale of fairy-tale peril, respectively. The Mitchells vs. The Machines creates a thematic conflict by contrasting the distorted, personal scale reflecting the family's chaotic life with the anonymous, massive scale of the robots that overwhelms humanity. Soul uses scale to differentiate between the physical and metaphysical realms. The real New York City is depicted in a familiar, human scale, while the abstract landscapes of the "Great Beyond" are designed on an immeasurable, vast, and superhuman scale. This prepares the viewer for the magnitude of the character's metaphysical journey.

DISCUSSION AND CONCLUSION

This study has demonstrated through a systematic analysis of ten 3D animated films that architectural stylization is a primary vehicle for narrative construction, emotional engagement, and thematic expression. The detailed examination of key scenes and sequences, guided by the parameters of form, texture, lighting, and scale, confirms that architecture in animation consistently transcends the role of a passive backdrop to become an active narrative agent. The findings align with the concept of hyperreality (Bridges & Charitos, 1997; Kürşad, 2020), where stylized environments are understood not as less real than physical reality, but as perceptually and emotionally intensified spaces that transcend conventional realism. The personified house in Monster House, the automotive-scale world of Cars, and the metaphysical realms of Soul all exemplify how stylization creates spaces that are conceptually coherent and narratively potent, freed from the constraints of physical realism. This creative liberation allows architectural elements to directly mirror character psychology, embody central conflicts, and guide the audience's emotional journey.

The narrative potency of animated architecture revealed in this analysis suggests a move beyond traditional functionalism in spatial design. This approach aligns with the broader recognition of narrative's role in shaping human experience, as seen in other design disciplines where 'narrative-driven approaches' (Lum, 2019) are being integrated to create more coherent and meaningful user journeys. While such approaches have been explored in fields like service design, this study demonstrates how their principles are masterfully employed in animation and can be translated into a tangible framework for architectural practice. The techniques identified—such as symbolic exaggeration, thematic materiality, and expressive scale manipulation—provide a concrete toolkit for architects to operationalize this narrative potential, thereby infusing greater emotional depth and storytelling into real-world projects.

Implications for Architectural Practice and Education

The stylization techniques identified -such as symbolic exaggeration, thematic materiality, and expressive scale manipulation- offer a toolkit for architects and designers to infuse narrative and emotional depth into real-world projects. This suggests a move beyond traditional functionalism towards what can be termed "narrative-driven design," where spaces are conceived to tell stories and evoke specific psychological responses.

In architectural education, these findings advocate for a stronger interdisciplinary curriculum that incorporates principles from animation and cinematic storytelling. Analyzing films like Encanto or Spider-Man: Into the Spider-Verse can teach students how to communicate cultural identity, social dynamics, and abstract concepts through spatial design. This approach equips future architects with the skills to create more experiential and emotionally resonant environments, particularly in the burgeoning fields of digital and virtual design.

Projections: Stylization in the Digital Future

The rapid development of immersive technologies like Virtual and Augmented Reality (VR/AR) presents a direct pathway for applying these animation-derived techniques. The stylization methods explored in this study are not merely illustrative; they are foundational to designing compelling virtual environments. In VR/AR, where user experience is paramount, the ability to use stylized form, light, and scale to orchestrate emotion and narrative will be crucial. The findings of this study provide a theoretical and practical framework for leveraging architectural stylization as a user-experience strategy in these digital realms.

Furthermore, from an art historical perspective, the analysis shows a clear lineage. The stylized, flowing lines of Encanto echo Art Nouveau (Baytar, 2019), while the fractured geometries of Spider-Verse reflect Cubist and contemporary graphic novel sensibilities. This demonstrates that 3D animated films are not creating a new language from scratch but are digitally revitalizing a rich history of stylistic expression within architecture and art.

Concluding Remarks

In conclusion, this research establishes architectural stylization in 3D animation as a sophisticated and intentional narrative device. Through systematic examination of its core components, a framework has been developed for understanding and utilizing stylization beyond entertainment contexts. The potential of these techniques to generate more meaningful, narrative-rich, and human-centric spaces -whether physical or digital- appears considerable. As boundaries between physical and virtual environments continue to blur, the principles of architectural stylization, as refined in animated films, are positioned to play a significant role in shaping the future of spatial design, potentially fostering more expressive dialogues between people and their inhabited spaces.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work, the authors used OpenAI's ChatGPT-4 to review the text, conduct literature searches, and make structural improvements. The content was subsequently reviewed and edited by the authors, who take full responsibility for the final version of the publication.

Author's Contributions

The article is single-authored. All research was done by the corresponding author.

Competing Interests

There is no potential conflict of interest.

Ethics Committee Declaration

The research does not have a research methodology that would require ethical approval.

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Author's Biography

Erdem Köymen graduated from Trakya University's Department of Architecture in 2005 and completed his Master's degree in 2008, focusing on "Architecture in 3D Animated Films." He earned his Ph.D. from Yıldız Technical University in 2014 with a dissertation on augmented reality-assisted real-time 3D sketch modeling. Throughout his career, he has contributed to architectural design, 3D animation, game development, and music composition. He has also worked as a graphic designer, art director, and scene designer. Currently, he teaches at Istanbul Zaim University's Architecture and Interior Architecture Departments and continues research in architectural design, modeling, animation, and digital arts.

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Research Article

An investigation of the local industrial design industry in China: A micro view

Dr. Zhiyong Wang[1*]

[1]Chongqing Technology and Business University, Modern International Art & Design Academy, Chongqing, China.
wangzhiyong@ctbu.edu.cn

*Corresponding Author

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Abstract
The research on the development of the industrial design industry is of great academic value and historical significance in design studies. Based on the criticism of the heroic approach, this study investigates the local industrial design industry in Sichuan Province, China, from the perspective of anonymous history. It aims to understand better the details of the development of the industrial design industry in Sichuan and encourage further research on the local industrial design industry in China from a micro view. The study explores the grassroots activities of the industrial design industry in Sichuan through qualitative research methods such as field research, interviews, and questionnaires and examines the selected research objects by means of phenomenological depiction and analysis. This approach reveals some meaningful characteristics of the design and consumption ends of the local industrial design industry at the micro level. It concludes that many aspects of the anonymous part of the local industrial design industry remain untouched, and further investigation is needed to shed light on them.

Keywords: Anonymous history, Local industrial design industry, Small and micro enterprises, Consumers, Users

Extended Abstract

Introduction: Since the rise of the industrial design industry in Sichuan in recent years, an in-depth investigation into it (as one of the studies of the development of the local industrial design industry) has become increasingly important in terms of both academic value and historical significance. Thanks to the contributions of many researchers, the theory of anonymous history has developed considerably in design studies. It provides a new perspective to explain the historical process of modern design and has begun to attract the attention of researchers in China, inspiring methodological innovation in this field. At the same time, the traditional heroic approach has limitations in summarizing the historical process of Chinese modern design, especially in revealing local developments. The industrial design industry in Sichuan, as a local activity, is often ignored in traditional narratives. Therefore, based on the theory of anonymous history, research on the development of the industrial design industry in Sichuan can re-examine the research object by shifting the focus from the master narrative to a microscopic investigation. This approach reveals the historical characteristics of grassroots activities in the industrial design industry in their anonymous state.

Purpose and scope: From the perspective of anonymous history, this study reveals the grassroots activities of the industrial design industry in its unknown state in Sichuan. The findings will help better understand the details of the development of the industrial design industry in Sichuan and encourage further research on the local industrial design industry in China from a micro perspective.

Method: Against the theoretical background of anonymous history, this study targets the local activities of the design and consumption ends (namely, design agencies and consumers or users) of the industrial design industry in Sichuan at the micro level. In terms of methodology, the study primarily relies on qualitative research methods. Specifically, it involves phenomenologically depicting and analyzing the selected research objects and the collected information. The specific methods used in this study include document analysis, case study, and comparative analysis. Data collection is conducted through field research, interviews, and questionnaires. Among these methods, field research and interviews are mainly used to collect basic information about industrial design agencies. Questionnaires and interviews are used to gather basic information about consumers or users of daily necessities living in Sichuan and to understand their attitudes and opinions.

Findings and conclusion: First, based on the theory of anonymous history, the grassroots activities of the industrial design industry in China would come to the fore. The details of the development of the local industrial design industry are difficult to disclose against the backdrop of the master narrative and heroic approach. Second, from the perspective of anonymous history, this study explores the design and consumption ends of the local industrial design industry in Sichuan at the micro level, and examines the selected research objects by means of phenomenological depiction and analysis. In the process, some remarkable results emerged. Although different from the star design agencies often mentioned in the master narrative, unknown industrial design agencies, as small and micro enterprises, are also an integral part of the industrial design industry. The evolution and growth of these companies or enterprises contribute to the progress of the local industrial design industry as well. Therefore, their present state, achievements, and the problems or challenges they face deserve attention. In addition, anonymous consumer and user research is of vital importance. Their consumption and usage patterns, preferences, and attitudes are closely related to the marketing, innovation, and brand strategy of the local industrial design industry. Future studies could explore the relationship between consumer behavior and local identity in greater depth, examining variables such as age, cultural affiliation, and digital market dynamics. Third, although the findings are limited in this study, the introduction of mixed methods combining qualitative and quantitative means will provide a considerable outlook for further research on the development of the local industrial design industry in China. Future studies that integrate quantitative methods will support the qualitative findings, thereby constructing a more comprehensive understanding of the evolution of local design industries. Finally, many aspects of the anonymous part of the local industrial design industry still remain untouched, and more investigations need to be made to shed light on them. Through the above-mentioned methods, the concept of anonymous history could be further applied to other regions of China, to different scales of industrial design enterprises, and to varied consumer contexts.

Keywords: Anonymous history, Local industrial design industry, Small and micro enterprises, Consumers, Users

INTRODUCTION

Along with the rapid development of science and technology, industrial design, as the starting point of the innovation chain and the source of the value chain, has become a key to promoting the high-quality development of the manufacturing industry. The development of the industrial design industry in Sichuan, an important economic center in western China, is not only connected to the transformation and upgrading of the regional economy but also an important support for the realization of a sustainable development strategy. Since the rise of the industrial design industry in Sichuan in recent years, in-depth investigation into it (as one of the studies of the development of the local industrial design industry) has become increasingly important in terms of both academic value and historical significance. From the perspective of anonymous history, this study will reveal the grassroots activities of the industrial design industry in Sichuan under an unknown state. The findings will help to understand better the details of the development of the industrial design industry in Sichuan and encourage further research on the local industrial design industry in China from a micro view.

Theoretical Background

In 1936, the publication of *Pioneers of the Modern Movement* (the revised edition entitled *Pioneers of modern design: From William Morris to Walter Gropius*) by Nikolaus Pevsner marked the beginning of the study of modern design history. After the 1940s, Reyner Banham (1960) and Siegfried Gideon (1948) made new contributions to this field, reflected in the works *Theory and design in the first machine age* and *Mechanization takes command: A contribution to anonymous history*. The former expanded the scope of modern design history, while the latter first proposed the theory of anonymous history as a critique of Pevsner's heroic approach. From the 1970s to the 1990s, researchers such as Penny Sparke (1986), Adrian Forty (1992), Jonathan Woodham (1997), and John Heskett (1985) maintained their focus on modern design history. These researchers had a broader theoretical view and examined modern design history through different methods. This represented a shift from historical narrative to analysis and interpretation of modern design history from a sociological or cultural perspective. Among them, Forty criticized the heroic approach and emphasized the social nature of design activities. Meanwhile, some researchers began to reflect on the methodology of modern design history. Representative contributions include Clive Dilnot's (1984a, b) papers *The state of design history, Part I: Mapping the field* and *The state of design history, Part II: Problems and possibilities*, Victor Margolin's (1995) paper *Design history or design studies: Subject matter and methods*, as well as Forty's (1995) paper *Debate: A reply to Victor Margolin* and Woodham's (1995) paper *Resisting colonization: Design history has its own identity.* They all explored the idea of anonymous history from different perspectives. Later,

Kjetil Fallan (2010) summarized the methodological issues of the heroic approach and anonymous history in his book *Design history: Understanding theory and method*. Finally, the study of modern design history underwent a theoretical turn toward the perspective of anonymous history.

Chinese researchers have conducted much research since the emergence of modern design in China during the 1980s. A pioneering work is the paper *Chinese modern design: A retrospective* by Wang Shouzhi (1989). After entering the twenty-first century, methodological discussions gradually appeared in this field (Yuan & Wu, 2007; Li, 2008; Xu, 2008; Yi, 2017; Yuan, 2017; Zhou, 2020; He & Ogata, 2021). The researchers also examined the methodology of modern design history from different angles, such as writing style, approach, typology, cultural studies, and comparative analysis. Among them, Shouyun Yuan (2017) explicitly discussed the topic of the heroic approach in the study of modern design history. Regarding research on the design industry, some researchers began to realize its importance as well. Shuai Zhu (2013) emphasized that researchers should pay more attention to the development of the design industry. Later, Shuo Li (2016) conducted a comparative analysis of the development of industrial design in Britain and China from a macro view.

Because of the contributions of many researchers, the theory of anonymous history has developed considerably in design studies. It provides a new perspective for explaining the historical process of modern design and is beginning to attract the attention of researchers in China, inspiring methodological innovation in this field. Meanwhile, the traditional narrative of design history, represented by the heroic approach, has been unable to summarize the historical process of Chinese modern design fully, and it is even more difficult to reveal the local development of modern design activities. The industrial design industry of Sichuan, which is closely connected to everyday life, represents local activities of modern design. Due to the lack of direct connection with the heroic approach to Chinese modern design history, the industrial design industry of Sichuan is usually ignored or overshadowed by the traditional narrative. As one of the sources of China's industrialization and modernization, the development of modern design in Sichuan is an integral part of Chinese modern design history. However, according to search results from China National Knowledge Infrastructure (CNKI), no article on the industrial design industry of Sichuan from the perspective of local history has been published so far. Therefore, based on the theory of anonymous history, research on the development of the industrial design industry in Sichuan can re-examine this subject by shifting the angle from a master narrative to a microscopic investigation and showing the historical characteristics of the grassroots activities of the industrial design industry that remain unknown. The link between anonymous history and the local design industry lies in how local design activities, which are still undocumented and receive little attention, are revealed during the design and consumption stages and how their significance is ascribed. This perspective provides a rich, vernacular archive of place-specific solutions, material wisdom, and aesthetic tendencies forged by everyday practice rather than master narratives. It also cultivates a deeper, more personal connection to the region, in which consumers recognize their own lived experiences and familial traditions reflected in these artifacts, transforming passive consumption into active participation in regional identity formation.

METHODOLOGY

Against the theoretical background of anonymous history, this study targets the local activities of the design and consumption ends (namely, design agencies and consumers or users) of the industrial design industry in Sichuan at the micro level. In terms of methodology, the study mainly relies on qualitative research methods, which involve phenomenologically depicting and analyzing the selected research objects and the collected information. This approach, which originated from the theory of Edmund Husserl, focuses on understanding and describing the essence of the research objects. It involves key aspects such as direct observation, rich description, thematic analysis, and validation.

Participants in the research include three owners who are running a local industrial design agency and 24 consumers living in cities in Sichuan, such as Chengdu, Yibin, and Zigong. Their ages range from 15 to 75, and their occupations include factory worker, company employee, teacher, civil servant, and college student. The specific methods used in this study include document analysis, case study, and comparative analysis. Data collection is conducted through field research, interviews, and questionnaires. Field research and interviews

are primarily used to collect basic information about industrial design agencies. The interviews focus on three aspects: business conditions, representative achievements, and problems or challenges faced. Questionnaires and interviews are used to collect basic information about consumers or users of daily necessities living in Sichuan and to understand their attitudes and opinions. The questionnaire includes the following questions: (1) Which channel(s) do you choose to buy daily necessities? (2) What do you think is the most important factor in purchasing daily necessities? (3) Do you think industrial design is important for daily necessities? (4) Are you concerned with the place of production of daily necessities? (5) Do you tend to buy daily necessities made in Sichuan? (6) What is your attitude toward daily necessities made in Sichuan and the quality of their industrial design? The interviews then focus on explaining the reasons for the answers.

The research procedure is as follows: First, the present state of the development of the industrial design industry in Sichuan is introduced through document analysis. Second, the grassroots activities of the industrial design industry in Sichuan and its organic relationship with daily life are investigated through a case study and comparative analysis. Third, the main characteristics of the research on the local development of the industrial design industry are summarized in the conclusion (Figure 1). As the flow chart shows, once the target was set, a literature review and information disclosure application were first made to conduct document analysis. Then, research objects were selected based on document analysis, followed by field research and interviews with the selected local design agencies, as well as questionnaires and interviews with the selected local residents. An analysis was then conducted to present the results based on the collected data, which included the basic information from field research and questionnaires, and the attitudes or opinions collected from interviews, and a conclusion was finally drawn.

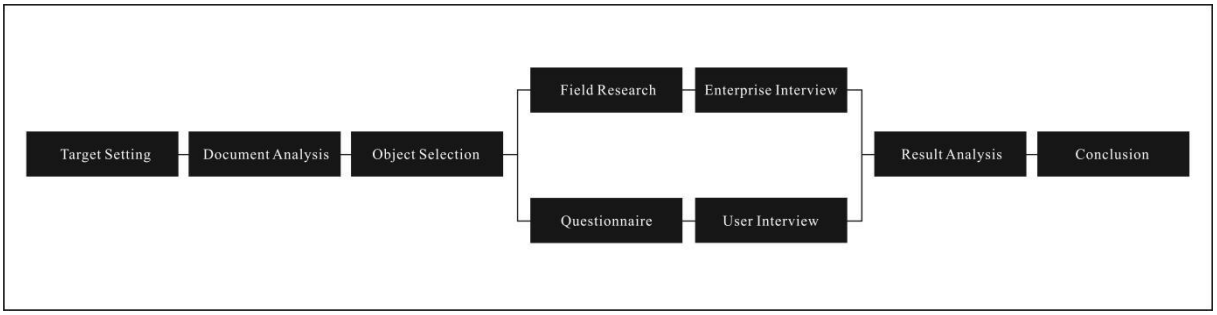

Figure 1. The flow chart of the study

FINDINGS

The State of Development and Studies of the Industrial Design Industry in Sichuan

Since the reform and opening up in the 1980s, Chinese government has valued the development of the industrial design industry. The Eleventh Five-Year Plan proposed “to develop professional industrial design”. The Twelfth Five-Year Plan proposed “to promote the transformation of industrial design from appearance design to up-market comprehensive design services”. The Thirteenth Five-Year Plan proposed “to support the construction of industrial design centers”. In addition, industrial design also shoulders the responsibility of achieving the national strategic goal of Made in China 2025” (Liu, 2019). The series of policy guidance, as well as the establishment of the market economic system and the wave of industrialization, together set the historical background of the rise and development of the industrial design industry in Sichuan. In this context, the industrial design industry has also made remarkable achievements in Sichuan in recent years. For instance, activities such as the Sichuan-Taiwan Industrial Design Awards have stimulated design innovation, promoted design incubation, and provided strong support for the high-quality development of the manufacturing industry. Meanwhile, the local government has also introduced a series of policy measures, such as the Guidance for the Creation of the Sichuan Provincial Industrial Design Research Institute *(Sichuan Shengji Gongye Sheji Yanjiuyuan Chuangjian Zhinan),* to speed up the establishment of an industrial design innovation system and promote the development of high-end, intelligent, and green manufacturing.

In respect to research and statistics, in the first chapter of the book *Zhongguo Gongye Sheji Nianjian 2006-2013* (China Industrial Design Association, 2014), the state of industrial design education, design institutions, and industry organizations in Sichuan is summarized in a highly general way. This study mentions explicitly that industrial design agencies in Sichuan are primarily concentrated in Chengdu. By the time the book was completed, there were nearly 20 companies engaged in industrial design, and the companies listed are mainly a few-star design agencies, such as Luokeke Design Co., Ltd., Jialantu Design Co., Ltd., and Langjian Design Co., Ltd. Nevertheless, for the development of the industrial design industry in western China, including Sichuan, current studies still compare it with the more developed coastal areas and summarize its situation, in a stereotypical manner, as being in a backward and marginalized state (Ren & Sun, 2023; Sun et al., 2019; Wang, 2023). But relative backwardness does not mean stagnation, nor does it mean that its development lacks historical significance in the context of Chinese modern design history. In addition, in December 2023, an information request was made to the Sichuan Provincial Department of Economy and Information for "the annual number and revenue of all industrial design agencies in Sichuan Province in the past 10 years (from 2013 to 2022)", and a formal reply was received in January 2024, which stated that there are no statistics so far.

According to the above statement, the following facts can be confirmed about the research on the industrial design industry in Sichuan: (1) At present, researchers mainly focus on the development of the industrial design industry in Sichuan from a top-down perspective and incorporate it into the structure of the master narrative; (2) From an overview, the development of the industrial design industry in Sichuan is usually summarized in a general and brief way, lacking the support of empirical details; (3) In terms of comparative analysis, the development of the industrial design industry in Sichuan is often given a relatively backward stereotype; (4) In terms of quantitative analysis, the development of the industrial design industry in Sichuan lacks diachronic and dynamic long-term statistics. In other words, the specific activities of the industrial design industry in Sichuan still need further research to be revealed. Based on the theory of anonymous history and shifted from an overview perspective to a microscopic perspective, the following investigation analyzes selected companies (the design end) and individuals (the consumption end) and shows the details of activities in the industry. As research objects, these enterprises and individuals have an organic connection with the development of the industrial design industry in Sichuan and can be regarded as the cells of the grassroots activities of the industry at the micro level.

