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Architecture, Planning and Design are strongly affected by other disciplines such as fine arts, philosophy, engineering, geography, economics, politics, sociology, history, psychology, geology, information technology, ecology, law, security and management. However, there are not enough academic journals which specifically focus on the connections of architecture, planning and design with other fields of science. ICONARP aims to fill that gap. Our scope is to provide a suitable space for theoretical, methodological and empirical papers, which use global and local perspectives together, in architectural and urban studies.

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

- To question global and local interactions in the field of Architecture, Planning and Design,
- To discover the relationship between Architecture, Planning and Design,
- To increase the contribution of Architecture, Planning and Design to social and behavioral sciences,
- To discover the relationship of Architecture, Planning and Design with other fields of science that are affected and affect,
- To develop theoretical and methodological foundations of Architecture, Planning and Design,
- To discuss the role of architects, planners and designers today and in the future,
- To compare the differences between architecture, planning and design research, practices and education in different countries,
- To bring a scientific view of current issues and discussions in field of Architecture, Planning and Design,
- To discover innovative methods and techniques in the field of Architecture, Planning and Design.

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Urban Resilience Index Study on Ankara Metropolitan Area

Şeyma Elif Dincer*
Özge Yalçıner Ercoşkun**

Abstract

Nowadays, urban planning, urban resilience, and climate change issues are discussed differently within the frame of developing and changing technological conditions. Studies on climate change, disasters, environmental data, and effective use of resources indicate that cities are responsible for exceeding their ecological limits. Cities are both the source of these problems and the most affected in terms of threats to urban residents and urban infrastructures. As a result of the uncertain and ever-changing risks brought on by urbanization and population growth worldwide that put pressure on cities in a variety of interconnected and complex ways perceptions of the preparedness and safety of cities are evolving. To manage these issues, new paradigms are needed. There is no consensus on the concept of urban resilience and methods for applying this concept in urban areas. In this research, how to create a relationship between existing approaches, theories, and practices in the field of urban resilience is discussed. The necessity to include resilience in numerical measurement techniques and planning applications and how these application methods will be operated was explained. In the process of creating a planning decision support system to ensure urban resilience, indicators that would provide input to measurement and index studies were researched, and new indicators were proposed. In this study, a formula for the urban resilience index was determined, and analyses that would provide input to the planning in Ankara metropolitan districts according to these indicators and urban resilience characteristics were put forward through geographic information systems. According to these studies, Gölbaşı was determined to be the district with the highest urban resilience index and Keçiören as the district with the lowest.

Keywords:
Climate change, Decision support systems, Geographical information systems, Index studies, Urban resilience.

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INTRODUCTION

The idea of resilience is closely related to the fundamental principles of sustainability. Although not used interchangeably, the principles that contribute to sustainability also have positive effects on resilience (Ercoşkun, 2012). Over the past decade, the concept of resilience has been explored across various scientific fields and decision-making processes (Coaffee, 2013). In general, resilience is analyzed within four categories: ecology, disaster and conservation planning, social and institutional, and economic. The concept of socio-ecological resilience, which highlights the relationship between the ecosystem and society, is particularly noteworthy as it plays a crucial role. The origin of resilience in the ecological sense dates back to the 1970s when it was defined as the ability of a system to self-heal and improve following damage or deterioration (Holling, 1973). This definition was later expanded to encompass the field of urban ecological resilience, which studies the capacity of cities and urban systems to absorb extreme climate events or gradual climate changes and the associated risks, while maintaining their essential characteristics (Ernstson et al., 2010; Maru, 2010). Disaster and risk reduction-based approaches focus on reducing the vulnerability of cities, their infrastructure, and residents (especially disadvantaged groups) to unexpected hazards and minimizing their economic impacts while improving infrastructure.

Social and institutional-based approaches to resilience place emphasis on the capacity of societies to adapt to unexpected risks, transparency, participation, collective learning, and preparedness. In the economic realm, resilience refers to the ability of regional and urban economies to withstand uncertain risks. The socio-ecological approach integrates ecosystem functions and social dynamics to manage the adaptation of cities to new processes and to create resilient cities (Lambin, 2005; Andersson, 2006).

The study of resilience spans across multiple scientific fields and decision-making processes, with a particular focus on the interplay between the ecosystem and society. The various approaches to resilience aim to improve the capacity of cities, their residents, and economies to withstand and adapt to the effects of climate change and associated risks.

The concept of resilience is widely recognized as a key factor in enabling systems and societies to withstand and effectively respond to the adverse effects of disasters, hazards, and risks (UNISDR, 2009). It is important to note that the focus of resilience is not solely on reducing losses in the face of a given risk, but rather on improving the overall performance of a system in the face of such threats.

If we consider cities as a system, urban resilience can be defined as a can be conceptualized as a multidisciplinary framework for analyzing and addressing the challenges faced by cities. This framework highlights the key attributes of cities that allow them to be reactive, adaptable, recoverable, regenerative, and transformable in the face of various risks

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and hazards. By examining these attributes, it becomes possible to not only diagnose problems, but also generate effective solutions to them.

The characteristics of urban resilience have been well documented in the literature. Some of the key features include robustness (Wardekker, de Jong, Knoop, & van der Sluijs, 2010), speed and efficiency in response, diversity (Walker & Salt, 2006), backup redundancy, environmental awareness, repetitive processes (Brown et al., 2012), integration, effectiveness, adaptability (Eraydın & Taşan-Kök, 2013), coping mechanisms, sensitivity to changing conditions, coordination (Arup, 2014), flexibility, and equality (Bahadur et al., 2010). These characteristics all play important roles in enabling cities to respond effectively to the risks and hazards they face.

It is worth noting that the concept of resilience is often viewed as a solution tool for addressing the broader global challenges posed by climate change. Given the inevitable impacts of climate change on cities and urban dwellers, especially in large cities, it is important that urban resilience becomes a priority for policymakers, planners, and stakeholders. By understanding the key features of urban resilience and working to enhance them, cities can become more resilient, better equipped to respond to the adverse effects of climate change, and more capable of thriving in the face of these challenges.

The notion of resilience, and the complementary concept of vulnerability, hold tremendous practical significance in addressing the challenges posed by climate change. In the context of urban areas, resilience has been conceptualized as a city's ability to mitigate the effects of climatic events and conditions, and to develop the means of effectively coping with these disruptions. This capability encompasses the maintenance or improvement of various elements of the urban environment, including physical infrastructure, social institutions, the natural environment, and governance structures.

While previous efforts in this field were largely focused on forecasting and preventing adverse effects, the emphasis has shifted towards preparation and adaptation in the face of high uncertainty. There exist numerous resources and materials, such as action plans, guidebooks, case studies, and reports, aimed at promoting resilience in response to climate change (UNISDR, 2012). However, there remains a lack of clear relationships between the definitions of resilience used in these resources, and the implementation plans developed from them.

To truly ensure the resilience of cities and their populations, it is necessary to determine levels of resilience, and to develop quantitative frameworks and methods for enhancing resilience in the face of extreme weather events and other ecological, social, and economic disasters. This is a critical step in reducing the exposure and vulnerability of cities and their inhabitants to the impacts of climate change.

In urban planning, the objective is to lay the foundation for the formulation of a vision and strategy for targeted development. Development plans are created to articulate a clear vision of the future

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and to achieve these development goals. However, from the perspective of resilience, traditional planning methods are inadequate in addressing the ever-evolving risks and uncertainties associated with constantly changing socio-ecological systems in cities (Yamagata & Sharifi, 2018). To address these deficiencies, the integration of resilience into urban planning requires the development of innovative methodologies.

The concept of resilience-based planning is a bottom-up approach that is equipped to handle the dynamic and ever-changing risks and uncertainties in cities. It is sustainable, future-oriented, and provides a new perspective on urban planning processes, allowing for the sharing of information and development of a shared understanding (Yamagata & Sharifi, 2018). This approach is adaptable to unexpected changes, produces city-specific solutions, and provides coordination.

Key features and criteria related to land use planning, such as density, mixed use, accessibility, permeability, and multifunctionality, affect the resilience and vulnerability profiles of cities and have implications for evacuation planning, flood risk management, energy and water consumption, the urban heat island effect, and social justice (Yamagata & Sharifi, 2018). By integrating resilience into urban planning, cities can be better equipped to address the challenges posed by climate change and to achieve their development goals.

The integration of resilience into urban planning practices, adaptation to climate change, and disaster management is crucial in promoting and strengthening the ecosystem. Ecosystem protection and enhancement play a critical role in mitigating the effects of future disasters, creating a natural threshold that helps absorb their impacts.

The concept of nature-based solutions has recently gained recognition as an effective approach for enhancing urban resilience. This approach emphasizes an ecosystem-based method with three distinct phases: preservation, renewal, and reproduction of existing ecosystem services. The benefits of nature-based solutions for urban resilience are multi-faceted, including reduction of river flood and heat stress risks, resource generation, tourism and recreation opportunities, carbon storage, and improved human health.

The World Bank (2022) highlights the key nature-based solutions that contribute to urban resilience, including bioretention areas, built and natural inland wetlands, river floodplains, mangrove forests, salt marshes, sandy shores, urban forests, terraces and slopes, river and stream renaturation, building solutions, open green spaces, green corridors, and urban agriculture. These solutions offer a range of benefits, such as reducing flood risk, mitigating heat stress, generating resources, promoting tourism, storing carbon, and improving human health.

The integration of resilience into urban planning, climate change adaptation, and disaster management through the use of nature-based solutions is crucial in promoting and strengthening the ecosystem. The ecosystem-based approach offers a range of benefits that contribute to

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enhancing urban resilience and protecting communities from the impacts of future disasters. Urban resilience is the capacity of individuals, communities, institutions, businesses and systems in cities to function, adapt, grow and transform in the face of stress and shocks.

This study approaches urban resilience from a socio-ecological perspective, emphasising the interaction between human systems and ecological systems in urban environments. Integrating resilience thinking into urban planning will address the shortcomings of traditional planning. It is important to recognise that threats cannot always be avoided because future conditions are unpredictable. It is necessary to try to understand the complexities and uncertainties inherent in urban planning as dynamic and constantly evolving social-ecological systems.

The main objective of this research is to establish the relationship between existing approaches, theories and practices on the concept of urban resilience and the methods of its application in metropolitan areas and to create a spatial decision support system. The necessity of incorporating urban resilience into quantitative measurement techniques and planning applications and how to operate these application methods are explained. In the process of creating a planning decision support system to ensure urban resilience, indicators that will provide input to measurement and index studies have been investigated and new indicators have been proposed.

RESEARCH METHOD

Determining the resilience levels of cities is one of the basic conditions for creating resilient cities. Along with the need for applied quantitative research, an analytical method is needed to understand the uncertainties that cities face and to determine their strengths and weaknesses.

Urban resilience is a complex and multifaceted concept that is measured through a variety of approaches specific to particular aspects of urban systems. The assessment of urban resilience has attracted worldwide attention. Understanding how to assess the level of resilient cities or how to scientifically quantify urban resilience helps academics to transform theory towards the practical construction of resilient cities. As a new research topic, there are few studies in this field and there is no common standard for measurement. These methods include assessing the robustness of infrastructure, the adaptability of social systems and the sustainability of environmental practices.

(Kong et al., 2022) categorised the techniques for measuring urban resilience as follows;

- Indicators and Indices
- Simulation Models
- Case Studies and Comparative Analysis
- System Dynamics
- Social Network Analysis (SNS)

- Optimisation Models
- Geographic Information Systems (GIS).

Table 1. Recent Urban Resilience Index Studies Table.

Source	Study	Model	Indicators
Cutter et al., 2008	DROP (disaster resilience of place)	Schematic model	Ecologic, social, economic, institutional, infrastructure, community capital
Cutter et al., 2010	Disaster Resilience Indicators for Benchmarking Baseline Conditions	0-1 Normalization, Cronbach's alfa, mean, total resilience, score	Social, economic, institutional, infrastructure, community capital
Arup, 2012	Urban Resilience Index	Scoring 1-5	Health and wellbeing, economy and society, infrastructure and environment, leadership and strategy
Cutter et al., 2014	The Geographies of Community Disaster Resilience	0-1 normalization, Cronbach's alfa	Social, institutional, ecologic, community capital, economic
Suárez et al., 2016	Towards an Urban Resilience Index: A Case Study in 50 Spanish Cities	Shannon entropy index, 0-10 scoring, 0-1 normalization. $R=\frac{Hb+Hf+Hlu+LA21}{EF/Area}$	Economic diversity, land use diversity, food variety, Local Agenda 21 process, ecological footprint
Fu, Xin, & Wang, Xinhao, 2018	Integrative Urban Resilience Capacity Index (IURCI)	Normalization, weight, Delphi, entropy IURC= ∑(İ=1)^n 〖xi*xw〗	Ecological and physical condition, economical condition, community capital, institutional services

In addition, there are other assessment methods used in various urban resilience domains. Rose, A. (2004) pioneered the use of general equilibrium (CGE) models to assess economic resilience in urban systems. This quantitative approach provided a comprehensive framework for analyzing economic impacts and recovery processes. Li, Y., et al. (2018) introduced a multi-stage framework for evaluating abrupt changes in resilience status within urban socio-environmental systems. This method combined quantitative resilience value calculations with qualitative tipping point analysis to identify early warning signals. Zheng, Y., et al. (2018) explored the relationship between resilience and development through a mixed-methods approach. Combining expert consultation and exploratory factor analysis, this study provided insights into the complex interplay between these two factors. Tang, Y., et al. (2020) and Chen, Y., et al. (2021) employed network models to assess transportation resilience. These quantitative models allowed for the analysis of network vulnerabilities and system-wide impacts of disruptions. Liu, Y., et al. (2020) utilized life cycle assessment to evaluate infrastructure

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resilience. This approach provided a comprehensive perspective on the environmental impacts and sustainability of infrastructure systems. Bixler, R., et al. (2020) linked metropolitan networks to resilience planning and implementation through a combination of interviews and social network analysis. This mixed-methods approach offered valuable insights into stakeholder perspectives and network dynamics. Sweetapple, C., et al. (2019) demonstrated the impact of increasing resilience on sustainability in the design and operation of seweage systems. Their work involved capturing a wide range of potential futures and identifying tipping points, showcasing the application of scenario planning and resilience assessment in infrastructure systems (as cited in Li et al., 2023).

Indices and models have been developed in the literature for the understanding the level and the measurement of resilience (Table 1). Indices are approaches that make observations and measurements by reducing more than one set of indicators to a single numerical range.

Indicators play a crucial role in the assessment and evaluation of resilience, as they provide a means for making comparisons and determining rankings of the relevant measurements. In the context of urban planning, the use of resilience indicators and indices is particularly significant in the creation of a decision support system. To be effective, these indicators must possess certain key attributes. Firstly, they must have a proven track record of use in scientific and field studies, demonstrating their reliability and validity. Secondly, they must be universally applicable, able to be used across a range of contexts and situations. Thirdly, they must be directly linked to the concept of resilience, providing meaningful and relevant information. Finally, they must be able to be obtained from widely available, national sources (Cimellero, 2016).

In the resilience literature, indicators are typically classified into five categories: physical (Adger, 2000), social (Lin, 2006), ecological (Cutter et al., 2007), economic (Fernandez et al., 2013), and institutional structure (ARUP, 2015). In this study, the authors sought to develop a set of indicators specific to Turkish cities, arranging them based on their relevance to urban resilience and the data that could be obtained. These indicators were further analyzed and classified into three main categories: physical space, environment and climate, and socio-economic structure. The data of Built area (impermeable ground), Green Area m2 per person, Land use business/housing ratio, Number of buildings at risk of flood (Q100), Impermeable floor (Ha) indicators were created using geographical information systems.

A comprehensive list of indicators that were used in the index study is presented in Table 2. Notably, a number of special indicators were also proposed to address disaster risk and climate change issues, such as meteorological data, values related to consumption and waste, and indicators of flood risk specific to the region being studied. The inclusion of these unique indicators underscores the authors' recognition of the

importance of considering the local context and specific hazards in the planning and assessment of urban resilience.

Table 2. Urban Resilience Indicators.

Physical Space Indicators	Impact on Urban Resilience	Literature
Planning		
Built area (impermeable ground)	Negative	Oecd 2021, Eurostat
Green Area m2 per person	Positive	Cutter et al, 2008
Land use business/housing ratio	Positive	Sharifi &Yamagata, 2014
Disaster Risk		
Number of floods	Negative	Burton, 2015
Emergency reporting rate	Negative	Cutter et al., 2008
Construction in flooded areas (100 Years)	Negative	Burton, 2015
Total number of incidents (fire department)	Negative	Cutter et al., 2008
Environmental and Climate Indicators	Impact on Urban Resilience	Literature
Environmental performance value	Positive	Şeker et al., 2020
Presence of sites	Positive	Cutter et al.,2008
Meteorological data		
Monthly maximum temperature (°C)	Negative	EPA,2021, URL 13
Average number of days with maximum temperature 30 °C and above	Negative	EPA, 2021, URL 13
Average number of days with minimum temperature -20 °C and below	Negative	EPA, 2021, URL 13
Monthly maximum rainfall (Mm=Kg÷M²)	Negative	EPA, 2021, URL 13
Air quality value	Negative	Cariole et al., 2018; Monterio et al., 2017
Consumption and Waste	Impact on Urban Resilience	Literature
Water consumption	Negative	Muller, 2017
Solid waste amount	Negative	Sharifi et al., 2017
Amount of recycled waste	Positive	Sharifi et al., 2017
Vehicle ownership rate	Negative	McBain et al., 2017
Natural gas consumption	Positive	Muller, 2017
Indicators of Socio-Economic Structure	Impact on Urban Resilience	Literature
Demographic structure		
Population density	Negative	Ehrlich et al., 2018;Sharifi et al., 2021
Persons under 20 or Over 65	Negative	Sharifi &Yamagata, 2014; Morrow, 2008
Proportion of divorced persons	Negative	Sharifi & Yamagata, 2014
Number of higher education graduates	Negative	Norris et al., 2008; Morrow, 2008
Human development index ranking	Positive	Şeker et al., 2020; UNİHDI. 2021
Governance and transparency value	Positive	Şeker et al., 2020; Cutter, 2014
Economic Structure	Impact on Urban Resilience	Literature

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Poverty rate	Negative	Norris et al., 2008; Morrow, 2008
Tenant household ratio	Negative	Cutter et al., 2008; Norris et al., 2008; Morrow, 2008
Sale price	Positive	Cutter,2010; Burton, 2015; Morrow, 2008
Rental price	Positive	Cutter,2010;(Burton, 2015; Morrow, 2008
Number of people receiving social assistance	Negative	Burton, 2015; Morrow, 2008

The composite indicator approach was used to determine the indicators in the index developed specifically for cities (Nardo et al., 2005). This method includes the steps of choosing the spatial analysis scale, determining the characteristics of the resilience, determining the indicators, normalizing the data, entering the data into the index, and visualizing the results with geographic information systems. Normalization of indicators after determination was made with a minimum-maximum scaling between 0 and 1 where 0 points indicated the worst ranking for each indicator, and 1 point was the best ranking. Values in between were scaled in this range (Cutter et al., 2010; Etsy et al. 2005). The maximum value of the true value of the indicators is calculated as follows: Indicator equals (Actual Value- Minimum Value) / (Maximum Value- Minimum Value) if it is positive in terms of urban resilience. The maximum value of the actual value of the indicators is calculated as follows: Indicator equals (Actual Value-Maximum Value) / (Minimum Value-Maximum Value). Calculated values are shown in Tables 3, 4, and 5.

Table 3. Environment and Climate Indicators Results.

Environment and Climate Indicators Normalized Values									
Indicator	Altındağ	Çankaya	Etimesgut	Gölbaşı	Keçiören	Mamak	Pursaklar	Sincan	Y. Mahalle
Water consumption m3	0.73	0.00	0.60	0.97	0.34	0.61	1.00	0.64	0.36
Max. temperature (°C)	0.98	1.00	0.00	0.75	0.25	0.90	0.98	0.50	0.55
Average number of days with maximum temperature 30 °C and above	0.09	0.48	0.10	1.00	0.65	0.29	0.54	0.00	0.14
Average number of days with minimum temperature -20 °C and below	1.00	1.00	0.91	0.82	0.66	1.00	1.00	0.00	0.86
Monthly maximum precipitation (Mm=Kg÷M²)	1.00	0.94	0.54	0.52	0.21	1.00	0.00	0.76	0.81
Number of vehicles per household	1.00	0.37	0.63	0.00	0.78	0.96	0.41	0.78	0.30
Air quality index	0.20	0.33	0.26	1.00	0.02	0.48	0.81	0.26	0.00
Solid waste tons/year	0.73	0.00	0.55	1.00	0.20	0.53	0.99	0.42	0.38
Recycled waste tons/year	0.63	1.00	0.50	0.07	0.71	0.38	0.12	0.49	0.70

Environmental performance value	0.58	0.74	0.69	0.71	0.00	0.36	0.47	0.32	1.00
Natural gas consumption m3	0.15	1.00	0.52	0.02	0.77	0.12	0.00	0.21	0.62
Protected area (Ha)	0.03	1.00	0.54	0.97	0.00	0.60	0.00	0.14	0.55

Table 4. Physical Space Indicators Results.

Physical Space Indicators Normalized Values									
Indicator	Altındağ	Çankaya	Etimesgut	Gölbaşı	Keçiören	Mamak	Pursaklar	Sincan	Y. Mahalle
Number of floods	0.86	0.82	0.97	1.00	0.00	0.87	0.94	0.99	0.09
Total number of incidents (fire department)	0.28	0.00	0.64	0.91	0.15	0.43	1.00	0.52	0.07
Number of emergency warnings	0.53	0.00	0.71	0.80	0.50	0.54	1.00	0.77	0.38
Number of buildings at risk of flood (Q100)	0.79	0.43	1.00	0.89	0.31	0.90	0.93	0.29	0.00
Green area ratio	0.55	1.00	0.65	0.01	0.46	0.39	0.09	0.00	0.50
Impermeable floor (Ha)	0.75	0.00	0.48	0.64	0.67	0.61	1.00	0.68	0.33
Workplace/ housing ratio	0.37	0.09	0.33	0.11	0.00	0.06	0.16	0.99	1.00

Table 5. Socio-Economic Conditions Indicators Results.

Socio-Economic Conditions Indicators Results									
Indicator	Altındağ	Çankaya	Etimesgut	Gölbaşı	Keçiören	Mamak	Pursaklar	Sincan	Y. Mahalle
Number of undergraduate and graduate school graduates	0.09	1.00	0.43	0.04	0.41	0.21	0.00	0.13	0.50
Population density person/ha	0.71	0.65	0.48	1.00	0.44	0.00	0.58	0.74	0.28
Total population under 20 and over 65	0.67	0.10	0.48	1.00	0.00	0.35	0.97	0.49	0.34
Number of people with Green Cards	0.00	0.78	0.89	1.00	0.55	0.30	0.98	0.54	0.46
Poverty rate %	0.00	0.91	1.00	0.05	0.64	0.45	0.47	0.69	0.79
Tenant household ratio %	0.00	0.17	0.62	1.00	0.53	0.52	0.64	0.72	0.35
Sale price TL/M2	0.00	0.94	0.53	1.00	0.35	0.21	0.54	0.23	0.68
Rental price TL/M2	0.25	1.00	0.63	1.00	0.25	0.13	0.13	0.00	0.63

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Divorced person ratio %	0.62	0.00	0.54	0.60	0.94	0.58	1.00	0.80	0.57
Governance transparency value	0.37	1.00	0.47	0.43	0.85	0.41	0.00	0.48	0.92
Human development index	0.34	1.00	0.27	0.23	0.41	0.16	0.00	0.17	0.57
Number of people receiving social assistance	0.25	0.87	0.79	1.00	0.14	0.00	0.95	0.44	0.70

The index values of the indicators whose weights are considered equal are calculated by taking the arithmetic average of the normalized values of the indicators and the index values for three different indicator sets (physical space, environment and climate, and socio-economic structure) (Table 6). The index score of the indicator sets was created for each district, and these scores were totaled to obtain the urban resilience index score (Cutter et al., 2010) as follows: Urban Resilience Index Score = Physical Space Index Score + Environment and Climate Index Score+ Socio-Economic Structure Index Score.

Additionally, features of the Arcgis Pro 2.9 software and geographic information systems were used while obtaining indicators and creating thematic maps. In this study, data from the Copernicus Portal Urban Atlas were used which is land cover/use data produced from satellite images with a precision of 1/10,000 scale. The spatial data obtained from this data, after selecting the areas such as green areas and residential areas with "select by attribute," a separate layer was created with the "export" feature process. By using the "select by location" tool, the area calculations of these areas were made using the "field calculator" tool. The calculation of the numerical data of the areas was combined with the tables of the data obtained from the geographical district borders and the institutions, and the data calculated through the program were combined with the attribute table in the program. Then, thematic coloring was done with the "graduate color" process in the demonstration section. The unique aspects that distinguish this study from other methods are the implementation of this method at the district level in the city of Ankara in Turkey to create a holistic urban perspective and decision support system with climate change and urban planning data. This pioneering study adopts a socioecological perspective and employs an index study to investigate the spatial distribution of urban resilience in Ankara, Turkey. The study highlights the city's vulnerability to extreme heat events and flooding,

exacerbated by the increasing prevalence of impermeable surfaces. For the first time, a comprehensive set of district-level resilience maps has been developed for the Ankara metropolitan area, providing valuable insights for urban planning and decision-making. The study's unique contribution lies in its integration of index and risk assessment approaches, enabling the creation of a spatial decision support system that can guide resilience-building strategies.

FINDINGS AND DISCUSSION

The results of the sub-indicator sets created to reach the urban resilience index ranking are listed below. The district with the highest environment and climate Index is Çankaya while the districts with the lowest are Keçiören and Sincan, according to these results. The district with the highest socio-economic structure index is Çankaya while the districts with the lowest are Altındağ and Mamak. The district with the highest physical space index is Pursaklar, and the district with the lowest is Keçiören (Table 6, Figure 1,2,3). An urban resilience index comparison was created for the central districts of Ankara using the index calculations. In the urban resilience index ranking, the highest district is Gölbaşı, and the lowest district is Keçiören (Table 7, Figure 4).

Table 6. Index Results of Indicator Groups.

Name of the District	Environment and Climate Index	Socio-Economic Structure Index	Physical Space Index
Altındağ	0.59	0.28	0.59
Çankaya	0.66	0.70	0.33
Etimesgut	0.49	0.59	0.68
Gölbaşı	0.65	0.69	0.62
Keçiören	0.38	0.46	0.30
Mamak	0.55	0.28	0.54
Pursaklar	0.53	0.52	0.73
Sincan	0.38	0.45	0.60
Yenimahalle	0.52	0.57	0.34

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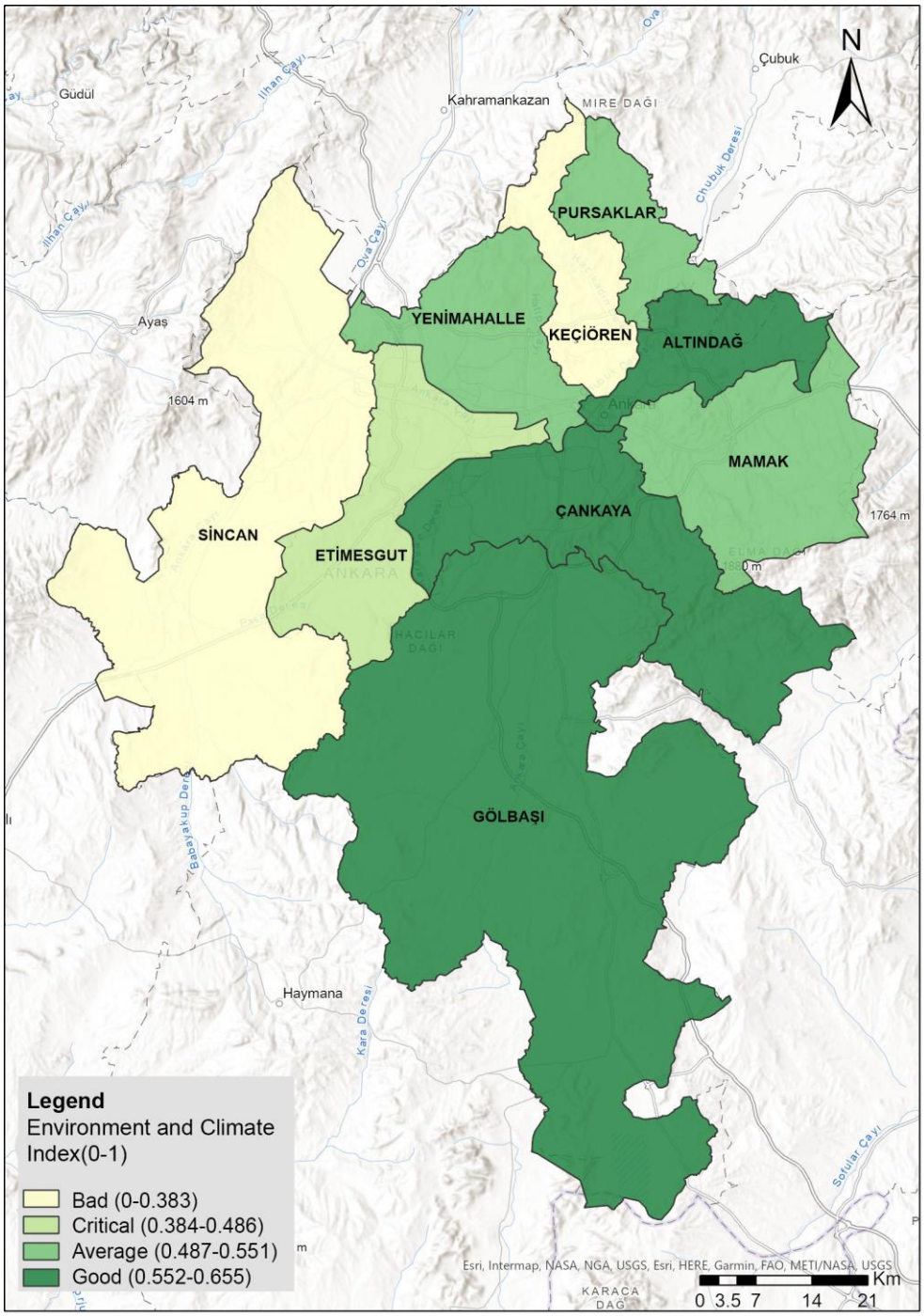

Figure 1. Environment and Climate Index Map,2022.