An Analysis of Anonymous Activities of Industrial Design Industry in Sichuan

Different from the previous studies, which mainly contained macroscopic narratives or focused on the star design agencies in the region, this study conducted interviews with three industrial design agencies that belong to the type of small and micro enterprises and are relatively unknown, and made a brief comparison (Table 1).

Table 1. A comparison of three industrial design agencies in Sichuan

Name	Characteristics	Strategies	Challenges
Yiting	Broadest scope, offering industrial design and production, modeling, packaging, and exhibition services.	Expansion and upgrading through commercial design, school-enterprise cooperation, and international competitions.	Domestic and international environment, local industry chain, suppliers, manufacturing, and potential stagnation.
Yingxiangli	Specialized in wine showcase market, targeting major cities.	Focus on professional design services, relying on personal relationships to open market space.	Capital chain issues, difficulty in receiving payments.
Wanmeng Muzuo	Specialized in children's furniture market, selling products online.	Focus on product sales performance, relying on social media platforms for market testing.	Continuous supply of successful products, quality and cost control, and market promotion on new media platforms.

These agencies are Chengdu Yiting Industrial Product Design Co., Ltd., founded in 2007 (hereinafter referred to as Yiting); Sichuan Yingxiangli Wine Cellar Engineering Co., Ltd., founded in 2014 (hereinafter referred to as Yingxiangli); and Chengdu Wanmeng Muzuo Children's Furniture Shop, founded in 2022 (hereinafter referred to as Wanmeng Muzuo). In addition to being small and micro enterprises, these three companies have

one thing in common: their founders all majored in industrial design at universities in Sichuan. This commonality indicates the entrepreneurial efforts of local design professionals. All three companies are located in Chengdu, which reflects that, as mentioned in the previous section, Chengdu has indeed developed into the center of industrial design activities in Sichuan and offers considerable market opportunities to industrial design firms, including small and micro enterprises. In terms of business scope, Yiting provides the design and production of industrial products (Figure 2) and also offers design services such as modeling, packaging, and exhibition, which could prove to be the broadest among the three samples. Yingxiangli and Wanmeng Muzuo are smaller in scale and more specialized in scope: the former mainly targets the wine showcase market (Figure 3). At the same time, the latter focuses on the children's furniture market (Figure 4).

Figure 2. Air purifier designed by Yiting

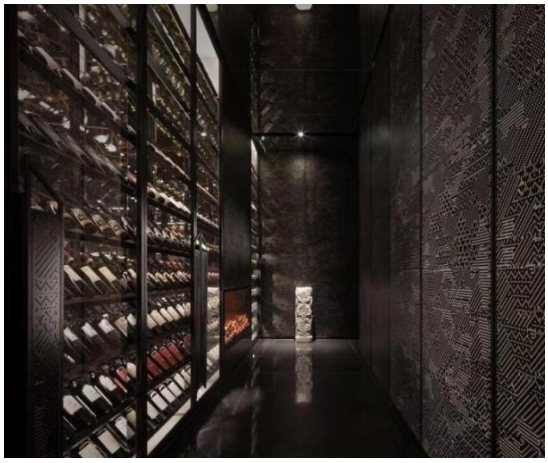

Figure 3. Wine showcase designed by Yingxiangli

Figure 4. Children's furniture designed by Wanmeng Muzuo

The differences among the three companies are further amplified when it comes to expressing their representative achievements. Yiting not only carries out commercial design activities but also actively participates in school-enterprise cooperation and international design competitions. It has been awarded various honorary titles by the local government, showing a strong trend of expansion and upgrading. Yingxiangli emphasizes, in its achievements statement, that the company provides professional design services for customers in major cities (e.g., Chengdu, Shanghai). As a design agency that mainly sells products online, Wanmeng Muzuo highlights its considerable sales performance on the internet. When asked about the problems or challenges encountered, Yiting gave the broadest answers, involving the impact of the macro environment at both the domestic and international levels, the timeliness of the local industry chain, suppliers, and manufacturing, and possible stagnation in its own development. For the same question, Yingxiangli's answer is very direct: the core issue is the capital chain problem, highlighted by the difficulty of receiving payments. Wanmeng Muzuo's answer is also relatively micro: it includes the continuous supply of successful

products, quality and cost control, and market promotion on new media platforms. From a comparative analysis viewpoint, although these three small and micro enterprises are founded by design professionals and are located in Chengdu, their development strategies, marketing means, and the problems or challenges they face are very different. Yiting provides a wide range of industrial design services and manages to show its comprehensive strength by creating a brand image. When facing problems or challenges, its way of thinking is more macro and systematic. Yingxiangli depends on the maintenance of personal relationships to open up market space when providing specialized design services, while Wanmeng Muzuo largely relies on social media platforms to test the market. When faced with problems or challenges, the focus of the latter two companies is different due to the diversity in their business operations, but both concentrate on how to deal with and solve the practical difficulties of the moment. This possibly suggests that they have not yet developed to the point where they need to consider a macro strategy.

During the interview process, the owner of Wanmeng Muzuo ranked the importance of decision-making factors that she learned from communication with customers of the e-commerce platforms. The ranking from high to low is as follows: (1) quality, (2) word-of-mouth evaluation, (3) function, (4) price, (5) brand image. According to questionnaires and personal interviews with 24 daily necessities consumers living in Sichuan through social media, this study obtained the statistical result of ranking the importance of the same decision-making factors: (1) quality, (2) word-of-mouth evaluation, (3) function and price (tied), (4) brand image. Among these respondents, 92% have had a whole experience of online shopping. This result indicates some features of internet marketing and the purchase of industrial products. The number of target group samples collected in this study is too small to have statistical value, but the analysis of some typical cases is still worth mentioning. The following are the results of the case study. First of all, although the vast majority of respondents buy daily necessities through the combination of e-commerce platforms and brick-and-mortar stores, two respondents (aged 31-40 and over 60, respectively) said that they are only willing to buy goods offline. The respondent in the 31-40 age group (male, bank clerk) rated word-of-mouth evaluation as the most important factor in decision-making and said that e-commerce platforms are extremely unreliable in this regard. The respondent in the over 60 age group (male, retired worker) believed that the price factor is the most important in decision-making. However, being older, he faced some technical barriers and resulting insecurity that prevented him from buying goods on e-commerce platforms. Otherwise, the advantage of the low price of online shopping should have been a positive factor to stimulate him to use online shopping methods. Second, consumers participating in the survey have similar opinions on the two questions concerning local brand image building: (1) Do you tend to buy daily necessities made in Sichuan? (2) What is your attitude toward daily necessities made in Sichuan and the quality of their industrial design? For the first question, 79% of the respondents answered “no”, while for the second question, 75% answered “indifference”. In other words, at least within the scope of this study, it does not show that Sichuan local brand image building is good enough to have consumers express a strong preference. Nonetheless, there are a few exceptions. A respondent aged over 60 (female, retired civil servant) answered “yes” and expressed a preference, citing nostalgia as the main reason, which is closely related to her age. Another respondent in the 15-20 age group (male, college student) gave the same answer, explaining that the reason was the identity associated with highly commercialized local cultural symbols. Therefore, due to the age difference, the roots of the positive attitude towards the Sichuan local brand image form a strong contrast in motivation. On the one hand, the design triggers nostalgia in the pre-modern context, while on the other hand, it fosters cultural identity in the post-modern context.

Limitations

In terms of research limitations, large-scale questionnaires cannot be carried out because of the limited research grant, and there is no basic statistical data on the industrial design industry in Sichuan so far. Although this study shows some meaningful details of the grassroots activities of the industrial design industry in Sichuan at the microscopic level through qualitative research methods such as phenomenological depiction and analysis, the findings are only one-dimensional and cannot be cross-checked by quantitative methods such as official statistics and large-scale questionnaires. Therefore, the research on this subject needs to be further developed. Quantitative and qualitative methods will be integrated to form a mixed-methods design, yielding more in-depth and detailed results.

CONCLUSION

The following conclusions could be drawn from the investigation described above. First, based on the theory of anonymous history, the grassroots activities of the industrial design industry in China would come to the fore. The details of the development of the local industrial design industry are difficult to disclose against the backdrop of the master narrative and heroic approach. Second, from the perspective of anonymous history, this study explores the design and consumption ends of the local industrial design industry in Sichuan at the micro level, and examines the selected research objects by means of phenomenological depiction and analysis. In the process, some remarkable results emerged. Although different from the star design agencies often mentioned in the master narrative, unknown industrial design agencies, as small and micro enterprises, are also an integral part of the industrial design industry. The evolution and growth of these companies or enterprises contribute to the progress of the local industrial design industry as well. Therefore, their present state, achievements, and the problems or challenges they face deserve attention. In addition, anonymous consumer and user research is of vital importance. Their consumption and usage patterns, preferences, and attitudes are closely related to the marketing, innovation, and brand strategy of the local industrial design industry. Future studies could explore the relationship between consumer behavior and local identity in greater depth, examining variables such as age, cultural affiliation, and digital market dynamics. Third, although the findings are limited in this study, the introduction of mixed-methods research combining qualitative and quantitative methods will provide a promising outlook for further research on the development of China's local industrial design industry. Future studies that integrate quantitative methods will support the qualitative findings, thereby constructing a more comprehensive understanding of the evolution of local design industries. Finally, many aspects of the anonymous part of the local industrial design industry remain untouched, and further investigation is needed to shed light on them. Through the above-mentioned methods, the concept of anonymous history could be further applied to other regions of China, to different scales of industrial design enterprises, and to varied consumer contexts.

Author's Contributions

This study was created by a single author.

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Competing Interests

There is no potential conflict of interest.

Ethics Committee Declaration

Ethics committee approval was obtained on 01.09.2023 by Modern International Art & Design Academy Ethics Committee, Chongqing Technology and Business University.

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Figure References

Figure 1: Created by the author.

Figure 2: Yiting. (2024). *P401 Air Cleaner.* Idingcn. https://www.idingcn.cn/cases/689886ae853718ea2abcfd44 (20.11.2024).

Figure 3: Taken by the owner of Yingxiangli, Zhanpeng Wang.

Figure 4: Taken by the owner of Wanmeng Muzuo, Qin Tang.

Author's Biography

Zhiyong Wang obtained his PhD at the School of Design, Southwest Jiaotong University. He is now a lecturer of Modern International Art & Design Academy, Chongqing Technology and Business University. He blends academic interests with modern design history, sociology of design, and modern design education.

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Research Article

Phygital design model proposal with innovative marketing approach for corporate fashion stores

Asst. Prof. Dr. Mertcan Öztekin[1*], Prof. Dr. İpek Fitoz[2]

[1]Yalova University, Faculty of Arts and Design, Department of Interior Architecture, Yalova, Türkiye.
mertcan.oztekin@yalova.edu.tr

[2]Mimar Sinan Fine Arts University, Faculty of Architecture, Department of Interior Architecture, İstanbul, Türkiye.
ipek.fitoz@msgsu.edu.tr

*Corresponding Author
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Abstract
In recent years, experiential and innovative approaches have been seen in the act of purchasing in the fashion sector. The concept of "phygital", which combines physical and digital advantages, has emerged. This study proposes a phygital design model as an innovative approach for corporate fashion stores. In the research, an interdisciplinary hybrid space design model with mixed methods is aimed. Firstly, the store atmosphere is based on the SOR model on a qualitative basis. The phygital space design model was constructed with inferences made from the literature and hypotheses developed in this context. Since hedonic consumption behavior is seen in fashion, the model is measured with a theory belonging to psychological behavior theories. Thus, the model quantitatively shows whether fashion stores can be included in the phygital space class. In addition, hybrid components and class values of space experience quality were created in the model. Two case studies were conducted to test the phygital design model. As a result of the research findings, how a phygital approach is realized in store space design is discussed comparatively.

Keywords: Corporate identity, Fashion retail, Store design, Phygital, Phygital design

Extended Abstract

Introduction: New approaches have emerged in retailing. The act of shopping takes place with the support of technology in both physical and online stores (Szozda, 2023). However, due to the positive and negative aspects of physical and e-commerce, a common combination of the two is sought (Lopienski, 2024). However, in addition to online stores, physical stores are more preferred and provide an advantage in terms of experience. This issue was emphasized at the Paris Retail Week, and it was emphasized that the digital experience should be integrated with the physical experience for the future (Purcarea, 2018). Store efficiency can be increased by including interactive technologies in physical stores (Vashishtha & Kashyap, 2023). Due to the sensory interaction of consumers, creating a sensory environment in store design can provide versatile advantages (Bonfanti et al., 2023). Solomon (2018) emphasized that sensory effects affect purchase or desire. Technological tools used in store spaces encourage social interaction. In this respect, new experiential space designs are needed due to the social and psychological aspects of the shopping action in fashion. According to the literature and research examined, the physical environment is a need for shopping experiences due to the social and emotional structures of consumers. At the same time, today's innovative technological infrastructure is also sought. The phygital approach, which is a combination of physical and digital, comes to the fore. In this parallelism, the study presents a model for the phygital design of corporate fashion store interiors.

Purpose and scope: Fashion retail is a dynamic structure in terms of preferences, sociability, psychological needs, marketing, and managerial strategies in the act of shopping. The aim of the study is to design store spaces with a phygital approach for corporate companies in the fashion field. The rise of technology transforms consumer behavior by contributing to the interaction of the senses (Mounaim & Tighzri, 2020). This phase requires holistic planning for fashion stores. Phygital is a unique experience and advantageous for the future. However, how this approach can be realized and its welfare effect in life is unknown (Mile et al., 2023). In addition, although digital applications are on the rise, they are missing in the holistic experience (Clemente et al., 2024). In this parallel, there is a gap for a holistic phygital store atmosphere that can meet the physical, digital and sensory effects of companies operating in the field of fashion. Store interiors are an important interface in fashion marketing. For this reason, a phygital space design model for corporate fashion stores is proposed in the research. The focus of the study is whether and by which criteria the stores can be classified as a phygital store for corporate fashion companies. In addition, it is stated with which design factors the store spaces should be designed in order to increase the phygital experience and provide advantages to both consumers and companies.

Method: The study consists of mixed methods. For the research design, Mehrabian and Russel's Environmental Psychology Model (S-O-R), which has been used in various branches of retail, has been taken as a qualitative basis. SOR creates an effective environment by bringing together store atmosphere components. The model was constructed as a result of the hypotheses developed in parallel with document analyses and expert opinions. As a result of the inferences in the research, for the SOR model, Stimulus: digital tools, Organization: corporate identity and Response: sensory factors. It is associated with hedonic behavioral attitudes in the consumption of the fashion market. In order to define the store space design as phygital, the model is quantitatively evaluated with Herzberg's two-factor theory. This theory shows the adequacy of the content to provide motivation in the environment. According to the model, technology matches the experience pyramid for the quality values of the phygital experience. The model is depicted with the shining sun and shows the advantage of space design. The model is tested in two case studies. The results of the findings of the proposed phygital space design model are discussed comparatively.

Findings and conclusion: Two case studies were analyzed with the phygital store space design model. According to the results of the findings of the analyzed cases, phygital stores are advantageous. Because it can positively affect consumers' shopping experiences with the use of in-store technology (Guzzetti et al., 2024). In addition, the phygital interior design of fashion stores can be categorized with the proposed model. As a result of the findings, it is seen that the higher the phygital value, which is the sum of the module components in the model, the higher the positive interaction between the organization, fashion, store, and consumer. As seen in parallel with behavior-based theories, phygital experience can be improved by space design. While the research can theoretically define the phygital space, it is the response to the phygital design criteria for corporate fashion stores. In terms of application contributions, it can be an example in the sector and can add a positive experience between the consumer and the store. In addition, it is possible to achieve commercial gains for fashion companies with this model.

Keywords: Corporate identity, Fashion retail, Store design, Phygital, Phygital design

INTRODUCTION

In recent years, with the increase in competition in fashion retail, traditional models have changed and new approaches to shopping experiences have started. Two purchasing experiences are integrated through technology in physical and online stores (Szozda, 2023). As a combination of physical and digital worlds, phygital is an entertainment and pleasure-oriented marketing approach (El Badia et al., 2021). With phygital content in retail stores, consumer experience can improve and customer loyalty can increase (Bonfanti et al., 2023). Due to the positive and negative aspects of physical and e-commerce, the blend of the two is advantageous (Lopienski, 2024).

However, physical stores are more preferred than online stores and are advantageous from an experience perspective. Bag (2023) stated that global online purchasing will increase by 24% by 2026, but at the same time, 76% of the purchasing experiences will still be seen in physical stores, and the vitality of physical stores will be maintained. This issue was also emphasized at the 2018 Paris Retail Week, emphasizing the need to integrate the digital experience with the physical experience for the future (Purcarea, 2018). Another study analyzed a survey of 8,975 global consumers in 25 countries and regions and showed the necessity of technological support for consumers (PWC, 2023). The inclusion of interactive technologies in physical stores can increase store efficiency (Vashishtha & Kashyap, 2023). In research, it is obvious that consumers demand a customized experience. In addition, a customized store experience with technology can increase revenues by

20% to 30% (Adhi et al., 2019). At this stage, the physical space should be designed in a phygital experience. Physical stores can create an attractive experience by integrating digital interaction (Aiolfi & Sabbadin, 2019). In addition, the interaction of the senses in the rise of technology has changed behavior (Mounaim & Tighzri, 2020). For this, the necessity of a holistic planning of phygital stores in terms of sensory is obvious.

Phygital is a unique experience and a bright approach for the future. However, how this approach can be realized and its welfare impact in life is unknown (Mile et al., 2023). Although phygital applications are increasing, their relationship with different elements is missing (Clemente et al., 2024). In addition, stores should be designed with features that can meet customers' hedonic, social and entertainment experiences with the help of technology. Because it is important to create a sensory environment in store design due to the sensory interaction of customers (Bonfanti et al., 2023: 97). In the reviewed literature, it was seen that consumers miss the shopping experience in the physical store due to their social and emotional structure. In this parallel, there is a gap for a holistic digital store environment that can address the physical, digital, and sensory experiences of companies operating in the fashion field.

Sensory stimuli in the physical environment can affect purchasing (Solomon, 2018: 381). In addition, technological tools used in the store can encourage social interaction. In this way, the sensory atmosphere created by the interaction can affect the consumer (Runesson et al.,2020). Saricam (2023) suggested in his research that clothing stores should be designed to elicit cognitive and sensory effects, thereby providing a positive experience that satisfies consumers. Digitalization should be handled as a method so that it can be integrated with the pleasure of the physical moment. In this direction, it is important how the phygital design for fashion stores will be constructed with atmosphere components. The aim of the research is to design a store space that meets the physical, digital, and sensory environment experience for corporate fashion stores. This research can make both practical contributions to sectoral applications and theoretical contributions to academic disciplines. In this direction, it is evident that the phygital store space can be defined with the model presented in this direction, and the digital experience effect can be increased.

THEORETICAL BACKGROUND

Corporate Fashion Store Experiences

Corporate identity is the most basic feature of organizations. It is a visual expression of a company's identity and existence (Gregory & Wrechmann, 1993). It includes an image that reflects the basic qualities of the organization, design and connotations about the managerial structure (Vural & Bat, 2013). Olins (1984) defined it as the characteristics that reflect what the organization does, how it does it and who it is. Okay (2013) stated that just as the external appearance of individuals can affect the other party positively or negatively, the places belonging to the organization can have a similar effect.

Stores are linked to the concept of retail. Retail is the totality of products or services that meet the need for consumption (Bermans & Evans, 2011). A store is a place where something is sold. Stores are classified broadly, and one of these classifications is fashion. Fashion is the image of values as a result of symbolic differentiation and abstractive integration (Yağcı, 2005). In the context of these values, stores with a corporate identity are important in the preferences of individuals. Nowadays, the demands of consumers increasingly emphasize the experience of fantasy, emotion and entertainment elements. At this point, the inner emotional, mental state and thought of the individual are mobilized (Srinivasan & Srivastava, 2010). The products in the stores, the products image, and everything outside the physical elements of the space cannot be experienced, so they are supported by other sensory messages with high impact (McIntyre et al., 2016). In order for the experience to take place, there must be signals transmitted to the sense organs. In stores, this experience is realized through atmosphere components. Hulten (2011) expressed the atmosphere components as smell, auditory, visual, taste and tactile sensation. Kotler (1973) divided the components of the store atmosphere into four dimensions based on the senses of sight, hearing, smell and touch according to the supporting service relationship offered with the product sold. In this research, fashion store atmosphere components are in four dimensions in parallel with Kotler.

Heskett (2013) stated that interaction with objects in space forms the basis of form, color, pattern, and texture. Form is the shape of space and content. Each form has textural properties. One of the factors affecting the perception of space is color. All these design elements can be loaded with meanings (Yazıcıoğlu & Meral, 2011). In these parallel, visual factors in the store environment can revive the corporate image as color, shape, form and writing. With the auditory factors, an association is created with the features it carries and the identity gains sensory meaning (Lindstrom, 2005). Smell factors are related to product fit, intensity and even gender and can characterize corporate identity in the atmosphere (Hulten, 2011). Touch and feel factors are a means by which people communicate and feel intimacy (Lindstrom, 2005). Identity can also be expressed through textural characteristics in the material. Turley and Chebat (2002) argue that creating a unique atmosphere in stores is advantageous in market competition. Emotions positively affect mental processes, evaluation and decision-making, and may increase the likelihood of repeating this behavior (Porat & Tractinsky, 2012). Kotler (1973) emphasized that the stimuli in the atmosphere create a perception and this perception can increase the positive effect rate in decision making. As a result, store spaces create a holistic experience environment and undertake the task of keeping the corporate fashion identity alive.

Phygital As an Innovative Approach in Corporate Fashion Stores

The phygital approach is a customized journey for users by integrating online interactions with offline experiences (Khan, 2018). Phygital is more interactive experiences that intertwine traditional marketing with the digital world (Moravcikova & Kliestikova, 2017). It is expected to be a step towards the future of fashion in phygital stores. At this stage, it is necessary to determine the digital tools used in store space design.

Phygital tools in corporate fashion stores

Phygital marketing includes virtual and augmented reality, radio frequency identification (RFID), beacon technologies, QR codes, location-based services (LBS), virtual test rooms, face and voice recognition technologies, touch technology, and mobile payment systems (Gedik, 2021). They can be analyzed in seven classes in terms of their equivalents in the literature, as well as the examples that have been applied: Virtual reality is the depiction of a virtual world that is not real. Virtual reality (VR) provides vibrancy with visually rich depictions in fashion stores and helps to enhance individuals' experiences (Yoon et al., 2021). For example, the Balenciaga fashion show took place in 2020 with VR technology. The catwalk, mannequins and collection products were depicted in the virtual world. This example is a dynamic fashion show presentation in a space that does not exist in reality. A virtual reality experience can be presented through digital screens as well as VR glasses. Augmented reality is an interactive and immersive experience created by combining digital objects in the real world within a physical environment (Caboni, 2020). While experiences within the boundaries of the physical world are made more authentic with augmented reality, creativity can be achieved with digital content added on top of reality. In this way, the effect of space design can increase.

RFID (Radio Frequency Identification) is a system consisting of auditory effects, visual effects and informative data loaded on chips. The first use of RFID was based on logistics and enabled customers to enter the store environment with the cards given them and to have their profiles displayed on the staff screen (Baytok, 2009). RFID can be placed on any labels and objects because it is a chip. Messages are transferred with chips in this area. In short, like a game installation, what can be added to these chips and the kind of atmosphere desired for the space can be loaded for that purpose. Especially with the addition of more emotions in the atmospheric dimension, corporate fashion companies make these applications because they have a high impact and easy interaction. The use of digital screens in store spaces can positively affect customers' purchasing decisions. In addition, the purchasing experience in physical stores can be enriched with touch technology (Vashishtha & Kashyap, 2023). Guiding information about the store is an effective way to organize the space, as it is designed for various purposes such as product displays, payment points, smart mirrors, or touch events.

QR codes are a code system that enables practical interaction between the store and the consumer and are strategically placed on different surfaces, such as products and shelves (Caboni, 2020). QR codes enable the reading of the space and can enrich the space design by supporting display communication, orientation, and action. In the absence of cashier areas, offering the option to pay with a QR code can contribute to the organization and display of the space. In addition, directing QR codes to different destinations can further customize the experience, supported by visual and auditory cues. Mobile applications can be integrated with

the venue. Purchasing can also be realized through mobile applications. Mobile applications can increase the digital perspective with customer participation (Mile et al., 2023). Even in some stores, places that offer a cashless experience, such as Amazon Go, Canada Goose, and Uncommon Store, have made arrangements that focus more on display. All of these can functionally facilitate space organization. It can also offer a gamified spatial experience by influencing behavior. Other technological applications can cover all applications in digital interactive interior design. For example, technological tools such as mixed reality, motion sensors, and holograms can be included in this title. Due to the rapid advancement of technology, this category was created for alternatives that can be integrated into the phygital approach.

Hypothesis Development

As seen in the theoretical background, fashion brands are motivational rather than physical products. Within the scope of retail and marketing, motivation is a concept identified with entertainment, pleasure, satisfaction, and enthusiasm as "hedonic consumption". This consumption involves objects that revive imaginary pleasures through abstract images and increase the sense of pleasure (Odabaşı & Barış, 2013). For hedonic consumption, an attractive atmosphere should be created and consumer perceptions should be activated (Calvo-Porral & Levy-Mangin, 2021). Schmitt (1999) states that sensory, emotional and cognitive expressions make the act of purchasing a more social experience. Consumption is realized by seeing, hearing, smelling and feeling the products and the environment (Holbrook & Hirschman, 1982). However, today's innovative technologies also serve as an experiential tool in hedonic consumption. In light of these results, the following hypothesis emerges for the construction of the model:

H1: Technology is an effective tool in experiential purchasing in fashion stores.

In the TÜSİAD (2021) report, it is emphasized that the relationship between online and physical stores has strengthened. It is stated that this relationship has been developing since 2010 and will continue to mature after 2020. However, in line with the information examined in the theoretical background, the design fiction of the physical environment may lag behind virtual spaces. Virtual store spaces offer unique, creative experiences due to the opportunities provided by technology. In line with these results, the following hypotheses emerge:

H2: The rationalization of original experiential fiction in the design of physical store spaces is limited.

H3: Consumer interaction can increase with technological opportunities in the design of virtual stores.

However, although virtual stores provide convenience, accessibility and unique narrative fictions, they are limited in creating an effective store atmosphere because they are experienced through screens (Vrecopoulos, 2001). Because this experience is only visual and auditory. In a survey conducted in the United States in January 2021, participants were asked which experiences they missed during their store visits. The result; 55.4% stated that they were most looking for the opportunity to see and feel the products, 51.4% to spend time outdoors, and 40.7% for social interaction (TÜSİAD, 2021). Physical stores, where multiple sensory organs contribute, are the experience sought in fashion consumption. In this context, the following hypotheses emerge:

H4: Virtual stores cannot be perceived by sensory factors such as smell and touch.

H5: Physical stores offer a more effective experience compared to virtual stores.

H6: In physical stores, a perception with a higher sensory impact occurs with the combination of vision, hearing, smell, touch and feel factors.

Reports and literature indicate that physical stores offer a stronger sensory interaction. This is where the concept of phygital becomes important.

RESEARCH METHODOLOGY AND MODEL DEVELOPMENT

A hybrid phygital store design model was created within the scope of the hypotheses developed due to the interdisciplinary approach given by the design and marketing disciplines. The presented model is discussed through a case study. For this reason, mixed methods research is used. Qualitative research makes sense of the relationships between data, while quantitative research measures the relationships between data (Creswell,

2013). Mixed research methods are widely used in the analysis of social and behavior-based studies with both qualitative and quantitative methods (Creswell & Creswell, 2018). In this parallelism, the basis of the model is in the qualitative SOR model due to the consumption behavior of the stores.

Mehrabian and Russell (1974) discovered the behavioral response of external stimuli by influencing the internal organism with the Stimulus-Organism-Response (SOR) theory. The widespread use of the SOR model is that it explains consumption behavior in the broad perspective of retail, such as physical purchasing behavior and online shopping (Huang, 2023). In addition, the SOR model makes an important contribution to behavioral psychology because it triggers emotions with internal perception and creates behavior (Shah, n.d.). For this reason, it is the basis of the phygital design model to be presented in the research. The stages of the phygital design model for corporate fashion stores are shown in Figure 1.

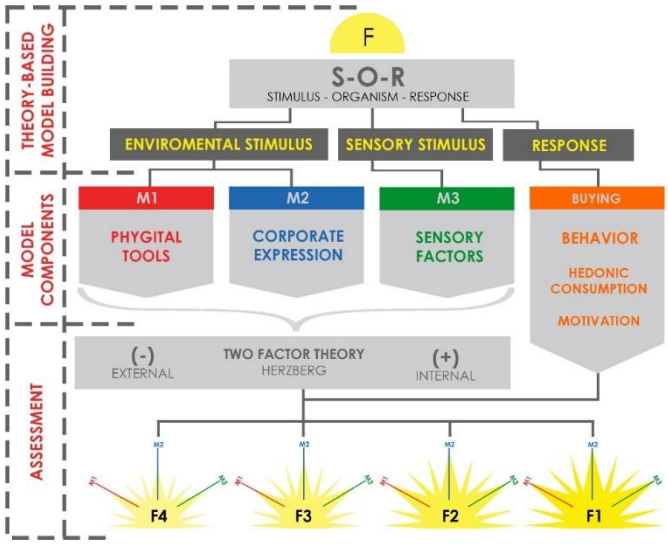

Figure 1. Model design stages

Since the need for consumption in the fashion sector is realized through satisfying behavior, it is evaluated using the two-factor theory from behavioral theories. The two-factor theory developed by psychologist Frederick Herzberg proves both theoretically and practically that the environment can affect psychological behavior by providing motivation (Herzberg et al., 1959). In this theory, there are intrinsic and extrinsic factors. Extrinsic factors are considered as elements that are mandatory to meet basic needs, while intrinsic factors are to create a more motivating atmosphere (Kayım, 2018). The model developed in this research reveals how phygital design can be applied in the space for corporate fashion stores. Satisfying factors positively affect individuals' behavior and increasing the tendency to purchase. Unsatisfactory factors refer to conditions that affect individuals' behavior negatively (Gawel, 1997). The basic approach of this theory is the importance of intrinsic factors in increasing motivation as a minimum level of extrinsic factors. Providing extrinsic factors can create a motivating environment (Usta, 2017).

Neuhofer et al. (2013) emphasized that as the technology level increases, the quality of experience will increase in parallel. This quality of experience is a powerful experience (enhanced experience, interactive, immersive technology), an enhanced experience, an assisted experience, and a standard experience (low experience). As the phygital design model aims to improve the quality of store experience, it has four values (Figure 1). In this context, according to Herzberg's theory, the aim is to overcome the neutral value and reach positive values. In the model, it is likened to the sun both conceptually and symbolically. Because the sun is symbolically associated with holiness, light, knowledge, creativity, power, conceptually with divinity, universal wisdom, enlightenment, light, brightness and nobility (Sarıgül, 2015). It also reflects material and spiritual effects (Ersoy, 1990). With these correspondences, the depiction inspiration of the model is the figure of Helios the sun god. The phygital space design model for corporate fashion stores is the F value symbolically representing the sun. The F value includes the module rays M1, M2, and M3. The table presented in Figure 2 is the phygital design model.

- M1 module SOR model is a phygital tool within the scope of "Impact". In the second part, according to the literature reflected in phygital space design, VR, AR, QR, RFID, digital display, mobile applications, and other applications.
- M2 module SOR model is the institutional expression reflected in space design within the scope of "Impact". These are colour, shape, form, texture, and writing as mentioned by Heskett (2013), Yazıcıoğlu and Meral (2011).
- M3 module SOR model is related to sensory factors within the scope of "Organism". As discussed in the theoretical background, according to Kotler (1973), at the border of fashion retail store spaces, sight, hearing, smell, and touch are the five senses.

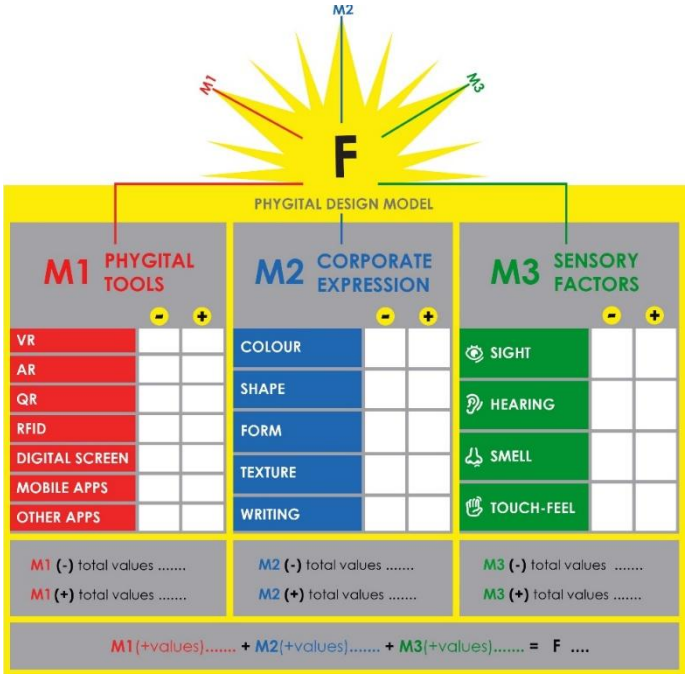

Figure 2. Phygital design model

There are objective and subjective analyses for design problem solving (Tonetto & Tamminen, 2015: 638). However, a space design should be based on indicators in order to be objectively recognized as digital. If the elements belonging to M1, M2 and M3 in Figure 2 Phygital Design Model are used in the space design, they should be marked as plus value (present) or minus value (absent). According to Herzberg, extrinsic factors should be compulsory and motivation is provided by the completion of intrinsic factors (Ünlü, 2013). In order to obtain the result of the model in the context of two-factor dual factor theory, the sum of the positive values of the three modules should be more than the negative values. As in Figure 3, if the positive and negative values are equal, the space expresses a situation with a neutral value.

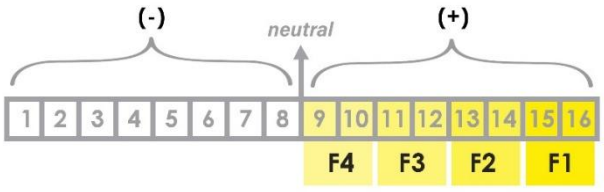

Figure 3. Phygital design model values classes

In order to increase the quality of the experience in the store environment, the elements of the modules in Figure 1 Phygital Design Model should be included in the design of the space. Figure 3 shows the value classes of the model and "F" stands for phygital values. According to the sum of the positive values mapped to the technology experience pyramid of Neuhofer et al. (2013); 9-10 are "F4 medium phygital", 11-12 are "F3 medium high phygital", 13-14 are "F2 high phygital", 15-16 are "F1 very high phygital". The resulting value

of the phygital design model is shown in Figure 4 as a representation of the organisation-fashion-store-consumer interaction.

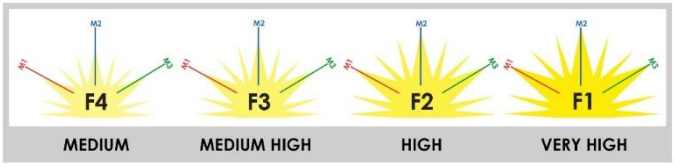

Figure 4. Phygital design model values

It is preferred in terms of marketing strategies by adding value to design disciplines related to aesthetics and art on the basis of experience (Codignola, 2018: 58). In addition, technological services offered in the act of consumption can offer consumers a satisfactory service quality (Selvi, 2007: 190). In this context, the higher the F value in the model, the higher the corporate quality of the fashion store's phygital design quality.

Innovative approaches in retail companies need to be tested and how consumers can understand them needs to be explained (Artusi & Bellini, 2020). To this end, the phygital design model for corporate fashion stores developed within the scope of the research was tested in the next section. The research conclusion is reached by discussing the findings of the case study and the phygital design model.

FINDINGS

Case Study

As brands move towards the luxury segment, the quality of visual identity and the conceptual approaches behind the identity can increase (Martarello, 2023: 6). For this reason, examples of luxury fashion brands were taken because of the space design experience they give to the consumer, both in terms of application practices and marketing. There are two examples for the discussion with each other. These examples are Burberry and Canada Goose brands. The first example is the Canada Goose brand's phygital store in Toronto. In a narrow passage corridor, a cracking ice simulation was created with OLED panel technology. With the support of sensors, ice breaking sound and animation are animated. In cold snow rooms at -12 degrees, products are tested with landscape videos reflecting the North Pole. There is no cash area. The purchase is made through the mobile application or screens that can pay in the store. The product is delivered with same-day shipping service and a comfortable shopping is offered (Reagan, 2019). In parallel with these data and based on the visual indicators shown in Figure 5, information on the module components of the phygital design model is as follows.

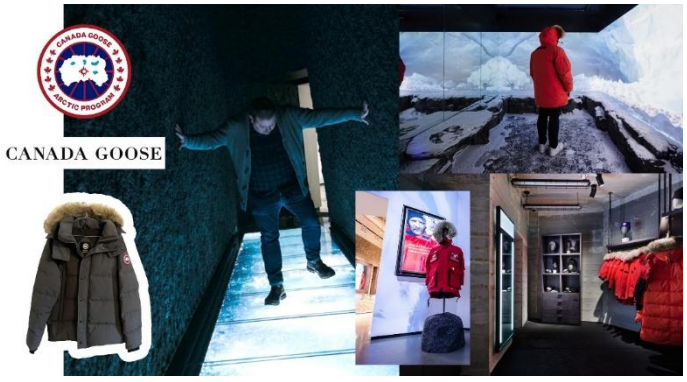

Figure 5. Canada Goose Collage

- In terms of M1 phygital tools, digital screens were used in various sizes and substructures in the space. QR is on product labels. Since it is a cashless store, the purchase process takes place via mobile application and digital screens. There are sensors within the scope of other applications.
- As M2 corporate expression, the black, red and blue colors of the corporate identity are seen in the space. It is a depiction of a luxury sportswear brand with mass asymmetric forms. Hard rough textures

of rock and slope are used on surfaces in space design. The text is in the space in corporate typography in informative texts on signboards and screens.

- M3 sensory factors of sight, hearing, touch and smell are applied in the space design. Snow rooms make you experience the touch factor and all auditory supports in the space differentiate the experience. In addition, store's odor supports reflecting the product and image in the space atmosphere.

The other example is the phygital store of the Burberry brand located in a historical building on Regent Street in London. With the concept of "digital rain" in the space, rain images projected on the screens, rain and thunder noises and an advanced sound system provide an experience. Through the mobile application, customers can communicate with the staff and make reservations and purchases. With a 38 m2 main screen, 100 screens in different parts of the space and 500 speakers, the rain experience continues throughout the store with visual and auditory factors (Gaudoin, 2012). When the product enters the cabin, RFID chips send commands to the digital screens inside. In parallel with these data, based on the visual display analyzed in Figure 6 and the store video on YouTube, information about the module components of the phygital design model is below.

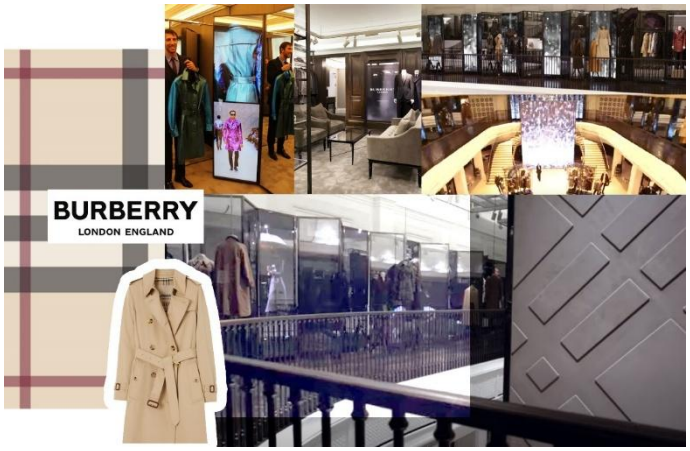

Figure 6. Burberry Collage

- In terms of M1 phygital tools, AR and VR do not exist in space. QR and RFID are on product labels. Digital screens are frequently used in the space. There are mobile applications integrated with the cabins associated with the space. All these digital tools support the space design and depict the corporate image. It offers a physical and phygital experience.
- The beige color belonging to the corporate identity is used as the M2 corporate depiction. Burberry corporate tartan pattern is on the space surfaces. Mass and symmetrical forms are compatible with the corporate identity. Wooden surfaces depicting the brand are the texture of the material in the space. The text in the corporate typography supports and informative texts are reflected on the screens.
- Visual elements are used throughout the space in M3 sensory factors. Digital tools and materials and products of the space correspond to the sense of touch. In addition, the atmosphere of the space was created with auditory and odor (store odors reflecting the product and image) supports.

CONCLUSION

The aim of the research is to store space design that will meet the physical, digital, and sensory environment experience for corporate fashion stores. The phygital store is not only using technological elements but also creating in-store experience (Lopienski, 2024). Experience is a holistic strategy with the consumer rather than goods and services (McIntyre et al., 2016). In this parallel, the research is a hybrid model in the integrity of corporate expression and sensory factors as well as phygital tools. As an innovative approach, the phygital design model presented for corporate fashion store spaces was tested through a case study. The designs of the luxury fashion brands Burberry and Canada Goose, which were analyzed as case studies, were evaluated with regard to their incorporation of physical and phygital elements. As a result of the research findings, corporate phygital store classification is appropriate in both examples. For the evaluation of the model created in the

qualitative context, quantitatively, based on Herzberg's two-factor theory, it is shown in Figure 7 that both samples have values that pass the minimum conditions. In this context, as a result of the data obtained from the sample examination, the sum of the model module values reached to the phygital (F) value. Canada Goose has a medium-high phygital store space design at F:12 phygital value. Burberry has a high phygital store space design with F:13 phygital value.