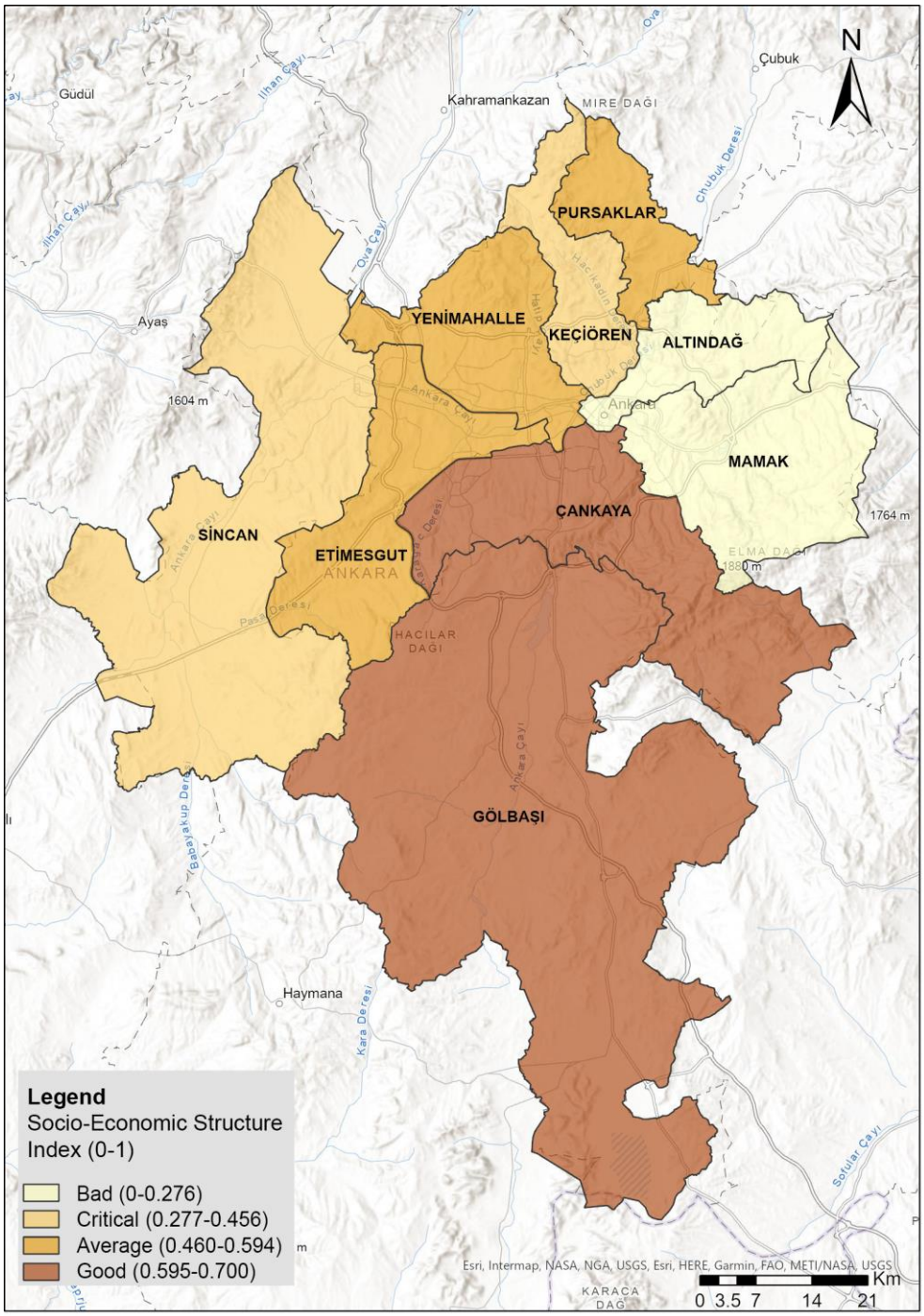

Figure 2. Socio-Economic Structure Index Map,2022.

DOI: 10.15320/ICONARP.2024.293

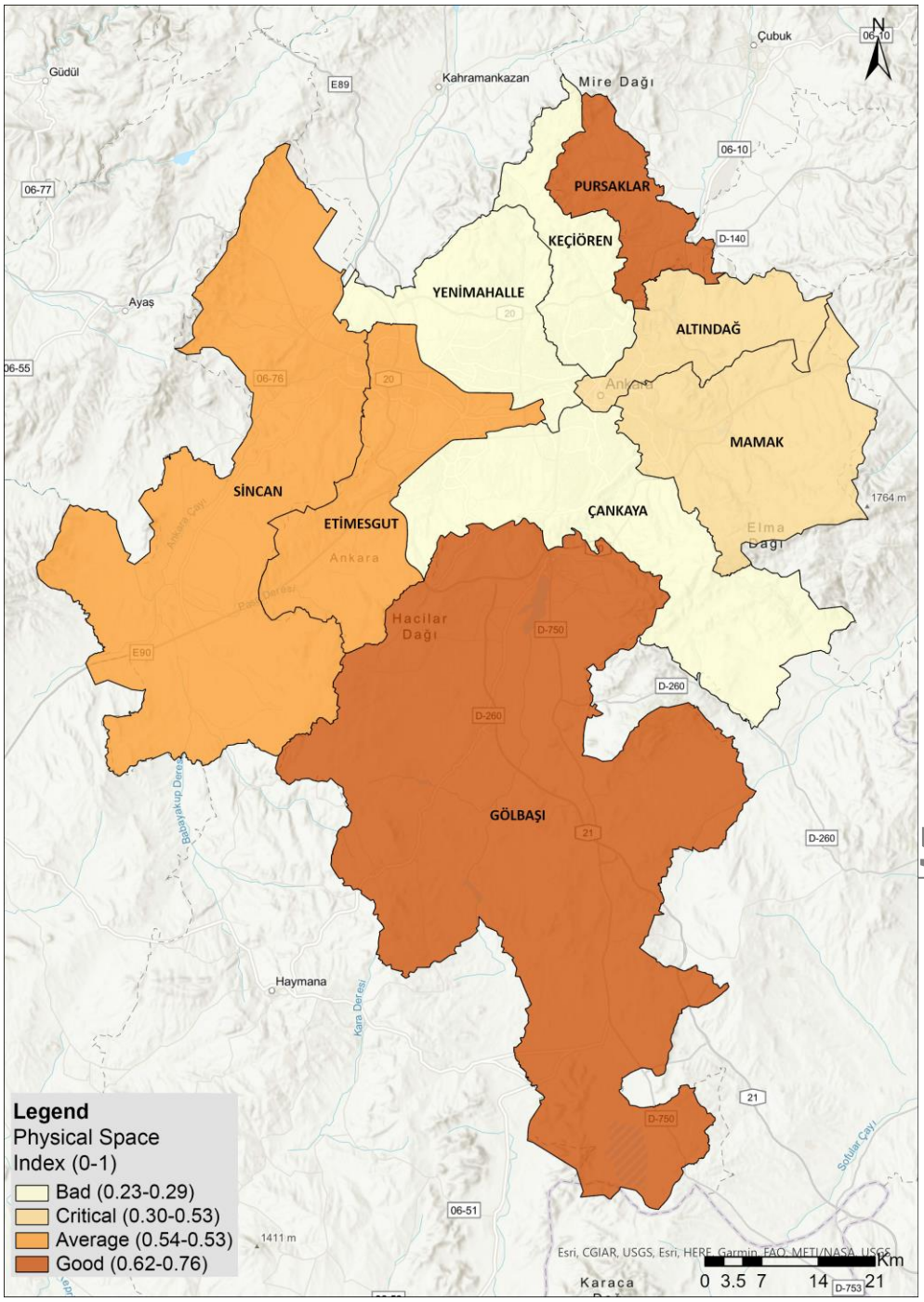

Figure 3. Physical Space Index Map,2022.

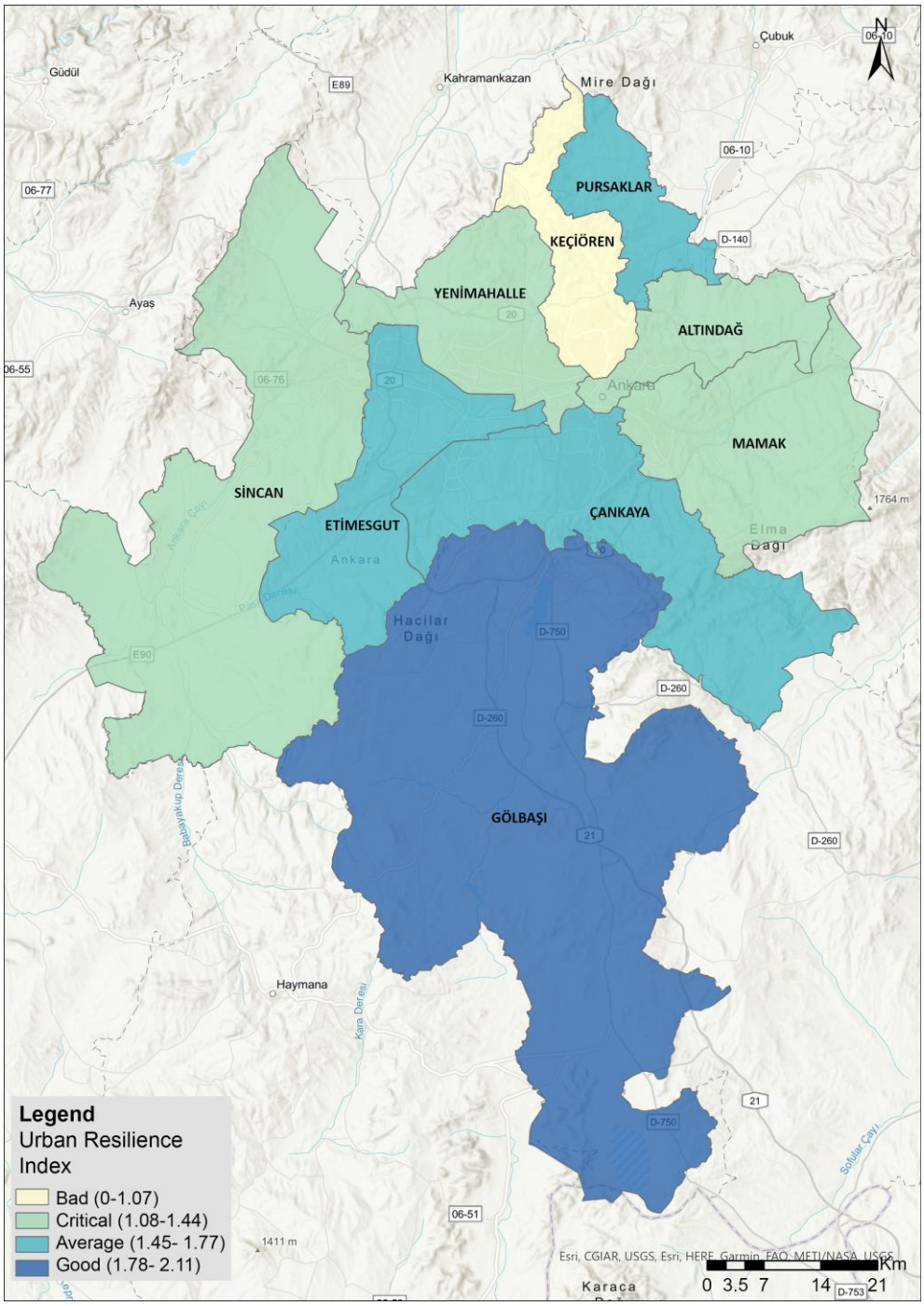

Figure 4. Urban Resilience Index Result Map,2022.

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Table 7. Urban Resilience Index Results.

Name of the District	Urban Resilience Index
Altındağ	1.46
Çankaya	1.69
Etimesgut	1.76
Gölbaşı	1.97
Keçiören	1.14
Mamak	1.37
Pursaklar	1.78
Sincan	1.43
Yenimahalle	1.43

According to the results of the research, when the lowest (the last three in each sub-title between 00.00 and 0.10) and the highest (he first three in each sub-title between 0.90 and 1.00) indicators of Ankara central districts are examined, it is possible to make a comparison showing the lowest and highest values and their strengths and weaknesses for each district.

The Gölbaşı district, which has the highest urban resilience index, comes to the fore in air quality due to its low population, low consumption values, and the presence of a special environmental protection zone that includes Mogan Lake; and other values are in the first place with the remaining average values.

The reason the Çankaya district, which is the district with the highest socio-economic resilience, has medium values in urban resilience is its low physical space index. Due to the high density of buildings and high population, there is an increase in temperature values due to high consumption values and high level of impermeable ground; thus, the Çankaya district has medium values contrary to expectations. Etimesgut, which is another district with a medium value, has a low risk of flooding because it is more planned compared to other districts, but its temperature values are high because it creates an urban heat island effect due to insufficient green space. The Pursaklar district, which is the last district with a medium value, has lower consumption values than other districts due to its low population and the fact that it is a newly established district. This district, located on the airport road that develops in parallel with the transportation axes and has a form defined as urban sprawl, falls behind in the rankings due to the lack of green areas.

The lack of natural areas in the Altındağ district, which is of sensitive value, causes an increase in temperatures in an arid climate. Its low

economic level also causes fossil fuel consumption. In the Mamak district, which has a sensitive value, high population density creates inadequacy of infrastructure and municipal services. Being one of the districts with a low socio-economic level and one of the districts in the process of transformation, Mamak also has extreme climate values due to the lack of proper infrastructure, lack of natural areas, and insufficient green areas. The fact that the district of Sincan, which has a sensitive value, has the lowest rate of green area and natural area causes extreme weather events. Keçiören, the district with the lowest urban resilience index, is in the lowest ranking in Ankara with its existing dense building stock and high population, insufficient green areas, excess consumption values, and high number of floods despite not being in a floodplain (lack of infrastructure). These results indicate the multifaceted nature of urban resilience and reveal which areas have deficiencies.

Critical literature suggests that in practice, resilience is often used as a comprehensive term for future preparedness without a clear interpretation of what it means or how certain interventions or system characteristics can improve it. Although theoretical discussions on resilience have been extensively researched, methodological challenges persist with the implementation of the concept. The necessity of measuring resilience is crucial, particularly in determining which method is applicable and in identifying vulnerable points. The problems with measuring resilience are primarily twofold: one being conceptual and the other being methodological. The conceptual issue arises from the lack of a shared understanding of what resilience means and the limitation of evaluating it with a single number or result, given that it is a dynamic process that changes over time. Despite criticisms regarding the overly reductionist nature of measuring urban resilience with indicators and indexes, which limits its perspective on issues, it remains a powerful tool in terms of simplifying complexity, providing a means for identification and monitoring, defining structures, and offering comparisons.

To overcome the epistemological illusion created by indexes, which provide only scientific knowledge and instrumental analyses, a need exists to restructure urban resilience studies with strong theoretical and empirical tools. Conceptualizing the built environment as a multifaceted and interconnected system that encompasses ecological, sociocultural, economic, and governance dimensions is therefore necessary to fully grasp the interconnections, synergies, exchanges, contradictions, tensions, and future reasonable scenarios or trends.

According to research findings, the main problems and issues of the city of Ankara are related to its physical infrastructure and urban form, as well as flawed policy and planning decisions, and ongoing administrative problems. Based on the resilience index results of the metropolitan districts of Ankara, the key problem areas are the physical infrastructure and past land-use decisions that still have an impact.

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Another important issue that needs to be addressed in the context of the resilience of the metropolitan districts of Ankara is the incompatibility between the changing administrative approaches and the old and new approaches. Although climate change adaptation, promoting bicycle use, and green urban planning initiatives are promising, the reality of planning processes, the lack of adaptation to individual contexts, and the failure to consolidate them without broad and deep participation, reveals significant problems. Political and economic issues in developing countries are also an important topic to be examined under the theme of urban resilience. When interpreting the resilience index results of Ankara, the most important factors for Gölbaşı district to obtain the highest values are its relatively limited urban sprawl, natural conservation areas, and special environmental protection zones, which restrict development and provide the highest green area ratio in the city. On the other hand, the intense urbanization in Keçiören, insufficient green areas, and inadequate infrastructure pull it back in the rankings. The more densely built-up and impermeable an urban area is, the more vulnerable it becomes. Car-focused transportation increases impermeable surfaces and leads to floods and deaths. When these data are updated over time, it is evident that different results can emerge within the framework of social dynamics, relationship networks, and local knowledge, provided that the current and planned climate and flood plans are implemented, and the urban resilience work is re-evaluated within the context of local stakeholders and expert opinions.

CONCLUSIONS

The biggest obstacle to resilience is the inadequacy of open and green spaces in existing housing areas in areas with low resilience in this study which was conducted in the central districts of Ankara. Suggestions for planning solutions to the problems in the districts with the lowest resilience are listed above.

In Altındağ district lowest resilience area is socio-economic structure index. Solution Suggestions for Altındağ district are ;

- Create new business areas, increase community centers, strengthen public transportation to the center in order to raise the economic level
- Increase local governments' incentives and assistance for renewable energy and natural gas in order to reduce fossil fuel consumption
- Increase green areas (to prevent surface warming) and increase permeable floors.

In Çankaya district lowest resilience area is physical space index. Solution suggestions for Çankaya district are;

- Increase green areas (preventing surface warming) and increase permeable floors

• Increase the continuity and access to green areas to create carbon sink areas

• Implement and supervise the Çankaya municipality "sustainable energy action plan" actions

• Close the valleys to construction

• Create a rail system to support public transportation and reduce carbon emissions.

In Etimesgut district lowest resilience area is environment and climate index. Solution suggestions for Etimesgut district are;

• Increase green areas (preventing surface warming) and increase permeable floors

• Increase the continuity and access of green areas to create carbon sink areas

• Support public transportation with a rail system which would reduce carbon emissions.

In Gölbaşı district lowest resilience area is physical space index. Solution suggestions for Gölbaşı district are;

• Strengthen the city center and public transportation (to reduce vehicle ownership and reduce carbon emissions)

• Increase pedestrian access by encouraging mixed use

• Take measures to slow down urban traffic on intercity roads

• Protect the wetland ecosystem between Eymir and Mogan Lakes

• Keep the lakes alive by saving the aquifers feeding the lakes from the pressure of construction

• Increase the number of community centers.

In Keçiören district lowest resilience area is physical space index. Solution suggestions for Keçiören district are;

• Prevent urban growth approaching the ring road,

• Protect remaining valleys and catchments

• Make a healthy and ecological transformation in housing areas through urban scale reinforcement areas

• Increase green areas (preventing surface warming) and increase permeable floors,

• Increase the continuity and access of green areas to create carbon sink areas

• Evaluate rainwater

• Increase infrastructure services and arrange city streams as green infrastructure

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• Increase pedestrian access by encouraging mixed use.

In Mamak district lowest resilience area is socio-economic structure index. Solution suggestions for Mamak district are;

• Create new business areas and increase community centers in order to raise the economic level and strengthen public transportation to the center

• Avoid increasing building density

• Increase the continuity and access to green areas to create carbon sink areas

• Plan the Hatip Stream and Bentderesi surroundings as a green infrastructure

• Provide a healthy and ecological transformation in housing areas through urban scale reinforcement areas.

In Pursaklar district lowest resilience area is socio-economic structure index. Solution suggestions for Pursaklar district are;

• Limit construction and increase open green areas (preventing surface warming) and increase permeable floors,

• Increase the continuity of green areas and access to these areas in order to create carbon sink areas

• Establish community and education centers.

In Sincan district lowest resilience area is environment and climate index. Solution suggestions for Sincan district are;

• Increase green areas (preventing surface warming) and increase permeable floors

• Increase the continuity and access of green areas to create carbon sink areas

• Create incentives for a rail system and public transportation for business trips

• Increase social facilities.

In Yenimahalle district lowest resilience area is physical space index. Solution suggestions for Yenimahalle district are;

• Increase green areas (preventing surface warming) and increase permeable floors

• Increase the continuity and access of green areas to create carbon sink areas

• Create a green transformation (eco-renovation) of industrial areas

• Use Atatürk Forest Farm for food production

• Establish an effective public transport system

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• Activate existing green areas (the district has large areas of wasteland

• Evacuate buildings in flooded areas and plan a green space system over city streams.

Suggestions for designed solutions to these problems are nature-based. The less nature is interfered with and the more the design is created according to nature, the rate of being affected by climate change and disasters will be minimized. The resilient urban planning approach proposals that have been created are as follows:

• Interaction between temporal and spatial scales

• Mixed use

• Compact city form

• Highly connected transport system (sustainable public transport, digital ticketing, online navigation services)

• Intelligent, digitized utilities and applications

• Building types and urban rooms with low service costs, reduced environmental footprints

• Planning redundancy and resilience of critical infrastructure and systems

• Increasing the efficiency and safety of technical and industrial systems and processes including production, transportation, communication and construction infrastructure and systems to increase energy efficiency and reduce environmental footprints

• Active participation

• Protecting and developing natural systems (including climate) and areas of environmental, historical, and cultural importance

• Nature-based approaches.

According to the results obtained, suggestions for the city of Ankara in order to create green infrastructure and provide nature-based solutions in order to provide urban resilience are listed above at three intervals.

Short Term;

- Increasing green areas
- Rehabilitation of the existing green system
- Planting the environment of existing transportation axes
- Systematic inventory studies of existing green areas with information systems
- Implementation and supervision of the Ankara Climate Action Plan, Ankara Bicycle Master Plan, and Green City Plan

Medium Term;

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• Preparation of environmental plan and master zoning plans from an ecological perspective

• Creating a natural structure analysis which is one of the basic conditions of planning, in terms of information systems in an accessible and manner that is easily developed (slope, aspect, wind)

• Planning city streams and surroundings as open green areas

• Revealing urban streams and transforming their the ground around them into permeable structures

• Increasing investments in rainwater collection and wastewater recycling

• Making plan notes and arrangements preventing construction over city streams and their environment in development plans

• Increasing green roof, green wall, and other applications supporting urban agriculture

• Increasing urban forests and urban farms (food self-sufficiency)

• Creating green corridors that connect green infrastructures with each other and with the city

• Increasing public transportation and urban mobility by providing integration between transportation systems

• Making a sustainable mobility action plan

• Establishing a city information system (creating data by considering ecological boundaries)

Long Term;

Relocation of construction away from water resources, valleys, and floodplains

• Creation of backtracking and continuity of data systems and efficiency of GIS infrastructure

• Increasing the public transport and metro system

• Reduce carbon emissions by 40% by signing the Agreement to Be a Green Capital and President's Agreement.

When we examine urban resilience theoretically and practically, transforming resilience from a conceptual dimension into concrete urban interventions is a challenging process. The necessity to measure resilience is important in determining which method is applicable and at which points there are vulnerabilities. In this study, a methodology was developed to determine the resilience of cities with the proposed index. With this method, index calculation data and indicators, which can be reused and diversified in other studies, are arranged so that they can be arranged and reused for different purposes. Indicators in different fields offer a holistic analysis by drawing attention to the multifaceted structure of urban planning. This index, which is a guide for city

planners, can be used to reveal the strengths and weaknesses of a city and to use it as a tool for special project areas and plan studies. Identifying the areas in need of improvement in the city is useful for finding priority areas in public policies and for monitoring and comparing changes with geographic information systems in the temporal dimension. Digital technologies, geographic information systems and smart city applications add a temporal dimension to urban planning and offer an up-to-date solution to the participation processes and feedback mechanism problems that are often targeted as not being implemented. This index study is unique and important in terms of creating a decision support system for urban planners.

It is important to adopt a bottom-up approach in resilient urban planning decision processes and to evaluate the information obtained from indices and geographical information systems in the axis of social dynamics, political conditions, relationship networks without removing the glasses of social sciences and to create a decision process by synthesising all these conditions.

Since there is no information system on resilience in Ankara metropolitan area, this study has created a spatial decision support system with 35 maps produced in geographical information systems and an inventory that can be a reference for future researchers has been obtained.

The resilience value obtained with this index provides a comparative perspective on the need for improvement and is useful for the identification of priority planning areas. The physical, ecological, economic and social results obtained from this index are an important decision support system for public policy decision processes. This index offers a wide range of applications for planning decision processes. It is useful for tracking progress, identifying needs, intervention or mitigation processes, monitoring change and making comparisons. Decision support systems are the ability to collect, process, contextualise and present data to transform big data into useful information for the planning process. For the healthy functioning of these processes, all institutions should produce their data in the same standards, work in cooperation and apply the concept of transparency. Open data helps public officials to make evidence-based decisions that serve all citizens and improves the ways of sharing information, providing services and monitoring results. The way for urban planning to adapt to today's change and development processes is to include new paradigms in planning processes and to produce solution-oriented, rational and objective plans.

SYMBOLS

∑ Sum of values

(°C) Celsius degree temperature unit

(Mm=Kg. Amount of precipitation in kilograms per 1 M2

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TL Turkish lira

M2 Square meter

Ha Hectares of area (10,000 m2)

NOTES

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A Narrative of Modern Built Space in Cyprus: Abdullah Onar's Critical Practice

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Abstract

The article is aimed at presenting a perspective towards Turkish Cypriot architect Abdullah Onar's design activity and specifically his own house. Both his built and unbuilt projects can be seen as remarkable specimens for the critical approaches towards modern architecture, where he is assumed to build a modern life for his clients. The main argument of the text is constituted on the idea that with the postcolonial era, modern architecture was questioned and adapted to the local conditions in Onar's practice by making the place-identity visible. The key question contemplated on covers how it sometimes became a tool for reflecting the current context and part of the struggle to make architectural profession visible in the Turkish community; and by this means, had a possible undertone of becoming a contemporary nation. At this very point, the study tries to understand the role of his own house in the historical narrative of modern built space on the island. The Onar house, which was executed between 1962-63, is one of the experimental examples in which Onar's characteristic architectural elements were formulated holistically, to serve as a model for later works. Seen on the historical threshold of the period, the house is critically analyzed via the concept of place-identity, possible connotations it uncovers as the representation of the self and the dichotomy between the local and the modern. The formal architectural elements and spaces that comprise an extension of the cultural past are featured in the architect's own house in such a way that they are critiqued and redefined in a contemporary context, making the building a notable example of his critical practice.

Keywords:
Abdullah Onar, Cypriot architecture, Cyprus modern, Mediterranean modern

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INTRODUCTION

Movements in western architecture and art in the early twentieth century that embraced the ideas of novelty and breaking ties with the past are generally classified as “modernist"; and the concept of the "modern" is broadly understood to describe the rejection of tradition to give shape to the present and the new (Henket, 2002; Heynen, 1999). During the post-World War II years, there was still a partial adherence to basic principles of modernism in the international architectural arena; however, a critical, questioning attitude aimed at rethinking the "modern" in architectural culture and seeking solutions to the current needs of the period was also very much in evidence. In this atmosphere, new approaches tended to revolve around concepts such as identity and relationships with place (Goldhagen, 2000).

In Cyprus, it is commonly argued that the orientation towards modern architecture is closely related to the colonial experience (Pyla & Phokaides, 2009). The approaches specific to Post-World War II modernism, continued to develop after the colonial period. It has therefore been asserted that modern architecture was an expression of both modernization and decolonization during the post-colonial period (Pyla & Phokaides, 2009). As existing studies show, this attitude is more strikingly embodied in public buildings, especially in government structures.

This study presents a partial view of the prolific architectural production (comprising over 600 projects) of the pioneering Turkish Cypriot architect, Abdullah Onar[1](1929-2019), including both his built and unbuilt projects, in the context of the impasse that modern architecture has confronted in Cyprus since the 1950s. It begins with a look at the burgeoning of modern architecture in the island, and continues with several of his works which were designed during the 1960s and 1970s, when his production was particularly prolific; and then focuses on his own family home, a project which he designed and completed in the early years of his career; and where, for the first time, one encounters in their entirety many of the characteristic elements that would become a *sine qua non* in his later projects. The text adopts a critical methodology, where the house - the case study - is critically analyzed via the concept of place-identity, possible connotations it uncovers as the representation of the self and the dichotomy between the local and the modern.

[1] Before the surname law adopted in 1974, his name was Abdullah Mulla Ali.

The primary source material on Onar’s works is found in his personal archive, in interviews with his daughter Anber Onar and his wife Aysan Onar, and in the memoirs of Turkish Cypriot architects of the period or interviews conducted with them. Secondary sources include the few research articles and books that survey the period from a retrospective point of view. The lack of scholarly studies in the north of the island examining the architecture of the 1960-74 period in Cyprus, and the fact that scholars in the south dealing with this period focus primarily on analyzing architectural examples within the Greek Cypriot context, has

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made it necessary to foreground the primary sources. The dozen registered Turkish Cypriot architects in those years did not have their own printed and visual media where they could express themselves, so their views and other traces of the period have also had to be gleaned from these sources for this study: the archival documents are evaluated critically, and perspectives on some aspects of the architectural atmosphere of the period are underpinned by quotations gathered from witnesses.

This was a period which saw modern architecture being re-evaluated in the international arena, the return home of Cypriot architects who had received their education in Europe and Türkiye, the establishment of Cyprus as an independent republic in 1960, and soon afterwards, the growing conflict between the island's two different ethnic groups, which culminated in Greek and Turkish military interventions and a war in 1974 that would lead to the present geographical and political division of the island into northern and southern areas. Such an environment presents a dynamic, yet fragmented, heterogeneous and difficult architectural historiography.

This fragmented aspect necessitates the scrutiny of multiple perspectives and individual experiences. At this very position, the questions and accordingly the main problem, can be described as follows: How can one read Onar's approach to modern architecture, which was believed as a connotation of the newly established state and a contemporary nation? Is it possible to see a solid response of this possible act, particularly in his own house, in a medium where he was relatively more comfortable and unlimited in terms of design? What is the contribution of Onar's own house to the historical narrative of modern built space on the island?

MODERN ARCHITECTURE ON THE ISLAND

In the last years of the British colonial period (1878-1960), especially in the years after the World War II, the capital city of Nicosia started to grow rapidly, and residential areas were formed outside the city walls (Oktay, 2007). Cyprus was declared a Crown Colony in 1925; and as Given (2005) argues, architectural styles were used as a political and ideological instrument from the 1920s to the 1950s. The British colonial administration preferred not to include the traces of Ancient Greek revivalism in the buildings they constructed, since this symbolized the Greek Cypriots' desire to unite with Greece (Given, 2005); and as a result, using the forms of modern architecture, which did not seem to have the potential to create a tie with the past, became an approach that the colonial administration could support.[2] Pyla and Phokaides (2009) similarly underline that the experience of modern architecture on the island was a process that went along with the colonial period, and they draw attention to the complexity of this adventure noting that another factor nurturing this atmosphere was that it was during this period that Greek Cypriot architects who had been educated in Europe in the 1930s

[2] In fact, the first sign of this situation was the Greek uprising in 1931. The ideals of the Greek Cypriots to unite with Greece ("Enosis ") began to take shape; and the nationalist paramilitary association EOKA was established in 1955 to fight against the British colonial rule. In response, the Turkish community demanded partition ("Taksim") as an alternative to potentially being subservient to Greek Cypriot rule; and they established their resistance organisation, TMT, in 1958.

returned to the island and initiated their architectural practices. Through the work of these young architects, who had graduated from international education programs and adopted a new line, the creation of examples of modern architecture in Cyprus gained momentum (Pyla & Phokaides, 2009).

Costas Georghiou (2013) notes that during the interwar period, local architectural elements and the symbols of the United Kingdom were used together, in order to earn the trust of the Cypriot people and to manifest the authority of the colonial administration. The characteristic features used by the Public Works Department included the use of local elements like yellow sandstone and arched arcades, along with a modern approach such as the clear display of the structure, the use of unadorned surfaces and the accentuation of the stairwell (Georghiou, 2013).

Kiessel and Tozan (2011) formally analyze the façades of the houses in Cyprus from the 1930-50 period; and describe the presence of expressive horizontal bands, accentuated by rounded corners and window or roof finishes, as a "Mendelsohnian" approach. While local sandstone accompanied these elements during the colonial period, it was superseded by reinforced concrete and white plain walls after the 1960s; bold overhangs, pilotis, brise-soleils, iron railings, portholes, sundeck-like terrace roofs became essential parts of the "Cypriot Moderne" (Kiessel & Tozan, 2011).

With the establishment of the Republic of Cyprus as effectively a federal republic in 1960, the island gained its independence, and a different socio-political and economic process began. It has been argued that the idea of "Cypriotness," which began to develop from the 1950s onwards, sought its counterpart in architecture with this new era (Bryant, 2004 cited in Gürdallı & Koldaş, 2015). Despite independence from the British administration, architects maintained their modernist attitudes after decolonization. During this political and social phase, similar forms were used, but the representation of architecture changed: the vocabulary of modern architecture now became a symbol of new national consciousness, progress and an independent Cyprus, and took on new meanings within the changing circumstances, especially in public buildings.

However, as a result of the bi-communal conflict that arose on the island in 1963, a fragmented environment emerged during the early post-colonial years:[3] the architectural movements that would represent the independent state were interrupted at this stage of turmoil (Gürdallı & Koldaş, 2015),[4] and the post-colonial context at some point turned into a process of continual disagreement between the two communities.[5] The conditions of the Turkish Cypriot community – particularly the fact that their economy had come to a standstill – led to the reduction of architectural activities to a limited level, especially where the construction of public buildings was concerned; and

[3] The Turkish community on the island migrated to safe areas in 1964 due to the events of 1963 and lived in enclaves in the designated areas until 1967. The blockade was lifted in 1967, but they lived in isolation until 1974. The Turkish Cypriots established their own administration under the title of the "General Committee". After Turkey's military intervention in 1974, the committee took the name of the "Autonomous Cyprus Turkish Administration Assembly." The "Turkish Federated State of Cyprus" was established in 1975 and the "Turkish Republic of Northern Cyprus" was proclaimed on 15 November 1983 (Güven, 2005).

[4] The international competition for the government complex, which took place in the Greek part in 1968-73, is an important example of the progress on the Greek side of this dual structure. Pyla and Phokaides (2011) state that the Greek part prioritized nation building in the post-colonial period; and they draw attention to the representation of post-independence. At this point, it is important to emphasize that the expression "Republic of Cyprus" in that text is used in reference to the activities and developments in the Greek part. Turkish Cypriots withdrew from the government in 1964. The development plans foreseen for the period 1962-76 were also left to the administration of the Greek community, and the office of the Turkish Vice President was removed from the list of services to be moved to the new building. None of the Turkish Cypriot architects participated in the competition (Pyla & Phokaides, 2011).

[5] The dual structure dates back to 1963. The first physical division of Nicosia was in 1956 during the colonial period. Turkish Cypriots created a separate municipal council in 1958, and in the constitution of 1960, the issue of whether these municipalities would be separate or single was left unclear (Papadakis, 2006). The British colonial period in Cyprus officially ended with the establishment of the Republic of Cyprus in 1960. Regarding the complexity and rupture in this period, Tozan (2009), in her work, has gone so far as to make the politicized suggestion that the post-1974 period should be considered as the "post-colonial period" for the Turkish community in Northern Cyprus.

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architects began to emphasize functionality in these buildings (Gürdallı & Koldaş, 2015).

In the 1950s, modern building materials were available on the island; but after 1963, due to the severe embargo which was imposed on the Turkish Cypriot community until 1967, and which was continued slightly more leniently until 1974, there were serious problems finding construction materials; and even transportation and communication possibilities became problematic (Feridun & Feridun, 2013). Hakkı Atun, one of the first architects in the Turkish Cypriot community, recalls that they were subjected to completely isolation after 1963; this created a vicious circle in terms of learning about and obtaining construction materials (Author, personal communication, July 28, 2016). However, Atun (2016) also notes the existence of two large companies – Yüksel Ahmet Raşit and Osman Mısırlızade – which supplied construction materials for the northern part of the island, and adds that they tried to work out different methods of resolving material shortages.

Atun (2016) says that in the 1960s, [*sic*][6] the return to the island of Turkish Cypriot architects who had been educated abroad led to a new period in which architectural production could be carried out without the need for Greek Cypriot architects;[7] and he characterizes this phenomenon of the first architects taking their place and make their contribution in the construction industry in Cyprus as a revolution to its core (Onar, 2022). When the architect Ayer Kaşif describes the scene they encountered as they arrived on the island, he says that the first thing was to introduce their profession (Author, personal communication, July 13, 2017). Thus the role of the handful of actively practicing Turkish Cypriot architects was particularly significant, as it led to the recognition and visibility of professional architectural practice in the eyes of the public.

Despite this, however, very little has been written about Turkish Cypriot architects and architecture during this period. When talking about the 1960s, Atun notes that the idea of copying local yellow stone structures built during the colonial period did not attract Turkish Cypriot architects, who were more inclined towards adopting a modernist attitude. They also compared themselves with their Greek Cypriot contemporaries, and wanted to prove that they were at the same level (Author, personal communication, July 28, 2016). Some of those who returned to Cyprus began to open their architectural offices in the capital, Nicosia, but most of the others, especially those who returned during 1957-59, tended to continue their careers in state institutions because of the difficult circumstances created by the bi-communal tensions during those years (Feridun & Feridun, 2013). One example is the first Turkish Cypriot architect to register, Ahmet Vural Behaeddin, who designed a few houses for the people who played principal roles in the political life of the island after the colonial period. One of Ayer Kaşif's projects, the first that he completed, soon after his

[6] To be precise, this return of foreign-educated Turkish Cypriot architects began in the mid-1950s. Ahmet Behaeddin was the first to return; İzzet Ezel Reşat and Abdullah Onar returned to Cyprus in 1957; Hakkı Atun and Ayer Kaşif arrived a couple of years later.

[7] According to the records of the TRNC Chamber of Architects, the first architects who completed their education and returned to the island can be listed as follows: Ahmet Vural Behaeddin (İTÜ), İzzet Ezel Reşat (Sheffield, 1957), Abdullah Onar (Durham, 1956), Ayer Kaşif (İTÜ, 1959), Ahmed Behzat Aziz-Beyli (İTÜ, 1960), Hakkı Atun (İTÜ, 1959).

return to the island, was a dormitory structure (1959-60), which referred to the "new" in terms of both its form and function.[8] Kaşif describes the project as “everything, including its geometry, the elevations, everything…. It is an example of modern architecture in its totality” (Author, personal communication, February 27, 2018). Kaşif links the modernist overtones in the productions of that period with the education he and his colleagues received; he believes that modern architecture was a part of the identity of the newly established state, and of the consciousness and the desire to be a contemporary country (Author, personal communication, July 13, 2017). Ironically, he also stresses that the approach of modern architecture was not dictated by the state, but was under the initiative of the architects (Author, personal communication, July 13, 2017).

Among these Turkish Cypriot architects educated abroad, the most prolific was Abdullah Onar, who followed his own modernist vision seen in numerous types, encompassing every class of society, and throughout the island.

ABDULLAH ONAR’S ARCHITECTURAL VISION: THE BUILT AND THE UNBUILT

Onar graduated from the Department of Architecture at Durham University in 1956. Before his return, he worked as a full-time architect at the City Architects Department. On his return to Cyprus, during the first months of 1957, he worked for a short time at Colakides & Economou Architects in order to obtain experience in his own country (Onar, 2021); he then set up his own architectural practice in Nicosia.[9]

When Anber Onar mapped his projects on their locations, she observed that within only twenty years, more than ninety of his buildings were constructed in the Köşklüçiftlik neighborhood in Nicosia alone (Author, personal communication, July 07, 2021). This makes it clear that Onar is the architect who practically built and formed this newly developing neighborhood, which continues to be an important and prestigious residential area even today (Figure 1).[10] While projects for houses are the predominant ones in his portfolio, he produced numerous different types of projects: restaurant, assembly hall and theater, cinema, mixed use buildings, garage, factory, hotel, motel, mosque, bank, printing house, casino, passage, gas turbines and office buildings. Even the projects which have not been realized can be recognized as quite radical and challenging in today’s context. Onar constructed projects throughout the island but they are mainly concentrated in the capital city, Nicosia. According to archival records, his first project dates back to 1956 and then there is a break between the years 1963-67 due to inter-ethnic conflicts. Remarkably, his architectural office was producing projects at its peak between the years 1968-1974, when there was still an impasse on the island.

[8] The building, which is now the Democracy Secondary School, was converted into a school right after its construction, and the library was turned into a cafeteria.

[9] His office continued to be active until 1996. His registration number was 26 in the Cyprus Chamber of Architects; and 3 in the TRNC Chamber of Architects.

[10] See the mapping via a QR code in Onar, 2022, p.134.

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Figure 1. Ertuğrul Güven house, Nicosia, 1961-62; Ayhan Suphi house, Nicosia, 1961; Adnan Tahsin house, Nicosia, 1962; Niyazi Ali house, Nicosia, 1976; Aydın Selçuk house, Nicosia, 1969, respectively, Abdullah Onar Personal Archive (AOPA)

A Modern Portfolio

Onar envisioned a modern life combined with local cultural practices for users in both urban center and rural sites. One example is the Yücel Hafızoğlu House (1973-79) in Ağırdağ, a village located on the skirts of the Beşparmak Mountains (Figure 2). Conforming to a sloping terrain, the entrance façade in the north is located on the upper level of the plot, and almost the whole building rises on reinforced concrete columns above the garden. This experimental approach adds a lightness to the structure in every aspect, as it is liberated from the land, especially by the V-shaped columns, which have a solid expressiveness to exhibit the potential and capacity of the reinforced concrete material. The building's plain prismatic form and the expressionist response to its topography overlap with the modernist lines, but it also incorporates details peculiar to the climatic conditions of the area.

Figure 2. Abdullah Onar, Yücel Hafızoğlu house, Ağırdağ, 1973-79 (photo by Anber Onar)

Describing his architectural approach as "simple," Onar also indicated that he attached great importance to functionality and economy (Terlik & Kara, 2005); and as her daughter Anber Onar (Author, personal communication, July 07, 2021) mentions, he wanted to ensure this in a quality way with a proper budget, while elevating his clients to a new lifestyle. An example of this understanding materialized can be seen in the form of his apartment projects. As one of the first architects to build apartments, Onar offered a form of collective living which was unusual for the Cypriots back then. His very first apartment design was for the Evkaf apartments (1957) in Famagusta (Figure 3). This block, consisting of a ground-floor commercial level and three residence levels, follows a substantially rational formula. This design offers its users a functional but also a novel and unfamiliar scheme in a context where inward-oriented single-family houses were common.[11]

[11] For the emergence of apartment buildings and its discussion in the island, see Sioulas & Pyla, 2019.

Figure 3. Abdullah Onar, Evkaf apartments, Famagusta, 1957, Abdullah Onar Personal Archive (AOPA).

In order to enable people to own their houses with a reasonable budget and to contribute to more healthier growth of the city, Onar developed a new vision: the idea of "build-and sell" real-estate development (*yapsatçılık*), in 1968. The entrepreneurship involved purchasing plots within walking distance of the walled city of Nicosia and constructing modern, high-quality, affordable housing on them (Onar, 2021). This pioneering adventure starts with the first stage of the Temel Apartments in Nicosia (1968), a high-rise building which, in addition to its functional scheme, has a façade articulation in which it breaks the solidity of the mass and accentuates the rhythmic projections or recessed movements (Figure 4).

Figure 4. A Abdullah Onar, Temel apartments, Nicosia, 1968, AOPA

Onar also designed his own office block (1973) as an attached building within the historic fabric in the centre of the capital city, Nicosia. At a time, when architectural offices were set up in modified areas of residences or shops located on the ground level, Onar designed an architectural office as such from scratch for the first time (Onar, 2021). As well as being the first designed architectural office, it is also the first multi-storey office building to be constructed by a Turkish Cypriot architect (Yücel Besim, 2016). This pioneering initiative can be seen to have brought an entirely new perspective to the public eye, giving permanency to the role and place of the architectural profession. The building, which was built on a narrow plot, included a warehouse and a shop on the ground floor, and offices on the upper floors. On the

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first level, there is a balcony hidden behind the linear elements, mostly because of climatic concerns, but with an implicit reference to the traditional buildings next to it (Figure 5).

Figure 5. Abdullah Onar, his office, during the construction, Nicosia, 1973, AOPA

Onar's other designs also took into account the geographical and climatic conditions of the island, included elements peculiar to place, and minimized any sense of alienation or feeling of the uncanny in terms of space. Thus, large-sized openings, or sometimes band windows on the surfaces, elements with high plastic effects displaying the potential of the contemporary materials, reinforced concrete, brise-soleils, and recessed and projected movements of the mass, were indispensable in his designs.

Visualities of an Unsettled Time

Onar sketched out several architectural projects that were not materialized for various reasons, but which were also a part of his practice. While his original approach is felt in those designs, some of them offer a more ambitious formal language. For instance, the hotel project for H. Çağlayan in Nicosia in 1961 (Figure 6) and a mixed-use complex (Figure 7) epitomizes the typical features of a modernist look.

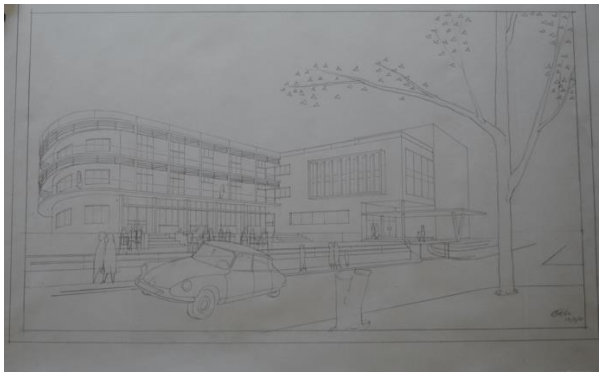

Figure 6. Abdullah Onar, a hotel proposal, Nicosia, 1961, AOPA

Figure 7. Abdullah Onar, proposal for a mixed-use complex, Nicosia, 1973, AOPA

Perhaps the most interesting project in Onar's portfolio is his first - unbuilt - proposal for Sinde mosque (1971) (Figure 8). Onar's proposal shows a surprising innovative and assertive approach to the building, an approach reminiscent of that used in the Ankara Kocatepe Mosque project designed by Vedat Dalokay, with its abstract/modernist minarets and a shell roof structure.

Figure 8. Abdullah Onar, Sinde mosque proposal, Sinde (İnönü)/Famagusta, 1971, AOPA

Besides the public buildings, there are unrealized single family house projects in his archive and some of them were spectacular in terms of their plastic effects. The Kenan Atakol House (1973) was designed with an approach intended to keep functionality in the forefront, while embracing horizontal movements that were harmonious with the topography, and reminiscent of Wrightian forms (Figure 9).

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Figure 9. Abdullah Onar, Kenan Atakol house, Ağırdağ, 1973, AOPA

Another residential project in Ağırdağ (1974) was also designed in accordance with the topography, embedding some of the functions within (Figure 10); demonstrating a highly plastic effect with a horizontal emphasis, the building welcomes its users with a stimulating entrance arrangement, which also serves as a parking space. These approaches make it clear that Onar's intention was to create a new, modern and speculative landscape, not only in the capital but in rural areas as well.

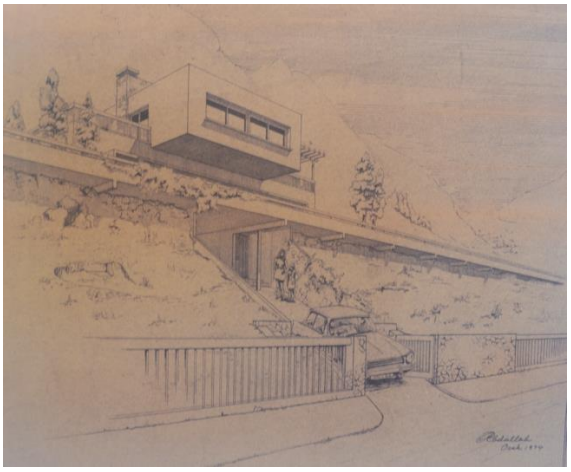

Figure 10. Abdullah Onar, a house project, Ağırdağ, 1974, AOPA

Architectural images and visualizations are understood to engage "deep cultural, disciplinary and institutional strata and be loaded, etymologically, politically and operationally" (Kulper, 2020). In this sense, the existence and prominence of all these features in projects designed by Onar that did not or could not be built during the times of turmoil in Cyprus, may be considered his response to the very chaotic atmosphere of those times. As an architect who had the aspiration to build the representation of the ideals of freedom and independence through – and together with – the architectural profession, Onar continued to portray the new life by building on paper during this period, without moving away from these ideals; despite ruptures in the socio-political context, post-colonial architecture continued in this sense, uninterrupted, in his drawings and envisaged projects.

During the chaotic period between 1963-67 in particular, Onar occupied himself with different but related jobs, on the peripheries of

architecture. Lecturing on perspective drawing lessons was one of them (Onar, 2021). His interest in painting was embodied in panoramic drawings, in which he portrayed and so documented moments from life within the walled city (Figure 11). These depictions are "subjective," in the sense that architect tended or chose to incorporate the local and the modern in the same scene. The framed images lead the eye to the Saray Hotel, one of the most spectacular modernist buildings of the period, and one can recognize, in the architect's choice of this view, an implicit expression of his meticulous attitude towards the local, the historical past and the modern.

Figure 11. Abdullah Onar, two drawings from the walled city of Nicosia, 1967, AOPA

The architect's own residence is one of the projects that display this sensibility, and where the representation of decolonization can be read in relation to his efforts to make the architectural profession visible in the Turkish community.

THE ONAR HOUSE: THE SELF, THE MODERN AND A CRITICAL PRACTICE

In the context of the architecture of Cyprus, it has been argued that the houses in the city were shaped and transformed due to both new lifestyles and local elements, and that semi-open transitional spaces maintained their existence as the main spatial component dominating the layout (Pulhan & Numan, 2005); this attitude has been defined as "critical production," with reference to the examples in the south (Fereos & Phokaides, 2006). As Liane Lefaivre (2003) points out, Lewis Mumford turns "critical regionalism" into a concept which, rather than just defining the challenge, includes reconciliation with the global. According to Mumford, the architect must take into account the connection between the building and its topography, the landscape, and the specific region in which it is located (Mumford, 1956). This definition differs clearly from historicism, which describes merely copying or recalling historical forms or elements. Rather, it presents a more complex rhetoric that falls within the confines of a definition situated between local and universal qualities. Stuart Hall described the emphasis on this kind of locality as an inevitable aspect of modernity, and as a natural reaction of people when they are subjected to

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globalization (Hall, 1993). In the context of Cyprus, it can be seen as a response to and a move beyond the modernism encountered in the colonial period, towards opening up to the world with a new identity in the post-colonial period.

Thus, the orientation towards the local, which is seen as a natural reaction to the universal and its inevitable continuity, has been defined as "a critique of modernism, a reaction to modernism's own doctrinal extremism" or as "a series of creative responses to local conditions" (Heynen, 2002; Torre, 2002). This coexistence arose because an "anxiety knew no national or local boundaries and affected the discourse of modernism as a whole" (Goldhagen & Legault, 2000). Following this line of thought, Marjorie Pryse (2009) emphasizes the need for the traditional at the core of modernism: "The traditional comes into being only as it is rebelled against." In Onar's works, this situation can also be perceived as a dialectical relationship, where the synthesis that emerges from the tension between two different ends, or the oscillation between them, actually reveals a "critical production".

Although the changing political and economic conditions on the island of Cyprus in the post-colonial period created the need to build a new society, it is not unexpected that efforts were made to preserve place-identity and to include references and familiar forms. However it is difficult to read an atmosphere in which post-colonial ideals could not proceed uninterruptedly, since the bi-communal conflict in Cyprus began immediately after the colonial years, and implicitly even before that point. In the north of the island, the notion of nation-building finds its counterparts in architecture mostly in the post-1974 period. Yet, without denying the early post-colonial context, how should one read the architect's own house, which was built in 1962?

Onar foregrounded geography and climatic conditions as the most important factors shaping his design (Onar, 2022), and so his own house has a dual structure that includes elements specific to its place, as well as references to modern architecture. Post-World War II modernism, which includes the processes of re-evaluating modernism, crystallized through the use of brise-soleil, exposed concrete, fragmented volumes and sculptural overhangings on the island (Pyla & Phokaides, 2009); the Onar house was built with these process and conceptions in mind.

Two different entrances were designed, which give the two-storey house a transformative use and the potential to accommodate two different families while ensuring them their privacy (Figure 12).

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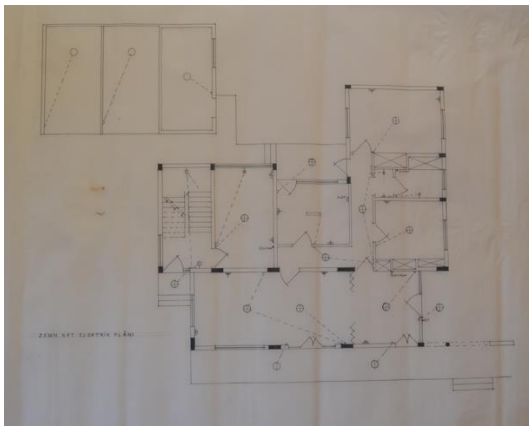

Figure 12. Onar house, ground floor plan, AOPA

It is stated that in the functional organization of residences built during this period on the island, there was a distinct grouping and linking of areas designated as private and public, in order to encourage practical relations (Fereos & Phokaides, 2006). Onar's design for his house follows this kind of pragmatic formation, with the spaces inside– unlike the scheme of a traditional house – being divided into separate and well-defined functional groups.

The reinforced concrete system is reflected on the façade by creating frames or accentuating some floors; protruding volumes or surfaces in relation to sun shading elements reinforce the horizontal emphasis and help to define the semi-open areas. These features used by Onar are precursors of the ways in which he creates a dynamic effect on unadorned surfaces in his later structures. The proportions of solid and void, and the articulation of the façade, accordingly make the structure lighter and break up the solidity of the mass. The asymmetrical balance is supported by the vertical emphasis of the stairwell in one direction, and the horizontal accent of the ceiling of the ground floor culminating in sun shading elements in the other direction.

Interlocking concrete structural elements, which both provide shading and define the entrance, modulate this entrance space (Figure 13). Wooden details on the entrance door welcome the users with a semi-transparent surface. Indeed, transparency is a prominent component of modern architecture and a symbol of progress; and the increasing level of transparent surfaces, especially in Onar's housing designs, cannot be interpreted as an arbitrary decision *per se*: these transparent surfaces are the elements that express the departure of the house from the traditional and signify the architect's commitment to the modern.

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Figure 13. Onar house (photo by Anber Onar)

Within the house, the entrance part is connected to the living space using a flexible folding element. In addition, the corridor related to the entrance divides the functional layout, and organizes the interior in line with the distinction between private and public. In particular, the kitchen has been freed from the isolated and disconnected position with the living space that it had in the traditional house, and has been positioned with a view to its functions and relations in connection with the living space.

A similar plan solution is repeated on the upper level, where a striking detail is the suspended ceiling in the living area, which takes the form of a wooden grid hanging about 40 cm below the actual ceiling (Figure 14). With a total design approach, as Anber Onar states, this element was designed to feature the lighting elements, add rhythm to the space, and enliven the ceiling and the living area visually (Author, personal communication, September 26, 2021).

Figure 14. Onar house interior, AOPA

The natural lighting and the user-outdoor relations, which are the priorities on both levels, are completed with semi-open spaces and large transparent surfaces. The architect's wife, Aysan Onar, summarizes this feature as producing the maximum use of natural heat and light with minimum energy, and creating livable spaces with the light pouring in (Author, personal communication, August 23, 2022). The form of the openings in the upper level evoke the Le Corbusier effect:[12] the

[12] It is known that Onar was drawn to the work important architects of the period such as Le Corbusier (Author, personal communication with Anber Onar, July 07, 2021). In addition to all this modern look, the only nationalist element that drew attention was the flagpole at the residence.

horizontal band windows running along the façade not only contribute to the façade composition, but also allow the interior to be in uninterrupted contact with the exterior. These windows are accompanied by a single long, integrated bookshelf that continues along the parapet as an extension of the wooden joinery inside.

All the furniture in the house was purchased from the UK-based company G-Plan (Onar, 2022). It is possible to see the traces of mid-century design and its iconic lines in G-plan's handmade sofas and armchairs; and Aysan Onar emphasizes that they paid particular attention to the furniture to ensure that it was modern and attuned to the aesthetics and materials of the house (Author, personal communication, August 23, 2022). In the context of the Republican era in Turkey, Gürel (2009) interprets the reception of modern furniture as being linked with gaining a western identity, and suggests that modern furniture also acted to mark a civic position associated with the young republic and its progressive ideals; in Gürel's (2009) argument, items of modern furniture are said to be "objects of a distinguished social status and of cultural development." From this Turkish perspective, the modern interior of the Onar House might be read as pointing to the "civic position" undertaken by the architects of the period; and one might claim that using the forms of modern architecture means to embrace the new era and the development of the country, and that the use of modern furniture displays a distinguished social position and cultural progress, especially when it was preferred by one of the first architects of the community. In fact, however, Cyprus had already been under British rule for over eighty years by this point, and both its Greek and Turkish Cypriot populations had internalized and were quite at ease with their western identities. In addition, unlike many of his contemporaries, whose focus was on building for state purposes or for political elites, Onar worked both on public buildings and to provide housing and raise the standard of living at every level of society. It thus seems clear that the architectural principles and furnishings he employed in the Onar House simply reflected his personal vision and aesthetic, and that this transformation in the domestic interior completes the modern dwelling typology, which for him symbolized a contemporary way of living.

Furthermore, while the motivation for creating a modern space is connected to ideas of spatial economy and functionality, the design of this house also suggests that the architect envisioned a “reform in taste”.[13] The modern domestic interior, especially where it is encountered on the public side of the Onar House, seems to reflect this intention: living and dining spaces serve to communicate the inhabitants’ image of self to outsiders. The furniture one installs and the way one arranges it are also ultimately expressions of one’s image of oneself, and together they carry messages about the self that one wants to convey (Cooper, 2014); and this becomes especially clear in one of

[13] Gürel (2009) has put forward this expression not specifically for the architects in Cyprus, but for the architects who promote modern designs in general.

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the image of the interior of the house which Onar selected to show in a video he filmed (Figure 15).

Figure 15. Onar house interior, still image from the video, AOPA

Along the same lines, Clare Cooper (2014) argues that in general, a house has two crucial and unlike components, the exterior (the public aspect) and the interior (its intimate aspect); through these components, a house reflects both how the individual sees him/herself or the self as viewed from within, and the self that the individual chooses to exhibit to others. In short, both the modern exterior of the house and the modern interior have symbolic meanings that express the owner's "sense of personal uniqueness" (Cooper, 2014). One can continue to read this "sense of personal uniqueness" in other parts of the Onar House, such as the exterior: here, a large terrace, which unites with the private entrance on the lower level, turns into a platform where the living area opens to the outside, establishing a direct communication with the street, and also enabling passers-by to perceive the garden and the semi-open threshold. This type of connection between private and public space, which is found on the public face of the house, on the garden and street facade, might be thought of as reflecting a Cypriot architectural identity, in the sense that it suggests what has been described as the "garden façade" logic of the traditional houses of Cyprus (Pulhan & Numan, 2006). Onar, however, has structured the garden façade quite differently from how it would usually be in the traditional Cypriot house – disconnected from the street by an interface – by placing it in a position facing outward, in a move that both questions and modernizes the logic of the facade in traditional Cypriot house architecture.

Similarly, the use of semi-open spaces in Onar's designs might be thought of as a cultural extension of the approach to porches adopted in the Ottoman period, which had emerged earlier in the form of arcades on the facades of Latin houses. Onar generally created these areas with the columns separated from the facade of the building, and/or with protrusions from the upper mass. In his own residence, the upper floor partially extends forward, in a way that transforms the lower terrace into a semi-open area in line with the cultural and climatic characteristics of its specific location (Figure 16).

Figure 16. Onar house, AOPA

This threshold was frequently in use: it was a place where the family spent a lot of time and guests were hosted, especially in the long summer days and nights, in close relationship with the house, as Aysan Onar mentions (Author, personal communication, August 28, 2022). This transitional area is a sort of modern equivalent of the thresholds in traditional houses that are called *sündürme* in Turkish (and *iliakos* in Greek). The *sündürme* is the area between indoor and outdoor spaces (Pulhan & Numan, 2005:170), and it shapes both climatic conditions and spatial experiences in traditional houses. As such, it is not only a transitional space; it also serves as the heart of the layout (Sioulas & Pyla, 2019). A primary characteristic of modern architectural practice in Cyprus is that "reinterprets the vernacular architectural solutions of in-between spaces to control climatic conditions" (Fereos & Phokaides, 2006); and this can clearly be seen in Onar's critical practice here: as in-between spaces, the terrace and the entrance space united with it do not appear in their traditional form, but rather, have been reevaluated according to new demands within the framework of climatic conditions and the cultural ethos.

In-between spaces in Cypriot houses reflect an architectural approach similar to that found in other Mediterranean houses: they establish a connection with the cultural past and creates spaces associated with a sense of both place and identity (Pulhan & Numan, 2005). In spatial terms, place-identity can be understood in terms of the relation between an individual's self-identity and his or her conception of the environment in which he/she lives in (Proshansky, Fabian & Kaminoff, 1983): it is "an interpretation of self that uses environmental meanings to symbolize or situate identity", and this kind of situating establishes not only an emotional tie, but also common values (Cuba & Hummon, 1993). In the Onar House, the emphasis on place identity is immediately apparent; and common roots and shared values are not ignored, but instead, adapted to actual realities with a critical approach. The elements he uses are themselves codes meaningful to the culture and to individuals who have shared similar values and a common past.