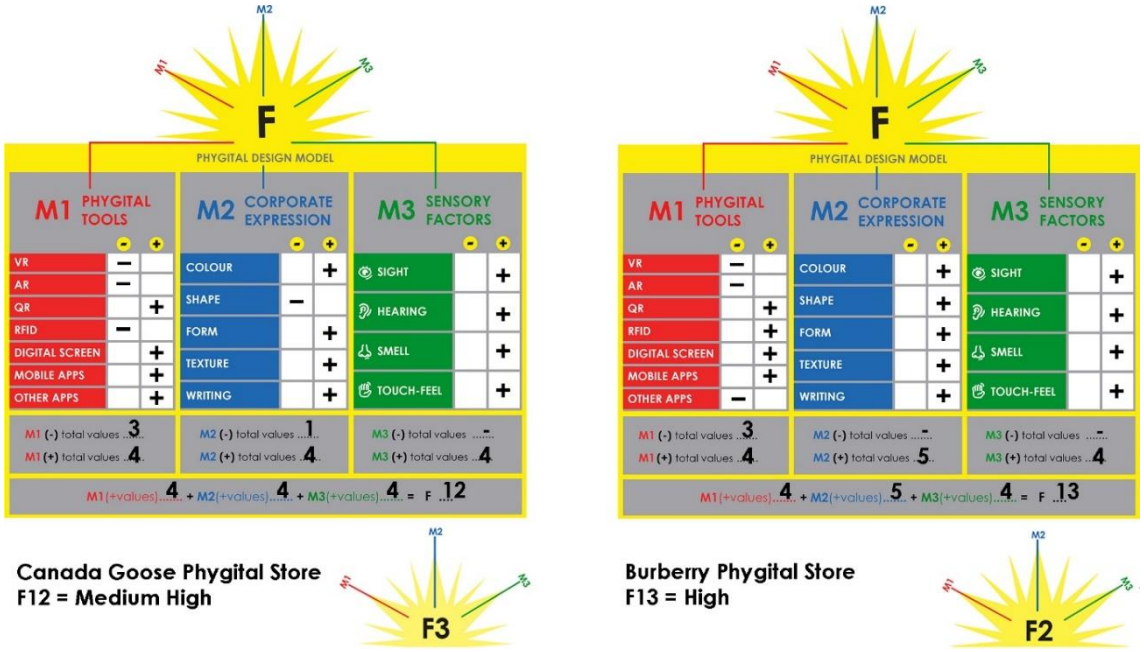

Figure 7. Results for phygital store designs

As a result, as seen in many studies, in-store technology users may increase with the experience of positive relationships with the store (Guzzetti et al., 2024). In parallel with the results of the research findings, hypothesis 1 can be confirmed. The environment contributes to the internal evaluation of the individual and helps the store atmosphere to lead to a positive purchasing behavior (Akgün & Zerenler, 2021). Both the necessity of the physical environment and the opportunities provided by virtual shopping and the use of digital technological hybrid can provide advantages to store spaces. In this context, the physical experience of the phygital store space design supports hypotheses 4, 5 and 6. In addition, the existence of virtual store facilities in the physical environment and digitalization in space design support hypotheses 2 and 3. The research proves that the proposed model can define the phygital store space and increase the phygital experience effect. The lighter the phygital design sun in the model sheds, the more powerful the phygital fashion store space will be. As a result, the phygital design model presented in this study is to bring a new dimension to the retail sector and provide advantages to both consumers and companies. This study proposed how to create a store space design with a phygital approach. It was based on corporate companies operating in the field of fashion. More specifically, it can be limited to subheadings in the field of fashion. Not only limited to the fashion field, it can also include different areas of retail. In addition, this study proves how interior architectural design will be realized and the space will be phygital. The benefits of the phygital effect for consumer experience and companies can be measured with different quantitative methods. Since technology is developing rapidly, studies on what new technologies will be and more detailed studies can be carried out on the border of phygital tools.

Authors' Contributions
The authors contributed equally to the study.

Competing Interests
There is no potential conflict of interest.

Ethics Committee Declaration
The study does not require ethics committee approval.

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Authors' Biographies

Mertcan Öztekin has been working at Yalova University, Faculty of Art and Design, Department of Interior Architecture as of 2023. He completed his Bachelor's, M.Sc and Ph.D. degree studies in Istanbul, Mimar Sinan Fine Arts University, Department of Interior Architecture. On the basis of interior architecture, he continues his research in the fields of exhibition design, store design, corporate identity, fictional design and fashion. He also has multidisciplinary sectoral studies at the intersection of fashion design and interior design.

İpek Fitoz graduated from Mimar Sinan Fine Arts University, Department of Architecture. She completed her master's degree at the Department of Interior Architecture and her Ph.D. at the Department of Industrial Design at the same university. She conducts her academic studies as a professor at Mimar Sinan Fine Arts University.

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Research Article

Procedural design in digital games: Space and environment interaction in No Man's Sky

Asst. Prof. Dr. Onur Aşkın[1*], Asst. Prof. Dr. Gülsüm Damla Aşkın[2]

[1]Doğuş University, Faculty of Art and Design, Department of Digital Game Design, İstanbul, Türkiye.
oaskin@dogus.edu.tr

[2]Doğuş University, Faculty of Art and Design, Department of Interior Architecture, İstanbul, Türkiye.
gaskin@dogus.edu.tr

*Corresponding Author

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Abstract
This study analyzes the effects of procedural design on the space and environment in No Man's Sky. The research includes 300,000 comments from Steam gaming platform users between 2016 and 2024. Player comments were analyzed using the following categories to understand players' experiences of space and environmental interaction: "creativity and possibilities," "environment and space design," "environmental interaction and dynamism," "exploration and diversity," "game mechanics," "procedural generation," and "repetition and predictability." Word frequency, thematic analysis, and sentiment analysis were used to assess players' perceptions of procedural design. The findings suggest that despite the procedural design's freedom of exploration and visual variety, players generally perceive the experience with neutral emotions. Repetitive designs and limitations were found to reduce player satisfaction. The impact of innovative content was limited. This study highlights the potential of procedural design to create aesthetics, functionality, and individualized experiences in game design. The procedural design should be optimized in future studies to create stronger emotional effects, and the design processes should be restructured based on insights from player comments.

Keywords: Procedural design, Game design, Environment design, Third-person game, No Man's Sky

Extended Abstract

Introduction: Procedural design expands the boundaries of digital game worlds by offering players unique and personal experiences in randomly generated, dynamic, and variable environments. This design method, which enables the creation of digital worlds through algorithmic processes, is widely used in various disciplines, such as game design, architecture, and environmental design. Advancements in digital technologies have enabled more effective procedural design increasing the aesthetic and functional diversity of game worlds. The No Man's Sky game stands out as a strong example of procedural design, featuring planets that provide unlimited freedom of exploration, different biomes, locations, environmental interactions, and survival mechanics. Procedural content generation techniques have been used to create millions of unique planets and star systems in the game's design. This situation has provided a platform for players to create their own stories, but it has also led to criticisms of repetitive structures and a lack of consistency. Current studies address the technical aspects of procedural design, but there is a notable lack of research aimed at understanding how players perceive and experience this design approach. Using direct user feedback, such as player comments, to gain insights into the perception and effects of procedural design could fill a significant gap in this field. Understanding how players experience the dynamic structure of game worlds and how procedural design shapes individual gaming experiences will offer new perspectives on the game design process. This study examines the effects of procedural design on digital spaces and player experience using No Man's Sky as an example.

Purpose and scope: This study aims to analyze the effects of procedural design on digital spaces and environmental interactions in the No Man's Sky game. Procedural design aims to offer players unique and personalized experiences in randomly generated worlds and understanding how players perceive this approach is crucial for improving game design processes. The comments will be used to understand aspects of player experiences such as aesthetics, environmental harmony, and creativity, in the context of digital spaces. The research excludes user feedback from other platforms because it is solely based on player comments on the Steam platform. This situation may limit the generalizability of the

results. Additionally, the subjective nature of player comments may make it difficult for the analysis results to represent the entire player base. The 2016–2024 time frame used in the study may exclude experiences from the game's first release period. Although the effects of major updates on player perception will be examined, the lack of sufficient data for some updates may limit this analysis. Finally, it may not be possible to fully measure the impact of the playtimes mentioned in the comments on the player experience. This study provides a comprehensive perspective on the impact of procedural design on player experience and contributes to the development of novel approaches to game design processes despite these limitations.

Method: In total, over 300,000 user comments from this dataset were analyzed to examine the effects of procedural design on spatial and environmental interactions in the No Man's Sky game. Data were obtained from a dataset published by Silas Rickards on the Kaggle platform under the CC0: Public Domain license. During the analysis process, the Python programming language was used; the Pandas and NumPy libraries were preferred for data cleaning and editing operations. For ease of analysis, the data were categorized into thematic categories using natural language processing (NLP) tools, such as NLTK and spaCy. The comments were classified as positive, negative, or neutral for sentiment analysis using the VADER and TextBlob tools. The Google Colab environment has enabled easy code sharing and reproducibility of the analysis process. These methods have enabled meaningful information extraction from large datasets and an in-depth understanding of players' experiences. The method's systematic and repeatable nature has enhanced the scientific value of the research and made it reproducible by other researchers.

Findings and conclusion: Players generally perceive the procedural design effects in No Man's Sky positively, but these effects are mostly limited to a neutral level. Players recognize the creativity of procedural design, spatial design, and exploration mechanics, but they express that they do not create a strong emotional connection with these elements. Especially the keywords "space" and "environment" indicate that players are aware of their perception of space and environment, but this perception generally remains at a neutral level. Despite satisfaction with the exploration mechanics, the elements of diversity and uniqueness, such as "diversity" and "uniqueness," have been insufficient. Repetitive content and limitations are among the most frequently voiced criticisms by players, indicating that the procedural design did not meet the expectations of the players. Research findings indicate that major game updates have a limited impact on players' perceptions of space and environment. Although players notice the innovations, they do not significantly contribute to the overall gaming experience. Analyses of playtime have shown that long-term players are more disturbed by repetitive content, whereas short-term players focus more on aesthetic and exploration elements. These findings suggest that developing procedural design can have a more significant impact on players. Enhancing elements of visual storytelling, uniqueness, and diversity is recommended to ensure that players establish a stronger connection with the spaces. In addition, major updates should include innovations that contribute to the story and spatial interactions, rather than being limited to technical improvements. Some suggestions are being offered for game designers. Reducing repetitive content in design processes, offering players more unique and dynamic spaces, and creating personalized experiences are critical. Adopting design approaches suitable for the player profile can optimize content for different play durations and experiences. Additionally, enriching game worlds in terms of both visual aesthetics and depth of meaning can help players have a more satisfying experience. Future studies should provide a broader perspective by comparing the effects of procedural design across different player profiles and game genres. These findings can guide game designers in enhancing their creative processes, contributing to the more effective and meaningful use of procedural design.

Keywords: Procedural design, Game design, Environment design, Third-person game, No Man's Sky

INTRODUCTION

The world of digital games is evolving to provide players with ever-wider, more diverse, and more personalized experiences. In this context, procedural design has become one of the cornerstones of innovation in this field by enabling dynamic and randomized construction of game worlds. With the potential to create an unlimited universe, procedural design expands players' freedom of exploration and offers a game world based on individual experiences. No Man's Sky places this technology at the center of game design, creating digital spaces and environmental interaction through personal experiences. As a game in which an unlimited number of planets are randomly generated and players experience the mechanics of exploration, construction, and survival, No Man's Sky demonstrates the contributions of procedural design to the game world. Each planet's unique structure, aesthetics, and resource dynamics constantly reshape players' perception of space. However, the freedom and diversity offered by this design approach have also been criticized for its repetitive structures and lack of predictability and consistency. This tension between the freedoms offered by procedural design

and the criticisms regarding repetition and unpredictability necessitates a more comprehensive consideration of its effects on digital spaces.

This study aims to analyze the effects of procedural design on the interaction between digital spaces and the environment, using No Man's Sky as a case study. This study aims to analyze the effects of procedural design on the interaction between digital spaces and the environment, using No Man's Sky as an example. In this context, the main goal of the study is to reveal the effects of procedural design on player experience and to offer new perspectives on the design of digital game spaces. Understanding the potential of procedural techniques in digital game design will not only improve the aesthetics and functionality of game worlds but also guide designers in creating individualized and authentic gaming experiences. In this context, the main goal of the study is to reveal the effects of procedural design on player experience and to offer new perspectives on the design of digital game spaces. Understanding the potential of procedural techniques in digital game design will not only improve the aesthetics and functionality of game worlds but also guide designers in creating individualized and authentic gaming experiences.

Background

This literature examines the role of procedural design in the context of digital space and environment design. The effectiveness of procedural design in the creation of dynamically changing and diverse digital spaces is specifically addressed in the context of game design. The literature has extensively explored the effects of this design approach on space and environment interactions and player experiences in digital worlds. It has also examined how procedural techniques are used to design elements such as planetary surfaces, biome diversity, resource distribution and environmental features, and how these processes contribute to players' experiences of exploring and making sense of the game world. Advances in digital technologies are reshaping the processes of design and content production, with procedural design techniques becoming increasingly important in fields such as game design and architecture. Procedural design enables the production of diverse and customizable content using algorithmic approaches. Schwarz and Wonka (2014: 1-16) showed that this technique can be used to generate automated design solutions considering complex constraints such as building facade lighting. Lienhard et al. (2017: 39-48) propose rule-based transformations to create new designs by combining elements of existing designs. While these studies demonstrate the versatile applications and potential of procedural design, they also point to user adoption challenges and articulating design problems (Craveirinha & Roque, 2015a). In the field of architecture and environmental design, procedural design enables the transformation of static spaces into dynamic, adaptive spaces. Anderson et al. (2018: 164-177) reported that using procedural algorithms in areas such as office planning can achieve close alignment with human engineering, efficiency, and standards compliance. Similarly, the autoencoder networks presented by Yümür et al. (2015: 111) allow for more intuitive exploration of complex modeling domains.

Procedural content generation (PCG) offers significant opportunities and challenges for both designers and players in the game design process. Notable for its capacity to accelerate development and prototyping processes, PCG is a particularly effective tool for creating large and dynamic game worlds (Galdieri et al., 2021: 47). However, users' general preference for hand-designed levels points to procedural content generation's shortcomings in user-centered design. However, procedural levels have also been found to have no apparent negative impact on users' ability to navigate the game world (Galdieri et al., 2021: 50). Designing user-friendly interfaces is crucial for effective use of PCG tools. Interfaces should have the capacity to guide users through complex options in a way that facilitates the design process (Barret et al., 2011). This makes procedural design processes more accessible for both professional and amateur users. Furthermore, an author-driven procedural content production approach places designer control at the center of the creative process, enabling designers to produce content that supports the player experience (Craveirinha & Roque, 2015b).

Experience Driven Procedural Content Generation aims to create content based on player behavior by combining user modeling with content adjustments (Yannakakis & Togelius, 2015). This approach offers a viable solution not only in game design, but also in other fields such as interface development and software design. The customization possibilities of procedural content generation techniques enable more effective guidance of creative processes in game design. PCG in game design offers both opportunities and challenges, as in the case of No Man's Sky. While PCG has the potential to reduce development costs and create expansive

game worlds (Cardona-Rivera, 2017), it also risks producing content that players find boring and repetitive (Tait & Nelson, 2021). This problem is particularly pronounced in games that increase the importance of exploration and novelty in the player experience. In this context, there are suggestions in the literature to improve PCG in a way that is compatible with players' perceptions of uniqueness (Cardona-Rivera, 2017). This requires not only a technical optimization process, but also an understanding of players' mental models and perception structures. The gap between academia and the gaming industry can be bridged by respecting designer control of procedural design processes, creative processes, and existing workflows (Gorm Lai et al., 2020). Designers' creative decisions can be implemented without being constrained by the procedural system itself. The success of procedural generation in games, such as No Man's Sky, largely depends on players perceiving a "designer's touch" in the algorithmically generated worlds. Approaches that enhance designers' control over procedural tools can make game worlds deeper and more meaningful, both technically and aesthetically.

Procedural design expands players' freedom of exploration with the potential to create an unlimited universe, offering a perception of the game world based on individual experiences. No Man's Sky's generative design shapes the aesthetics of human-machine interaction and constructs the game experience based on the relationship between designer, system and player (Carpenter, 2022: 180). This allows narratives discovered by the player to emerge rather than being predetermined. Thus, games become not only tools that deliver creative content, but also platforms that trigger players' creativity and imagination. Carpenter (2022: 178) argues that this approach reshapes notions of intentionality and creativity in digital contexts. In particular, such situations, where players can create their own stories, emphasize the dynamic nature of games. Future PCG developments should aim to ensure the alignment between the producer's conception of meaning and the player's cognitive experience (Cardona-Rivera, 2017). This requires not only the development of procedural algorithms, but also creating designs that support players' sense-making processes and make them active in the interaction. Diversifying game worlds, both aesthetically and functionally, can increase players' motivation for exploration. This approach is not limited to technical innovations but also emphasizes the adoption of a human-centered perspective in game design.

In game design, procedural design plays a critical role in diversifying the content creation process and individualizing the player experience. Smith and Mateas (2011) proposed answer set programming, which allows the specification of design spaces in procedural content generation. This approach allows game worlds to be both aesthetically and functionally customizable. No Man's Sky is a striking example of how procedural design can be effective in shaping game worlds. The game's design presents a galaxy of millions of star systems and planets, each with unique biomes and resources. Reinhard (2021) examined No Man's Sky as a model for digital archaeology in recording and preserving player-generated content. Flick et al. (2017) developed a code of ethics by treating the game as an archaeological site. Carpenter (2022: 187) considered the design of the game in terms of human-machine interaction, an approach that positions players not only as elements within the game but also as external actors. The ecological design of the game emphasizes biodiversity and natural resource dynamics, while diversifying players' interactions with the environment. Santos et al. (2023) observed that the scientific content of the game increased players' motivation and scientific understanding of chemistry. Biomes in the game provide a dynamic gameplay experience by forcing players to adopt different strategies and types of interactions. No Man's Sky presents a game world that invites players to create both individual and collective stories. Procedural production techniques shape the spaces within the game, testing the unpredictable nature of its design and the limits of creativity. These approaches offer new perspectives on digital game design, both theoretical and practical.

While the existing literature has extensively focused on the technical aspects of procedural design and its effects on shaping game worlds, there is a distinct lack of studies that directly understand the player experience. In particular, there is a need to learn about the perception and effects of procedural design by utilizing direct user feedback such as player comments. Understanding how the dynamic nature of game worlds is experienced by players and how procedural design shapes individual game experiences can make a significant contribution to this field. In this context, analyses based on game reviews provide an important resource for assessing the effects of procedural design on players and lay the groundwork for the development of more user-centered approaches to design processes.

Theoretical Framework

This study evaluates No Man's Sky players' perceptions of procedural design in line with three fundamental approaches highlighted in game theory literature: Jesper Juul's (2005) "semi- -real" game theory, Ian Bogost's (2007) conceptualization of "procedural rhetoric," and Salen & Zimmerman's (2004) "meaningful play" theory, along with Hunicke, LeBlanc, and Zubek's (2004) Mechanics–Dynamics–Aesthetics (MDA) model. These three approaches explain how players perceive in-game systems, under what conditions a game offers a meaningful experience, and in which situations procedural diversity results in emotional satisfaction.

According to Juul's (2005: 163) conceptualization of "semi-reality," digital games are systems that operate according to precise rules and fictional worlds that come to life in the player's imagination. In the fictional system-derived universe, the player interacts with an algorithm-guided mechanical system while also seeking meaning. Although No Man's Sky generates over 18 quintillion planets through procedural generation algorithms, the lack of environmental narrative and coherence in these planets caused players to quickly become emotionally detached from the exploration experience in the game. Players' frequent reports of "neutral" feelings (such as comments like "I was excited at first, but then all the planets started to feel the same") corroborate Juul's claim that a narrative context does not support nonfictional rules, which become ineffective.

Bogost's (2007) procedural rhetoric theory argues that game systems are not solely for entertainment; they can also convey specific ideologies, thoughts, or emotional states through rules and processes. In No Man's Sky, the developers attached the meaning to procedural universe creation to elevate the theme of infinite exploration and freedom. However, the frequently recurring complaints of a "feeling of emptiness" and 'aimlessness' in player reviews correspond to Bogost's "simulation void" phenomenon. As players spend time on algorithmically unique but perceptually similar planets, they begin to question the rhetoric of discovery expressed by this procedural universe. Despite the different appearances of the structures, creatures, or biomes they encounter early in the game, many players note that the game dynamics remain constant, diminishing the excitement. This reveals a disconnect between the narrative the procedures aim to convey and the players' experience of the meaning.

The "meaningful play" and MDA model developed by Salen and Zimmerman (2004) and Hunicke et al. (2004) emphasize that the mechanical structures of the game must produce perceptible and contextual outcomes to create an emotional (aesthetic) impact on the player. Although numerous content types (e.g., resource gathering, building structures, trading, and exploration) are technically integrated into the No Man's Sky example, the aesthetic (emotional) satisfaction of players remains limited because a consistent narrative or feedback system does not support many of these mechanics. A large portion of players stated that, for example, discovering a planet's atmosphere or finding a rare creature has no lasting impact on the game world. This situation reveals the lack of mechanical-dynamic-aesthetic integrity, as emphasized by the MDA model.

These three theoretical approaches provide a multidimensional explanation for why procedural generation fails to translate into a meaningful gaming experience in No Man's Sky. When the content generated by the rules lacks a clear structure that the player can perceive and integrate into the context, even if they are technically powerful, procedural systems remain weak in terms of meaning production. In this context, it is crucial not only to increase content diversity in game design but also to theoretically ground how this diversity will interact with the player experience.

Space-Environment Relationship in No Man's Sky

No Man's Sky is a sci-fi-themed survival and exploration game developed and published by Hello Games. Originally released in 2016, the game allows players to explore, survive, and create their own stories in a vast galaxy containing millions of planets. The core mechanics of the game include gathering resources, building bases, trading, and interacting with various aliens (Hello Games, n.d.). The procedural design used to create spaces in No Man's Sky forms the basic structure of the game and offers diversity and exploration in a limitless universe. Procedural design algorithms randomly generate structures such as abandoned locations, historical ruins, space stations, and bases. These spaces allow players to engage in meaningful interactions in the game world (Figure 1).