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The house thus both presents and enables this communication, and brings his conception of place-identity to the fore.

CONCLUSION

Postcolonial experiences are described by Clammer (2008) as those experienced by the colonized in the process of "reconstructing their cultures, identities and senses of self-worth; recovering their own histories, languages, mythologies, rituals, art and philosophies." The architectural practice examined in this study can also be considered as a part of this effort. However, the complexity of the post-colonial era on the island also makes it difficult to read the buildings solely within the framework of this definition. Between the colonial and postcolonial periods in Cyprus, there is a shift in the understanding of architectural modernism: during the colonial period, the architectural vocabulary of the "modern" was used as an instrument to express the message of not belonging to a particular nation, while for some architects in the post-colonial era the same language took the form of an expression of a new independent identity and visibility in the world.

In this context, Abdullah Onar's life and work are exceptions, in a number of ways. His work was not limited to serving the needs of the state or particular elites, but was constantly in demand at every level of society; and his architectural practice flourished despite prevailing political and economic conditions, reaching its peak level of production during 1968-74. External and environmental factors contributing to this extraordinary momentum may include, between the lines, social progress and modernization in the post-colonial era; the increasing need for housing due to demographic changes; and the appeal of his architectural approach, which combined a modernist aesthetic with local references, and in part reflected the natural response of a population exposed to globalization.

Onar approached his architectural practice with a reconciliatory and critical attitude, especially in his projects for houses. His own house is a significant example of modern architecture being adapted to the context as a representation of the self while preserving place-identity. For the architects at the time, professional representation and visibility were on the agenda, and they saw it "as a mission" to include representational efforts that pointed to social progress and the growth of an independent state.[14] Onar's own residence, while bearing traces of representation, does not have an explicit political agenda, and he focuses instead on the lived experience of its interior, in-between, and exterior spaces. But even so, the architect's own residence, implicitly, represents the decolonization and being a modern nation in relation to his efforts to make the architectural profession visible in the Turkish community; and to his aspirations to build the new way of living, which situates between the local and the modern.

This architectural attitude can no doubt be related to local experiences that were sometimes disconnected and sometimes parallel

[14] Kaşif emphasizes that the architects of the period considered it their mission to represent the new state.
(Author, personal communication, July 13, 2017)

to each other, in a context where the two communities in Cyprus were trying to re-establish their cultures and identities. At the same time, however, it reflects the "sense of personal uniqueness" of its architect and owner, Abdullah Onar, who did not simply conform or limit himself to the local politics of the state, but consistently pursued his own vision – of an international architectural modernism adapted to Cyprus, and which would enable lived space to be in harmony with its environment, on a human scale, economical and accessible to all; and to create and raise the standard of a modern way of life.

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Resume

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Eclecticism in Augustan Temple Architecture

Zsuzsanna Emilia Kiss *

Abstract

In the history of architecture, eclecticism is clearly associated with 19th-century architecture. This paper focuses on the fact that eclecticism is a way of thinking, a design concept in which the architect combines high-quality architectural elements from different periods to achieve the desired effect on his building. This approach is often necessary to meet client demand.

This philosophy was also used to serve the imperial intention, as a study of the temple architecture of the Augustan period states.

The aim of this paper is to look at eclecticism not primarily as a style but as a design method that has been present throughout history. My hypothesis was, that that eclecticism was viewed in its entirety significantly more in the age of Augustus than in the 19th century.

To underline my findings, I examine a list of significant buildings, such as the temple of Iuppiter Capitolinus and the temple of Venus Genetrix were influenced by early architectural origins, such as the typology of Vitruvius, the characteristics of the Etruscan or Tuscan temple - and examine such. Further, I have a detailed look at the general features and particular characteristics of the temple architecture in the Augustan period, I conclude with and the temple renovations - the Temple of Concordia, the Temple of Castor and Pollux, the Temple of Apollo Sosianus - and the newly erected sacral buildings - the Temple of Divus Iulius, the Temple of Mars Ultor, the Monumentum Ancyranum. This paper demonstrates that the eclectic approach of the early imperial period was so complex that it focused not only on the external appearance but also on the internal design and furnishings.

Keywords:
Augustan period, Eclecticism, Roman architecture, Temple architecture

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INTRODUCTION – HISTORICISM AND ECLECTICISM

The word eclecticism, mostly accociated with the historicising buildings of the 19th century. However, this study aims to show, by examining the temples of the Augustan period, that such an architectural style that combines elements of style and decoration from different periods, already existed at this time.

The term "eclecticism" comes from the Greek word έκλεκτικός (eklektikos) (www.greek-language.gr) means ‘selective’. It was first used in philosophy and referred to the method of selecting and adopting certain doctrines from different schools of philosophy. So Greek philosophers from the 2nd century BC but particular Romans, who were familiar with the views of their Greek predecessors, e.g. Cicero (106-43 BC). In the 19th century Victor Cousin (1792-1867) was the one, who used the term éclectisme for his own philosophical method. (https://www.britannica.com/topic/eclecticism. Accessed 15 May 2024.) The idea is discussed by German architectural theorists from the early 18th century, such as Leonhard Christoph Sturm. (Neville, 2020, p. 152), however, the method – dominating the second half of the 1800s - was only named eclecticism, as a method of selecting architectural styles based on their quality. At this time, the theorists of eclecticism collected and published the works of representatives of the style in a journal. For instance, César Daly in La Revue générale de l'architecture et des travaux publics and Ernst Allard in L'Émulation. (Schoonjans, 2012, 177)

The term "eclecticism" is nowadays interchangeable with "historicism". (Brülls, 2007, p 1; Curl, 2006, p 135) Using them as synonymes causes confusion. In the second half of the 19th century, eclecticism was a modern method by which the architect used elements from different periods to create a new and more valuable work. (Scott, 1858, p 246) Nowadays, however, it is t is increasingly used in a pejorative sense, referring to buildings that blend elements of different architectural styles without any concept. (Goode, 2009, Vol.1. p 261) While the meaning of historicism as the evocation of a historical style has remained unchanged over time, in English academic terminology it refers only to neo-styles. (Gotte, 2009, p 409) However, this is not the case in the German literature, where it can apply to buildings that are purely evocative of one epoch and to those that mix elements of several historical periods. (Dolgner, 2022)

To comprehend ancient architecture, it is necessary to study and understand the method of creation, thus extending the concept of eclecticism to antiquity. The need that architects wish to recall previous historical periods has always been present, but it cannot be called historicism, only ‘memorism’. (Kalmár, 2021.). If, according to a programme with a qualitative selection, the architect evokes elements of different historical periods and composes them into a harmonious whole, whatever the age he lives in, he is following the method of eclecticism. The extension of 19th-century eclecticism as a creative method to other historical periods may raise new aspects. Indeed, the history of style

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permeates the history of architecture today. The same cannot be said yet of the history of architectural design. If we are to make a detailed analysis of architecture, we cannot ignore the functional, structural, formal, interrelated determinants of the design methods. If the creator imports solutions from earlier periods in other geographical areas, and this is necessary, then it can also be qualitatively selected, i.e. 'eclectic'. And this architectural behaviour occurs in all ages.

THE MAIN ANTECEDENTS OF AUGUSTAN TEMPLE ARCHITECTURE

Before analysing the religious buildings erected during the reign of Augustus (27 BC – 14 AD), it is worth recalling the characteristics of the temple architecture of the Republic as a precursor, with its roots in Etruscan temple architecture and the era of the Etruscan kings. We know the characteristics of the Etruscan 'type' only from Vitruvius' description and from Etruscan tombs. Mainly, because only their foundations were built of stone, their upper structures of wood and their sculptural ornamentation of terracotta.

Vitruvius tried to 'canonise' everything in his work, and the same was true of the Etruscan – or Tuscan – temple, the characteristics of which he described in Book IV. chapter 7. (Vitr. 4.7.; oline: Vitruvius (1567), p 147-153) He defined proportions and relationships for every detail of the building; for example, the ratio of the length to the width of the podium was 6:5. He divided the length in half to determine the depth of the cella and defined the depth of the porticus in front of it in 3 units. Then split the width into 10 smaller units, and from these, he formed three cellas 3-4-3 units wide. This clearly shows a typology similar to the Tuscan temple. (Figure 1)

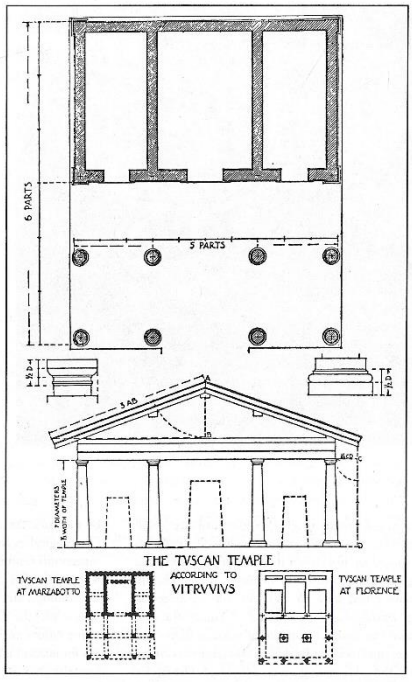

Figure 1. Etruscan temple according to Vitruvius (Stamper, 2005, p. 20).

However, many temples differed from the Vitruvian scheme described above , as the examination of the archaeological remains of the temples of the period, providing clear information on their layout, and detailed tombs,. In fact, Vitruvius identified the characteristics of the three-cell temple built for the Capitoline triads (Iuppiter, Iuno, Minerva) with the Tuscan type, perhaps because the main temple of Rome, the temple of Iuppiter Capitolinus, also followed this layout. (Figure 2)

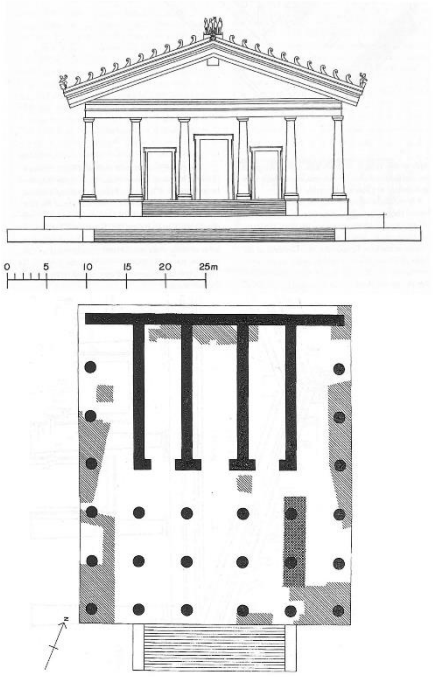

Figure 2 The temple of Iuppiter Capitolinus, Rome. (Stamper, 2005, p. 24; 28.)

The first design of this temple is associated with Tarquinius Priscus, fifth King of Rome (616-579 BC), but it was not completed until the time of his successors, Servius Tullius and Tarquinius Priscus. More precisely, it was not fully completed even during the reign of Tarquinius Priscus, and it was only in the first year of the republic, on 13 September 509 BC, that it was dedicated by M. Horatius Pulvillus consul. (Albertoni, Baroni, & Boccuccia, 2008, p. 14-15)

The sanctuary, built in honour of Iuppiter, Iuno and Minerva – or Tinia, Uni and Menerva – is surrounded on three sides by columns, the rear cella wall running down to the line of the columns. The building itself stands on a high podium, accessed by a flight of steps on the main façade. The temple was first restored in 179 BC, and after more than 400 years of existence, it was destroyed by fire in 83 BC. It was then entirely rebuilt by Sulla and his successor Quintus Lutatius Catulus. (Stamper, 2005, p. 14) These conditions were to influence the temple architecture of Iulius Caesar, which served as a direct model for Augustus. To get an accurate impression of the temple and compare it with buildings of later periods, it is not sufficient to examine the plan; it is also necessary to have information about the design of the façade. Since the temple was rebuilt several times over the centuries and then completely destroyed, it is

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necessary to analyse the images of the coins struck during the temple's rebuilding during the Sulla period. The image of the Temple of Iuppiter Capitolinus first appears on a silver denarius, presenting the first detailed depiction of a building (Stoll, 2000, p. 17) from the Republican period (509-27 BC). (Figure 3.)

Figure 3. Silver denarius struck by M. Volteius 78BC. (https://www.coinarchives.com/87edd875379e70418220070e5d99ede9/img/taulerfau/095/image00234.jpg (Accessed on 07.02.2022)

This mint, dating from 78 BC, shows the pre-fire state of the Tuscan temple type with terracotta decorations and Tuscan columns. The main façade after the rebuilding is shown on the Petillius coin of 43 BC. (Tameanko, 1999, p. 142) (Figure 4.)

Figure 4. Silver denarius struck by Petillius Capitolinus 43 BC. (https://www.coinarchives.com/e580fe075b044aeff16f0e019875961b/img/roma/e91/image00808.jpg (Accessed on 07.02.2022)

Although the image on the coin is schematised, the Tuscan columns have been replaced by Corinthian ones, symbolised by the kalathos; the roof and tympanum are decorated with sculptures. Sulla had the Corinthian columns brought from Olympieion in Athens and had them installed. (Stamper, 2005, p. 14) This was not only a translation (Abramson, 1974, p 8) but the beginning of an eclecticism that continued under Caesar and was completed in the reign of Augustus.

The embodiment of Caesar's sacral architecture was the temple of Venus Genetrix, which Iulius Caesar began building in 48 BC as a vow to commemorate his victory at the Battle of Pharsalus and consecrated in 46 BC. (Bardon, 1940, p. 5) (Figures 5., 6.)

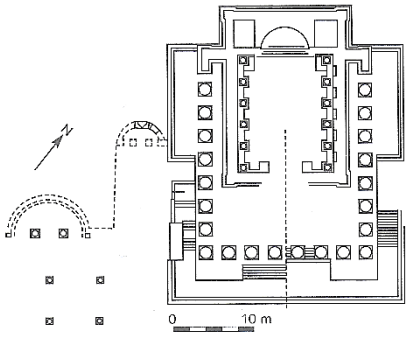

Figure 5. Floor plan of the Venus Genetrix temple. (Coarelli, 2007, p. 107.)

Figure 6. An "opened" perspective view of the Temple of Venus Genetrix. (Maisto, & Vitti, 2009. p. 33.)

Caesar had initially intended to build a temple to Venus Victrix, who was the patron goddess of his enemy Pompeius, but changed his mind after the victory and the killing of Pompeius. (Schollmeyer, 2008, p. 109; App. 2. 68., 2. 81.) This may have been because Pompeius had already dedicated a temple to Venus Victrix (Rüpke, 2001, p. 66), so Caesar finally built the temple of Venus Genetrix in the Forum Iulium, modelled on the temple of Iuppiter in the Forum of Pompeii. (Bardon, 1990, p. 24) However, while the former was built in honour of the Roman goddess, the latter was built to the mother of Aeneas, and thus the ancestress of the gens Iulia. This was the beginning of the process that led to the introduction of the cult of the emperor and the imperial family.

This greatly influenced the later temple buildings, both in terms of the temple's location and layout. The sanctuary of Venus Genetrix stood on the long axis of the Forum Iulium, forming the square wall of the short side. This disposition, rooted in Etruscan architecture, became common in the imperial period. The octastyle building was built on a high, marble-covered opus caementicium podium (Coarelli, 2007, p. 106-107), and unlike the previous ones, it was ascended by two sets of lateral stairs rather than one. Another novelty was the plan of the cella, which ended with an apse rather than a straight wall. The apse contained a statue of Venus, modelled by Arcesilaus. (Plinius, XXXV. 156.) The temple, completed over two years, with Corinthian columns of solid marble, became a prototype in imperial architecture.

From Pliny's account, we know that Caesar consecrated six dactylothecae in the temple (Plin. HN 37. 11.) and that he bought and placed in the temple, for 80 talents, the Byzantine Timomachus' painting of Aiax and Medea (Plin. HN 35. 136.), which was consecrated in front of the temple (Plinius, XXXV. 26.). Gurd, referring to Cic. Verr. 2.4.135., believes that it is possible that Caesar brought these two works of art with him to Rome after his victory at Pharsalus. (Gurd, 2008, 308) The gilded bronze statues of Caesar and Cleopatra were placed next to them. (Coarelli, 2007, p. 107) By placing the statues of Venus, Caesar and Cleopatra in the same temple, Iulius Caesar created a kind of family shrine.

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In both cases, we see the roots of the eclectic approach that would become one of the hallmarks of the 'imperial style' that would develop during the reign of Augustus.

THE AUGUSTAN TEMPLE ARCHITECTURE – BUILDING AND REBUILDING

In many ways, Augustus followed the policy of Iulius Caesar and Caesar's architecture. He also continued the religious reform begun earlier. This meant that new gods came to the fore, and many of the previously venerated gods were relegated. Augustus continued the 'domestication' of state religion begun by Iulius Caesar by introducing the state cult of Caesar. This took place after Caesar was made a god by the Senate in 43 BC. The acceptance of his cult was greatly aided by the appearance of a comet in 44 BC, called sidus Iulium, which was interpreted as a sign of the beginning of a happy future. At the same time, Augustus sought to curb the worship of Eastern or Egyptian gods, thus strengthening the official state religion. This was necessary because these mystery religions were not addressed to the Roman citizen but the people, and thus posed a threat to the close religious-political unity that was to be established.

Venus was becoming increasingly prominent among the gods worshipped from time immemorial, which was also a continuation of the Caesarian tradition. It was a way of justifying the leadership of the gens Iulia by the divine origin of the family.

The rise to prominence of the worship of Apollo and Mars also began with the accession of Augustus. Apollo was Augustus' patron, who helped him to victory at Actium in 31 BC. There were also wonderful stories about Augustus' conception, according to which Augustus was the son of Apollo. According to legend, Atia was visited one night by Apollo in the form of a serpent, and the fruit of that night was Augustus. Suetonius tells us that on one occasion, Augustus hosted a dinner party with his friends, at which the participants dressed as Olympian gods, and he wore the costume of Apollo. (Suet. 70.1.)

His admiration for Mars obscured Iuppiter's because he was the one who helped Augustus avenge Caesar's death. His increased importance was also reflected in the temple built in his honour as it became the site of pre- and post-war ceremonies, whereas these had previously taken place in the temple of Iuppiter.

Augustus also considered it important to revive religious worship of the ancient gods. To this end, he revived archaic priestly offices such as the fetiales, sodales Titii and Arvales fratres. (Kunz, 2004, p. 16) His religious reform was greatly aided by Varro's Antiquitates rerum humanarum et divinarum, originally dedicated to Caesar but eventually used by Augustus.

The Ludi saeculares in 17 BC served to consolidate the new religious order, Augustus himself taking part in the ritual, thus setting an example. Another popularising measure was Augustus' 'feast cumulation', i.e.,

linking the dies natalis of the temples with other feast days, including those of the imperial house, to make them more memorable.

To gain a comprehensive picture of the sacral building activity of the period, including temple renovations, alterations and new constructions, an important reference point is Augustus' writing, the Res gestae. This work shows that Augustus is credited with building 82 temples. (Augustus, 20.) It is difficult to say how many were new constructions because Augustus used the term 'feci' in all cases, even if 'refeci' would have been the correct term since they were only renovations. In order to determine when and what kind of building activity was taking place, Degrassi examined the dies natalis so that if he found a dies natalis earlier than Augustus' for a temple or aedes, [6] then we can only speak of renovation and rebuilding. There was probably a difference between the two: aedes could refer to a single cultic building, a sanctuary, while temple could refer to a group of cultic objects, a sanctuary precinct. (Gros, 1976, p. 15-16) In 35 of the 82 cases, an Augustan dies natalis could be found, but in only seven of these, was there no evidence of an earlier date. Only in the case of the latter buildings could it be assumed – with a high degree of probability – that they were 'real' Augustan temples.

GENERAL FEATURES OF AUGUSTAN TEMPLE ARCHITECTURE – LAYOUT, MATERIALS, STRUCTURES, FORMS

The surviving monuments show some of the general characteristics of the 'aurea templa', or Augustan temple architecture.

In the case of the floor plan, this means a high podium and frontality. These two features alone apply in general to all the temples described below. The reason for this lies in what has been described above, i.e. several of them were converted buildings, which meant that they could only apply the new architectural principles with restrictions, respecting the existing parts.

In relation to building materials and structures, the temples did not differ from other public buildings. In many cases, their podiums were made of marble and opus caementicium or opus quadratum. The material of the ascending structures was the main difference compared to the earlier ones, as it was almost always marble. Where it was not, it was at least used as a covering material. Augustus also wanted to represent the greatness of Rome by using precious colourful stone materials from all parts of the Empire, combined with snow-white marble from the newly discovered quarry at Carrara, to clad and decorate buildings. Thus, he realised his vision of transforming Rome from a brick city into a marble city. (Suet. 28.) The 'aurea templa' meant that tufa and wood were no longer the two dominant building materials, and that much larger and more spectacular temples – shining like gold – could be built. (Winkler, 2005, p. 3)

The shapes, decorative motifs and sculptural ornaments on religious buildings follow a clear system of symbols and a specific iconographic programme. The designers and stone carvers only enjoyed a certain

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freedom in creating floral ornamentation. This may be the reason why the floral ornamentation is, in most cases, rich and luxuriant. It is likely that the craftsmen of the period also used pattern books. In the case of figural building sculpture, Greek mythological themes were usually chosen, in parallel with the events of the period.

In addition to the Greek designs, a typically Roman element also appeared in building sculpture, namely the sacrificial animal, which gradually became a symbol.

Greek elements were not only used in the imagery; in general, but the columns were also Corinthian.

It is clear from the preceding points that Augustan temple architecture is characterised by eclecticism, i.e. a qualitative selection in which Greek decorative elements, such as the Corinthian columns mentioned above or the incorporation of original Greek works of art, are combined with traditional Etruscan features such as the high podium, the axiality and the adaptation to the environment. The result was a temple type of the early imperial period, which spread throughout the Empire over several centuries. This does not mean that it has not changed over time, but rather that the' basic type' has been adopted by the inhabitants of the place in question, adapting it to their tastes over time.

TEMPLE RENOVATION WORKS

Among the sacral buildings of the Augustan period, it is worth examining the renovations first. The layout of the renovated temples is typical of the earlier period, while the way they were renovated and, consequently, their new appearance, is certainly typical of the Augustan period.

Augustus reserved the right to build temples, and so it was the renovations that were dedicated to members of the imperial house and the city nobility. An example of this is the rebuilding of the Concordia temple between AD 7-10, which was attributed to Tiberius. (Figures 7., 8.)

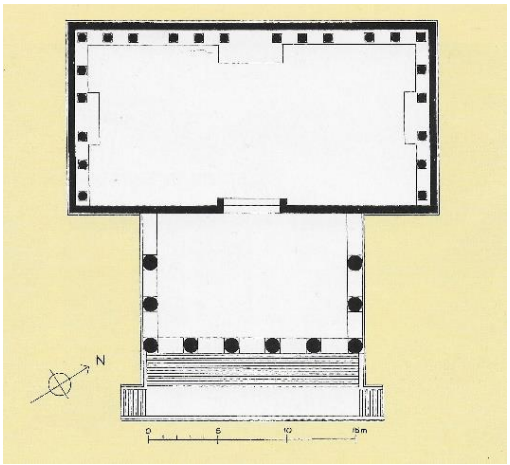

Figure 7. Floor plan of the Concordia temple. (Schollmeyer, 2008, p. 107.)

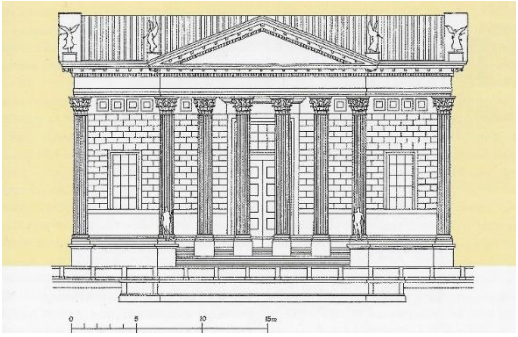

Figure 8. The main façade of the Concordia temple. (Schollmeyer, 2008, p. 107.)

The temple, rising on the western side of the Forum Romanum, was built by Marcus Furius Camillus in 367 BC to commemorate the end of the war between the Patricians and the Plebs. Consecrated on 16 January AD 10 as Aedes Concordiae Agustae, the building has a unique floor plan. The cella is 45 m wide and 24 m deep, while the pronaos is 34 m wide and 14 m deep. This means that the axiality is not prevalent here, or is expressed differently, since the axis of the cella is not perpendicular to the main façade but parallel to it. The concrete core of the temple's podium, which has survived to the present day, probably dates from the 121 BC construction phase, making it the earliest concrete structure in Rome. When the renovation of the building began in 7 AD, the appearance of the building was based on the 'marble Rome' principle. The interior had white marble columns and the exterior was covered with marble. The cell was a 'museum' of Greek sculptures and paintings and a setting for imperial representation. We know from Pliny's descriptions that it was the site of the statues of Bryaxis' Aesculapius and Seleucus, Boedas' the praying man, Baton's Apollo and Iuno (Plin. HN 34. 73), Euphranor's Latona with his children Apollo and Diana in her arms (Plin. HN 34. 77), Naucerus' the resting boxer and Niceratus' Aesculapius and Hygia (Plin. HN 34. 80). Also in the temple were the sculpture' of' Piston's Mars and Mercurius (Plin. HN 34. 89) and the paintings of Sthennis' Ceres, Iuppiter and Minerva (Plin. HN 34. 90), Zeuxis' Marsyas (Plin. HN 35. 66), Nicias' Liber Pater (Plin. HN 34. 131) and Theodorus' Cassandra (Plin. HN 35. 144). Augustus had four obsidian elephants set up in the sanctuary (Plin. HN 36. 196), and Octavia donated a sardonyx stone set in a golden horn to the temple (Plin. HN 37. 4). The statue of Theodorus' Cassandra and the sculptures of Hercules and Mercurius were also installed in the building. The cult statue of Concordia was erected opposite the entrance.

Tiberius also rebuilt the temple of Castor and Pollux on behalf of himself and his brother Drusus. (Figures 9., 10.)

The building of Aedes Castorum or Aedes Castoris was begun in 495 BC by Aulus Postumius Albinus, completed by his son and finally consecrated in 484 BC. The rebuilding was necessary because it was destroyed by fire in 14 BC. Finally, in 6 AD, the temple with opus caementicium structure and octastylos peripteros covered with tufa tiles was consecrated.

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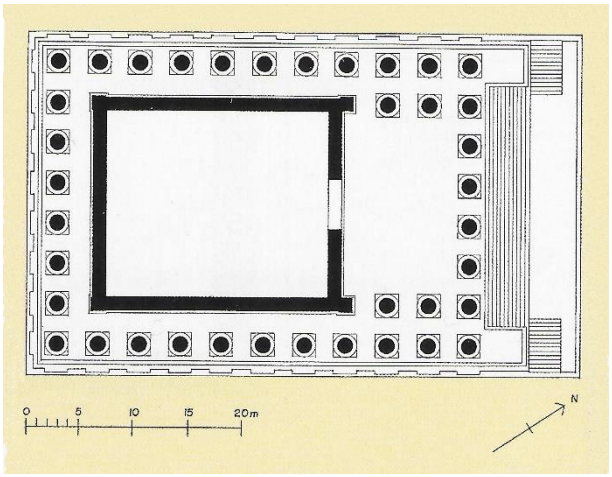

Figure 9. The floor plan of the Castor and Pollux temple. (Schollmeyer, 2008, p. 34.)

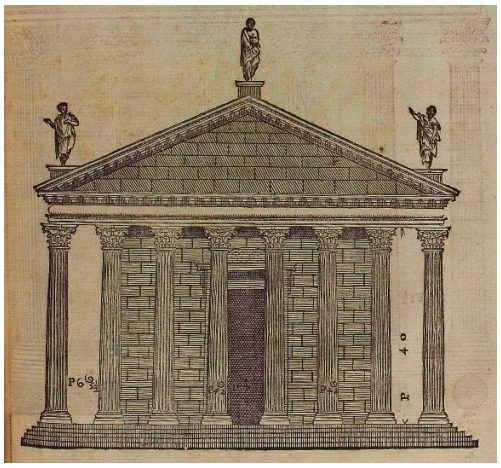

Figure 10. The main façade of the Castor and Pollux temple according to Andrea Palladio. (https://digi.ub.uni-heidelberg.de/diglit/palladio1581/0251 (Accessed on 07.02.2022)

Perhaps the most important of the major renovations of the period was the first temple of Apollo in Rome. The 'ancestral temple' was built in 431 BC by Gnaeus Iulius Mento. The temple of Apollo in Circo or Apollo Medicus or Apollo Sosianus commissioned by Gaius Sosius in 34 BC, is a typical example of the eclecticism of the Augustan period. (Figures 11., 12.)

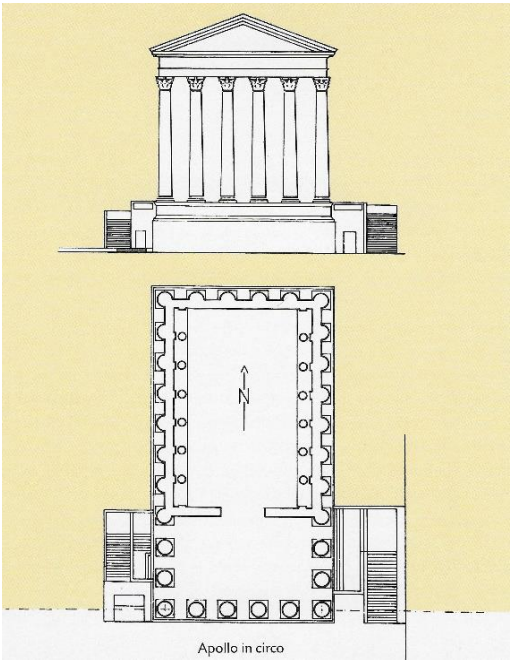

Figure 11. Main façade and floor plan of the Apollo Sosianus temple. (Schollmeyer, 2008, p. 104)

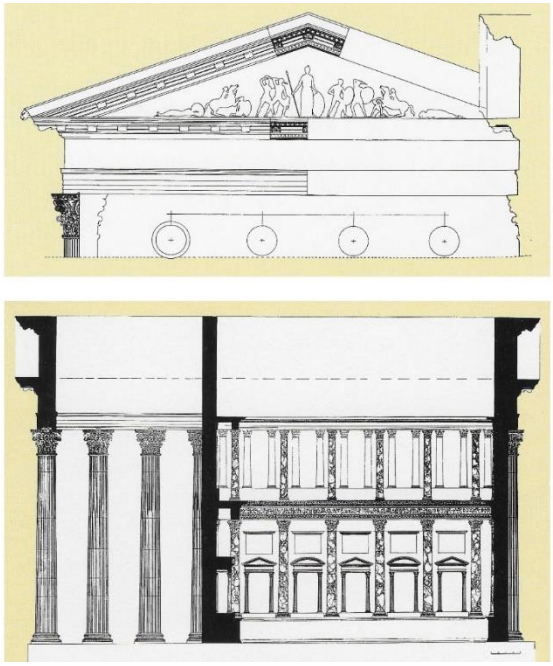

Figure 12. Pediment and longitudinal section of the Temple of Apollo Sosianus. (Schollmeyer, 2008, p. 52; 104.)

The temple was rededicated on 23 September, Augustus' birthday. (Simon, 1990, p. 30)

The cella, built in opus reticulatum on a concrete core podium, was surrounded by Carrara marble columns, with travertine columns and half-columns rising inside. The columns were fitted with specially trained Corinthian capitals. It should be noted here that the use and adaptation of the Corinthian column order from Greek architecture is peculiar to the architecture of the Iulian and even more so to Augustan temple architecture.

The aim was probably to achieve the most ornate appearance possible and thus to achieve imperial representation. This eclecticism is also reflected in the sculptural decoration of the building. A group of classical Greek sculptures is placed in the tympanum. Its subject, the Amazonomachy, symbolised victory over the barbarians of the East in its contemporary context. The same qualitative selection of architectural elements is also present in the interior design, where a selection of Greek artworks is housed. Here stood two works by Aristeides of Thebes - a statue of a tragic actor and a boy (Plin. HN 35 99), and a statue of the dying children of Niobe, considered to be the work of Scopas or Praxiteles (Plin. HN 36. 28).

THE MAIN AUGUSTAN TEMPLES

In parallel with the restoration of the temple of Apollo Sosianus, Augustus built a temple consecrated to Apollo without precedent. (Figures 13., 14.)

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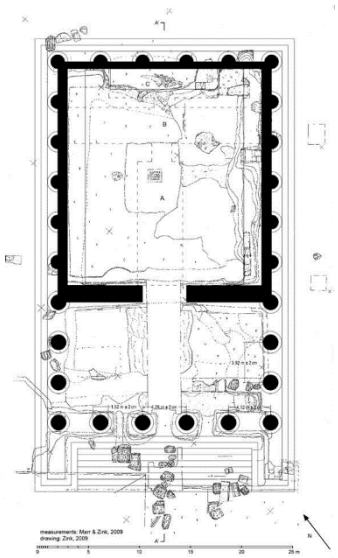

Figure 13. Floor plane of the temple of Apollo Palatinus. (Zink, 2012, p. 395. Fig. 6.)

Figure 14. Reconstruction of Palatine temple of Apollo – Apollo Palatinus temple – according to S. Zink. Colour scheme based on pigment analysis. (Zink, & Piening, 2009, p.121. Fig. 10.)

He vowed to build it in 36 BC when he succeeded in defeating Sextus Pompeius at the battle of Naulochus. However, as construction work was still in progress at the time of the Battle of Actium, it was also a commemoration of the latter battle. It was finally consecrated on 9 October 28 BC. This date, however, did not coincide with the date of the battle of Naulochus or the battle of Actium, but with the feast of the Capitoline triad, which included Venus Victrix (Galinsky, 1996, p. 214), who was associated with the victory. Since the sanctuary was built in connection with Augustus' frescoed private house on the Palatine, it was named the Temple of Apollo Palatinus. Its site was chosen by Apollo himself since it was built on the spot where lightning struck the ground near the temple of Cybele. (Suet. 29.) The temple, surrounded by the portico of the Danadias - a marble portico of 'giallo antico' with fifty black marble statues of the Danaidas (Coarelli, 2007, p. 1–3) - was designed in every detail to represent the emperor. It was built on an artificial terrace using the opus caementicium technique (Winkler, 2005, p. 5), with tufa

and travertine or Carrara marble ascending structures, and its gates were ivory-clad. The decorative work was carried out according to a uniform iconographic programme. The aim was to allegorically depict the defeat of Antony through mythological stories of the killing of Niobe's children and the expulsion of the Gauls from Delphoi. From Pliny's description, we also know that the statue of the temple's pediment was made by Archermus' sons, Bupalus and Athenis (Plin. HN 36. 13.), the excellent sculptors of the time who decorated many of Augustus' buildings. The Greek marble Apollo of Propertius stood in front of the temple. (Coarelli, 2007, p. 143)

The interior decoration and furnishings were equivalent to the ornate exterior. Pliny also recorded the art treasures kept in the cell. Here stood the statue of Diana by Timotheus (Plin. 36. HN 32), and Octavia's son Marcellus placed a dactylotheca in the temple (Plin. HN 37. 11). The damaged head of Diana's statue was re-carved in the reign of Augustus by the famous sculptor of the time, Avianus Evander. The cult statue of Apollo was made by Scopas. In its pedestal were the books of Sybilla, formerly preserved in the temple of Iuppiter Capitolinus; the temple ceiling was also decorated by Cephisodotus' work Latona. (Coarelli, 2007, p. 143.)

The construction of the temple of Divus Iulius - Aedes Divus Iulius or Templum Divi Iuli - was concurrent with the construction of the temple of Apollo Palatinus. (Figures 15., 16.)

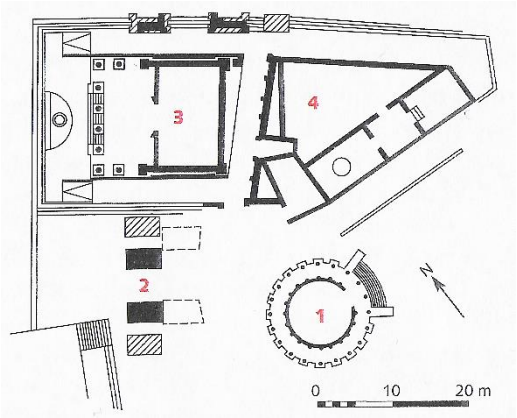

Figure 15. 1. Temple of Vesta, 2. Arch of Augustus, 3. Temple of Divus Iulius, 4. Regia. (Coarelli, 2007, 80.)

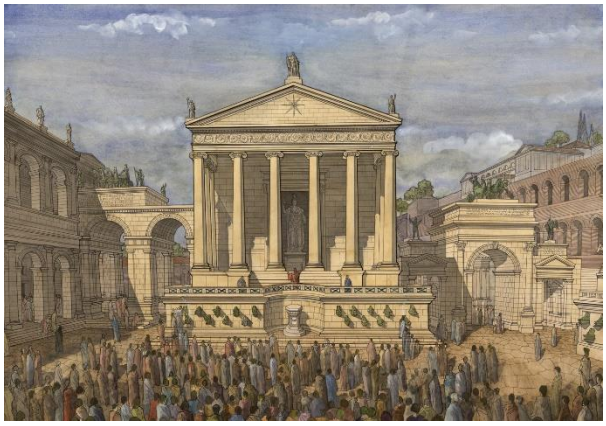

Figure 16. Reconstruction of the temple of Divus Iulius according to Jean-Claude Golvin. (https://jeanclaudegolvin.com/en/project/italy/italie-roma-temple-du-divus-iulius-jc-golvin-2/ (Accessed on 07.02.2022)

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The temple, with a hexastyle prostyle system, was built on the eastern side of the Roman Forum between the Regia, the Castor and Pollux temples and the Basilica Aemilia, on the site of the tomb of Iulius Caesar. Its podium, made using the opus caementicium technique, was decorated with a semicircular incision for an altar. Consecrated on 18 August 29 BC, the temple, with Corinthian columns, differs in proportions from the classical short-sided main façade since the tomb marked out the exact position of the building and the existing layout of the Roman Forum did not allow for a free plan. The cell would have extended deep into the Regia if ideal proportions had been desired. The result was a plan that recalls the Venus Genetrix's approach to the podium and the cella level, and the Vitruvian Tuscan temple type in its proportions, in a single-cella version. The sanctuary is unique in its proportions and iconographic programme because the enemies could only be represented indirectly since they were also Roman citizens. Thus, the 'impersonal' elements of the battleships, ship parts, sea creatures - and the allegory of victory - Victoria on a globe - were only represented in the building sculpture. The artworks in the temple were chosen by Augustus to represent the divine lineage of the imperial family. A good example of this is the image of Venus emerging from the sea by Apelles (Plin. HN 35. 35, 91) since Venus was the ancestress of the Iulius-Claudius dynasty, i.e. Caesar, which naturally reminded everyone of Augustus' divine origin. The interior was also decorated with other Greek works of art and Egyptian trophies.

However, the highlight of Augustan temple architecture was not the sanctuary of deified Caesar but the temple of Mars Ultor. (Figures 17., 18.)

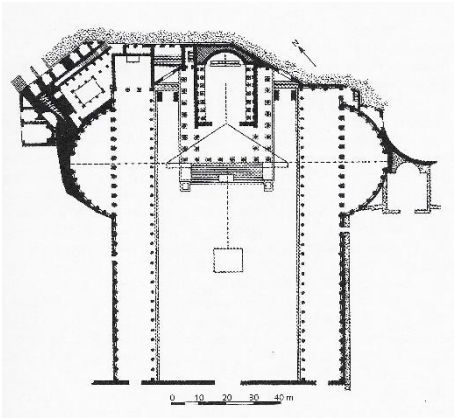

Figure 17. Reconstructed plan of the Temple of Mars Ultor and the forum. (Coarelli, 2007, p. 109.)

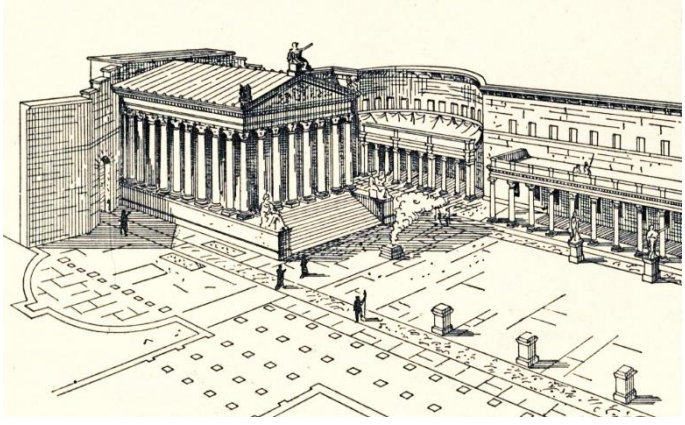

Figure 18. Forum Augustum and the Temple of Mars Ultor. (Platner, 1911, p. 277.)

It was built by Augustus in 42 BC as a vow to commemorate the Battle of Philippi and the avenging of Caesar's assassination. Its layout copied that of the temple of Venus Genetrix in Caesar's forum. Augustus, however, embedded the temple of Mars Ultor in a large-scale architectural setting, organising the entire forum around the temple, which formed its central motif. The sanctuary, consecrated in 2 BC, was located opposite the entrance of the Forum, along its long axis. Unlike the Forum Iulium, the Forum Augustum was organised along two axes. The transverse axis was connected by the great exedrae on the sides, and the intersection of the two axes fell in front of the entrance of the temple of Mars Ultor, on the edge of the podium. (Figure. 17.) This further proves that the whole was built according to an overall concept. The same can be said about the iconographic programme, which was also extended to the temple's surroundings. The topic was the ancestors of the gens Iulia and the relationship between the family and the gods, continuing the programme begun by Caesar at the temple of Venus Genetrix. In and around the temple were statues of Aeneas, Romulus, Iulius Caesar and Augustus, among others. The theme of the tympanum's frieze was Ara Pietatis Augustae. The figure of Mars represented revenge, Romulus as the founder of Rome and Fortuna as the guarantor of succession. The exterior and the interior were decorated with marble slabs of different colours from all parts of the Empire (Cooley, 2003, p. 2–5) - Numidian yellow, Phrygian reddish and so-called Lucullus red-black - to represent the greatness of the Roman Empire in the Augustan period. Thus, a vibrant and unique polychrome building was created, which Pliny, not by chance, called the most beautiful building in the world.

According to Pliny, there were two bronze statues in front of the temple, once the pillars of Alexander the Great's tent. (Plin. HN 34. 48.) The group of cult statues most probably stood on a podium about nine metres wide in the cella, which still stands today. (Kunz, 2004, p. 11)

The octastyle temple was where the Senate met to decide on matters of war, peace, and triumph. It was also the venue for the Ludi Martiales and hosted the Salii.

The construction of the Temple of Mars Ultor and the Forum of Augustus is also important because it completed the transformation of the Forum Romanum from a marketplace to a political and public scene. (Forster, 2005, p. 10)

One other temple must be mentioned in connection with the religious architecture of the Augustan period; the temple of Augustus and Roma, the so-called Monumentum Ancyranum, built in Ancyra between 25 and 20 BC. (Figures 19., 20.)

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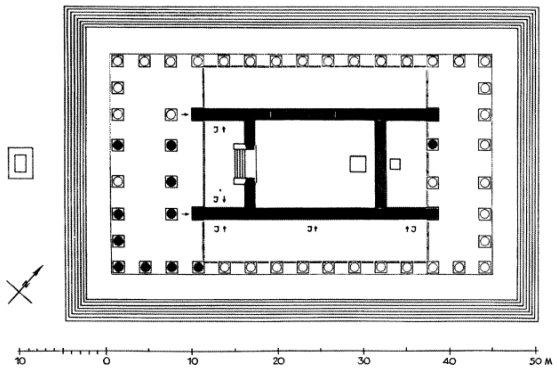

Figure 19. Floor plan of the temple of Augustus and Roma in Ankara. (Güven, 1998, p. 39. Fig. 12.)

Figure 20. The ruins of the temple of Augustus and Roma in Ankara nowadays. (Photo by David Hendrix/The Byzantine Legacy)

Its plan is octastylos pseudodipteros, which, unlike the city of Rome, is entirely Greek in its design. (Ward-Perkins, 1981, p. 279) However, the temple is notable not for its architecture, but because in 14 AD, a Latin copy of Augustus' will was placed on the inner wall of the pronaos and a Greek copy on the outer wall of the cella. Another temple was built in honour of Augustus in Galatia after it was annexed to the Roman Empire, in Pisidian Antioch (Yalvaç). (Figures 21., 22.)

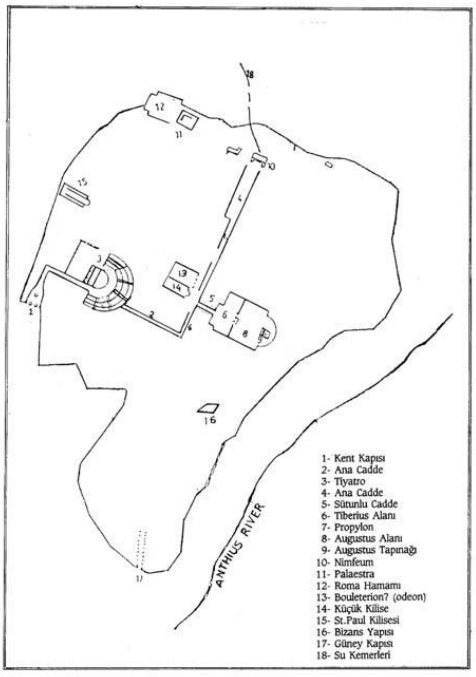

Figure 21. Site plan of Pisidian Antioch (Taşlıalan 1993, p. 293., Plan 1.)

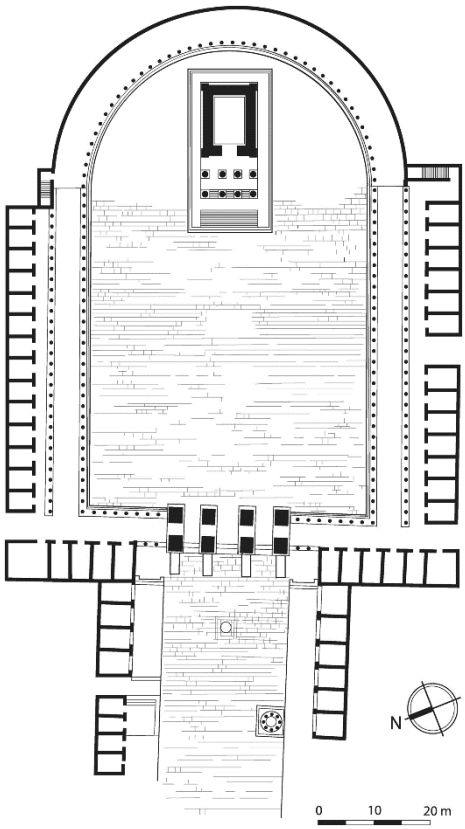

Figure 22. Plan of the Pisidian Augusteum (Favro – Yegül 2019, 634.)

We also know that a Latin copy of the Res Gestae was placed also here. (Güven, 1998, p. 32-33) This also shows Augustus's intention to impose his new ideological and architectural programme throughout the empire. (A Greek copy of the Res Gestae is also survived at Apollonia (Uluborlu) on a staute base, which is the so called Monumentum Apolloniense.).

The temple at Colonia Caesarea in Antioch, also known as the Augusteum or Sebasteion, rose at the highest point of the city. The tetrastyle prostyle temple of Corinthian order of columns was built in a grand architectural composition on a podium with a semicircular enclosure behind the sanctuary, surrounded by a colonnade and accessed through a triple-arched, arcaded propylon. (Figure 23., 24.)

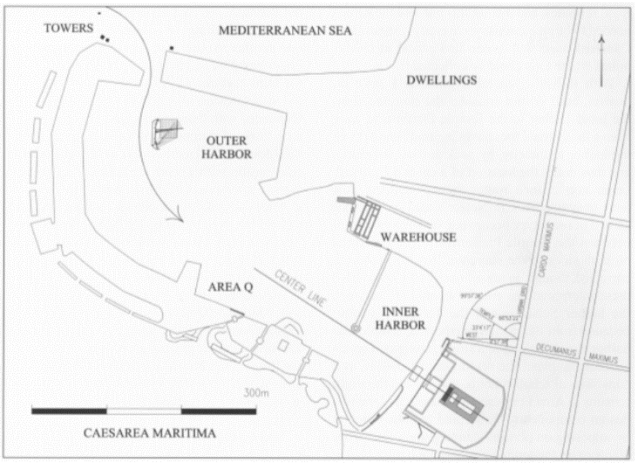

Figure 23. Plan of Caesarea Maritima (Holum 2015 p. 58., Fig. 6.)

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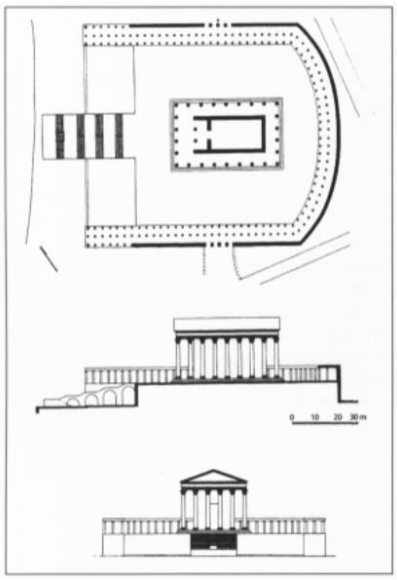

Figure 24. Plan of the Augustus temple complex at Caesarea Maritima (Holum 2015 p. 54., Fig. 4.)

The Latin copy of the Res Gestae was also placed here, on the ornamented entrance gate – known as Monumentum Antiochenum (Robinson, 1926). The sculptural decoration of the sanctuary was in the spirit of the Pax Augusta, and the propylon was decorated with reliefs and statues demonstrating Augustus' victories on land and sea and the benefits of belonging to the Roman Empire for the local population. As architectural and epigraphic records show, the sanctuary was dedicated to Augustus shortly before his death in 14 AD. (Rubin, 2011, p. 34.)

The first excavations were carried out in 1924 under the supervision of W. M. Ramsay and D. M. Robinson, and in the same year the reconstruction of the sanctuary complex was completed with the help of the architect F. J. Woodbridge. Woodbridge himself produced the 'revised' drawings in 1971. Then K. Tuchelt published drawings for the first time in 1983, followed in 1982-83 by reconstructions by Mitchell and Waelkens, which confirmed Woodbridge's original vision. In 1993, M. Taşlıalan, while calling attention to the protection of the ruins, noticed details that had been missed by his predecessors and so produced a new reconstruction. Examining the decorations and reliefs of the architects of the Pisidian Augusteum, similarities can be found with certain motifs of the temple of Augustus in Ankara and the temple of Mars Ultor in Rome, and it can be concluded that decorative elements may have been made even under the reign of Tiberius (14-37 AD). (Akgül Örzarslan, 2012, p. 400-405).

Similar to this large-scale composition, following Hellenistic town-planning principles, Herod had a sanctuary complex built at the same time at Caesarea Maritima (now Sebastos) dedicated to Augustus and Roma. Here the sanctuary itself is arranged in antis in a hexastyle peripteral system, thus even more related to its Greek predecessors, but the distinct axial, monumental staircase approach reflects the Roman approach. The Corinthian colonnaded temple was impressive in size, with a foundation area of about 28.5 x 46.2 m, according to excavations carried

out between 1989 and 2003, and the overall height of the building may have reached 30 m. The height of the temple could be reconstructed from the 33 or so fragments of superstructure (column drums, Corinthian capitals, bases and different fragments of entablature) found here, following the proportions of the Corinthian order of columns. The fragments found also revealed that their 'core' was a well-carved local sandstone, covered with a hard white stucco, giving the impression of a temple built entirely of marble. This was what Flavius Josephus (c. 37-100 AD) called in his writing 'leiotatos litos' (high polished stone). It stood on a platform, which measured 100 m (north – south) by 90 m (east – west). (Holum, 2015, p. 51-53.) The sanctuary and colonnade formed a grandiose background and enclosure for the inner harbour.

By comparing the site plans of Pisidia and Caesarea Maritima, it is clear that the similarity is not only in the sanctuary and its architectural context, i.e. its temenos design, but also in the orientation and the city-scale composition. While the temenos of Augustus and Roma in Pisidia were organised for the view over the land, in Caesarea the axis of the composition was the inner harbour and the bay.

These two examples show that, by the end of Augustus' reign, his architectural programme was no longer reflected in imperial buildings alone.

CONCLUSION

In Ancient Rome, it was the Augustan period when one can first speak of planned eclecticism. Thus, the temple architecture of Augustus' shows a conscious and comprehensive concept of qualitative selection, combining Roman traditions with representative Greek architectural elements and works of art. With the establishment of the Empire, the ruler created a comprehensive programme. Augustus had two main goals: to prove his divine origin and that he was a continuator of the ancient Roman tradition representing the greatness of the empire and of himself. To this end, Greek architectural forms, already considered classical at the time, ancient Etruscan traditions, innovations in architectural techniques and the extensive use of precious building materials, not least marble, played an essential role. The theoretical background of the architecture programme is marked by Marcus Vitruvius Pollio, the first known architectural theorist. The theoretical background of the architecture programme is marked by Marcus Vitruvius Pollio, the first known architectural theorist. His work is also characterised by eclecticism, since he created his canons by analysing Greek buildings and incorporating elements, he considered valuable. (Howe, 2005)

Augustus also reserved the right to found sanctuaries and temples. It was largely to this habit that made it possible for a new type of building and style to spread throughout the empire within a few decades. This 'building policy' was so successful, so consolidated, that it determined

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sacral architecture for many decades and as the last two examples show, this process began at the latest in the last decade of Augustus' reign.

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Resume

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Evaluation of Graduate Outcomes in Architecture Accreditation Requirements from a Student Perspective

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Merve Atmaca Çetinkaya **
Ali Şahin ***

Abstract

Architectural education encompasses a variety of methods, with the primary goal of maintaining and improving education quality. In this context, the concept of accreditation has emerged as a system that ensures the preservation of certain standards and keeping these standards up to date in higher education. In Türkiye, the Association for Accreditation of Architectural Education (MIAK-MAK) has established certain accreditation requirements for Architectural Bachelor's Programs in 2021. According to these requirements, the targeted graduate profile is defined under the title of "Education and Learning Characteristics" of the program. The subheading "Knowledge, Skills, and Competencies that Graduates Should Acquire" summarizes the knowledge and skill areas that students need to acquire through the courses included in the program's curriculum, which are categorized into five titles. This study aimed to statistically evaluate the importance of the areas created for the knowledge, skills, and competencies that the graduate should gain from the perspective of the active student. The study focuses on the students of the Department of Architecture at KTO Karatay University Faculty of Fine Arts and Design. In this context, a face-to-face survey was conducted with the students, and the survey results were evaluated using the Analytic Hierarchy Process method. By comparing each subheading with the others, a ranking system was created, and their importance levels were determined. The results of student evaluations indicated that especially issues related to life safety, structural systems, sustainability, and global architecture stood out prominently. Studies evaluating accreditation criteria from the student perspective are very limited in the literature. For this reason, as an important approach, this study points out the gap in the field for researchers working on accreditation. This research, which aims to provide a perspective from students, is expected to offer an alternative approach and provide a participatory view in educational research.

Keywords: *Architectural education, Accreditation, Analytical hierarchy process, Student perspective, MIAK-MAK.*

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INTRODUCTION

Design process in architecture education, while being a singular act, also encompasses master-apprentice relationship. When this educational process is analysed with a general approach, periodic differences come to the fore and it can be seen that different educational policies have been established. The diversity in these educational policies has led to the emergence of different approaches in practical and theoretical education.

Within the scope of this study, the achievements of contemporary architectural education in Türkiye have been opened up for discussion. In order to better understand the subject of contemporary architectural education, which forms the main framework of the study, it is firstly necessary to be aware of its development process. Particularly, understanding the ecoles and intellectual backgrounds that influence the architecture schools in Türkiye is considered important. The research conducted for this purpose has provided an understanding of the development processes of the curriculum and programs used in architecture schools. For this reason, in the first part of the study, the historical process of architectural education and its role in shaping the architectural education in Türkiye were analyzed.

Another important concept that constitutes the basic setup of the study is accreditation. Accreditation in higher education is defined as "the evaluation and external quality assurance process that measures whether predetermined academic and field-specific standards in a particular field are met by a higher education program and higher education institution" (URL 1). Particularly when accreditation process of architecture is examined, it can be observed that the academic environment, faculty members, students, the field of architecture, other professional fields, and relationships with society are involved. In this regard, the second section of the study extensively examines the objectives and benefits of accreditation in higher education, as well as the standards developed by accreditation organizations for architectural education in both the worldwide and Türkiye.

Within the scope of the study, the assumptions of the CHEA Institute for Research and Study of Accreditation and Quality Assurance regarding student learning outcomes are considered to be important. According to CHEA student learning outcomes are of critical importance as they can contribute to the accountability of accreditation and guide future discussions and decisions. At this point, describing the student learning outcomes specifically mentioned as evidence of the success of each institution and program reveals an approach that is based on the student. In addition, with the aim of accreditation bodies to address student learning outcomes visibly and effectively, the student is again regarded as a fundamental target. Students, parents, and the public attach importance not only to the university diploma but also to the general education and quality behind it (CHEA, 2003). Therefore, the basis of the study is the correct understanding, interpretation, and evaluation of student learning outcomes.

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As a result of this research, the standards established by MIAK-MAK regarding architectural education in Türkiye have formed the main framework of the study. The standards created by MIAK-MAK include five main categories and twenty-nine sub-categories under the section of "knowledge, skills, and competencies that graduates should acquire". The study aims to determine the degrees of importance of these parameters, considering student opinions.

Analytic Hierarchy Process, which is one of the Multiple Decision-Making Methods based on pairwise comparison, was used in the study. This method is highly preferable in terms of being simple, understandable, and providing rational data. At this point, determining which criteria are perceived as more important by students is seen as a significant parameter that contributes to the improvement of the education system. In order to bring the architectural education system to a better level, it is crucial to incorporate the views of the students who receive the education in this process. Considering all these, the study sought answers to the following questions:

- How do students evaluate the criteria determined by MIAK-MAK?
- What are the reasons behind the answers given by the students?

These two questions constitute the motivation of the study. In addition, to create a general framework regarding accreditation and to benefit from examples from Türkiye and the world, the following supporting questions were sought.

- How does the accreditation process in higher education work globally and in Türkiye?
- What are the similarities and differences between the criteria used globally and in Türkiye?
- What are the benefits of the concept of accreditation in higher education?

In this context, it is expected that the conducted literature research, survey and the obtained findings provide guiding insights. The overall structure of the study is represented by the structure diagram in Figure 1.

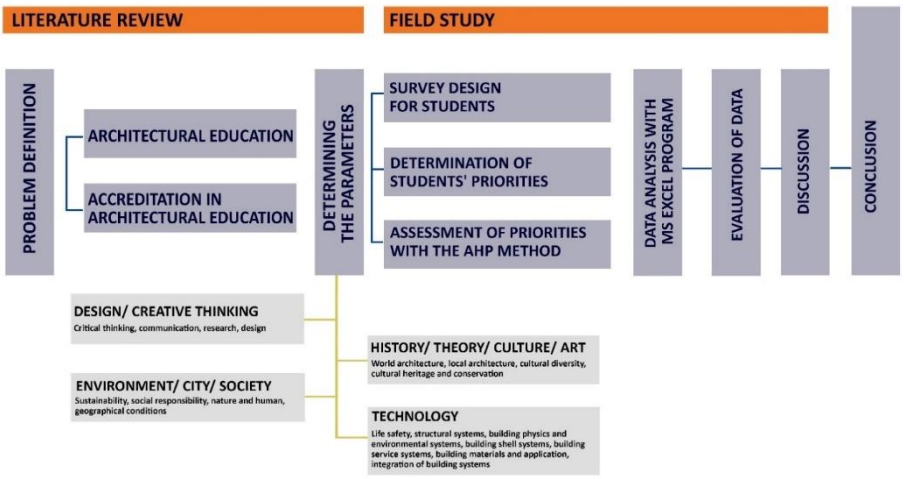

Figure 1. Structure diagram of the research

The concept of accreditation in higher education systems worldwide and Türkiye is discussed from different perspectives. The criteria obtained from MIAK-MAK constitute the basic structure of the research. MIAK-MAK evaluates departments in many different fields. The vision and mission of the institution, the strengths, and weaknesses of the program in self-evaluation processes, the stakeholders of the program, course contents, scopes, learning outcomes, the program's approach to the contemporary architectural environment, students' preparation for their professional lives, incentives and reward systems for faculty members, publications and research projects of faculty members, Physical, information and financial resources for the learning environment are taken into consideration in the process. Institutions must make continuous improvements and take steps to increase quality to bring themselves to reach a higher standard in these areas. For this reason, it can be accepted that students, one of the main stakeholders of the process, showed a participatory approach. How students perceive and interpret the educational process is important for educational institutions. The aim here is not to create a single point of view but to discuss the reasons underlying the different interpretations that were put forward. It is assumed that evaluating the competencies that students must acquire from the student's perspective will pave the way for a participatory approach. Many studies discussed in the following sections are related to how students evaluate accreditation (Esin, 2014; Attia, 2019; Kumar et. al, 2020; Pham, 2018). This study examines the students' perception and evaluation of the existing criteria of the MIAK-MAK. In this regard, it is envisaged that this approach will be a guide for the institutions and organizations that direct the accreditation process.