Figure 1. In-game space screenshots

Abandoned locations often contain clues to the game's story and rare resources, while historical ruins offer players insight into the galaxy's past. Space stations perform many functions, such as trading, upgrading ships, and undertaking new missions (Figure 2). Players also have the opportunity to build their bases and establish a permanent place in the game world. These bases can be used for various purposes, such as resource production, defense and aesthetic design. The customizable nature of the bases contributes to the process of players expressing their personal creativity and integrating with the game world (Hello Games, n.d.).

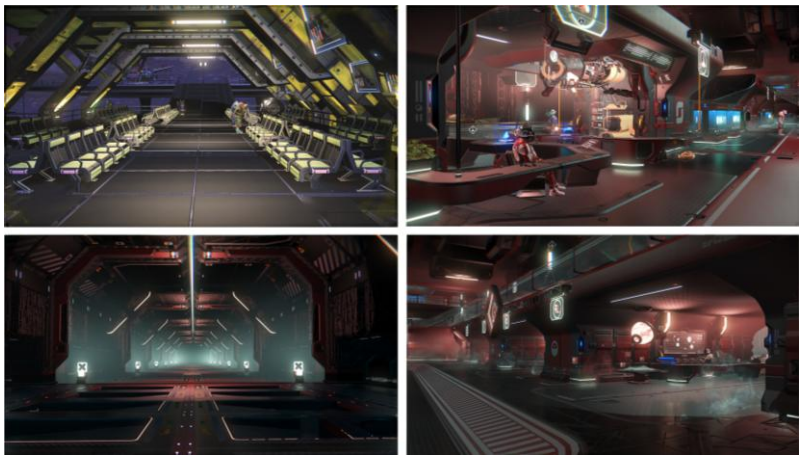

Figure 2. In-game space station interior images

Frothing-type planets are rare and visually striking in the *universe of No Man's Sky.* Owing to the intense acidic components of its atmosphere, this planet has a unique chemical structure. The round, transparent, and dynamic bubbles often seen on the surface reflect the acidic nature of the atmosphere, and their constant formation and disappearance give the planet both a lively atmosphere and visual appeal. Frothing's surface is generally eroded and mineral-rich, but vegetation is very limited. The planet's flora and fauna are limited to a few species that have adapted to harsh environmental conditions, challenging players' survival strategies. The climate is fraught with challenges, such as intense acid rain and low visibility, which necessitate careful planning for explorations (Figure 3).

Figure 3. Visual example of environmental design of the Frothing type of planets

A striking similarity exists between the round bubbles observed on the planet Frothing and the structures that players can explore in terms of space and environmental harmony. Large rings or other geometric structures

on the planet's surface create a harmonious aesthetic with the rounded contours of the bubbles. This similarity not only creates visual harmony but also demonstrates how design in the game world is integrated with procedural algorithms. The rounded forms used in the design of the spaces seem to reflect the natural elements of the planet, allowing players to experience the relationship between the environment and the spatial design more deeply (Figure 4). The constant movement of the round bubbles emphasizes the dynamic nature of the planet, while the fixed and rounded structures create an element of balance in the planet's design. These design elements enhance players' sense of exploration while preserving the naturalness of the environment. This harmony on the Frothing Planet provides an important example of how the procedural design of No Man's Sky can combine both aesthetic and functional balance. Players can experience an exploration that connects the planet's natural and artificial elements through these unique environmental and spatial elements.

Figure 4. Bubbles and circular space design on the planet Frothing

The procedural design in No Man's Sky shapes not only the geographical structure of planets but also the spatial organization and typology of buildings (Figure 5). The different architectural forms in the game, as seen in the image, demonstrate the modular design elements that can adapt based on technological level, planetary atmosphere, and the player's progress. This design philosophy enables players to distinguish between spaces during exploration while also emphasizing the variety provided by procedural generation. Each structure serves a distinct purpose; some are designed for trade and social interaction, while others are linked to survival and defense mechanics. This differentiation highlights that procedural design is not merely about random generation but rather a fundamental element that shapes players' spatial and environmental experiences.

Figure 5. Transforming Spaces through Procedural Design. Procedurally generated modular buildings in No Man's Sky showing variations in form, color, and material that create architectural diversity across planets.

Environmental design is one of the most striking features of No Man's Sky. Animal diversity, vegetation, climate, and material wealth play a significant role in the game's procedurally generated planets. Each planet contains different animal and plant species. Animals are rich in biodiversity and exhibit different behavioral patterns. Some animals are friendly, whereas others are aggressive. This diversity shapes players' interactions and strategies in the game world. On the other hand, vegetation not only defines the visual identity of planets but also has functional aspects, such as agriculture and resource gathering. Some planets may be adorned with giant mushrooms or exotic flowers, while others may be barren and devoid of vegetation.

The environment of the planet Jioka 14/G4 stands out as an area where organic and structural elements combine to form a diverse ecosystem. The perforated and organic forms on the surface appear to have emerged as a result of a biological process and are integrated with the natural environment (Figure 6). The floating purple and pink formations offer a unique visual and environmental experience. This environmental design allows players to explore the dynamics of the planet, while the organic details of the surface forms and the mobility of the floating structures provide both visual harmony and the opportunity to reflect on the ecosystem. The question of whether these structures were created by a natural process or a deliberate ecological order increases players' sense of wonder as they explore the planet. This diversity in the ecosystem deepens the discovery process and reveals the visual and functional integrity between environment and space.

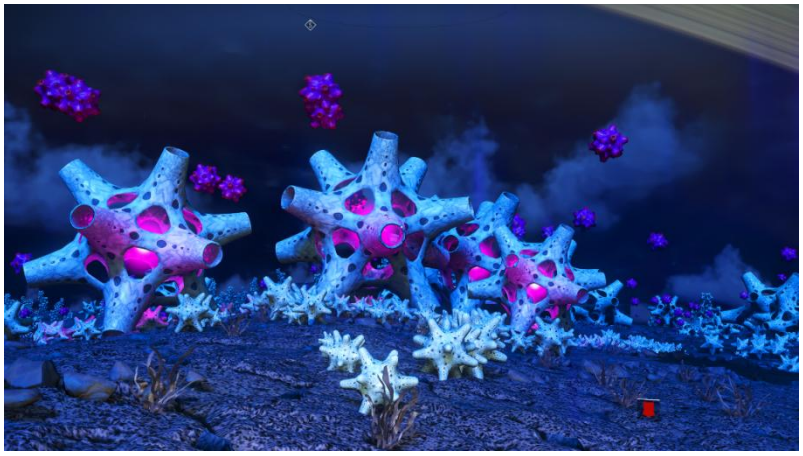

Figure 6. Surface structure and environmental forms of planet Jioka 14/G4

Climate is another important factor that directly affects the gaming experience of players. Some planets have harsh environmental conditions, such as high radiation, extreme temperatures, or toxic atmospheres, while others may be habitable and more favorable for exploration. This dynamic enables players to devise diverse strategies for survival across various planets. Material wealth provides players with a critical resource to upgrade their technology, build bases, and trade. The availability of rare materials on specific planets increases players' motivation to explore and encourages the diversity of the game world. No Man's Sky allows players not only to explore, but also to create their own unique stories within the game universe. Procedurally generated locations and environmental features provide players with a unique and personalized experience. The construction and customization of bases contribute to the process of expressing players' creativity. Dynamic interactions, especially with the environment, combined with survival and resource management mechanics, provide a deep gameplay experience. This dynamic nature of the game world allows players to constantly discover new experiences, making No Man's Sky a unique example of game design, both technically and aesthetically.

METHOD

Research Assumptions and Hypotheses

Main Hypothesis (H1): Procedural design enriches the player experience by positively affecting space and environment interactions in *No Man's Sky*.

Sub Hypotheses:

H1a: Procedurally generated spaces allow players to individualize the exploration experience.

H1b: Player-built structures provide environmental harmony and aesthetic variety through procedural design.

H1c: Major updates may influence players' awareness of spatial and environmental elements rather than directly transforming their perception.

Null Hypothesis (H0): Procedural design does not have a significant impact on space and environment interactions and does not enrich the player experience.

Research Questions

1. How is procedural design perceived in Steam user comments in the context of space and environment interaction?
2. What are the themes of players' satisfaction with or criticism of procedurally generated spaces?
3. What changes, if any, can be observed in players' awareness and interpretation of space and environment following major game updates?
4. How is playing time associated with positive or negative perceptions of procedural design?
5. What general trends emerge in Steam reviews on procedural design and perception of space over the years?

Boundaries and Scope of the Study

This research aims to analyze the effects of procedural design on space and environmental interactions in No Man's Sky based on user reviews written on the Steam platform between 2016 and 2024. The scope of the research includes understanding players' perceptions of procedural design, their interactions with spaces, and the effects of major game updates on these perceptions. The comments will be used to examine aspects of player experiences such as aesthetics, environmental harmony, and creativity in the context of digital spaces.

The limitations of the research include the fact that data were collected only from the Steam platform, and player feedback from other platforms was excluded. The subjective nature of the comments may make it difficult for the analysis results to be representative of the entire player population. The selected time frame may result in the exclusion of experiences from the initial release of the game and does not provide sufficient data for every major update. In addition, although the playing times mentioned in the comments are analyzed, it is not possible to directly measure the impact of these times on player experience. Despite these limitations, this study aims to provide a comprehensive perspective for understanding the effects of procedural design on player experience.

Data Collection

This research aims to analyze the impact of procedural design on space and environment interactions in No Man's Sky and is based on Steam user reviews. The research includes comments written on the Steam platform between 2016 and 2024. The data is taken from the dataset titled "No Man's Sky Steam Reviews (as of August 20, 2024)" shared by Silas Rickards on the Kaggle platform (Rickards, 2024). This dataset contains more than 300,000 user reviews and is released under the CC0: Public Domain license. The license terms allow the data to be freely used and analyzed (Figure 7).

Data Processing and Preparation

The dataset includes variables such as the number Steam assigns to each review (Review ID), the anonymized identities of the users (SteamID), the rating of the game as "Recommended" or "Not Recommended" (Rating), the users' written reviews of the game (Review), the date the reviews were written (Date Posted), the total time players spent in the game (Hours Played), and the number of "Voted Helpful" votes given to the reviews. This large dataset was divided into 10 equal parts for ease of analysis, and each part was processed as a separate .csv file. This was done with the help of the Pandas library using the Python programming language. Each file was structured in such a way as to preserve the date and content information of the comments and to ensure

accurate classification and analysis. The comments within each file were then categorized according to their themes and divided into separate analysis groups using specific keywords.

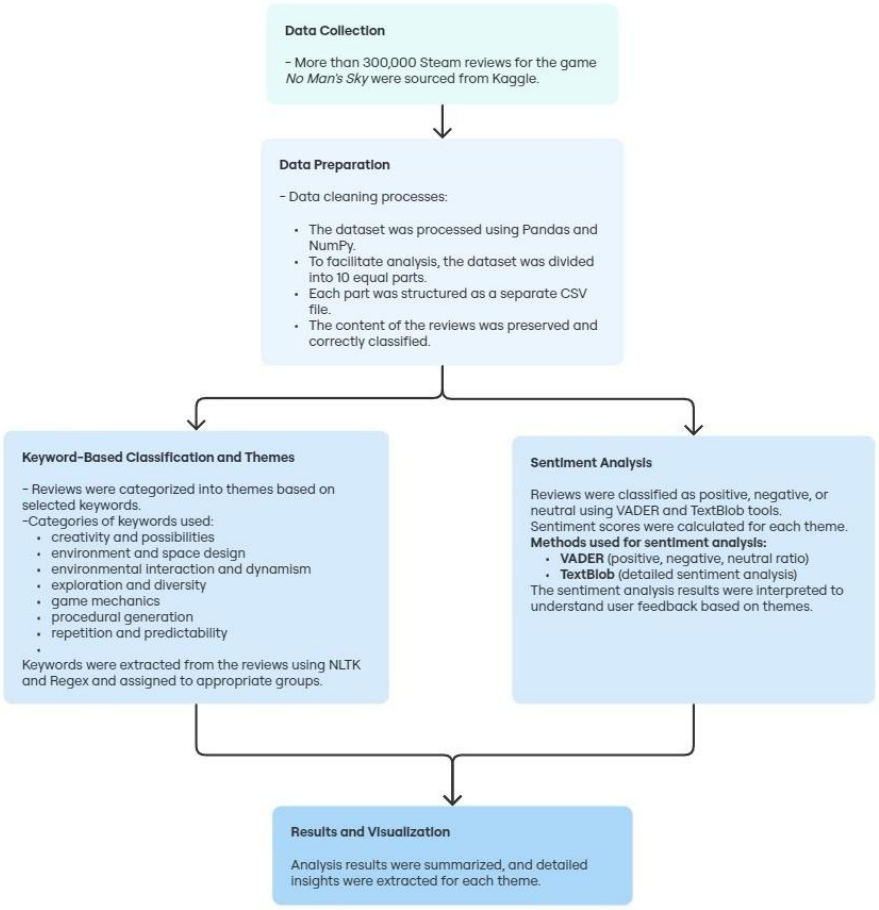

Figure 7. Data collection procedure

Categories and Keywords Used for Content Analysis

The identified categories and keywords were structured to systematically represent the semantic patterns in player comments. The categories were created based on both the core experience areas of the *No Man's Sky* game and the themes of aesthetics, interaction, and meaning production found in the game studies literature. To this end, thousands of player comments were first analyzed using natural language processing (NLP) methods to identify high-frequency words and emotional expressions. These words were then clustered according to their semantic similarities. The resulting clusters were thematically matched with the fundamental dimensions of the literature describing the gaming experience.

The Creativity and Possibilities category contains players' assessments of the game's level of creativity, innovation, and originality. In this context, the selected words "originality," "creative freedom," "innovative," "inspiration," and "unlimited" represent the freedom of design and scope for the discovery of procedural systems. The Environment and Space Design category was created to measure the emotional impact of the spatial organization and visual atmosphere of the game on players. In this category, words such as "space," "environment," "design," "atmospheric," "light," "beautiful," "atmosphere," "texture," and "scale" reflect players' perceptions of environmental aesthetics and spatial experience. The Environmental Interaction and Dynamism category was selected to evaluate the interaction between players and the environment and the responsiveness of the game world. In this context, words such as flexibility, variable, interaction, dynamic, limited, and environment help explain how the game's dynamic or limited structures are perceived. The Exploration and Diversity category is structured to understand the impact of the game's exploration-based nature on players; the words adventure, diversity, richness, uniqueness, and exploration in this category reveal players' emotional responses to the concepts of exploration and diversity. The game mechanics category

examines the relationship between players and mechanical systems and the level of meaning conveyed by these systems. The terms superficial, logical, depth, skill, action, and physical represent the cognitive, physical, and interactive aspects of game mechanics, respectively. The Procedural Generation category evaluates perceptions of algorithmically generated content in the game; the words "randomness" and "infinite exploration" enable understanding of the role of randomness and infinity themes in the player experience. The Repetition and Predictability category examines the emotional impact of repetitive structures and the predictability of the game. The words similar, change, innovation, repetition, and monotony represent the sense of uniformity associated with procedural generation, change expectation, and innovation perception, respectively.

All these categories are determined not only based on word frequency but also by considering the emotional and semantic context of the players' comments. Thus, the keywords used in this study ensure conceptual consistency and data-driven representativeness. This approach enables a multidimensional analysis of the relationship between the procedural systems of the game and player experience, strengthening the generalizability of the findings. This classification was constructed inductively in line with both the game studies' conceptual themes and the statistical trends of the dataset.

Analysis Process

The Python programming language was used for data processing and analysis. The following tools and libraries were used effectively in the analysis processes.

Data cleaning: Pandas and NumPy Libraries

Time series analysis and visualization: Matplotlib and Seaborn Libraries

Natural language processing: NLTK and spaCy Libraries

Sentiment analysis: VADER and TextBlob Libraries

Methodological Details

Comments were categorized according to themes such as procedural design, space layout, environmental aesthetics and game updates. Through language processing steps, unnecessary words were removed and the texts were made suitable for analysis. In particular, word frequency analysis was used to assess how often certain themes were discussed among players. In addition, the content of the comments contained positive, negative and neutral information, revealing the mood analysis. This comprehensive methodological framework provides a solid foundation for understanding the effects of procedural design on player experience in No Man's Sky and enhances the reliability of the data. This methodology used in the analysis process also offers a general model that can be applied in similar studies.

FINDINGS

This section presents the main findings of the study in three steps. First, it summarizes the word frequency and sentiment distributions across the seven thematic categories (Table 1, Figures 8 and 9). Second, these patterns are evaluated in relation to the main and sub-hypotheses (H1, H1a–H1c, H0). Finally, the results are interpreted through the research questions and discussed within the theoretical framework.

Table 1. Word frequency and emotional state analysis through categories

Category	Keywords	Sentence Count	Average Positive	Average Negative	Average Neutral
Creativity and Possibilities	originality	1	0.36	0.0	0.64
	creative freedom	1	0.57	0.0	0.43
	innovative	4	0.27	0.1	0.63
	inspiration	4	0.45	0.02	0.53
	unlimited	10	0.18	0.06	0.76
Environment and Space Design	space	9631	0.24	0.09	0.67
	environment	521	0.22	0.1	0.68
	design	912	0.21	0.11	0.68
	atmospheric	12	0.22	0.11	0.67
	enchanting	1	0.34	0.0	0.66

	light	256	0.21	0.1	0.69
	beautiful	125	0.5	0.05	0.45
	atmosphere	45	0.22	0.06	0.72
	texture	15	0.16	0.14	0.71
	scale	60	0.23	0.07	0.7
Environmental Interaction and Dynamism	flexibility	2	0.48	0.0	0.52
	variable	2	0.11	0.08	0.8
	interaction	43	0.18	0.07	0.76
	dynamic	14	0.42	0.04	0.54
	limited	88	0.13	0.23	0.64
	environment	521	0.22	0.1	0.68
Exploration and Diversity	adventure	154	0.49	0.04	0.47
	diversity	16	0.22	0.03	0.75
	richness	1	0.18	0.19	0.64
	uniqueness	2	0.22	0.12	0.67
	exploration	1265	0.47	0.04	0.5
Game Mechanics	superficial	1	0.23	0.05	0.72
	logical	5	0.28	0.06	0.66
	depth	50	0.23	0.07	0.7
	skill	7	0.21	0.18	0.61
	action	121	0.2	0.11	0.69
	physical	3	0.21	0.16	0.63
Procedural Generation	randomness	3	0.14	0.25	0.61
	infinite exploration	1	0.25	0.11	0.65
Repetition and Predictability	similar	60	0.22	0.06	0.71
	change	107	0.16	0.07	0.76
	innovation	1	0.44	0.0	0.56
	repetition	2	0.0	0.24	0.76
	monotony	1	0.09	0.0	0.91

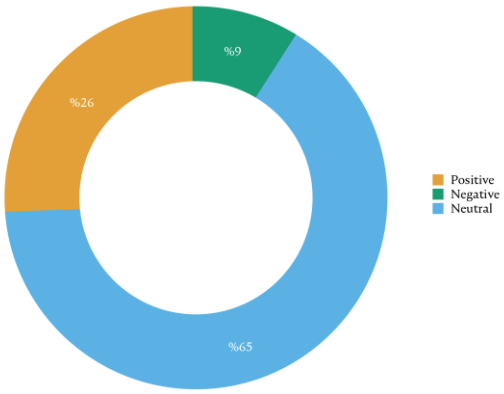

Figure 8. Weighted overall sentiment distribution of player reviews

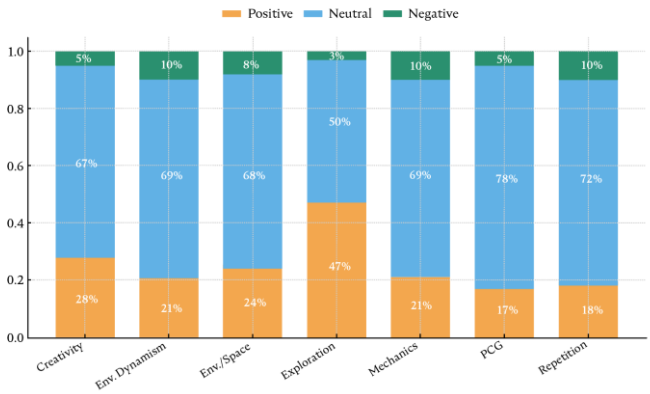

Figure 9. Weighted sentiment distribution by category

The analysis across seven thematic categories shows that No Man's Sky players' perceptions are largely neutral, with positive reactions concentrated in Creativity and Possibilities, Environment and Space Design, and Exploration and Diversity (Figure 8). The fact that neutral sentiment rates range from 60% to 75% across

all categories indicates that players notice the design elements, but that these do not create a strong emotional impact. Keywords such as originality, creative freedom, innovation, and inspiration show moderately positive sentiment in the Creativity and Possibilities context, ranging from 18% to 57% (Figure 9). However, the limited frequency of these concepts suggests that while players recognize the game's creative potential, they do not place it at the center of their overall experience. Similarly, the term "unlimited" is perceived with neutral sentiment 76% of the time, indicating that the sense of scale is noticed but does not create a deep emotional connection. The environment and space design are among the most frequently mentioned aspects of the game. The words "space" and "environment" generated positive and neutral sentiments in 22%–24% and approximately 70% of the time. This shows that the game's large-scale structure is noticed, but its emotional impact remains limited. Aesthetic terms such as "beautiful" (50% positive) and "atmosphere" (22% positive) reveal that the visual design is appreciated, but these aesthetic elements fail to create a lasting impact when they are not supported by narrative or interaction.

Players show a positive tendency toward environmental responsiveness. Words such as dynamic (42% positive) and flexibility (48% positive) in the Environmental Interaction and Dynamism category reflect this satisfaction, while the perception of limited (23% negative) and variable (80% neutral) indicates that environmental constraints negatively affect the experience. The term "interaction" (76% neutral) suggests that players are aware of their interaction with the environment, but it does not achieve a sufficient level of depth. Exploration and diversity are the strongest motivating factors in player experience. The words adventure and exploration generated positive feelings at a rate of approximately 47%–49%, indicating that discovery is one of the game's fundamental sources of satisfaction. However, the fact that words such as diversity and uniqueness contain a high percentage of neutral feelings (over 70%) suggests that repetitive spatial structures weaken the sense of discovery. Terms related to game mechanics, such as logical, depth, skill, and action, were rated with neutral rates ranging from 60% to 70%. This result shows that while game systems are functional, their emotional impact is limited. Players appreciate mechanical consistency but demand more meaningful feedback and variety. The concepts of randomness (25% negative) and infinite exploration (25% positive) indicate that algorithmic diversity is both exciting and detrimental to consistency in the context of procedural generation. Even when content diversity is provided, it does not translate into emotional depth when narrative continuity is not supported.

The Repetition and Predictability category revealed the most negative emotional tendencies. Words such as *repetition*, *monotony*, and *similar* reflect a feeling of fatigue toward repetitive patterns, while terms such as *change* and *innovation* were mostly perceived as neutral (56%–76%). This shows that although players notice the updates, their experience does not change meaningfully. Overall, the findings reveal that *No Man's Sky*'s procedural systems successfully provide spatial and visual diversity but struggle to maintain emotional depth. Positive emotions are concentrated around exploration, beauty, and dynamism, whereas neutrality dominates creativity, interactivity, and mechanics. This imbalance could be addressed through procedurally generated designs supported by narrative coherence and stronger environmental feedback, thereby increasing player engagement and meaning production.

Perception of Procedural Space in Player Discourse

This section examines how procedurally generated space is experienced through six sample player reviews (R1–R6) of *No Man's Sky*. The reviews were selected and coded to provide a balanced distribution of Recommended and Not Recommended ratings. Following the analysis of word frequency and emotional tone presented in the previous section (Table 1), this qualitative reading aims to show how the categories *Exploration and Diversity* and *Repetition and Predictability*, in particular, are embodied in player discourse.

First, it can be seen that the static and repetitive structure produced by procedural design is not a negative but, for some players, a preferred feature. The player coded R1 expresses the repetition of the game in a positive way as follows:

R1 (Recommended): "I have played it on PC for a long time, and it's the game of my dreams. It might be yours too. Just remember it's not for everyone, because it's very static and repetitive, something I really like in a game." This statement illustrates the study's argument that procedural space can generate pleasure not only through variety and surprise but also through ritual, routine, and meditative repetition, with the "static and

repetitive" structure framed as a constitutive part of the "dream game" experience. Similarly, comments coded R5 and R6 emphasize the wide range of exploration offered by procedural space and a sense of "digital tourism." R5 describes the fundamental core of the game as follows:

R5 (Recommended): "Yes, if you like self directed gameplay, enjoy exploration for exploration's sake, and don't mind that while there's a lot of stuff to do, none of it is terribly deep. No Man's Sky takes the basic premise of a walking simulator … and adds gameplay building blocks on top of it that constantly reference the basic experience … instead of one wooded meadow, you have a mind bogglingly huge array of possible combinations of terrain, flora, fauna, and atmosphere."

R6 supports this feeling in more casual language:

R6 (Recommended): "There is always something to do, somewhere to explore, and places to visit. At times, it does feel stagnant, but finding new technology, places, and solar systems really keeps things fresh." Reading these two quotes together, it becomes clear that the procedural system offers players a sense of "infinite" or near-infinite variety, but that this variety operates through constant slight variations rather than "deep" gameplay cycles. Consistent with the study's central argument, the experience is based more on a richness of spatial combinations than on mechanical density. At the same time, the repetition/novelty tension, marked by terms such as "repetition," "similar," and "change" under *Repetition and Predictability*, is embodied here in player discourse through experiential language. By contrast, the negative comments coded R3 and R4 show that the same procedural logic can also trigger feelings of emptiness, meaninglessness, and boring repetition. R3 makes the following statement about the representation of the cosmos:

R3 (Not Recommended): "this game just makes space feel so real full of emptyness, and full of nothingless … do i recomand this game no SAVE YOUR MONEY BUY KERBAL SPACE PROGRAM" The phrase "space feels so real, full of emptiness" suggests that the game's spatial aesthetics convey a sense of "cosmic emptiness," while also underscoring that this aesthetic ultimately translates into an experience of "nothingness" for the player. The space, although visually convincing, is perceived as "empty" because it lacks sufficient meaningful activities.

R4 directly targets the quantitative exaggeration of procedural repetition:

R4 (Not Recommended): "This game appears to be fun for around, 10 hours or so. Unless you like doing the same exact things on 1X10^59 planets. This'll get boring. Quick." This comment embodies the "scale/density paradox" discussed in the study: Increasing the number of planets to an astronomical scale is, in the player's eyes, reduced to a repetition of the same action on a cosmic scale when the action repertoire is not sufficiently diversified. R4's praise of another game, *Endless Sky*, as "almost the same thing … except more interesting" shows that procedural plurality alone is not enough to be engaging; spatial diversity produces an "empty crowd" when meaningful ludic differences do not support it. Among the selected comments, the short expression coded R2 points to the cultural discourse and meta-narrative surrounding the game:

R2 (Recommended): "I've had the game since launch. Internet Historian literally hit the nail on the head with this one." This sentence does not detail the player's own experience but instead refers to a popular YouTube video discussing the game. This suggests that the reception of procedural design is shaped not only by individual player–space relations but also by a wider network of collective commentary.

Overall, the comparative analysis between R1–R6 shows that procedural design can be experienced simultaneously as "endless exploration" and "endless repetition." For some players, the static and repetitive structure produces a calming, meditative, "dream game" effect (R1, R5, R6), whereas for others it generates feelings of emptiness and frustration (R3, R4). This bidirectional perception supports the study's central argument that procedurally generated space gains value in the player experience only when combined with design framing, expectation management, and meaningful variation in activities.

Main Hypothesis (H1)

The main hypothesis that procedural design enriches the player experience by positively influencing space and environment interactions in No Man's Sky is partially supported based on the data analysis. The keywords "space" (n = 9631) and "environment" (n = 521) related to environment and space design indicate that players

notice these elements on a large scale but remain neutral in terms of emotion. The 24% positive emotion rate for space indicates that the effects of procedural design are positive, but the 67% neutral rate suggests that these effects are limited. This suggests that H1 is only supported under certain conditions.

Sub Hypothesis 1 (H1a)

H1a: Procedurally generated spaces allow players to individualize the exploration experience.

The keyword Exploration (n = 1265) indicates that players are generally satisfied with the exploration mechanics, with 47% expressing positive sentiments. However, the 50% neutral rate suggests that this individualization experience is limited for some players. Similarly, adventure (n = 154) emerged as a significant factor in increasing player motivation, with a 49% positive rate. Although these results confirm the potential of procedural design to individualize the exploration experience, they suggest that H1a is only partially supported due to the high neutral rates.

Sub-Hypothesis 2 (H1b)

H1b: Player-built structures provide environmental harmony and aesthetic diversity through procedural design.

The 21% positive rate of the keyword design (n = 912) reveals a limited potential for procedural design to create aesthetic diversity. Beautiful (n = 125), with a positive rate of 50% indicates that environmental elements are aesthetically pleasing, while diversity (n = 16), with a positive rate of 22% indicates that this diversity should be emphasized more. These data provide limited support that procedural design provides environmental adaptation and aesthetic variety; therefore H1b is partially confirmed.

Sub-Hypothesis 3 (H1c)

H1c: Major updates may influence players' awareness of spatial and environmental elements rather than directly transforming their perception.

Major game updates have a limited effect on players' awareness of spatial and environmental elements. The keyword innovation (n = 1) was associated with a 44% positive and 56% neutral sentiment, suggesting that while updates were acknowledged, their emotional impact remained minimal. Similarly, the keyword change (n = 107) showed a limited positive perception (16%) and a predominant neutral response (76%), indicating that these updates did not substantially alter players' perception or emotional engagement with space and environment. Therefore, the findings suggest that major updates may raise awareness of new environmental features without significantly transforming how players perceive or experience these spaces.

Null Hypothesis (H0)

H0: Procedural design has no significant effect on space and environment interactions and does not enrich the player experience.

The analysis results show that procedural design has certain positive effects on the perception of space and environment. For example, high positive rates for keywords such as "beautiful" and "exploration" suggest that players are satisfied with the visual and exploration elements. However, the overall high proportion of neutrals (50-76%) suggests that the impact of procedural design is limited. Therefore, although hypothesis H0 is rejected, it is concluded that the effects of procedural design should be optimized.

The impact of procedural design in No Man's Sky is generally perceived positively by players; however, these effects are limited and usually confined to neutral emotions. Elements of procedural design, such as individualization, aesthetic variety, and novelty, need to be made more prominent and effective to enrich the player experience. These findings suggest that game designers need to restructure procedural production processes to create a deeper emotional connection. Procedural design is notable for promising variety and uniqueness, offering players a wide range of exploration possibilities. However, questions such as how this design approach is perceived by players, which themes generate satisfaction or criticism, and how major updates affect these perceptions remain to be answered for a deeper understanding of the game experience. This article examines player perceptions by focusing on five key research questions about procedural design and aims to provide implications for game design processes.

1. How is procedural design perceived in Steam user comments in the context of space and environment interaction?

According to Steam user comments, procedural design is considered a technical achievement. However, the keywords space (24% positive, 67% neutral) and environment (22% positive, 68% neutral) indicate that this design approach has a more neutral effect on players. This suggests that while players appreciate procedural design, they expect these spaces to be designed to create deeper emotional connections. In particular, an approach that emphasizes visual storytelling and spatial aesthetics may shift this perception in a more positive direction.

2. On which themes do players' satisfaction or criticism of procedurally generated spaces concentrate?

While players are satisfied with exploration mechanics (exploration, 47% positive) in procedurally generated spaces, they feel deficiencies in themes such as diversity (diversity, 22% positive, 75% neutral) and uniqueness (uniqueness, 22% positive, 67% neutral). In addition, repetition (repetition, 24% negative) and limitations (limited, 23% negative) are among the most frequently cited criticisms. These findings suggest that players need more unique and dynamic spaces. Game designers should consider mechanics that minimize repetitive designs and increase variety, which may increase player satisfaction.

3. What changes, if any, can be observed in players' awareness and interpretation of space and environment following major game updates?

Although the study initially assessed the impact of major updates on players' perceptions of space and environment, the analysis revealed that these effects are limited. Instead of claiming a direct causal relationship, this section now interprets change and innovation as indicators of players' awareness of updates rather than their emotional evaluation of them. Players' comments show that while updates are noticed, they rarely alter the overall perception of the environment or spatial experience. Therefore, this analysis's scope was moderated to reflect correlation rather than causation.

4. How is play time related to positive or negative perceptions of procedural design?

Playing time has a significant impact on perceptions of procedural design. Long-term players tend to complain about repetitive designs and a sense of monotony, whereas short-term players focus more on visual aesthetics and exploration. This difference highlights the need for customized design approaches based on playing time. For example, deeper storylines and dynamic content could be developed for long-time players, while mechanics that reward exploration could be designed for short-time players.

5. What general trends on procedural design and perception of space emerge in steam reviews by year?

Over the years, there have been clear trends in players' perception of procedural design and space. While interest in exploration mechanics has remained consistent, criticism of repetitive content has increased. This trend can be considered as a reflection of increasing player expectations with technological developments. Presenting procedurally designed spaces in an innovative and engaging way is critical to respond to these rising expectations.

The results of the analysis reveal that although procedural design is often recognized by players, it is mostly perceived in a neutral emotional context. For example, the keywords "space" (67% neutral) and "environment" (68% neutral) indicate that players notice space and environment elements on a large scale, but that these elements are limited in creating an emotional impact. Similarly, the keywords "exploration" (50% neutral) and "dynamic" (54% neutral) indicate that exploration and environmental dynamism are salient to players but fail to create a strong connection. These high neutral rates suggest that procedural designs fail to have a truly profound impact on players.

There may be several reasons for such high neutral perceptions. First, procedural design's tendency to create a repetitive perception of space and content may lead players to find their experience limited. Comments expressed through terms such as "repetition" (76% neutral, 24% negative) and "limited" (64% neutral, 23% negative) indicate that players perceive a lack of variety and uniqueness. Moreover, the insufficient delivery of innovations appears to be another contributing factor. The keywords "innovation" (56% neutral) and

"change" (76% neutral), which were analyzed in relation to major updates, reveal that players recognize these innovations but do not consider them as a meaningful experience transformation. The algorithmic and randomized nature of procedural designs is another important reason why players struggle to connect emotionally with the game world. While spatial designs and environmental details are aesthetically noticeable, the lack of strong storytelling or the creation of meaningful spaces can limit this connection. Finally, differences in player profiles and playing time can also affect this perception. Long-term players may take a more critical approach due to repetitive elements, while short-term players may have a more superficial experience.

This suggests that procedural design should be improved to increase players' emotional engagement. An approach that reduces repetition and predictability and emphasizes dynamic and unique content should be adopted. Furthermore, major updates should not be limited to technical improvements, but should include innovations such as story and space design that transform the player experience. A design approach that prioritizes visual storytelling and spatial aesthetics can help players develop a stronger connection with the game world. In this regard, it is suggested that future research should focus on player profiles, playing time and individual interpretation details, examining the causes of neutral perceptions in more depth. Such analyses can contribute to identifying shortcomings of procedural design and developing concrete strategies to improve the game experience.

Theoretical Interpretation of Findings

The findings of this study align with established approaches in the game theory literature. The limited emotional engagement observed in player comments is consistent with Juul's (2005) concept of semi-reality; it demonstrates that purely procedural systems cannot sustain interaction without narrative coherence. Similarly, Bogost's (2007) procedural rhetoric approach explains why, unsupported by contextual cues, algorithmic diversity fails to create meaning. Finally, Salen and Zimmerman's (2004) meaningful play framework and Hunicke et al.'s (2004) MDA model reveal how the disconnect between mechanics and aesthetic experience explains why procedural diversity does not always create satisfaction. These theoretical perspectives demonstrate that meaningful and emotionally engaging game worlds can only be produced when the designer's intent is balanced with procedural generation.

CONCLUSION

Although the effects of procedural design in No Man's Sky are generally perceived positively in terms of players' perceptions of space and environment, these perceptions are mostly limited to neutral emotions. The results suggest that players recognize procedurally generated spaces but do not generate sufficient emotional connection. The players frequently mentioned the keywords "space" and "environment," but the high neutral rates (67% and 68%) indicated that these elements are not sufficiently expressive. Similarly, while the exploration mechanics (exploration, 47% positive) were appreciated, the lack of individualization and the limited variety of this experience prevented players from forming a stronger bond. Regarding comments related to innovations (innovation, 44% positive), although players recognized updates, their impact was not widespread and did not significantly change the overall experience of the game.

Players generally perceive procedural design as a positive element; however, repetitive space designs and limitations cause negative reactions, which is consistent with the research questions. Major game updates had a limited impact on players' perception of space and environment and did not significantly affect their experience. There also appears to be a clear correlation between playing time and perceptions of procedural design, with long-term players often complaining of repetition and monotony. In contrast, short-term players focus more on visual aesthetics. Over the years, player comments have indicated a continued interest in exploration mechanics, alongside increased criticism of repetition and limitations.

Considering these findings, game designers should take steps to improve procedural design. Visual storytelling and spatial design should be integrated with the story to create a stronger emotional connection between spaces and players. Increasing the elements of exploration and variety by offering dynamic and unique locations, rather than repetitive content, is also important. Updates should not only include technical improvements but

also incorporate innovative features that enhance the game's story and spatial interactions. By developing dynamic and adaptive spaces, individualized experiences can be offered that change according to the way players play. This can make players' experiences more meaningful and satisfying.

For future academic work, more in-depth analyses should be conducted on why neutral rates are so high, the effects of dynamic spaces on player strategies, and comparative analyses of procedural design in different game genres. Detailed sentiment analysis of players' preferences and behaviors can increase the effectiveness of design processes. In conclusion, procedural design is recognized and perceived positively by players. However, its effects must be strengthened and structured to increase player satisfaction. These findings can shed light on game designers and academic studies, enabling more effective and meaningful use of procedural design.

Authors' Contributions
The authors contributed equally to the study.

Competing Interests
There is no potential conflict of interest.

Ethics Committee Declaration
The study does not require ethics committee approval.

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Figure 1-4, 6: *No Man's Sky* (PC version) [Video Game]. (2016, August 12). Hello Games.

Figure 5: Beau Lamb. (n.d.). *No Man's Sky.* Art Station. https://www.artstation.com/artwork/0O554 (12.10.2024).

Authors' Biographies

Onur Aşkın received his Proficiency in Art degree from the Institute of Fine Arts, Department of Graphic Design at Mimar Sinan Fine Arts University with his thesis titled "Investigation of Typography in Mixed Reality Technologies in the Context of Time, Space, Movement, and Interaction." His research interests include visual communication design, game design, game experience, human-computer interaction, mixed reality, virtual reality, and typography. He is currently an Assistant Professor in the Department of Digital Game Design at Doğuş University.

Gülsüm Damla Aşkın completed her doctoral thesis on creative thinking in interior architecture education at Mimar Sinan Fine Arts University in 2020. Her research interests include creative thinking, space, gamification, and interior architecture education. She is currently an Assistant Professor in the Department of Interior Architecture at Doğuş University.

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Research Article

Reimagining facade design using a collaborative gamification approach for enhanced form-based codes: 15 Khordad Street in Tehran

Assoc. Prof. Dr. Amir Shakibamanesh[1*], Maryam Nargeszadeh[2], Asst. Prof. Dr. Mahshid Ghorbanian[3]

[1]Iran University of Art, Faculty of Architecture and Urban Planning, Department of Urban Design, Tehran, Iran.
a.shakibamanesh@art.ac.ir

[2]Iran University of Art, Faculty of Architecture and Urban Planning, Master of Urban Design, Tehran, Iran.
pnargeszade@gmail.com

[2]Iran University of Science and Technology, School of Architecture and Environmental Design, Department of Landscape Architecture, Tehran, Iran.
ghorbanian@iust.ac.ir

*Corresponding Author
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Abstract
This study presents a novel methodological innovation by integrating the Delphi technique into a gamified evaluation framework, offering a new hybrid approach to collaboratively developing Form-Based Codes (FBCs). The primary goal is to increase the flexibility and participatory nature of the design process. The research focuses on a segment of 15 Khordad Street in Tehran, where facade design was re-envisioned via a collaborative digital platform using the Delphi technique. Based on literature review and a survey, the study provides a deep understanding of the area's design dynamics. Facade design alternatives were developed and interactively modeled using Unity3D. This interactive environment allowed urban designers exploring various design permutations and selecting their preferred facade elements based on the FBC alternatives. The collective preferences were then synthesized to identify an optimal facade design for the area. Findings revealed that 44% of participants favored a setback pattern, showing a strong preference for a specific urban design approach. By incorporating gamification into the FBC selection process, the study aims to shift urban design from a product-centric approach to a more dynamic, process-oriented, and participatory methodology. This research highlights the potential of gamification in transforming traditional urban design practices into more flexible, inclusive, and cyclical processes.

Keywords: Unity 3D, Gamification, Collaborative design, Form-based codes, Urban facade

Extended Abstract

Introduction: The management of urban aesthetics, particularly in historically and commercially significant zones like Tehran's 15 Khordad Street, presents a complex challenge that traditional planning methods often fail to address effectively. Conventional approaches to urban design frequently rely on static, product-centric regulations that prioritize physical outcomes over the social and collaborative processes essential for successful implementation. These

conventional, top-down methods often lead to exclusionary design practices, neglecting the crucial dynamics of citizen participation and local knowledge necessary for sustained urban vitality. While Form-Based Codes (FBCs) have emerged as a powerful regulatory tool focused on the physical form and public realm, their formulation is often criticized for being top-down and lacking flexibility. This rigidity stems from a fundamental theoretical weakness: treating the city and its visual context as a fixed entity rather than a living, evolving ecosystem. This research argues that to bridge the gap between rigid design codes and the dynamic nature of urban life, a paradigm shift towards a "process-oriented" approach is necessary, focusing on methods that facilitate collective intelligence and iterative refinement. The current practice's failure to engage effectively with multiple stakeholders necessitates the exploration of innovative platforms. By integrating "Gamification" and "Serious Games" into the urban design process, this study seeks to create a collaborative platform. This approach fundamentally redefines participation, transforming passive feedback into active co-creation and decision-making. This methodology not only facilitates the democratic selection of design criteria but also allows stakeholders to visualize and manipulate design variables in real-time, thereby transforming the drafting of FBCs from a purely technical task into an interactive, consensus-building experience rooted in the specific context of the city.