A GENERAL OVERVIEW OF ARCHITECTURAL EDUCATION

Beyond the definitions of Vitrivius and the guild system that followed, the school opened by Gian Galeazzo Visconti in Milan in 1380 is the oldest school of architecture (Kuran, 1969). In 1562, the Accademia del Disegno was established with the aim of protecting the best artists and providing education to young students, under the leadership of important figures such as Cosimo de Medici and Michelangelo. In 1593, the Accademia di San Luca, founded by Zuccari, was an organization focused on teaching. The common education program in these academies during this century consisted of a series of lectures and drawing practices (Lizondo-Sevilla et al., 2019). Established in 1671, the Academie de l'Architecture became the first architectural academy. Although its main purpose was to be an "Artists' Organization that determines artistic taste," it became a school where young and talented individuals went to Italy to receive education. In 1795, the French academies were reorganized and renamed as Academie de Beaux-Arts. Other than these, the Vienna Academy was established in 1705, the Stockholm Academy in 1733, the St. Petersburg Academy in 1757, the Royal Academy in London in 1786, and the National Academy of Design in the United States in 1826. In this context, the

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French academy and other academies became institutions that set aside the medieval understanding of art and embraced the Renaissance understanding of art (Kuran, 1969).

The foundation of the design studios used in architectural education today was laid by the prestigious school Ecolé des Beaux-Arts. At this point, education, which is carried out in two independent environments, the Ecole, and the workshops, continues in connection with arts other than architecture (Dikmen, 2011). In this education system which was based on the master-apprentice relationship, it is known that the workshop environment is not open to change, and accepted forms are used (Kara, 2017). In this regard, Sunar states that the architectural concept defined by Beaux-Arts as "working in isolation from society and life, staying within a narrow program proposed by others, and using limited formal expressions" (Sunar, 1975). Despite Sunar's radical critique, the organized form of Beaux-Arts in architectural education and its foundational role in today's education system hold a significant place in the development process of architectural education. The education program of Bauhaus, which follows Ecolé des Beaux-Arts, covers a process starting from scratch under the supervision of a master. At this point, the educational studios, which constitute the main fiction of architectural education, have been used actively in Bauhaus (Dikmen, 2011). According to Gombrich, "The building was built to prove that art and engineering do not necessarily have to remain alien to each other, as in the XIXth century, and these two can even benefit from each other. Students at this school were involved in the design of buildings and equipments. While never disregarding the purpose of design, they were given the opportunity to use their imagination and engage in bold experiments" (Gombrich, 1986). In particular, not only aesthetic concerns, technical features and content were considered insufficient; but also a utilitarian approach for people came to the fore. Bauhaus created a modern design style that influenced and implemented architecture, product design, and visual communication (Bingöl, 2009). The boundaries between visual arts and applied arts were removed and it became the source of new formations in many countries (Bulat, 2014).

Architectural education in Türkiye has evolved in line with the developments in the world. In this context, the establishment of Sanayi Nefise Mektebi currently Mimar Sinan Fine Arts University in 1883 is a significant milestone. In its early years, the influence of Ecole Des Beaux Arts was strongly felt. In the 1930s, with the exclusion of the Nazi regime, the Central European school played an active role in the education system. At this point, the institution is an important source in terms of training the faculty members who will take part in architectural education. Another important educational institution is Istanbul Technical University, which is the oldest institution of higher education in Türkiye. Since 1773, the institution has been educating professionals under different names and took the name ITU in 1944. Here, parallel to MSGSU (Mimar Sinan Fine Arts University), the artist-based academy

education continued for a while (Nalçakan and Polatoğlu, 2008). With the separation of the discipline of architecture from engineering, the need for a new curriculum emerged. The education staff formed by academy professors and the pioneering role of foreign architects such as Emin Onat, Clemens Holzmeister, and Paul Bonatz had an influence on shaping the curriculum. Especially the courses found in many European schools played a significant role in the formation of the curriculum at ITU (Rasimgil, 2019). The most important feature of the program, which was created with the influence of Bauhaus, was that it adopted the principle of "learn by designing, not learn first and then design". At the same time, with the developed libertarian approach, it also ensures the formation of a school with high motivation, production, and performance in the studios of the students' own choice (Şentürer, 2020). Another important architecture school is the Middle East Technical University. Established in 1956 in Ankara under the name Middle East Institute of Technology, the institution has brought innovations to the education system in Türkiye. Especially the use of the deductive method instead of the inductive method used in other institutions, and the transformation of the oral examination system into a forum-like atmosphere by eliminating the open jury system are significant changes (Nalçakan and Polatoğlu, 2008). The frequent use of wood and metal workshops and the effective use of architectural design studios in the institution are indicators of the Bauhaus effect (Akış, 2019)

In a general evaluation, it can be seen that the Ecole Des Beaux Arts and Bauhaus schools have had significant influences on the educational staff and curricula of architecture schools in Türkiye. These important architectural schools in Türkiye have played a significant role in shaping the education staff and curriculum formation of other universities in different cities through their graduates. Along with the formation of faculty members, university programs and curricula have also been shaped in similar ways. However, when a detailed examination is conducted between universities, significant differences can be observed in terms of credits, number of courses, course hours, and the number of teaching staff. For this reason, both national and international organizations working to establish, certain quality criteria in architectural education through the frameworks and the activities they develop (Doğaner and Hoşkara, 2020). This situation reveals to need accreditation, which is a current concept in architectural education.

ACCREDITATION IN HIGHER EDUCATION

Accreditation is defined as "equivalence" in TDK (URL 2) and "a quality infrastructure established to support the reliability and validity of the studies carried out by conformity assessment bodies and conformity confirmation documents they issue (such as test and inspection reports, calibration certificates, management system certificates, product certification certificates, personnel certification certificates, etc.)" according to TÜRKAK, the Turkish Accreditation Agency (URL 3).

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In general, accreditation in education is an external quality review process used to examine colleges, universities and educational programs for quality assurance and quality improvement (URL 4). In various countries, conformity assessment bodies are identified, and qualification criteria are set by these bodies.

In the field of higher education in Türkiye, the Council of Higher Education is authorized and there are different institutions from each discipline affiliated to this Presidency. It is important for higher education institutions and programs that accreditation is a system that allows for self-evaluation in terms of performance criteria, as well as external evaluation by authorized accreditation bodies. Furthermore, the prominence of concepts such as recognizability and reliability, the process of granting a reputable certificate to the institution, aiming to continuously improve quality, and trying to maintain standards consistently are among the important gains brought by accreditation. Aktan and Gencel's statement (2020) "Aiming to increase the quality of education and research, assuring the students and all stakeholders that the quality of education and training is based on certain standards, and informing students and stakeholders about institutions that provide poor quality education services" shows that the accreditation process also establishes a close bond with the students. Besides that, the goal of enabling students to make a transparent assessment of the quality of higher education gains importance in the context of improving institutional quality. Accreditation is a system that ensures the general reliability and recognition of the institution and the program, and it provides assurance due to the aim of constantly increasing the quality (Aktan and Gencel, 2010).

In this context, one of the most fundamental facts in accreditation processes is the establishment of standards. "These standards set out the requirements of the system to be established and determine what needs to be done to develop high quality education programs. In a system designed to accredit higher education programs, standards indicate which elements must be present in a higher education program in order for it to be judged to be at an acceptable level. Although there is no complete unity among the standards set by the various accreditation bodies, evaluations generally require that an educational institution seeking accreditation to meet the fundamental standards" (Aktan and Gencel, 2010).

One of the biggest criticisms of the concept of accreditation is that it can be a comparison tool or a standardization tool. At this point, the statements of Nur Esin, who served as former president of MIAK-MAK, gain importance. Nur Esin defined the accreditation process as integrating knowledge and skills, being open to criticism and change, and searching for original, individual development and awareness. At this point, the uniqueness of the program and its efforts to seek originality become extremely important. For this reason, the accreditation process should not be interpreted as a process that ensures that education

becomes uniform, but rather as a process in which certain quality parameters are ensured and originality comes to the fore (Esin, 2014).

It is also important that the global accreditation process to be considered as a tool for the continuous development of the program and that equivalence and approval mechanisms are a necessity for professional architectural practices. At this point, the program criteria in international accreditation are the same, which prepares graduates for global professional practice rather than standardization. In addition, accreditation paves the way for competitiveness in architecture, as it includes professional practice requirements that will direct graduates to become superior. In this context, the existence of positive and negative approaches to the issue of accreditation stems from the debatable and dynamic nature of the issue (Attia, 2019).

At this point, there are many institutions involved in the implementation of accreditation processes both globally and in Türkiye. The organizations responsible for accrediting the architecture department, which is the subject of the study, their fundamental principles, and the standards they have established are examined in detail in the following section.

Architecture Department Accreditation Institutions in the World and Türkiye

One of the most important organizations aimed at improving the quality of architectural education in the world is the Union Internationale des Architects-International Union of Architects (UIA). UIA, headquartered in Paris, is the only recognized global architecture organization (URL 5). In 1996, the UIA and UNESCO published the "Charter on Architectural Education", aiming to provide young architects with an education that prepares them for the professional, social and cultural challenges of a globalizing architectural profession (URL 5). In the Charter, architecture is defined as an interdisciplinary field that includes human, physical and social sciences, technological and creative arts and is a combination of many basic elements (Ayyıldız Potur, 2007).

Another important accreditation organization is the National Architectural Accrediting Board (NAAB), which operates in the United States. It plays a significant role in setting standards and accrediting architectural programs (URL 6). As seen in Table 1, the desired outcomes are targeted at two main levels: comprehension and skills. These outcomes are further divided into sub-parameters such as health, safety and welfare in the built environment, professional practice, regulatory context, technical knowledge, design synthesis, and building integration. Many states in the United States require graduation from a program accredited by NAAB or CACB/CCCA for working in the field of architecture. CACB/CCCA is the accrediting body for architecture programs in Canada and describes the outcomes as knowledge, skills, and comprehension, as shown in Table 1 (URL 6).

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European Association for Architectural Education (EAAE) is an international non-profit organization aim to advance the quality of education of architecture programs in Europe (URL 7). EAAE has developed a specific working plan for setting standards and has identified five categories and fourteen sub-categories related to student outcomes (URL 8). In the United Kingdom, the Royal Institute of British Architects (RIBA) is responsible for setting accreditation standards. According to RIBA, the required outcomes include design, technology-environment, cultural context, communication, and management skills (Minez, 2013).

In Türkiye, the "Architectural Education Accreditation Association", abbreviated as MIAK-MAK, was established on September 10, 2019, to accredit architecture programs. Having carried out its activities in cooperation with TMMOB Chamber of Architects under the name of "Architectural Accreditation Board" between 2006-2019, has gained its independent structure under the roof of the Association as of 2019. The main purpose of MIAK-MAK is to contribute to improve the quality of architectural education through accreditation, external quality assessment and information studies for architectural education programs. Thus, it aims to improve social welfare and the quality of the natural and built environment by increasing the quality of architectural services (URL 9). MIAK-MAK is a legal and independent organization established under the regulation of the Chamber of Architects' Architectural Accreditation Board (Şahin Güçhan, 2019). It has developed its accreditation system based on the UIA/UNESCO Architectural Education Charter, which is a binding educational requirement for the whole world. MIAK-MAK expects an architecture program to develop an educational approach that meets the MIAK-MAK Accreditation Requirements and to ensure the "Knowledge, Skills and Competencies Graduates Should Acquire". As seen in Table 1, the knowledge and skill areas that students should acquire are categorized under five main categories: design/creative thinking, history/theory/culture/art, environment/city/society, technology, and professional environment. Each field encompasses the knowledge and skills that architectural education aims to provide, which are defined at two basic levels: comprehension and skills. Comprehension refers to the capacity for internalizing knowledge, while skills refer to the ability to use acquired knowledge in different representational contexts (URL 9).

Table 1. Approaches of architectural accreditation organizations towards student achievement

UNESCO-UIA	NAAB	CACB / CCCA
Cultural and Artistic Studies: Knowing and understanding the historical and cultural counterparts in local and world architecture; possessing knowledge of fine arts and recognizing its relationship with architecture.	**Health, Safety, and Welfare in the Built Environment:** Understanding the impact of the built environment on human health and safety at multiple scales	**Design:** Ability to understand and analyze design theories, precedents and methods, design skills, ability to use design tools, ability to analyze programs, ability to understand and analyze site context and design, ability to know and analyze the broad implications of urban design, knowledge of detail design, design ability to document and present documentation
Social Studies: Identifying community needs and working with users who represent those needs; understanding the social context and equity/accessibility issues of built environments; knowledge of ethics, philosophy and policy issues related to architecture	**Professional Practice:** Having knowledge of professional ethics, regulators, and fundamental processes related to practice.	**Culture, communications, and critical thinking:** Ability to use critical thinking and communication by writing-speaking-visual media effectively, to know the history and theory of architecture, to understand cultural diversity and to look from a cultural perspective, to know ecological systems
Environmental Studies: Having knowledge about natural systems and built environments; being knowledgeable about topics such as conservation, waste management, ecological sustainability; recognizing the relationship between urban design and local/global demographic resources; being aware of natural disaster risks.	**Regulatory Context:** Having knowledge of laws and regulations applicable to life safety, land use, buildings, and construction sites.	**Technical Knowledge:** Learning about regulatory systems, materials information, structural systems, envelope systems, and environmental systems.
Technical Studies: Having technical knowledge of construction and materials, understanding of construction technologies and service systems; understanding of transport, communication and security systems; knowing the role of technical documentation and specifications in design.	**Technical Knowledge:** Ability to use building systems, technologies and assemblies according to the design, economy and performance targets of the projects	**Comprehensive Design:** Ability to produce architectural design using all the data

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Design Studies: Knowing design theory and methods; understanding of design processes; knowledge of architectural criticism.	**Design Synthesis:** Considering user requirements, synthesis of accessible design and the measurable environmental impacts of design decisions.	**Professional Practice:** Knowing the rights and responsibilities of the architectural profession, knowing ethical and legal responsibilities, understanding the trends that affect implementation, having knowledge about professional contracts and project management.
	Building Integration: Ability to measure building shell systems, structural systems, environmental control systems, life safety systems and building performance.	
RIBA	**EAAE** (international non-profit organization)	**MIAK-MAK**
Design	**Basic Background Subjects:** History and theory, supporting social sciences, basic sciences.	**Design/ Creative Thinking:** Critical thinking, communication, research, design
Technology-Environment	**Building Construction and Process:** Building physics, construction science, building service, construction economics, management, and law	**History, Theory, Culture, Art:** World architecture, local architecture, cultural diversity, cultural heritage, and conservation
Cultural Context	**Understanding the Surroundings:** Urban advertising, environmental studies, topography, surveying, and documentation.	**Environment / City / Society:** Sustainability, social responsibility, nature and human, geographical conditions
Communication	**Project Preparation and Design:** Presentation techniques, architectural design	**Technology:** Life safety, structural systems, building physics and environmental systems, building shell systems, building service systems, building materials and application, integration of building systems
Business Management and Law	**Complementary studies:** Conservation, interior design, research and written thesis, optional courses	**Professional Environment:** Program preparation and evaluation, comprehensive project development, monitoring of building costs, architect-employer relationship, teamwork and cooperation, project management, implementation management, leadership, legal rights and responsibilities, professional practice, professional ethics

At this point, it is seen that different institutions and organizations in various countries carry out accreditation processes. There are also important studies in the literature on accreditation in higher education. These studies generally; focuses on issues such as determining the contribution of accreditation to educational processes, the impact of student experiences, and the effects of accreditation on professional practices. Attia; in his study, selected five architecture programs accredited by NAAB in the Middle East and Gulf Region and examined competition in professional practices. He sees it as a positive development that accreditation is a continuous evaluation tool that encourages competition (Attia, 2019). Pham's study in Vietnam focuses on the evaluation of accreditation by university administrators. The identification of various limitations in the process, such as time and cost burden, and the negative evaluation of the review teams' lack of sufficient competence, point to the limitations of accreditation in improving the quality of higher education (Pham, 2018). Kumar et al. tried to determine the effect of accreditation in higher education from various numerical materials; and questioned whether students and parents prioritize accredited institutions when choosing institutions in their research. Accredited programs have been preferred by students due to the influence of many factors such as quality, excellence, curriculum/academics, learning-teaching relations, and academic reputation (Kumar et al., 2020). Additionally, Rondinel et al. examined a program that was included in the accreditation process by RIBA and focused on examining the quality of accreditation on education in Peru. The number of accredited schools in Peru is extremely limited. An inquiry was made through a survey conducted to different stakeholders, including students, graduates, faculty members, and employers. At this point, it has been concluded that especially active students and graduates have extremely high perceptions that accreditation increases the quality of education. Faculty members also stated that accreditation contributes positively to students' academic performance. In addition, the active use of the student portfolio by students, which is one of the RIBA criteria valid for each course, has been seen as one of the positive effects of accreditation. Therefore most important outcome of the study is that accreditation can improve quality assurance and make a positive contribution to the education process (Rondinel et al., 2022).

The impact of accreditation in education on student experiences and learning outcomes was tested in a study conducted in Chicago by constructing a conceptual accreditation model. The study, based on the engineering discipline, provides important data regarding accreditation. The general outputs of the conceptual model include alignment of curriculum and teaching practices with learning outcomes, more effective participation of faculty staff and students in all processes, and significant changes in the quality of students' educational experiences inside and outside the classroom. In the study indicating the positive effects of the accreditation process on students, it was observed that there was an

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increase in the collaborative approach and active participation levels, more interaction with instructors, more travel experience, and more participation in communities and competitions. At this point, it has been seen that accreditation makes significant contributions to the education process both on individual and faculty basis (Volkwein et al., 2007)

MATERIAL-METHOD

MIAK-MAK's self-defined vision is as follows: "to contribute to the improvement of the quality of architectural education by conducting external quality assessment and information studies; to support the improvement of social welfare and the quality of the natural and built environment by increasing the quality of architectural services; to ensure the development of the architectural profession through education; to improve architectural education through evaluation and competency studies by cooperating with official institutions related to education and developing recommendations". It is also clearly stated that architecture schools are expected to provide education in accordance with the knowledge, skills, and competencies that graduates should acquire (URL 10).

Analytic Hierarchy Process is one of the most frequently used Multi-Criteria Decision-Making Methods. In this context, in order to understand this method, it would be right to first explain the concept of decision and MCDM. Decision is defined as the choice that individuals make among different alternatives. In the decision-making process, criteria play an important role and vary depending on the situation (Dalbudak, 2022) In the decision-making process, "approaches and methods that attempt to reach the possible 'best/appropriate' solution that meets more than one criterion that conflicts with each other" are called multi-criteria decision-making methods (URL 10). In MCDM methodology, various methods are used such as Analytic Hierarchy Process (AHP), Analytic Network Process (ANP), Preference Ranking Organization Method for Enrichment Evaluations (PROMETHEE), Simple Additive Weighting (SAW), Weighted Product Method (WPM), Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), Elimination and Choice Expressing Reality (ELECTRE) (Harputlugil, 2018).

AHP is one of the most preferred methods due to its ease of use in mathematical operations and comprehensibility (Uludağ, 2016), the short duration required for evaluation, the ability to evaluate abstract and concrete criteria together, the ability to perform consistency analysis, and the clarity and understandability of the results (Prins and Topçu, 2014).

Among those, AHP allows the decision problem to be decomposed into the smallest details, ensuring that even the smallest detail can have an impact on the decision. It enables the participation of both subjective and objective opinions, as well as qualitative and quantitative information, in the decision-making process (Kuruüzüm, 2001). Therefore, it has a wide range of applications, including customer relations, strategic planning,

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demand evaluation, recruitment, budgeting, resource allocation, public policies, energy projects, production projects, investment projects, and project selection (Basar, 2011).

The AHP method used in studies related to architecture, but not very frequently. Şimsek used AHP to evaluate three different buildings designed by students using passive solar systems (Şimsek, 2019), Chong et al. used it in the evaluation of green buildings for reinforcement purposes (Chong et al., 2019). AHP was used by Bozic et al. to measure the attractiveness of cultural heritage sites in Phuket by taking the opinions of local experts and to contribute to cultural tourism (Bozic et al., 2018). In addition, Yıldız Kuyrukçu and Alkan used AHP in determining the importance of place-specific architectural design criteria (Yıldız Kuyrukçu and Alkan, 2019), Akadiri et al. used AHP in their study with expert groups for the use of sustainable materials in building design and stated that the results were influential in leading building design (Akadiri et al., 2013). Hatipoğlu Şahin used AHP in her study aiming to increase the quality of life in public housing, where she obtained the opinions of public housing users based on the criteria she determined (Hatipoğlu Şahin, 2021). In Deljavan's study, AHP was used to develop an ideal design for building facades by consulting with expert teams (Deljavan, 2020). In terms of education, Harputlugil's study stands out. In this study, final-year architecture students' projects were evaluated by academics based on certain criteria. The research revealed that AHP has a high potential for increasing competency and development in evaluations to be made in design education (Harputlugil, 2018).

As seen, although AHP is not entirely new to the field of architecture, its application areas are still limited. However, due to the rational data it provides, ease of implementation, and the ability to include even the smallest details in decision-making processes, it is assumed to have a significant place in the field of architecture as well.

AHP methodology has enabled the evaluation and measurement of various stages of the educational process by student stakeholders. AHP allowed the creation of a decision-making model with student evaluations. In this sense, analyzing the importance levels of the criteria determined by MIAK-MAK and making a choice was carried out with AHP. The AHP method mathematically shows the evaluation of the best alternative in terms of quantitative and qualitative criteria (Lin et al., 2008). Moreover, since it is an evaluation result based on comparison, it provides a model that can improve and resolve knowledge and curriculum problems for different universities. It can be said that AHP offers ease of use with its “simple but consistent mathematical system that can evaluate subjective/abstract/uncountable and objective/concrete/countable values together” (Harputlugil, 2012). The system established to achieve the desired goal based on the dual comparison method. These comparisons reveal the importance levels of the criteria relative to each other. As a result, a hierarchy is formed with

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the system that compares and ranks the degree of importance between the criteria (Harputlugil, 2012).

The AHP methodology consists of three stages: hierarchy formation, priority analysis and consistency determination. By using the methodology based on pairwise comparison, these three stages were applied in the scope of the study and the data were processed into AHP charts. The results and evaluations are detailed in the next section.

Within the scope of this research, a survey study approved by the ethics committee on KTO Karatay University Human Research Ethics Committee was conducted. In order to invite students to participate in the survey, announcements were made in the classrooms explaining the survey. After these announcements, the survey was conducted with the students who volunteered to participate in the study. Due to the ongoing hybrid education, a face-to-face survey was conducted with 85 students. At this point, the classes were interviewed in advance and an appointment was made, followed by a detailed explanation about the survey. In the practice carried out in class groups, a transparent environment was created enabling students to inquire about what they did not understand. The results of the survey were entered into the Microsoft Excel program and then evaluated by following the steps of the Analytic Hierarchy Process. In this context, the criteria determined by the MIAK-MAK and used for the survey are presented in Table 2. In the survey format, the criteria were explained with the expressions in MIAK-MAK's directive. Any unclear points were explained to the students by the survey's administrators.

Table 2. Criteria determined by MIAK-MAK (URL 10)

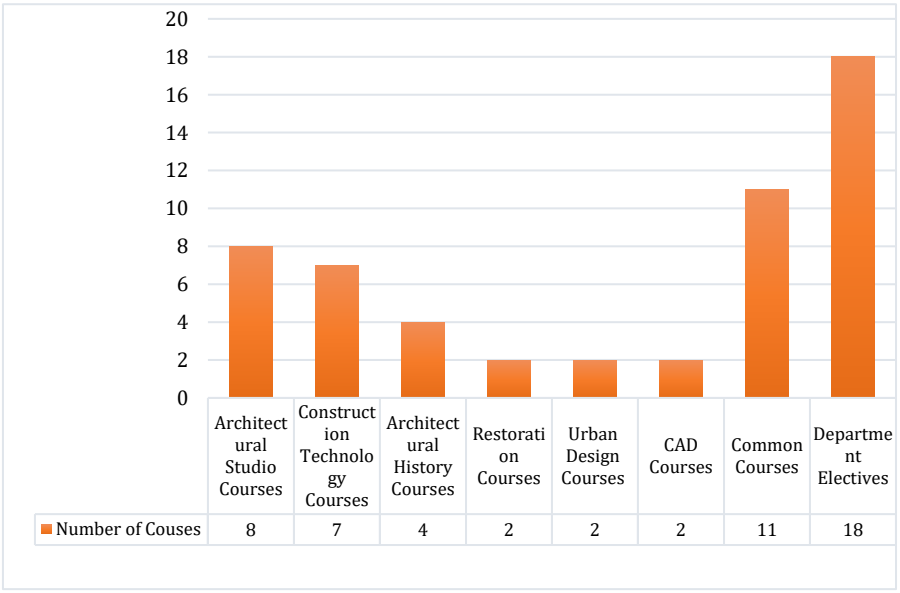
Design / Creative Thinking	**History / Theory / Culture / Art**	**Environment / City / Society**	**Technology**
Critical Thinking	World Architecture	Sustainability	Life Safety
Communication	Local Architecture/Cultural Diversity	Social Responsibility	Structural Systems
Research	Cultural Heritage and Conservation	Nature and Human	Building Physics and Environmental Systems
Design		Geographical Conditions	Building Shell Systems
			Building Service Systems
			Building Materials and Applications
			Integration of Building Systems

FIELD STUDY- FINDINGS

The study aimed to investigate which knowledge and skills were highlighted from the perspective of students and which ones were considered more important. The data obtained from the study is expected to contribute to the direction of education. Presenting the students' perspective is considered a participatory approach. There are 64 state universities and 45 foundation universities providing architecture education in Türkiye. 21 of these universities are accredited by MIAK-MAK with different conditions.

A field study was conducted in line with these objectives, with the students of the Department of Architecture at KTO Karatay University, Faculty of Fine Arts and Design, in May 2023. The department where fieldwork is carried out is making various preparations for the accreditation process currently. The department is planning to apply to MIAK-MAK in the first application period through processes such as curriculum change, active and graduate student tracking, and event planning. In addition, the department defines its vision and mission as "aims to train architects who can create qualified living spaces by using today's technology and facilities, compete in international areas, follow current urban and architectural issues, question and make suggestions, are human-oriented, observe the benefit of society, have a sense of history and environment, and stand out with their competencies in the working environment." In this context, it would be right to provide some general information about the department and its curriculum. The department was established in 2013 and currently has 4 faculty members, 4 lecturers, 3 research assistants, and a total of 130 active students. The current curriculum comprises 8 semesters, 56 courses, and requires earning 240 ECTS credits for graduation. The distribution of these courses is presented in Table 3.

Table 3. Course distribution in the applied university



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Since the AHP hierarchy is based on pairwise comparisons, a pairwise comparison matrix was prepared for main criteria and 36 pairwise comparison matrices were prepared for the sub-criteria. As part of the survey, a sample questionnaire prepared for evaluating the criteria is shown in Table 4.

Table 4. Sample questionnaire design

Critical Thinking	9	7	5	3	1	3	5	7	9	**Communication**
Critical Thinking	9	7	5	3	1	3	5	7	9	**Research**
Critical Thinking	9	7	5	3	1	3	5	7	9	**Design**
Communication	9	7	5	3	1	3	5	7	9	**Research**
Communication	9	7	5	3	1	3	5	7	9	**Design**
Research	9	7	5	3	1	3	5	7	9	**Design**

Firstly, an evaluation was made based on the age and gender distribution of the students who participated in the survey. According to this, out of 85 students, 56 were female and 29 were male. The distribution by classes can be seen in Table 5. Additionally, the average age of the participants is 21,7. In General, a homogeneous distribution among classes was preferred.

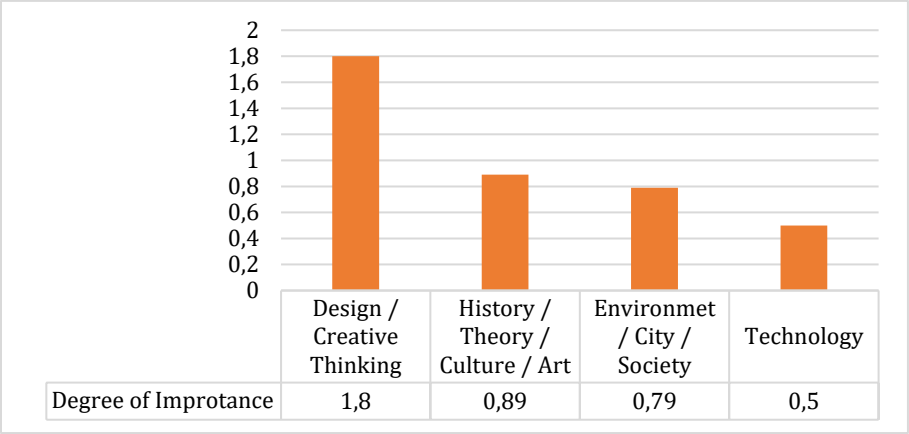
Table 5. Distribution of participants

	WOMEN	**%**	**MEN**	**%**	**TOTAL**
1st Grade	16	69,5	7	31,5	23
2nd Grade	12	60	8	40	20
3rd Grade	11	61,1	7	39,9	18
4th Grade	17	70,8	7	29,2	24
TOTAL	56	65,8	29	34,2	85

The survey results were processed into the AHP matrices using the software and the steps of the AHP were followed to obtain priority rankings. AHP assessment focuses on general perspectives of all classes. At this point, it can be accepted that there may be differences between classes. However, due to the limited sample size and to make a general judgement about student evaluations, no in-class evaluation was made.

In this context, first of all, the main categories of "Design/Creative Thinking, History/Theory, Culture/Art, Environment/City/Society, Technology" were evaluated. As seen in Table 6, the design-creative thinking main criterion, which includes sub-criteria such as critical thinking, communication, research, and design, emerged as the highest-ranking criterion compared to all other main criteria. Following that, the criteria of history-theory, culture-art, environment-city-society, and technology are ranked in order.

Table 6. AHP questionnaire main criteria evaluation results



	Design / Creative Thinking	History / Theory / Culture / Art	Environmet / City / Society	Technology
Degree of Improtance	1,8	0,89	0,79	0,5

When the sub-criteria were examined, the title of design-creative thinking was examined first. The definitions provided by MIAK-MAK for the sub-criteria under this heading which is Critical Thinking, Communication, Research, and Design were shared with the students. MIAK-MAK's definitions (URL 10) are as follows:

- **Critical Thinking:** The ability to question, express abstract thoughts, evaluate opposing views, and examine the results obtained with similar criteria,
- **Communication:** The ability to read and write appropriately, express ideas, and the ability to use different representation media to convey design thinking.
- **Research:** The ability to comparatively evaluate, document and apply the information obtained about the design process,
- **Design:** The ability to reproduce design knowledge in the creative thinking process; achieving new and original results in the context of universal design principles such as sustainability and accessibility.

As seen in Table 7, the sub-criteria of critical thinking, which includes concepts such as questioning and analyzing, were evaluated as the most important skill by the students. Following that, communication, research, and design were ranked respectively. In this context, it is worth investigating why research and design, which are fundamental to architecture, are considered less important by students. In this context, it is understandable that students who consider social networks as a communication channel attach importance to critical thinking and communication factors. In architectural studio courses, inquiry-based education plays an important role in the design process. It is thought that this situation affects student preferences.

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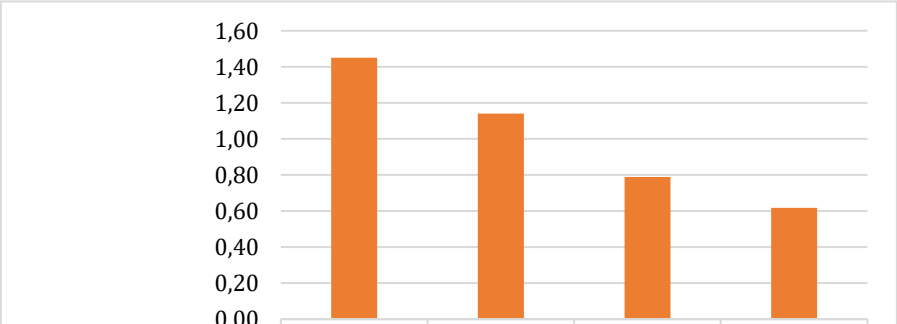
Table 7. AHP questionnaire design/creative thinking criteria evaluation results

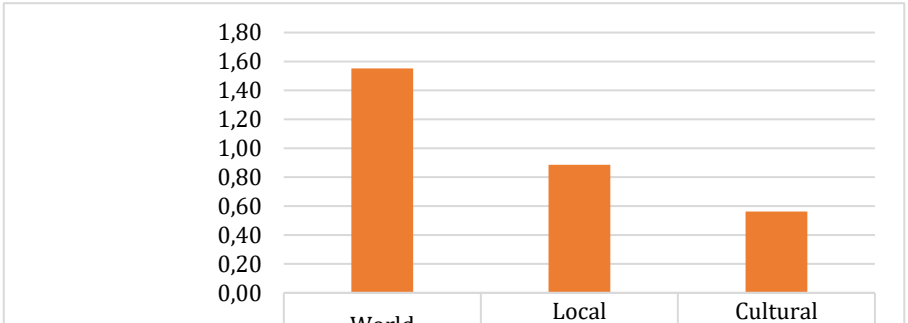


	Critical Thinking	Communication	Research	Design
Degree of Importance	1,45	1,14	0,79	0,62

Another sub-criteria research was conducted for the categories of world architecture, local architecture/cultural diversity, and cultural heritage and preservation, which is under the criteria of history/theory /culture/art. MIAK-MAK's definitions for these sub-criteria are as follows (URL 10);

- **World Architecture:** Understanding world architecture in the context of historical, geographical, and global relations.
- **Local Architecture/Cultural Diversity:** Understanding the architectural formations and examples of the current geography in the context of historical and cultural relations. Understanding the differences in value judgments, behavioral patterns, social and spatial patterns that define different cultures.
- **Cultural Heritage and Conservation:** Understanding cultural heritage, conservation awareness, environmental sensitivity, ethical responsibility, conservation theories, and methods.

Table 8. AHP survey history/ theory/ culture /art criteria evaluation results



	World Architecture	Local Architecture/Cultural Diversity	Cultural Heritage and Conservation
Degree of Importance	1,55	0,89	0,56

According to the results shown in Table 8, the subject of world architecture was perceived as more important than other criteria. This is followed by local architecture/cultural diversity and cultural heritage/conservation. Particularly, the interest in world architecture and local architecture/cultural diversity is interpreted positively in terms of following contemporary architecture.

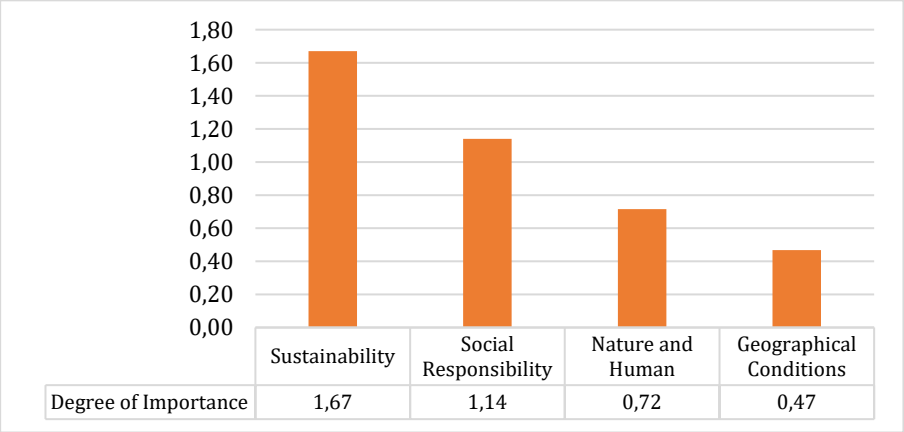
Another main category, referred to as environment/city/society, includes the criteria of sustainability, social responsibility, nature and human, and geographic conditions. According to MIAK-MAK's definition (URL 10):

- **Sustainability:** The ability to design sustainably using a variety of tools to minimize undesirable environmental impacts on future generations using knowledge of the natural and built environment.
- **Social Responsibility:** Understanding the architect's responsibility to prioritize public welfare, show respect for historical/cultural and natural resources, and improve quality of life.
- **Nature and Human:** Understanding all aspects of human interaction with natural systems and the design of the built environment.
- **Geographical Conditions:** Understanding the relationships between site selection, settlement and building design considering cultural, economic and social characteristics as well as natural features such as soil conditions, topography, vegetation, natural disaster risk, etc.

As shown in Table 9, the subject of sustainability has ranked higher than other criteria. It is also the second highest-ranking criterion in the overall table. Sustainability is one of the most discussed and discursive topics in today's world. It is of primary importance to architecture students as it connects environmental, social, and economic indicators and provides a multi-layered approach (Rosen and Kishawy, 2012).

This is followed by the criteria of social responsibility, nature and human, and geographic conditions.

Table 9. AHP questionnaire environment/ city/ society criteria evaluation results



The final assessment under the main category is technology, which includes the criteria of life safety, structural systems, building physics and environmental systems, building shell systems, building service systems, building materials and applications, and integration of building systems. According to MIAK-MAK's definitions for these criteria (URL 10):

- **Life Safety:** Understanding the fundamental principles of safety and emergency systems at the building and environmental scale in conditions such as natural disasters, fire, etc.

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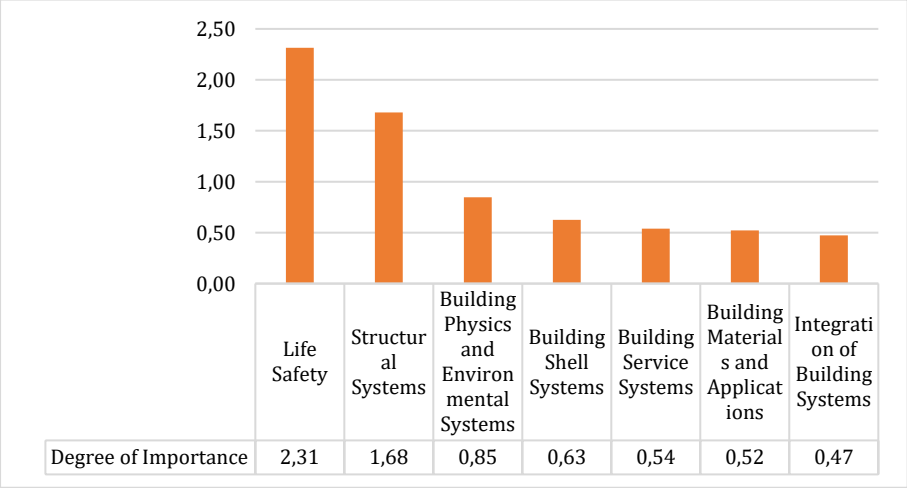
- **Structural Systems:** Understanding the behavior principles, development, and applications of static and dynamic structural systems that withstand vertical and lateral forces.
- **Building Physics and Environmental Systems:** Understanding the fundamental principles of building physics and energy use, such as lighting, acoustics, and climate control, in the design of physical environmental systems and the importance of using appropriate performance evaluation tools.
- **Building Shell Systems:** Understanding the fundamental principles and application methods of building envelope materials and systems design.
- **Building Service Systems:** Understanding the fundamental principles of design for service systems such as water and electrical installations, circulation, communication, security, and fire protection.
- **Building Materials and Applications**: Understanding the production, use, and applications of building materials in the context of technological advancements, their environmental impacts, and principles and standards related to reusability.
- **Integration of Building Systems:** The ability to evaluate, select, and integrate structural, environmental, safety, building shell, and building service systems in design.

As seen in Table 10, it can be seen that life safety holds the highest level of importance among all the criteria. This is followed by structural systems, again with a high rate. It is thought that especially the devastating Kahramanmaraş earthquake in February 2023 has had a significant impact on these results. It is interpreted that the negative physical and psychological effects of the earthquake also affected the opinions of active students who are still studying. In relation to the curriculum, it is seen that the subject of structural systems occupies a large place in both building science courses and architectural design studios. This is an important parameter affecting student preferences. When other criteria are evaluated, it is seen that building physics and environmental systems, building shell systems, building service systems, building materials and applications, and integration of building systems are listed in similar proportions with respect to each other.

Table 10. AHP survey technology criteria evaluation results



	Life Safety	Structural Systems	Building Physics and Environmental Systems	Building Shell Systems	Building Service Systems	Building Materials and Applications	Integration of Building Systems
Degree of Importance	2,31	1,68	0,85	0,63	0,54	0,52	0,47

In general, Table 11 has been prepared to ensure that all sub-criteria are presented in a common table. According to this table, especially life safety, structural systems, sustainability, and critical thinking stand out in terms of their importance degree compared to all other factors. Considering the course equivalents of these factors, it is seen that there are studio courses, construction technology courses, architectural history courses. This situation actually highlights the mixed structure of architecture discipline. Although some factors are superior to each other, it is seen that they are generally related to each other. From the student's perspective, the least important factors are geographical conditions, integration of building systems, building materials and applications, and building service systems.

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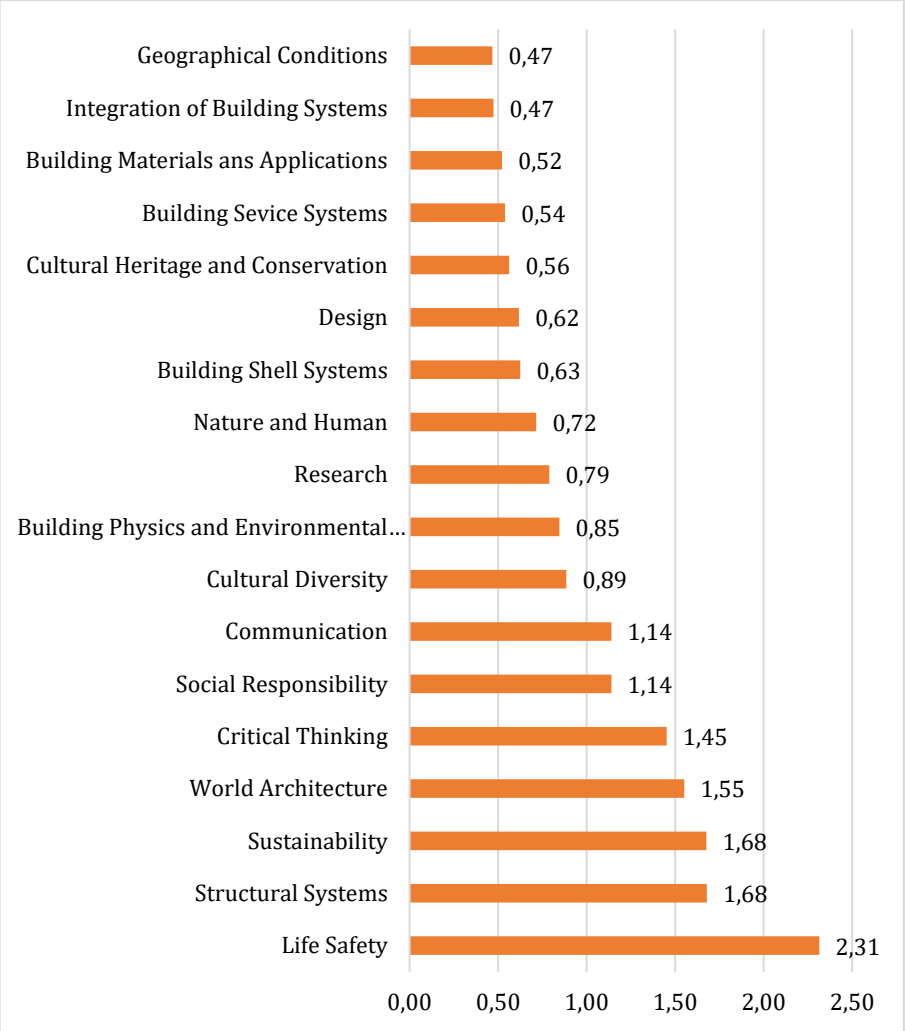
Table 11. AHP survey evaluation results for all sub-criteria



RESULTS

The discipline of architecture is a complex field that draws on engineering and social sciences. The courses in the current education system cover these concepts to a certain extent. In this study, which aims to provide a participatory process for improving the level of architectural education, the student is positioned at the center and the knowledge, skills and competence criteria used in the accreditation process are used as tools. The concept of accreditation in higher education aims to make academic competence transparent for students, to create a compliance infrastructure for students and to increase their acceptability in international institutions. In this context, MIAK-MAK is the only authority in Türkiye to accredit architecture programs. The knowledge, skills and competence system that this organization has established for the accreditation is similar to the systems of other accreditation organizations around the world. In particular, titles such as design, critical thinking, professional approach, culture and art, technology, environment, social, etc. constitute common discourses, while history and theory titles are seen only in MIAK-MAK.

Students' approaches to accreditation criteria determined by MIAK-MAK were considered important in this study. It is assumed that issues in the country and the world affect the students' perspective and approach as well as increase their interest. For example, in the survey conducted a few months after the February 2023 Kahramanmaraş earthquake, students ranked life safety and structural systems as the top priorities considering the effects of the earthquake, since it is important for students to know the construction of structural systems in a way that will ensure human life safety and the related theories and practices correctly. Türkiye is located in a region having significant earthquake and has faced many challenges due to eartquakes. For this reason, the place of earthquake-resistant building design and current approaches in the education curriculum should be reopened for discussion. Sustainability, another top choice, is an important issue not only in Türkiye but also in the world. Inequalities in social, economic and environmental issues and the increase in these problems explains students' predisposition towards sustainability. Therefore, it can be concluded that the situations experienced locally and, in the world, affect the students' answers. Another reason is that the program in which the surveyed students receive education aims to raise students who “question and make suggestions” and the curriculum is prepared to achive this perspective. The curriculum includes theoretical and practical courses as well as architectural project courses, encourages students to become questioning and discussing designers. Thus, critical thinking is one of the preferences expected to be at the top of student choices. In the same way, the scarcity of courses in the curriculum that include Geographical Conditions, Integration of Building Systems, Building Materials and Applications, Building Sevice Systems, and other available courses that are included in the elective pool have affected student choices. Therefore, it is thought that students with little knowledge on the subject hesitate to put the topic in the first place in the order of importance.

This study was applied to a specific sample area in the architecture department of KTO Karatay University, which is a foundation university. The AHP method used in the study has the feature of being adaptable to every process due to its flexible and changeable structure (Harputlugil, 2012). Therefore, this system can be adapted to other universities and curricula. In the future, studies are planned which will enable a comparison of the preferences of both public and foundation university students. This is important in terms of examining the question of whether there are any differences in the preferences of public and foundation university students. It is assumed that determining the reasons for the similarities or differences in the preferences and understanding the effects of these factors on education will have positive contributions from various perspectives.

Accreditation aims to create a systematic process that improves quality and makes it permanent for higher education institutions. Although it has a longer history in the world, it is a new and current issue

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for Türkiye. When the studies are examined in general perspective, the relationship of accreditation with institutions, its positive and negative aspects are emphasized. It is thought that this study, which focuses especially on active students and asks them to interpret the process, will make an important contribution to the literature. In addition, following this study, conducting a similar study with graduates will provide an opportunity to compare the findings.

In addition, it is thought that the students participating in the survey belong to Generation Z may have an impact on the survey results. When the characteristics of Generation Z are examined; they are defined as individuals with a high tendency to use technology and internet, creative, having strong motor skills, being able to cooperate and having high communication skills (Ziyagil, 2021). In addition, according to Ziyagil (2021), Generation Z is characterized as individuals who are "aware of the global world, can think flexibly and can understand different cultures". In this case, it can be concluded that students who exhibit the characteristics of this generation are interested in following current architectural trends. Therefore, in another study, the approaches of different generations of students can be investigated in similar studies and a comparison can be made over generations.

Finally, this study focuses on the general perspective of all classes. At this point, it is known that there may be different viewpoints between the classes. However, since the sample was limited to only one university, classes were not evaluated among each other in order to make a general judgment about student evaluations. Therefore, a comparison between classes can be made for the next studies. In order to maintain and improve the quality and standards of education in the increasingly growing number of architecture schools in our country, studies are needed from both the perspective of the educators and the students. In this respect, this study is considered important in terms of putting the student in the main focus and highlighting the student views. The results of this study will provide ideas for the arrangements to be made in architectural education in the new century. We anticipate that this study will be an important reference and offer valuable insight for future studies.

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Resume

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Traditional Architecture in the Central-Northern Mediterranean Region: Tectonics and Typological Analysis of Traditional Mut Houses

Ayşe Manav *
Zehra Gediz Urak **

Abstract

Architectural tectonics is a crucial starting point for comprehending traditional houses in terms of their form and usage. The components of land use, material use and construction technique, and plan layout, which reveal "tectonic integrity," are the criteria that are considered. This study employs the typology method to question the tectonics of traditional housing architecture located in the central northern part of the Mediterranean Region, specifically through the example of Mut Houses in Mersin province. The typology study has facilitated the identification and quantification of the diverse array of architectural solutions and details that are characteristic of the region. Mut is a medium-sized district situated in the mountainous parts of the Central Taurus Mountains, with a settlement history dating back to the Roman Period. The fact that microclimatic conditions impact the supply of materials and construction techniques, and the cultural context influences the use of land, garden, and space, ensures that traditional Mut houses possess a distinct appearance in this region. Regrettably, these houses, which contain important details of the region, are at risk of extinction. This article documents the tectonic values of traditional Mut houses and conducts a typological analysis of them.

Keywords: *Architectural tectonic, Mut, Traditional houses, Typology, Turkish house.*

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INTRODUCTION

Vernacular architecture is the essential unit that enables us to understand the culture of a community and its connection with the place, and it has significant heritage value as a representative of the world's cultural diversity. This study focuses on understanding the tectonics and typological features of the unique traditional houses of Mut District, located in the central northern parts of the Mediterranean Region, contributing to the diversity of the heritage in question. Mut District, located on the highway route connecting the Mediterranean and Central Anatolia regions, has an important location in the historical context, and the traditional city centre bears traces from different civilization periods. However, as in many historical settlements, traditional houses in the Mut District of Mersin Province are also rapidly disappearing because of the implementation of planning decisions that do not consider heritage values. The lack of a general preservation plan covering the site areas of the district is also effective in this regard. Traditional Mut houses are influenced by Mediterranean and continental climate conditions. They are also affected by the continental climate due to their geographical location. Rich forest lands and rocky structure of Mut District affect the use of materials in traditional houses, and topography and climate characteristics also involve the plot use, plan layout, and construction (Manav, 2021). The inner sofa type and its variants are mostly used in plan layouts in Mut houses. In the construction of these houses, predominantly wooden beams and roughly hewn masonry stones, rarely wooden-framed bağdadi or wooden-framed stone-infilled walls, were used. Mostly all buildings consist of masonry stone walls, and wooden frames are rarely used on the west and south façade walls and projections, depending on the building direction. The dwellings are generally two-storey and they have an earthen roof. Mut, located in the region grouped as Toros Plateau by Günay (1999), resembles the traditional houses in Akseki, Sütçüler, Beyşehir, Seydişehir, Ermenek, and Çamlıyayla in the same region in terms of the general appearance of the traditional houses (Sağıroğlu 2017; Kavas 2015; Demirarslan, 2018; Biçer, 2008; Öztürk, 2011). As in other traditional houses in this region (Toros Plateau), wood and stone are the two main construction materials of Mut traditional houses, but they have a simpler and more unique appearance than their counterparts with the usage of stone and roof details. As a result, the general appearance of Mut traditional houses is a combination of a rectangular prism made of stone and a cantilever that looks like a second mass attached to this prism on the facade due to the difference in material and roof type. In this study, the tectonics of traditional Mut houses were examined through a typological analysis method in the context of land use (plot and garden use), material use, construction technique, plan layout, and façade elements. Prior to this study, two analyses of traditional Mut houses were conducted. The first one was a master's thesis investigating ten buildings across different

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neighborhoods of Mut (İnce, 2013), while the second was centered on Mut Castle (Yergün and Ünal, 2005). Both studies provide information on traditional Mut houses; however, the first examines a few buildings, while the second is limited in its study area. Thus, the necessity of this study was to provide a valuable addition to the literature on traditional architectural heritage, safeguard the traditional houses in the region and the town of Mut, and facilitate the formulation of preservation policies. Understanding the tectonics and typology of traditional Mut houses highlighted the lesser-known features of houses in the north-central Mediterranean region.

Methodology of study

In this study, different methods were used to reveal the unique character and structure of the traditional houses of Mut, located in the north-central Mediterranean Region. The study has two parts. The first part is a literature review examining the tectonics, typology of traditional architecture, traditional Turkish houses, and the Mut District. The second part involves a 10-year field study from 2010 to 2020. Data from these surveys was analyzed through drawings, calculations, and maps. Initially, a comprehensive survey of the Mut district center was conducted, resulting in an inventory that assigned IDs to each traditional house. During this inventory study, 580 traditional houses and ruins were identified and marked on the urban map. Since it is the oldest source showing buildings, the boundaries of the research regions were determined by superimposing the 1955 aerial photograph and the urban map on which the traditional buildings and ruins were marked before. Thus, five different research regions emerged. To record the typology of traditional dwellings, a detailed form was prepared, including location, land use, street-building-garden relationship, building and garden entrance, garden elements, plan type, plan elements, and decoration details. Detailed identification of 232 buildings, allowed by the building owners and structural situation, was completed using these forms. During all identification studies, each building was documented with a photo, and each was given an ID number. In addition, plan sketches of 232 houses were drawn with on-site observations and measurements, and drawings of 11 buildings were made by taking detailed measurements using classical surveying techniques and laser scanning techniques. Finally, typological values were brought together, maps, tables, and graphs were created, and results were obtained by evaluation and comparison.

THEORETICAL FRAMEWORK: TECTONICS OF LOCAL ARCHITECTURE AND TYPOLOGY

Tectonics serves as a crucial starting point for comprehending traditional dwellings in terms of their form and usage. The term tectonics derives from the Greek words "tecton," which signifies a carpenter or builder, and "techne," meaning the art of making and

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manual labor, thereby giving rise to the concept of technology (Sönmez ve Ağca, 2021; Karvouni, 1999). Initially originating from the fields of construction science and architecture, the term has since evolved to encompass geological applications, specifically pertaining to ground movements (Hematang and Ikaputra, 2022). Generally, the term tectonic has been used throughout history to refer to the application of building materials, technologies, and construction techniques for artistic purposes (Hürol and Numan, 2007). According to Akbaş's study (2023), theorists like Bötticher (1852), Semper (1860), Maulden (1986), and Frampton (1998, 2002) did not evaluate tectonics solely in terms of building materials and their composition (Akbaş, 2023). They described the "structural form" formed by the structural components and the "artistic form" that makes this structural form visible, which they considered a kind of characterization, to define tectonics (Akbaş, 2023). Frampton (2002) characterized tectonics as an architectural form that integrates local materials into culturally specific combinations. Maulden (1986) defined tectonics as activities that express a location's character with historical continuity, transforming its structure into an artistic creation beyond mere construction with local materials and culture. The emphasis on the character of the location, local materials, and culture is particularly noteworthy. Furthermore, Frampton (1998) posits that the three fundamental characteristics of architecture are "topos" (place), "typos" (meaning-usage), and "tectonic" (architectural form emerging in the context of material and culture), and argues that these three cannot be considered independently of each other when understanding an architectural work. The type is related to the form and, in this way, understands the place; the tectonics represents the form, and thus the structure implements an external concept to reveal a meaning that belongs to the type and becomes evident through it (Giusti, 1996; Russo, 2017). In other words, the topography of the land on which a building will be constructed and its influence on construction, the potential of local materials, and the cultural customs of space utilization that impact the plan layout all contribute to the architectural form. In this sense, tectonic expression can be defined as the creation of a structure with unique combinations of usage patterns based on the cultural accumulation of the location using locally available materials and techniques (Kavas, 2011). This study analysed the tectonics of a traditional dwelling, considering its relationship with the land and garden boundaries, the materials and construction methods used, and the plan layout components, based on Frampton's definitions and the literature on Turkish/Ottoman houses. Typology is a key concept that underpins the theoretical aspect of this research and allows for a site-specific understanding of architectural tectonics.

Tectonic features specific to each building must be supported by numerical data to be considered characteristic of a particular region. For this reason, typological analysis method was employed in the study. Typology involves a systematic process of perception, analysis,

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documentation, abstraction, reduction, and diagramming, which has been widely applied in architectural research. In the field of Turkish/Ottoman residential architecture, typology studies have been used to understand and preserve traditional architectural practices. With typology studies, land use, plan types, material use, construction system and façade features in Turkish/Ottoman traditional housing architecture could be determined. Thus, analyses and evaluations can be performed on traditional textures or single structures, which have not yet been studied. The method of typology is an important tool for comparing regions and structures, protecting heritage development policies for a sustainable future, and understanding the tectonics of architecture in any place. Moreover, typological data of urban areas, neighborhoods, or rural settlements, which are representatives of traditional knowledge at different scales along with their natural and man-made environments, can be utilized to develop policies that include conservation in planning studies. In this study, a typological analysis method was employed to comprehend the tectonics of Mut's traditional houses and identify common features.

TRADITIONAL TURKISH HOUSES

Many studies have attempted to define and analyze traditional residential architecture in Türkiye. Accordingly, the Turkish house is sometimes defined as an Ottoman house and sometimes as an Anatolian house. In this part, Turkish house literature is examined and discussions regarding the origin of this house type, its distribution in Anatolian geography, and its grouping are presented.

By including the land use, plan layout, material use and construction details of the Turkish House, it is aimed to examine and discuss similar architectural features of traditional Mut houses in the following parts.

Research on the traditional Turkish house

Different views exist on the origins of traditional Turkish houses. The first opinion is that the building samples from the 15th and 16th centuries can only be approximated, and the earliest examples observed date back to the 17th century, and there is no certainty regarding their origin due to the lack of information and records (Kazmaoğlu and Tanyeli 1979, Kuban 1995, Günay 1999, Asatekin 2005). Another viewpoint is that the Central Asian nomadic tent is analogous to the room unit in terms of both space and function, and the arrangement of the rooms on the plane also mirrors the nomadic tent (Küçükerman, 2007; Tomsu, 1950; Çakıroğlu, 1951). Traditional Turkish residential architecture has evolved over time, incorporating slight modifications within the context of local influences, and can be seen throughout Anatolia and its surrounding regions. Although significant differences occur in size, construction and regional characteristics, some basic and immutable features reveal the Turkish house as a distinct type, fixed by tradition and tested over centuries (Bozdoğan, 1996).

Firstly, Sedat Hakkı Eldem (1968) described the civil architectural buildings produced in Anatolia and Rumelia during the Ottoman Empire, which reached their most developed form in the 17th and 18th centuries, as Turkish houses. As a result of Eldem's ongoing investigations, Turkish House Plan types are grouped as without sofa, with outer sofa, with inner sofa and with central sofa. Kuban (1995) named these traditional buildings "Turkish Hayat Houses" and examined their development in three periods. According to Kuban (1995), the houses mostly sampled from western and northwestern Anatolia, were cubic and single-sided, later on, more open forms, classical examples with protruding wooden walls were adopted, and recently, the living space in front of the rooms has become centralized and moved away from its classical type. Kazmaoğlu and Tanyeli (1979), made a grouping and evaluation according to the general formation. They stated that the main factor affecting the houses, which are shaped by the effects of different geographies and climate, is the socio-culture and socio-economy. They evaluated these buildings, which they named Anatolian -Ottoman-Turkish residential architecture, in two regions: the regions where the original Anatolian synthesis is seen and the transition regions. It has been stated that the original Anatolian Synthesis, Iranian and Central Asian plan schemes, nomadic life habits, and domestic construction technologies have merged over the centuries to form the Anatolian Turkish housing scheme, and synthesized and pure examples of local elements are more common in the Transition Regions. Günay (1999), named the house where Turks lived throughout history, which was under Ottoman rule, constantly developing with geographical and cultural influences the Turkish House. Günay emphasized Eldem's works and evaluated them in 15 regions according to building materials and construction techniques. Of these regions: Taurus highlands, Aegean coasts and islands, Southeastern Anatolia, Eastern Anatolia, partially Central Anatolia and Kayseri, while the buildings reflect the Turkish House character in terms of construction technique and plan features, Günay stated that local influences are dominant. Bektaş (1996), describes the Turkish House, which has been influenced since prehistoric times. Without making any zoning grouping, Bektaş stated that each of these buildings were shaped by the materials of the place and within the framework of the basic principles.