Purpose and scope: Urban design often suffers from a product-centric focus and superficial participation. This study employs a novel and systematic methodological framework to formulate Form-Based Codes (FBCs) for facade design, moving beyond generic standards to embrace specific socio-cultural contexts. The research is precisely focused on a highly sensitive segment of 15 Khordad Street in Tehran, a historically and commercially vital area adjacent to the Grand Bazaar. This particular context necessitates the establishment of a robust participatory mechanism that is especially vital for preserving the authentic cultural heritage and traditional architectural patterns that define the Bazaar's environment. The central aim is to design and test a structured collaborative process for evaluating and refining urban design choices with expert designers and local stakeholders. This process is engineered to facilitate iterative input and refinement, leading to the collection and synthesis of collective preferences. The ultimate goal is the identification of optimal design patterns that are rooted in consensus and local values, thereby transforming qualitative input into quantifiable FBC recommendations. Ultimately, this research aims to transform urban design from a rigid, static framework into a more dynamic, process-oriented, and genuinely participatory approach. The study seeks to balance the necessity of regulating the built environment with the need to respect the area's rich historical context and respond to contemporary needs. Furthermore, the research intends to propose a flexible, generalizable framework adaptable to other cities and cultural settings, promoting inclusive urban planning practices internationally.

Method: By using the survey method, a deep understanding of the selected area was achieved, and based on the proposed framework, this area was modeled and gamified using the Unity 3D game engine, chosen for its capability to render realistic, navigable environments essential for spatial assessment. For achieving desired form-based codes, the Delphi technique is used with a group of 20 urban design professionals. To ensure validity and reliability, the Delphi results were cross-checked by an additional expert panel. The method presents permutations of alternatives, where a simplified control interface was implemented to minimize the influence of participants' digital literacy. In this virtual environment, users navigate and select the best facade design options considering usage type. Finally, by compiling the selected alternatives, the desired form-based codes are presented.

Findings and conclusion: Based on the results from the choices made by the participants, the optimal alternative for each building and, ultimately, the selected pattern by the target group for the entire test area is presented. With these selected form alternatives, it's now possible to introduce the optimal pattern for the study area. As observed in the above Figure, 44% of the participants have chosen a setback pattern for the entire area. This preference indicates a significant inclination towards a specific urban design approach that could potentially influence the overall aesthetic and functional characteristics of the area. Finally, this research underscores the transformative potential of gamification in urban design, particularly in the formulation and application of Form-Based Codes (FBCs). By integrating gamification, the study demonstrates a paradigm shift from traditional, product-centric urban design approaches to more dynamic, process-oriented, and participatory methodologies. This shift is crucial in addressing the multifaceted and evolving nature of urban design challenges. The findings from this research highlight the importance of incorporating flexibility and adaptability in urban planning processes. The gamified approach allowed for the examination of a multitude of design permutations, offering a more comprehensive understanding of the potential impacts and outcomes. This approach is particularly beneficial in historical and culturally significant contexts like Tehran, where preserving the urban fabric while accommodating modern needs is crucial.

Keywords: Unity 3D, Gamification, Collaborative design, Form-based codes, Urban facade

INTRODUCTION

In contemporary urban design, a critical issue is the prevalent focus on architecture as a standalone element of city design, often characterized by an excessive emphasis on the physical attributes of structures to the detriment of a holistic, interdisciplinary approach. This approach, which tends to overlook the underlying causes of urban challenges, results in a perception of urban design as a finite product rather than an evolving process intertwined with social and political dynamics (Bahraini and Aminzadeh, 2006: 15). In recent years, the process-oriented approach to urban design has gained traction among theorists and practitioners. This approach underscores the importance of comprehensive problem identification, the exploration of diverse and multiple solutions, and the facilitation of implementation processes. It emphasizes logical and transparent decision-making, which is vital for integrating various stakeholder perspectives and fostering public participation in the design process (Hassan & Hamari, 2020). This methodology is instrumental in addressing complex urban challenges, as it facilitates the correction and evaluation of decisions, enhances the efficiency of design processes, and organizes different stages of design in a coherent manner (Behzadfar & Shakibamanesh, 2009: 4; Salimi et al., 2023; Shakibamanesh & Kokabi, 2022). An essential principle in developing urban plans is the maintenance of flexibility, inclusivity, diversity, and the provision of multiple options. Each plan must be adaptable to existing contexts and should be open to continual revisions, steering clear of rigid and unalterable approaches. This necessitates a comprehensive evaluation of all aspects and potential alternatives across various temporal and spatial dimensions (Barati et al., 2019: 16).

Furthermore, it is essential to directly and simultaneously engage designers, stakeholders, and decision-makers in the plan production and decision-making process to promote acceptable solutions (Marcucci et al., 2018: 119). This appropriate and effective connection is emphasized in modern urban design approaches for developing effective, creative, and appropriate solutions for complex problems. In fact, when faced with complex problems, often there is no single correct solution, which makes the participation, interaction, and reaching an accepted outcome by influential groups in the design process especially important (Bakhanova et al., 2020: 3). Therefore, a participatory approach among urban design experts in preparing and developing proposed plans seems necessary; because solving complex and multidimensional urban problems with a static view, relying on the perspective of a single designer, and focusing only on specific aspects and dimensions of a plan is neither possible nor acceptable (Macintosh & Whyte, 2008).

Form-Based Design Codes

Form-based codes are tools for regulating development to achieve a specific urban form. These codes can be applied across all design and planning scales, from a region to a collection of blocks and buildings. They address the relationship between building facades and the public realm, building form and massing, human scale, and various types of streets and blocks through urban regulations (Kan, 2012: 16; Elliott et al., 2012). The primary goal of form-based codes is to systematize the elements and spaces of the city, including buildings, facades, surrounding streets, and open spaces, to produce a predictable outcome in construction and create a more attractive built environment with higher quality, respecting human scale and providing a sense of meaningful place (Khalid Sbri, 2016: 3). Form-based codes typically offer a range of uses that are carefully selected to maximize compatibility between uses and the physical form of the area (City Council of Cincinnati, 2013: 1). Table 1 presents the key features of form-based codes (Adapted from Kan, 2012: 22; Ebrahimi, 2016).

Table 1. Key Features of Form-Based Codes (FBC)

Feature	Description
Vision-Oriented	These codes pursue significant objectives in creating built forms and urban designs at a human scale.
Purposeful	Form-Based Codes are intentional, focusing on transforming and organizing space.
Place-Centric	These codes concentrate on location, adaptable to various geographical, climatic environments, potential developments, and sensitive conservation conditions.
Holistic Approach	FBCs view urban space design from a comprehensive, multi-faceted perspective, formulated based on community needs.
Integration	Form-Based Codes can be aligned with infrastructures, buildings, spaces, and landscapes.
Mandatory	FBCs are obligatory for realizing the comprehensive vision of a community.
Adjustable	Form-Based Codes are adaptable, requiring regular revision in line with the evolving desires of communities.

Form-based codes typically encompass "eight main components": a regulating plan as a framework for understanding form-based codes, standards for public spaces, block standards, building type standards, building form standards, frontage type standards, architectural standards, and a summary. In addition to these components, other optional elements, such as green building standards, can be included in the code based on community needs (Khalid Sbri, 2016: 16). A vital element to ensure that a form-based code is appropriately and effectively compiled is the "process" by which it is created. The three main stages of form-based code development include: "documentation, visioning, and code summarization" (Parolek et al., 2008: 11). Form-based codes are often presented in the form of diagrams and text, usually tailored to a project by the designer, and after approval, conveyed as regulations. There is often less use of consultative and participatory approaches in the production and final selection of these codes (Kan, 2012: 17).

Collaborative Design: Concept and Levels

Participation involves transparency, openness in the community space, and plurality in the public domain, requiring a space where individuals can influence decisions that affect their fate. This includes people's involvement in all aspects of policy-making, prioritization, monitoring, implementation, follow-up, and all stages of providing social services (Bazi et al., 2017: 155). Participation can involve engagement at various levels of design, implementation, evaluation of programs, and benefiting from them. Participation can be defined as the conscious, voluntary, collective, and more or less organized action of individuals and groups towards collective goals, needs, and benefits at all macro, meso, and micro levels (Fazeli et al., 2015; Abdullahpur & Barakpur, 2019). Sensitive and competent experts must provide the necessary conditions for participation and expert assistance to allow people to participate more effectively in the development of programs or opposition to them (Sharafi and Barkpour, 2010: 40). The role of experts is not merely to present final and unchangeable solutions but to improve and complete solutions through continuous dialogue with the public. Experts focus all their energy on increasing citizens' awareness. Therefore, solutions result from the relationship between two groups: first, the opinions of experts who provide technical information, and second, the opinions of citizens (Sharafi, 2010: 26).

Various theories about levels of participation have been presented, where lower levels of participation encompass the "public right to know and be informed" about project subjects and design actions. The intermediate level involves participation in "determining interests and agenda" and "evaluating risks and recommending solutions." The highest level of participation is achieved when it takes the form of "participation in decision-making" (Münster et al., 2017: 2393). In this type of participation, citizens are involved in decisions about the quality and direction of their lives. This level of participation is based on the following principles (Sharafi and Barkpour, 2010: 39):

- There is no best solution to design problems. Each problem has more than one solution.
- Experts' decisions are not necessarily better than those of ordinary people. In decision-making, the realities should be stated first so participants can examine and choose from the available options. In such a method, the designer or planner should be considered a participant, determining and discussing the outcomes of possible options and expressing their opinion, rather than choosing from among the options, as other participants do.
- The work of design and planning should be clarified and made understandable. The options considered by experts are frameworks in their minds that need to be brought to the surface for discussion.
- After understanding the details and reviewing the options, participants can present their designs, not just react to ready-made plans.

Serious games and gamification: Enhancing public participation in urban design

Serious games, designed for purposes beyond entertainment, have emerged as significant tools in various fields for enhancing user interaction and facilitating inclusive participation among stakeholders, including vulnerable groups (Bakhanova et al., 2020: 3). These games allow decision-makers to experiment with diverse strategies in a virtual setting, a method that is often less feasible in real-world scenarios due to cost and risk factors. The low-risk environment of serious games provides a secure platform for creativity and experimentation, leading to more profound learning experiences and improved decision-making (Shakeri, 2016: 55; Shakibamanesh, 2014).

Gamification, a relatively new concept, aims to heighten user engagement and address specific issues or behavior patterns within a target community by infusing elements of entertainment (Zarrin Bal Masouleh, 2018: 15). In the context of urban planning, digital games facilitate knowledge transfer, participation, and interaction, thereby enhancing the learning process (Al-Dalou & Abu-Shanab, 2013; Lironi, 2016). These games, often integrated with digital storytelling technologies and mobile media, serve as valuable tools for cultivating social interaction (Shakeri, 2016: 17; Thiel, 2017).

A key benefit of using games in participatory processes is their capacity to present complex spatial concepts in a simplified, game-based environment, thereby making it easier for players to understand and interact with these concepts (Johansen & Pedersen, 2019: 31). While this approach might sacrifice some degree of precision, it significantly enhances user engagement and comprehension. However, the development of accurate, three-dimensional games can be resource-intensive. Hence, the feasibility of such games in participatory processes depends on balancing complexity with simplicity, ensuring that games are either straightforward or intricately designed yet reusable (Johansen & Pedersen, 2019: 23; Vanolo, 2018; Yen et al. 2019).

Gamification should be viewed as a complement to traditional urban design and planning methods rather than a replacement. It offers a way to define potential solutions without altering the fundamental problem-solving approach (Johansen & Pedersen, 2019: 30). For successful gamification, it is crucial to recognize that it is a process-oriented activity, requiring constant adaptation to changing user needs. It is also purpose-driven, necessitating a clear understanding of its objectives and ongoing monitoring of user interactions (Zarrin Bal Masouleh, 2018: 18 and 19).

Analysis of successful and unsuccessful gamification implementations suggests several factors critical for its effectiveness:

- Providing participants with a clearly defined and aspirational goal.
- Stimulating user curiosity.
- Creating a sense of achievement and victory.
- Offering consistent and constructive feedback.
- Delivering meaningful and performance-appropriate rewards.
- Aligning challenges with user capabilities.
- Personalizing user experiences.
- Encouraging social participation and publicizing user progress.
- Fostering a competitive yet collaborative environment.
- Cultivating a sense of progress and achievement among participants.

Serious games, as articulated by Michael & Chen (2006), are defined by their educational or practical objectives, employing typical gaming elements like rules and interactivity to achieve specific outcomes. Zyda (2005) highlights their broad applicability across various sectors such as healthcare, military training, and urban planning, underscoring their versatility. De Freitas & Oliver (2006) discuss how these games create immersive learning environments, offering safe spaces for users to experiment and understand complex systems and processes. Djaouti et al. (2011) emphasize that serious games often incorporate real-life challenges, allowing players to engage with authentic issues, especially pertinent in fields like urban planning.

In summary, serious games and gamification represent a convergence of education, technology, and user engagement. They offer diverse solutions in various fields, including urban design, by creating platforms for experiential learning, problem-solving, and community involvement. Their integration alongside conventional urban planning methods can significantly enhance the effectiveness of participatory processes in urban design (Asghari, 2021).

Given the transformative impact of gamification on urban projects (see Andrade et al., 2017; Opromolla et al., 2015), it is pivotal to delineate the key reasons underpinning its successful integration, as outlined in the table 2.

Table 2. Factors contributing to gamification success in urban projects

Reason for Success	Brief Explanation
Increased Citizen Participation	Gamification allows active citizen engagement in urban processes, enabling firsthand experience and involvement in decision-making.
Facilitation of Complex Conceptual Understanding	This method simplifies complex urban planning concepts, presenting them in a more accessible and game-like manner, enhancing public comprehension.
Enhanced Interaction and Collaboration	Gamification promotes collaboration among individuals and groups, fostering cooperation and coordination in urban projects.
Opportunity for Trial and Error	Providing a safe environment, gamification enables risk-free experimentation, allowing individuals to learn from mistakes without irreversible consequences.
Motivation and Transformation	Gamification boosts motivation and participation, driving positive transformations in urban projects through increased engagement.
Suitable and Elevated User Objectives	Gamification presents appropriate and lofty goals to users.
Instilling Curiosity in Users	Gamification sparks curiosity among users.
Inducing a Sense of Achievement	Gamification instills a sense of victory in users by reaching predetermined goals.
Providing Feedback to Users	Gamification offers feedback to users.
Meaningful and Proportionate Rewards for User Performance	Gamification provides meaningful and proportionate rewards based on user performance.
Balance Between Designed Challenges and User Abilities	Gamification ensures a balance between designed challenges and user capabilities.
Personalization of Experiences for Users	Gamification personalizes experiences for users.
Social Participation and Display of User Progress in Social Groups	Gamification encourages social participation and showcases user progress in social groups.
Creating Competitive Spaces Among Users	Gamification creates competitive environments among users.
Stimulating a Sense of Progress and Competitiveness in Users	Gamification stimulates a sense of progress and fosters competitiveness among users.

These reasons represent key advantages that can significantly contribute to the successful execution of gamification in urban projects.

METHODOLOGY

Definition of the Problem

Traditional approaches to urban facade design are often rigid, expert-driven, and lack mechanisms for iterative collaboration and contextual responsiveness—particularly in historically sensitive environments. This results in urban design outcomes that may not align with user needs, spatial character, or evolving socio-cultural dynamics. The core problem this study addresses is how to develop Form-Based Codes (FBCs) through a participatory, flexible, and context-specific method that integrates expert judgment with interactive design exploration. The challenge lies in combining structured expert consensus (via the Delphi technique) with immersive evaluation (through gamification) to create facade design alternatives that are both contextually appropriate and collectively validated.

Therefore, the study focuses on 15 Khordad Street, selected for its strategic importance as a historical and cultural hub adjacent to Tehran's Grand Bazaar, as well as its unique morphological challenges characterized by a fragmented skyline and inconsistent architectural identities. This research contributes to urban design literature by addressing the methodological gap in participatory planning; specifically, it proposes a hybrid Delphi–gamification approach to overcome the limitations of static, expert-driven Form-Based Codes (FBCs). By using the survey method, a deep understanding of the selected area was achieved. Based on the proposed framework, this area was modeled using the Unity 3D game engine, chosen for its capability to render realistic, navigable environments. For achieving desired codes, the Delphi technique was utilized with a group of 20 urban design professionals, with results cross-checked by an independent panel to ensure validity. In the virtual environment, a simplified interface was implemented to minimize the influence of participants' digital literacy, empowering them to select preferred facade options based on usage type. Finally, by compiling the selected alternatives, the desired form-based codes are presented.

The Delphi Technique

The Delphi technique was implemented during the early design phase to identify, refine, and validate facade design alternatives. It guided the development of code parameters before the gamified environment was built. The technique involved three iterative rounds; each aimed at narrowing the options and achieving expert consensus on the visual and structural components used in the virtual tests. The study participants were 20 urban design professionals and master's graduates, selected for their expertise in urban design and familiarity with Form-Based Codes. All participants voluntarily took part in the gamified testing process. The Delphi technique was employed to gather these expert opinions on the design alternatives. The process was conducted over three rounds: the first round involved a broad range of design ideas, the second focused on narrowing the options, and the third synthesized the collective feedback into final recommendations. Based on the studies conducted in the theoretical foundations section, Table 3 illustrates the emphasis placed on the process of formulating form-based codes within the proposed framework of the study.

Panel Composition

The central research problem—how to collaboratively develop facade design codes through participatory digital tools—was introduced in the first Delphi round. The panel comprised 20 individuals, all either urban design professionals or master's graduates with at least two years of relevant experience. Their expertise ranged across architectural design, urban morphology, and heritage preservation, ensuring interdisciplinary input. These individuals were selected based on academic background and demonstrated familiarity with Form-Based Codes.

Framework Overview and Component Structure

The initial code framework was derived from the literature on Form-Based Codes. This set served as a starting point for the Delphi process. Over three rounds, panelists assessed and modified these codes to meet the study area's contextual and architectural needs. A consensus threshold of 70% agreement was used to accept modifications or additions. These refined codes then formed the basis for the design permutations implemented in the game model. To operationalize the proposed participatory framework, the research outlines a step-by-step process for developing context-specific Form-Based Codes. Figure 1 illustrates the overall workflow of the framework, highlighting the layered structure through which facade elements are analyzed and coded. Complementing this, Table 3 categorizes these layers into distinct components—ranging from spatial configuration to visual and material qualities—forming the basis for systematic evaluation and code development.

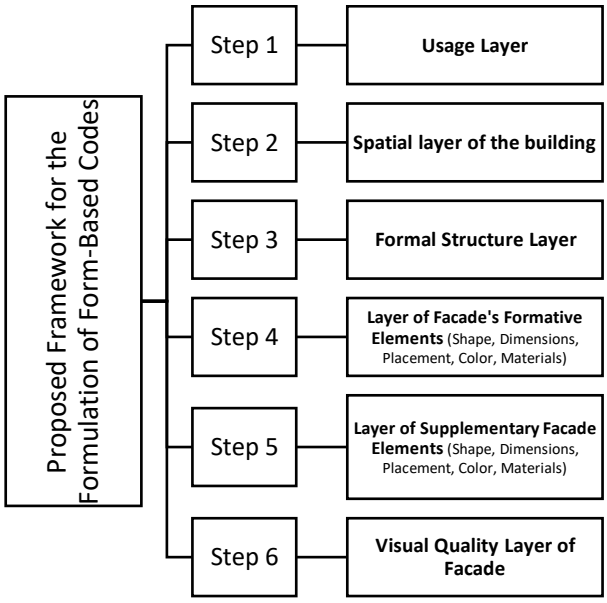


Figure 1. The process of proposed framework for the formulation of form-based codes

Table 3. Proposed framework for the formulation of form-based codes

Usage Layer				
Spatial layer of the building				
Rooftop		Upper Floors		Ground Floor
Formal Structure Layer				
Building Form (3D Structure)				Building Placement (2D Plan)
Horizontal Articulation		Vertical Articulation		Build to Line
Minimum/Maximum Building Width		Minimum/Maximum Building Height		Setback/Protrusion
Skyline Breaks		-		Min/Max Depth of Plots
-		Min/Max Height of Ground Floor		-
-		Setback/Protrusion of Upper Floors		Min/Max Width of Plots
Layer of Facade's Formative Elements (Shape, Dimensions, Placement, Color, Materials)				
Distinct Architectural Elements	Display Windows	Windows	Entrances	Balconies
Layer of Supplementary Facade Elements (Shape, Dimensions, Placement, Color, Materials)				
Canopies			Signboards	
Visual Quality Layer of Facade				
Materials		Light and Dark		Transparency
Type		Lighting		Percentage
Color Palette	Position	Amount of Light		Placement

By using the survey method and following the Delphi rounds, a deep understanding of the selected area was achieved, and based on the proposed framework, the agreed-upon facade design parameters—such as number of floors, setback type, material palette, and entry articulation—were translated into game logic within the Unity 3D platform. To achieve the desired form-based codes for the area, the Delphi technique is used; each selected parameter is embedded as a selectable design permutation. Participants in the game environment navigated through these alternatives, enabling real-time feedback loops. They are empowered to choose their preferred option for developing form-based codes to organize the facade appearance of the study area. The Delphi-based decisions informed each of the 15 design permutations per building, while the game outcomes helped synthesize the final collective preference.

FINDINGS

Case Study

The study area in this research is 15 Khordad Street in Tehran, between Naser Khosrow Street and Pamnar. This street is one of the important streets in Tehran Province; it is significant because it houses the Grand Bazaar of Tehran, which is the largest economic and functional hub of Tehran and is of great historical and cultural importance. Functionally, as the study area is located within the vicinity of Tehran's Grand Bazaar, and the land use in this area is predominantly commercial and commercial-administrative. This commercial-centric nature of the area influences various aspects of urban design, including traffic flow, pedestrian dynamics, public spaces and building facades. The focus on commercial and administrative uses also impacts the design and implementation of form-based codes, as these need to accommodate the specific functional requirements of such spaces while ensuring a cohesive urban aesthetic and maintaining the historical integrity of the area (Figure 1a).

Considering the location of the study area within the historical fabric of Tehran, the older parcels in the area often follow the pattern of a central courtyard; however, the newer parcels have adopted a construction pattern with higher density (Figure 1b). The study area demonstrates a lack of coherence in terms of height distribution, as it features predominantly older buildings ranging from 1 to 3 stories, while newer constructions are typically 4 to 5 stories. This disparity in building heights presents a challenge for urban design and planning, particularly in maintaining a balanced streetscape and preserving the historical character of the area while accommodating newer, taller structures. This aspect should be carefully considered in developing form-based codes and urban planning strategies to ensure a harmonious integration of old and new structures (Figure 1c). In terms of

materials, the commercial uses in the area predominantly feature brick, while the commercial-administrative buildings utilize a combination of brick, aluminum, and stone. This diversity in material usage adds a layer of complexity to the urban fabric, impacting the aesthetic and functional aspects of building design (Figure 1d).

Figure 2. Primary characteristics of the study area: a) Land use; b) Figure-ground; c) Building height (number of floors); and d) Building facade material

The area's lack of a consistent and uniform skyline, due to the heterogeneous distribution of building heights, further accentuates the challenge of creating a harmonious urban environment. This irregular skyline can impact the visual coherence and overall character of the neighborhood. Addressing these variations in skyline is crucial for developing effective form-based codes that can guide future development while respecting the existing urban landscape (Figure 3).

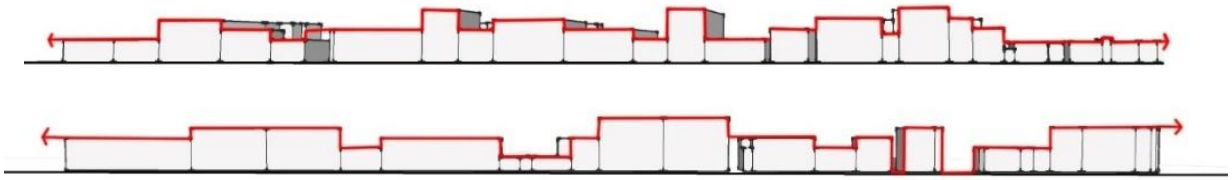
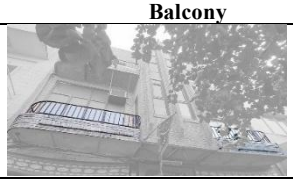
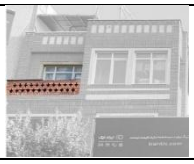


Figure 3. Skyline of the eastern facade (upper) and western facade (bellow)

Based on the impressions formed and the knowledge gained from the scope, the intended framework for providing form-based codes is presented in Table 3 and it is used to analyze the study area for developing Form-Based codes which is presented in Table 4.

Table 4. Analysis of the study area for developing form-based codes (commercial use)

Usage Layer		
Spatial layer of the building		
	Upper Floors	Ground Floor
Formal Structure Layer		
	Building Form (3D Structure)	Building Placement (2D Plan)
	Vertical Articulation	
1-3 Floors	Minimum Building Height	
3-5 Floors	Maximum Building Height	
4.60 meters	Maximum Height of Ground Floor	
4.60 meters	Maximum Protrusion of Upper Floors: 1.20 meters	
Layer of Facade's Formative Elements (Shape, Dimensions, Placement, Color, Materials)		
Balcony		
		 
Entrance		
		
Architectural Elements Emphasizing Entrance: Use of Sabat (traditional overhead arches), protrusion, incorporation of traditional Iranian architectural patterns and designs	**Heightened Entrance:** Usage of arch-shaped forms, increased height	**Enhanced Entrance:** Increased height, protrusion, material variation
Windows		
		
Display Windows		
		
Special Architectural Elements		
		
Layer of Supplementary Facade Elements (Shape, Dimensions, Placement, Color, Materials)		
Signboard		
		
Length: Proportional to the width of the plot **Width:** 60 cm **Color and Materials:** Brown, wood		**Length:** Proportional to the width of the plot **Width:** 60 cm **Color and Materials:** Brown, wood | Blue, tile
Visual Quality Layer of Facade		
Materials		
Type: Stone **Color Palette:** White	**Type:** Stone and Brick **Color Palette:** Cream-colored Stone and Red Brick	**Type:** Brick **Color Palette:** Commercial usage predominantly features Cream and Red Brick

Developing the Proposed Model and Research Tests

The study area includes both eastern and western facades. However, to prevent imbalance in the number of designed tests and to maintain consistency in terms of land use types and building forms, the eastern facade is selected as the test area. For conducting the tests, the existing buildings within the named area will be identified and labeled, and then the tests will be applied to them (Figure 4). This focused approach allows for a more controlled and detailed examination of the impact of form-based codes and design interventions.

Figure 3. Coded buildings ma

Based on the form-based codes framework of the study area, the algorithm depicted in Figure 5 has been selected from the identified patterns of the area. It will be used in the gamified model and in the design of research tests.

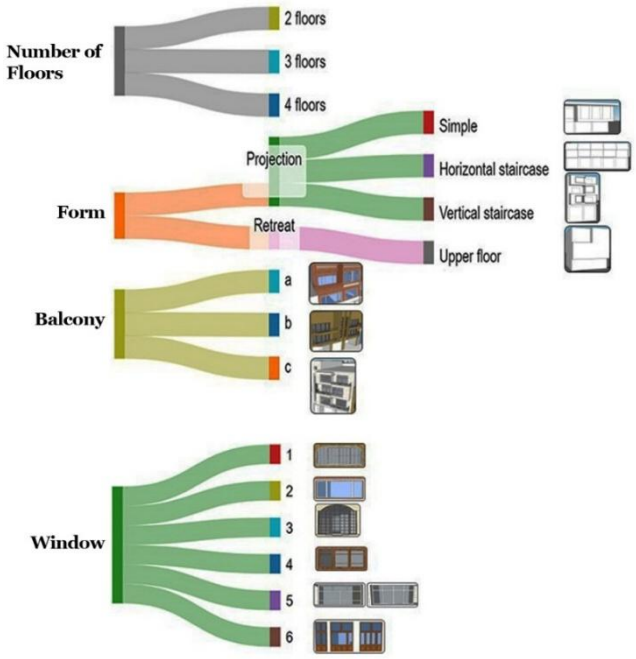


Figure 4. The Selected algorithm for the developed gaming model and design of research experiments

According to this algorithm, each building comprises 15 permutations, with the number of floors, form, window and balcony types, and materials varying across plots. This allows participants to observe changes in the area's structure by altering each building, thereby selecting their preferred option. Plots with suitable existing patterns in the area are considered fixed, so changes to each plot are made in accordance with those

patterns. SketchUp software was used to model the area, with every effort made to replicate its existing conditions closely. The modeled environment was then transformed into a game in the Unity 3D engine, designed from a human perspective and at a human scale. To further simulate the environment's reality, real ambient sounds were used in the game space. Additionally, participants can move at different speeds and change their viewing direction within the environment, providing a sense of freedom of movement as if they were in the actual environment (Figure 6).

Figure 5. Designed game environment

In the game environment, buildings that can be modified are marked with their respective designated letters (Figure 7). In front of each, there is a sign indicating the key corresponding to the code of that building. The user observes the building modifications by pressing the respective key on their keyboard.

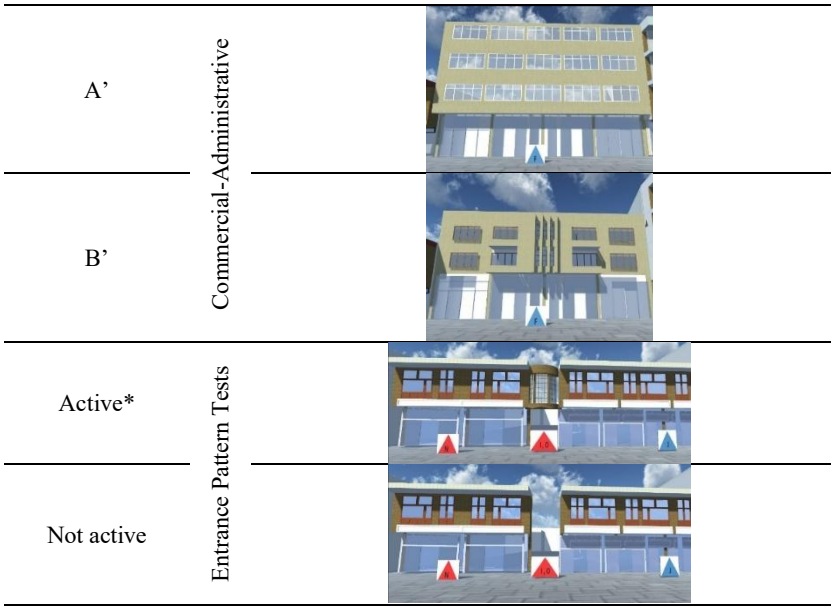
Figure 6. Naming of target buildings in the test

As mentioned, each building in the area has 15 different permutations. An exception is building H, which has a commercial-administrative use and therefore has two unique permutations in addition to the other permutations.

Table 5. Presented permutations for each named building

Specific Code for Each Test		Parcels with Narrow Width	Parcels with Wide Width
A	Two-Story		
B			
C			
D			
E			

F			
G			
H	Three Story		
I			
J			
K			
L			
M			
N	Four Story		
O			



*The permutations "Activate" and "Not activate" pertain to the presence or absence of a specially designed form for defining the entrance to the courtyard, which can be activated or deactivated using specific letters placed on a sign in front of the courtyard.

Analysis and Evaluation of Virtual Tests

The results obtained from the tests can be examined in two distinct parts; 1) Number of floors, 2) Form:

Floor preferences

This section presents the participants' preferences regarding the number of floors for each building in the test area. The table below summarizes the percentage of participants who selected each option:

Table 6. Analysis results: Distribution of floor selection preferences per building

Building Code	Percentage of Choice of Number of Floors for Each Building		
	4 Floors	3 Floors	2 Floors
A	35%	55%	10%
B	40%	35%	25%
C	15%	50%	30%
D	40%	30%	30%
E	50%	25%	20%
F	25%	35%	35%
G	20%	10%	45%
H	25%	20%	45%
Average	41%	43%	40%

Based on the results presented in the table, the most frequently selected alternative for the number of floors in the study area is three stories (Figure 8).

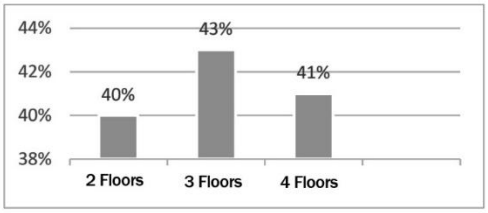


Figure 7. Participants' selection of floor number alternatives for the entire area

Form selection

This section outlines the distribution of selected facade form alternatives across buildings, highlighting the most favored design elements. In table 7, the selected form alternatives for each of the buildings in the area are presented in Table 7.

Table 7. Analysis results: Distribution of form selection preferences per building

Building Code	Form								
	Passage-like form	Setback	Horizontal Staircase	Protrusion 1	Vertical Staircase	Protrusion 2	Protrusion 3	Form B'	Form A'
									
A	10%	60%	-	5%	10%	10%	5%	-	-
B	15%	40%	5%	10%	10%	5%	15%	-	-
C	10%	30%	15%	5%	10%	5%	25%	-	-
D	5%	30%	25%	25%	10%	-	-	-	-
E	-	45%	15%	25%	5%	-	5%	-	-
F	10%	20%	5%	10%	25%	15%	10%	-	-
G	5%	45%	10%	25%	-	5%	5%	-	-
H	-	60%	5%	10%	-	15%	-	10%	-
Total	9%	55%	13%	19%	11%	8%	10%	1%	-

Based on the results from the choices made by the participants, the next step involves presenting the optimal alternative for each building and, ultimately, the selected pattern by the target group for the entire test area (Figure 9).

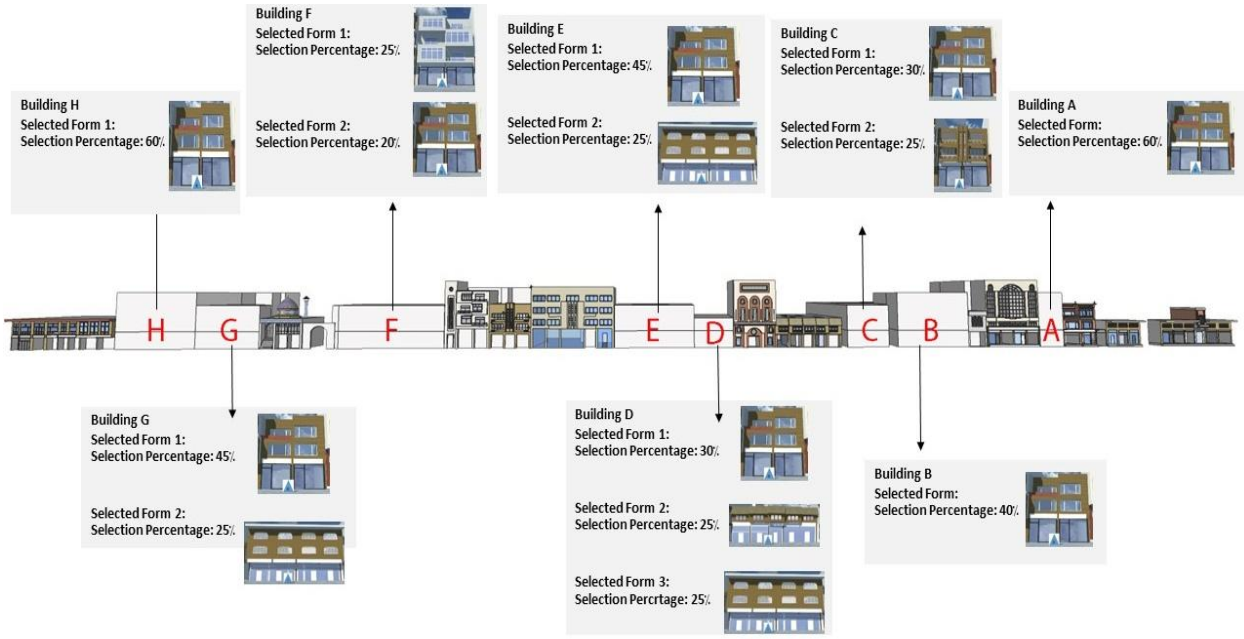


Figure 8. Selected alternatives for each building

Final pattern synthesis

With these selected form alternatives and by synthesizing the results from floor and form selections, the optimal design pattern for the study area can be derived. As observed in the Figure 10, 55% of the participants have chosen a setback pattern for the entire area. This preference indicates a significant inclination towards a specific urban design approach that could potentially influence the overall aesthetic and functional characteristics of the area.

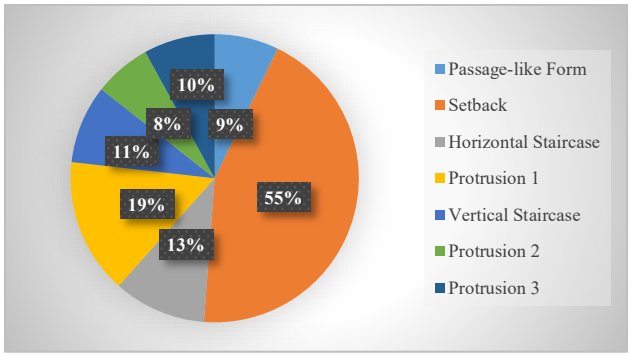


Figure 9. Participants' selection of alternatives for the entire area

Considering the participants' opinions and their selected alternatives, the proposed patterns for the eastern facade of 15 Khordad Street in Tehran, between Naser Khosrow Street and Pamnar, are presented in Figure 11 and 12.

Figure 11. Proposed pattern 1 for the entire area; average selection rate 41.8%

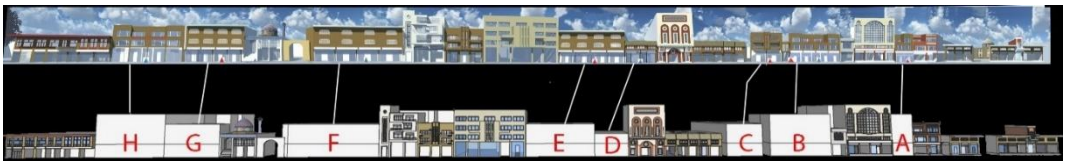


Figure 12. Proposed pattern 2 for the entire area; average selection rate 35%

CONCLUSION

This research underscores the transformative potential of gamification in urban design, particularly in the formulation and application of Form-Based Codes (FBCs). This study introduces a novel methodological integration of the Delphi technique with gamified design evaluation, creating a hybrid approach that has not been previously applied in the context of Form-Based Code development. This fusion enables more responsive and collaborative urban design practices. By integrating gamification, the study demonstrates a paradigm shift from traditional, product-centric urban design approaches to more dynamic, process-oriented, and participatory methodologies. This shift is crucial in addressing the multifaceted and evolving nature of urban design challenges. It is important to note that the codes developed in this study are specific to the socio-spatial and morphological characteristics of the 15 Khordad Street context. The framework may require adaptation when applied to other urban typologies or functional zones. The case study on Tehran's 15 Khordad Street vividly illustrates the effectiveness of gamification in fostering collaborative engagement among urban designers. The use of a gamified digital platform enabled a diverse group of experts to interactively explore and evaluate various facade design alternatives. This process not only enhanced creativity and stakeholder participation but also led to the development of more nuanced and contextually relevant urban solutions.

The findings from this research highlight the importance of incorporating flexibility and adaptability in urban planning processes. The gamified approach allowed for the examination of a multitude of design permutations, offering a more comprehensive understanding of the potential impacts and outcomes. This approach is particularly beneficial in historical and culturally significant contexts like Tehran, where preserving the urban fabric while accommodating modern needs is crucial. This method is especially well-suited for historical urban environments, as it enables preservation-conscious design through participatory input. The case of Tehran's Grand Bazaar vicinity demonstrates how heritage-sensitive facade patterns can be co-developed through structured expert feedback and gamified modeling. Looking forward, the integration of gamification with

augmented reality technologies presents an exciting avenue for further enhancing the participatory aspect of urban design. Such technological advancements could revolutionize the way stakeholders interact with and understand the potential transformations in their urban environments.

In conclusion, this study contributes to the emerging discourse on the role of innovative methodologies in urban design. It advocates for a more inclusive, interactive, and flexible approach to urban design, emphasizing the need to move beyond traditional practices. The successful application of gamification in this research paves the way for its broader adoption in urban design processes worldwide.

While this study focuses on the urban context of Tehran, the gamified approach for developing Form-Based Codes can be adapted to other cities facing similar challenges in urban design. For instance, cities with diverse architectural styles and urban forms may benefit from the flexibility of this methodology to integrate various design preferences into a cohesive urban framework. A limitation of this study is the reliance on gamification tools, which may not be readily accessible in all urban contexts. Additionally, digital literacy levels among various user groups may affect the usability and effectiveness of the gamified approach. Future studies could explore alternative methods to ensure inclusivity.

Authors' Contributions

Amir Shakibamanesh contributed significantly to the study by undertaking the following roles: Conceptualization, methodology development, formal analysis, validation of results, investigation, data curation, project administration, and supervision of the overall research process. Maryam Nargeszadeh contributed significantly to the study by undertaking the following roles: Conceptualization, methodology development, formal analysis, validation of results, investigation, data curation, and writing – original draft preparation. Mahshid Ghorbanian contributed significantly to the study by performing the following roles: Conceptualization, methodology development, formal analysis, validation of results, investigation, data curation, project administration, writing – original draft preparation, and writing – review & editing.

Competing Interests

There is no potential conflict of interest.

Ethics Committee Declaration

Ethics committee approval dated November 5, 2024 and numbered IR.AU.REC.1403.567 was obtained by University of Art Ethics Committee for Human Research (Tehran, Iran).

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Authors' Biographies

Amir Shakibamanesh is an urban designer and associate professor at the University of Art, Tehran. With over 19 years of experience, he has authored more than 39 scholarly publications and 13 books and book chapters. He directs the Virtual Reality and Emerging Technologies Lab in Urban Design and Architecture. His recent work focuses on smart cities, urban modeling and simulation, urban scene analysis, and the application of virtual and augmented reality in urban environments.

Maryam Nargeszadeh holds a master's degree in urban design from the University of Art, Tehran. She has authored two scholarly articles in Satrap journal. Her recent research focuses on virtual and augmented reality applications in urban spaces and citizen-centered strategies that enable people to shape their cities into preferred living environments.

Mahshid Ghorbanian is an urban designer and assistant professor at the Iran University of Science and Technology, with over 17 years of experience. She has authored more than 35 scholarly publications and 12 books and book chapters. Her recent work focuses on urban modeling and simulation, urban spatial structure and health, morphological and visual analysis of urban texture, and complex urban network data analysis.

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