When all these zoning and definitions are evaluated; It is understood that houses are generally shaped within the framework of basic principles that can be named as plan layout, form, use of materials, roof cover and construction technique adapted to geological and climatic conditions (Öztürk, Çahantimur and Özgünler, 2017). It is impossible to discuss a single type, material, and technique in a wide geographical and temporal context. Nevertheless, Turkish houses have been able to preserve and transmit their original characters for many years within this wide construction universe. Today, it is still possible to come across

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examples of traditional houses that correspond to all these definitions almost everywhere in Anatolia.

Plan layout, plot use, site intervention, and traditional urban pattern

As referred to in the previous part, there are four different types of traditional housing plan typology that Eldem (1968) determined after many years of field survey. In determining the plan typology, the relationship between the room and the sofa, which forms the connection between the rooms, is examined. In this context, plan types are named as: without sofa, with outer sofa, with inner sofa and with central sofa (Eldem, 1968; Figure 1).

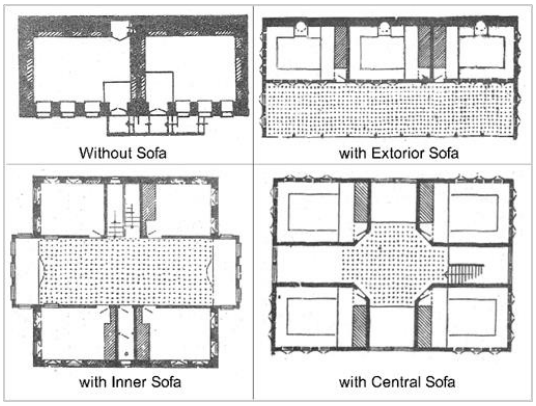

Figure 1. Traditional Turkish house plan types (Eldem, 1968)

In traditional Turkish house architecture, buildings are shaped in harmony with the topography of the land and the floor where the plan typology is evaluated is always located on the upper floor. So, whatever the topography, site intervention has always been minimal (Küçükerman, 2007; Kuban, 1995; Figure 2).

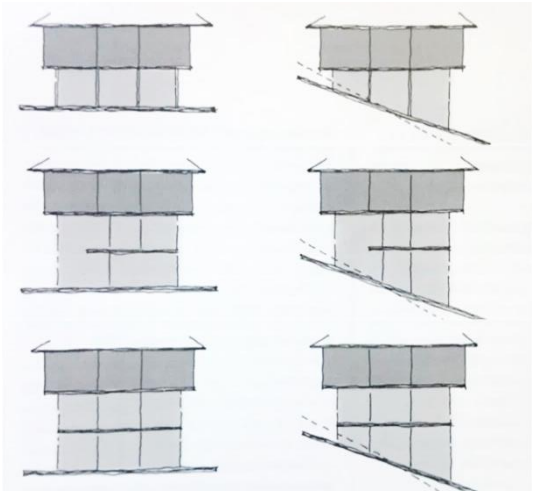

Figure 2. Site intervention, floors and main floor relationship (Küçükerman, 2007)

A daily routine with limited interaction with the outside world necessitated that daily task be carried out on the ground floor or in the garden. Therefore, large gardens enclosed by high walls and with

annexes play a key role in using the traditional dwellings and shaping urban pattern. The variable functions of the ground floor and the enclosed nature of the garden or building walls define the boundaries of the street, while the upper floors are extended towards the street through a perpendicular axis. The limited relationship of daily life in the garden and the house with the street, in other words, the introverted state of the general structure of the buildings, means a weak relationship with the city, and this creates a sparse pattern texture in traditional cities (Cerasi, 1998).

The characteristics of the room in the Turkish house

Although the construction technique, material use and building forms are depending on the climate and region, the main element of the Turkish House is the room. Even if all the rooms are the same or each one is in variable size, the spatial characteristics of the room remain the same because the traditional lifestyle does not change. There is no distinction between rooms according to their functions (Küçükerman, 2007). A room is a place to cook, eat, and live during the day and a place to sleep at night, developed in equipment and dimensions to perform all kinds of daily life activities. (Eldem 1968, Güven Ulusoy and Üstün 2019). The room-sofa relationship partially affects the entrance to the rooms and using/design of the interior furnishings. Room entrances are usually at the corners of room and in a door-cabinet system. This mechanism includes a door, cabinets, and sometimes a bathroom (gusulhane). The door cabinet system also formed the wall of the room. This wall, which separates the sofa or other rooms, can also be used in two sides. On the other walls of the room, there are small cupboards for storage, fireplaces, and windows (Küçükerman, 2007). The fireplace is also a specialized room element that has even been placed in our oral culture with the representation of the home. The fireplace, located on the outer wall of the building, is a building element that provides heating and ventilation to the interior space, and cooking (Bektaş 1996). Contrary to the plain appearance of the building envelope, the interior is very rich with specialized ceiling decorations in rooms and sofas, cabinets, niches, carved wood or plaster fittings, and wall paintings (Yürekli and Yürekli 2007). They are wooden horizontal building elements that have gained a special meaning in the establishment of the room; create the upper border of the doors, windows, and cabinets; resize the room and keep it at the human scale; and have a function in the construction system. Of these horizontal lines that divide the room at different levels, the upper line also has a spatial function by transforming into a shelf that completely wraps around the room (Küçükerman and Edirne 2022). Another factor that defines the rooms is the division of space and functions into horizontal sections at specific intervals. These wooden axes serve as beams in the construction system and play a crucial role in shaping the perception of the space. They determine the lower and upper boundaries of windows, doors,

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fireplaces and cabinet systems, affecting the dimensions of these elements. In some cases, the upper line can also function as a wooden shelf, adding extra utility (Küçükerman, 2007; Kuban, 1995).

As a result, the rooms in the traditional Turkish house; has a design with defined space elements that respond to functions such as sitting, sleeping, bathing, storage, performing daily activities and hosting guests (Küçükerman, 2007). For this reason, although the plans of traditional houses in Anatolia vary, the rooms have the same appearance. Depending on whether the houses are in cities or rural areas or in the context of time, there are differences in the decorative workmanship details in the interior.

Construction systems and material use of traditional Turkish house

The construction system in the traditional Turkish house has developed using three main techniques: under the influence of different climatic conditions, construction systems have become specialized and diversified. In addition, the fact that buildings are in a rural or urban environment affects the technical and detailed solutions applied in the construction. Stones, wood, and adobe are the main materials used in construction systems. Along with stone and adobe, brick and wood were used as the filling materials. In this context, with the contribution of the construction system selection, the common language in the general form of the building shell: the lower floors are fuller and more inward, and the upper floors are more open and outward facing with an increase in the number of windows. This is the most preferred mixed-production system for achieving a general format. To create a mixed system, load-bearing masonry walls were preferred at the ground floor level and timber framed systems were preferred on the upper floors. (Asatekin, 2007). Upper floors: It is built with a frame system consisting of uprights placed 30 to 90 cm apart and timber elements supporting them horizontally and diagonally. This frame takes the name of “hımış” when filled with stone, adobe, or brick, “dizeme” when filled with wood, and “bağdadi” when covered with laths and plastered with mud (Öztank, 2010).

TYPOLOGICAL ANALYSIS on TRADITIONAL MUT HOUSES

The traditional houses of Mut, which are the subject of the study, are also among the Turkish houses; in terms of location, plan and façade organization, architectural elements, construction technique, and material usage, it exhibits a transition region synthesis at the intersection of the Central Anatolia and Mediterranean regions and under the influence of both regions.

Location and history of Mut district

Mut is located in the central northern part of the Mediterranean Region in Türkiye. Mut was founded on the Göksu Valley, which

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connects Central Anatolia to the Mediterranean, between the Taurus Mountains, and is non-coastal district of Mersin Province (Figure 3). The wind generated by the pressure caused by the rapid changes in topography blows from the valley grooves along the northwest-southeast axis of the Göksu River and its tributaries, leading to the development of a distinctive microclimate in the Mut district (Köse, 2004; Wolf, 2003). The diverse topography of the area and the unique microclimate of Mut influence the construction of traditional buildings and the choice of materials (Manav, 2021).

This medium scale settlement's foundation is based on Claudiopolis, a Roman colonial city. Until the establishment of the Republic, it was located within the lands dominated by the Byzantine Empire, Anatolian Seljuk State, Karamanoğlu Principality and the Ottoman Empire. There are buildings or ruins belonging to these civilizations in the district centre and the immediate surroundings (Manav, 2020).

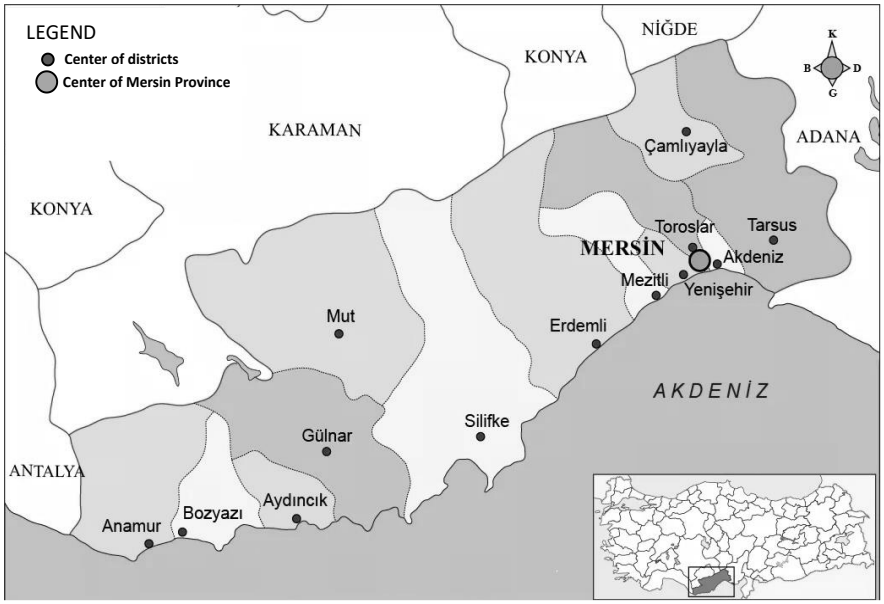

Figure 3. Location of Mut District in Mersin Province and Türkiye, Anonymous (2022)

Mut historical town center and determining the study area

The literature on Mut settlement was obtained from travelers (Davis, 1879; Evliya Çelebi, 1611-1685), stories from local people, (Atlay, 2006; Gürpınar and Mustul, 2013; Gürgen, 2016; Demirdağ, 2016; Akbaş, 2015) state archives (Directorate of State Archives, Turkish Language Association Library, General Directorate of Mapping), or other academic studies cited in the article. It is known that Mut, a town consisting of a single neighborhood in the 16th century, by 1914 consisted of three neighborhoods: Kale (147 households), Şıh (75 households), and Hamidiye (12 households). While it had the same three quarters until 1927, as of this year, the Şıh and Hamidiye Neighborhoods were merged and been Meydan Neighborhood, and Kale Neighborhood were divided into three parts and called Kale, Doğancı, and Pınarbaşı (Çelik, 1994; Atlay, 2006). While the names and locations of some important places in

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the city center are described in all these written sources, no maps or drawings of the settlement were found. The oldest source available in this context, the aerial photo dated 1955 (General Directorate of Mapping), was used to determine the research boundaries. At photo: Kale, Doğancı, Pınarbaşı, and Meydan, which are expressed as the first neighborhoods of Mut, are still more densely populated and leap towards various points on Asput, Yatırtaş Avenues, Bulgurcular, Üçbey, and Camili Streets (Figure 4).

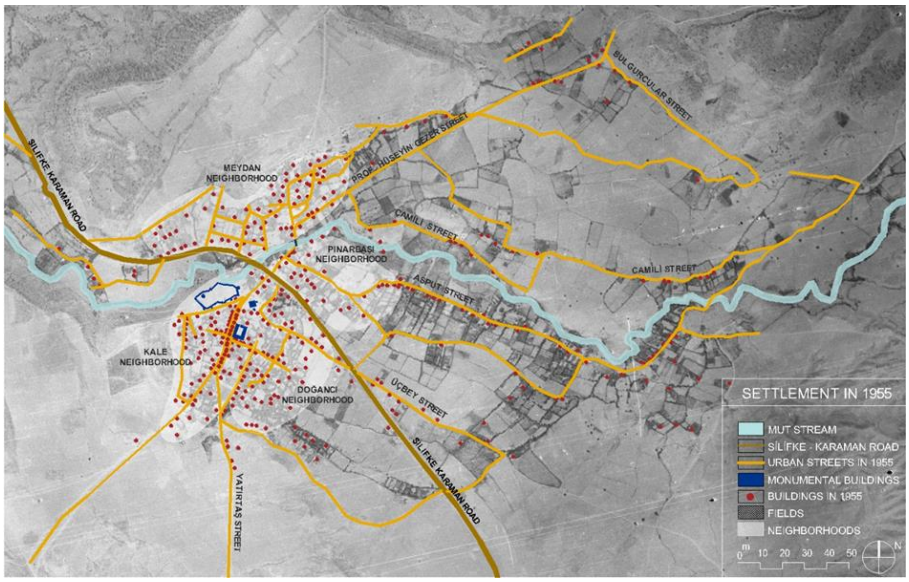

Figure 4. Settlement analysis in 1955 (edited by the authors using the 1955 aerial photo obtained from the General Directorate of Mapping and the literature of this period.)

According to this, the places where the traditional buildings are dense in Kale, Doğancı, Meydan, and Pınarbaşı Neighborhoods, Yatırtaş, Asput, and Bulgurcular Streets and surroundings have been determined as research areas. Since the traditional houses in Camili and Üçbey streets have gone, these streets are not included in the scope of this study. To make comparative evaluations in the following parts of the study, zoning was made by considering historical urban development. The area covering Kale and Doğancı Neighborhood is named region “a”, the area covering Meydan District is named region “b”, Pınarbaşı Neighborhood, Asput Street, and surroundings are named region “c”, Yatırtaş Street and surroundings are named region “d”, and the eastern part of Bulgurcular Street is named region ”e” (Figure 5).

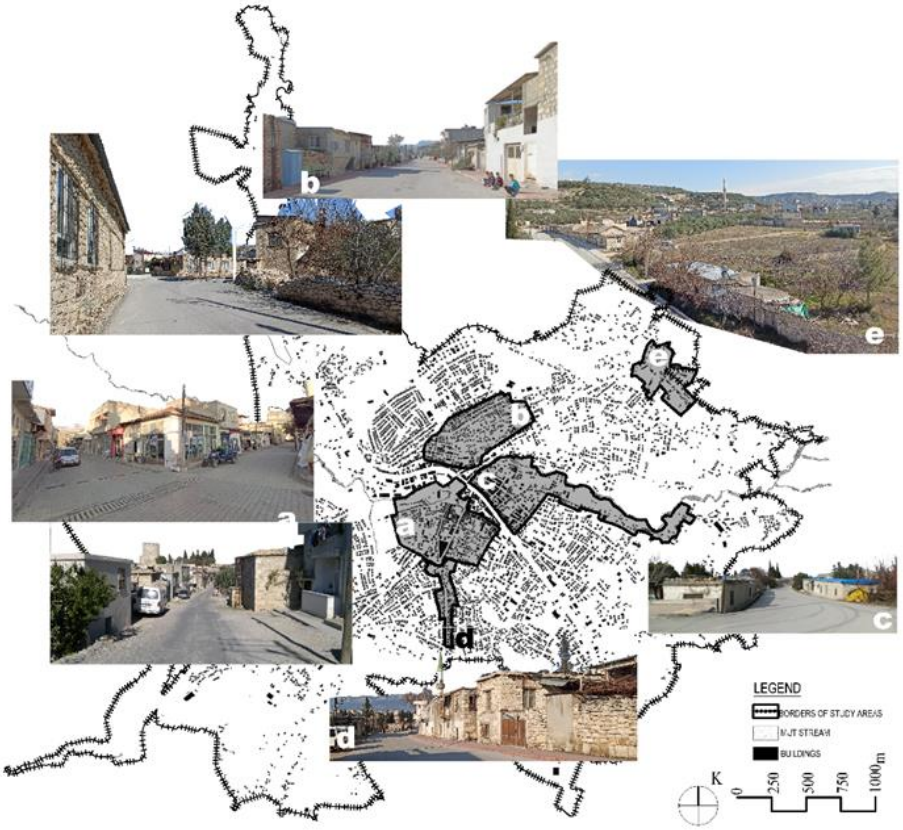

Figure 5. Location of all study regions in Mut and relative to each other, all photos taken in 2019 by the corresponding author.

General situation of regions and traditional urban pattern

Region "a" (Figure 5a, 6a) includes the Kale and Doğancı Neighborhoods. Numerous archaeological sites are found at different levels in this area. It comprises many monumental buildings, traditional dwellings, commercial buildings, and traditional streets within the city centre. Since the establishment of the modern city centre in this region, many traditional buildings as cultural heritage have been destroyed and new buildings that do not adapt to the existing architectural texture have been built. The Region "b" (Figure 5b, 6b) is in the north of Mut Castle, across the Mut Stream, and is higher than the other parts of the district. Two types of street patterns were observed in this region, consisting of organic and Gridal streets. In 1878, 15 exchanged households brought from around Rumelia/Edirne were settled in Meydan District, then known as Hamidiye District (Atlay, 2006). It is estimated that these exchanges lived in the part where the organic street structure is located and that their residences created a texture reflecting the traditional Ottoman Street structure. Aerial photographs show that the gridal street section was built between 1955 and 1969. In this section, which was developed as a residential area, traditional buildings are still used as dwelling with their original features. Pınarbaşı District (Figures 5c, 6c) was separated from Kale District and became a part of today's developing modern district centre. Today, a few traditional Mut houses can be examined among the large building blocks. The rapid construction of new buildings limits the information about the land use of traditional houses in the east of the

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Neighbourhood. On the contrary, Asput Street (Figures 5c, 6c) in the western part of the neighbourhood is a street used in the summer months in the past, with traditional residences among large orchards. Before the water network was established, access to the water source called Asput, which met the water needs of the district, was provided from this street. The water needs of the orchards around the street were also met from the same source (Akbaş, 2015). In both settlements, there has been a rapid decrease in traditional residences in recent years due to the construction of very high-rise sites that are incompatible with the existing texture. Yatırtaş Street (Figure 5d, 6d) is the beginning of the old Silifke – Mut road, and traditional dwellings still exist in this area. The buildings are directly connected to the street, and the garden is at the back of the building. All buildings were built within a common plot block. Bulgurcular Street (Figures 5e and 6e) is a street where bulgur production areas, large exhibition-drying areas, and employer and employee residences are located. After bulgur production, which affected the Mut economy, started in the 1930s, industrial and residential settlements developed on this street. (Manav and Urak 2019). On the street, whose original texture is largely preserved, there is a danger of construction, as in region “c”.

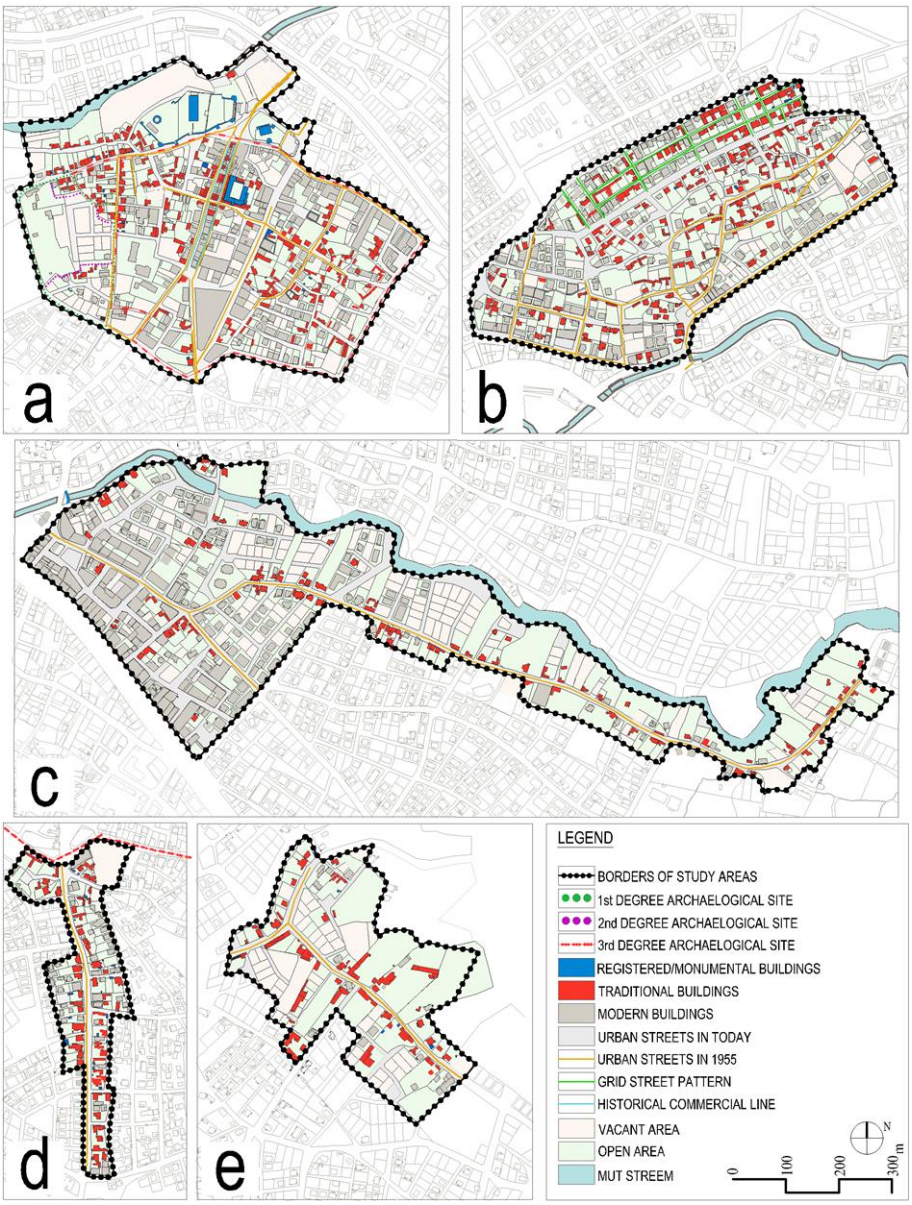

Figure 6. Traditional and new buildings in the first region (a) and second region (b), other regions: Asput Street and Pınarbası Neighborhood (c), Yatırtaş Street (d), Bulgurcular Street (e)

Land use (plot and garden use, site intervention)

Typological values of land use, garden utilization, and building entrances were determined by analyzing 232 buildings. The key finding from this analysis is that the gardens are actively utilized. Buildings are situated on one side of the plot, adjacent to the street, with the rest of the garden used for daily activities. The spatial arrangement of the street, building and garden did not affect the entrance to either the building or the garden. Despite being positioned along the street, the entrances to buildings are mostly through the gardens (Table 1). In addition, dwelling gardens play an active role shaping urban patterns as well as affecting daily life. It is deduced that the urban pattern formed by traditional dwellings is sparse than that formed by modern buildings. In addition, the organic street structure consisting of roads that suddenly change direction within the Ottoman residential settlement, short or long dead-end streets generally directed towards the inside of

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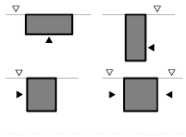
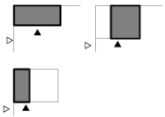
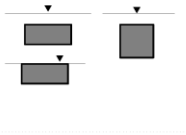
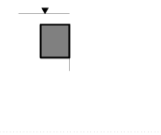
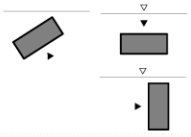
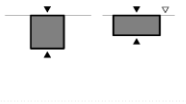
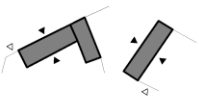
the building block (Aliağaoğlu and Uğur, 2016), can be seen in region “a” and region “b” (Figure 6).

Table 1. Street, plot, building and entrances of building relations

BUILDING-STREET RELATIONSHIP / ENTRANCE TYPES	NEXT TO THE STREET	AT THE CORNER	DISTANCED FROM STREET	TOTAL
ENTRANCE ONLY FROM STREET	 32 PSC	 3 PSC	0 PSC	35 PSC (%15,08)
ENTRANCE ONLY FROM GARDEN	 94 PSC	 5 PSC	 68 PSC	167 PSC (%71,98)
ENTRANCE FROM BOTH STREET AND GARDEN	 21 PSC	 9 PSC	0 PSC	30 PSC (%12,94)
TOTAL	147 PSC (%63,36)	17 PSC (%7,32)	68 PSC (%29,31)	232 PSC (%100)
LEGEND	▷ GARDEN ENTRENCE	▶ BUILDING ENTRENCE		

Gardens are perceived as an element that connects the houses with the street, spends time in it, and has various uses. The garden includes outdoor furnaces, warehouses, toilets, baths, outbuildings with poultry functions, and fruit trees. (Figure 7A). Gardens surrounded by high walls, the connection to the street are provided by gates called “bordo” gates in the region. Bordo gate has two wings and is wooden. The door opening is covered with wooden beams, tiled cladding, and small roofs in the form of a gable or porch (Figure 7B).

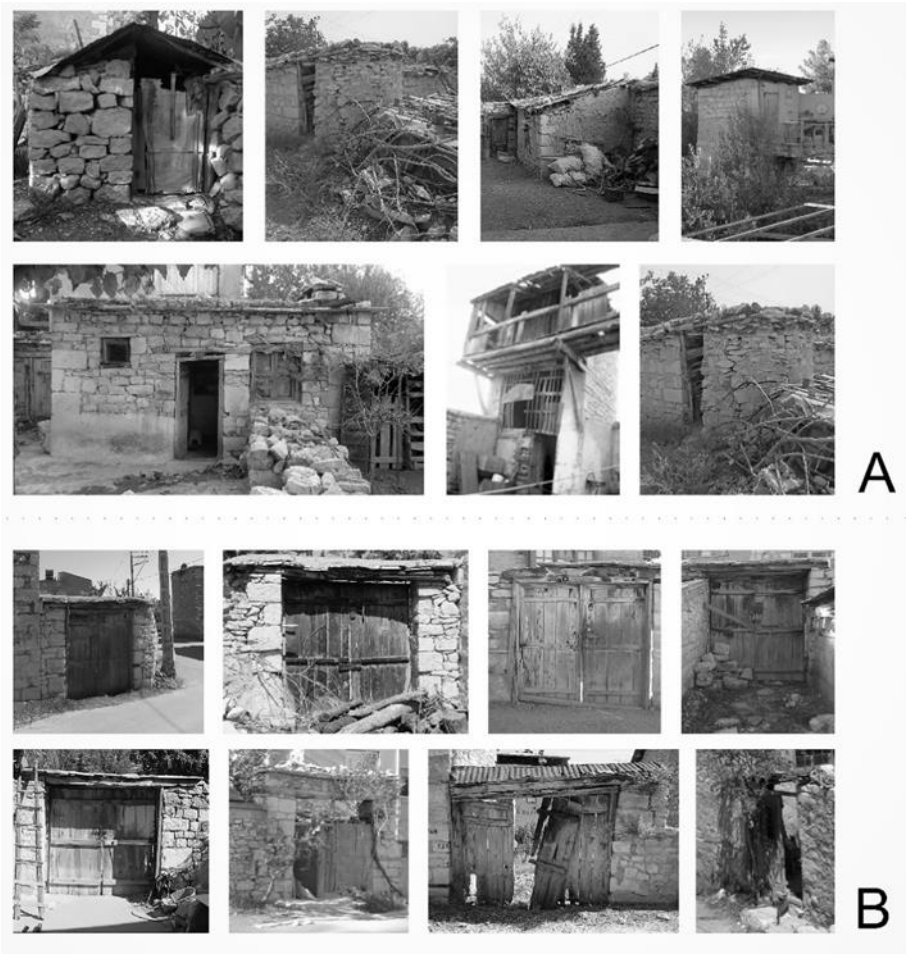


Figure 7. Annex buildings (Müştemilat) (A), The garden doors (Bordo) (B)

Plan layout, types, and plan elements

Traditional houses in Mut are derived from the main plan type, which is frequently encountered around Karaman and Konya and is called the plan type with a mabeyn (iki göz bir aralık) (Kahraman, 2012). Another type most used in the region is the inner sofa plan type and its variations. There are examples of wet areas such as toilets/bathrooms inside some buildings with inner sofas (Figure 8). Of the 232 houses examined, 147 (63.3%) have a mabeyn and 85 (36.7%) have an inner sofa, and there was no significant difference in the distribution between the regions (Figure 9).

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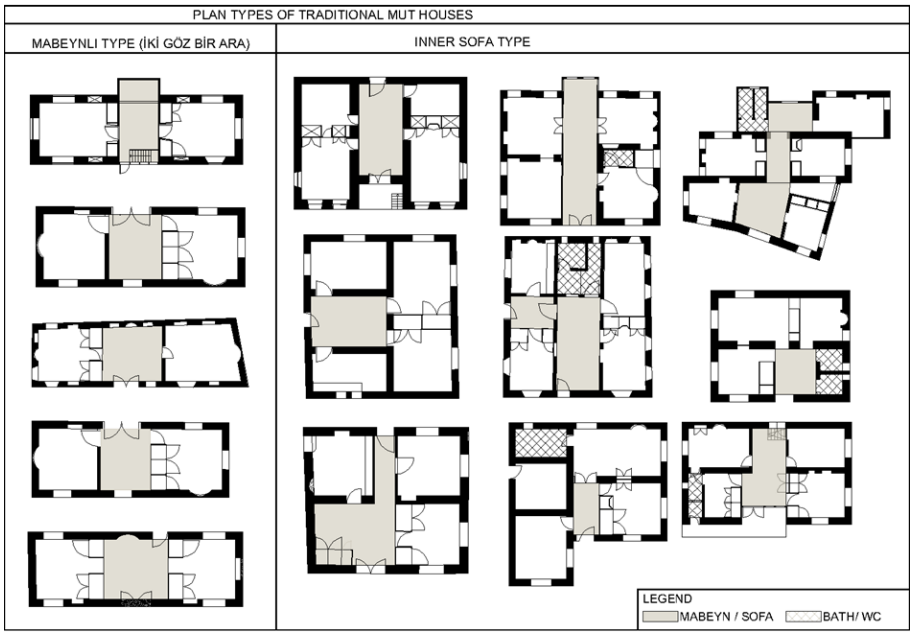

Figure 8. Plan types of traditional Mut houses

The entrances are generally located in the center of the buildings. In two-story buildings, a staircase is typically constructed on the façade for the first-floor entrances since each floor is used as a dwelling by different families, or the lower floor is used for non-dwelling purposes. The upper floor entrance is from a wide landing at the end of the stairs. These stairs are made of stone, wood, or using of both (Figure 10A). The first interior space at the entrance of the building is the sofa. On the sofa, there is a customized sitting area (sedir) separated by an arch or door, a stove for cooking or heating, or other service areas added later (Figure 10B).

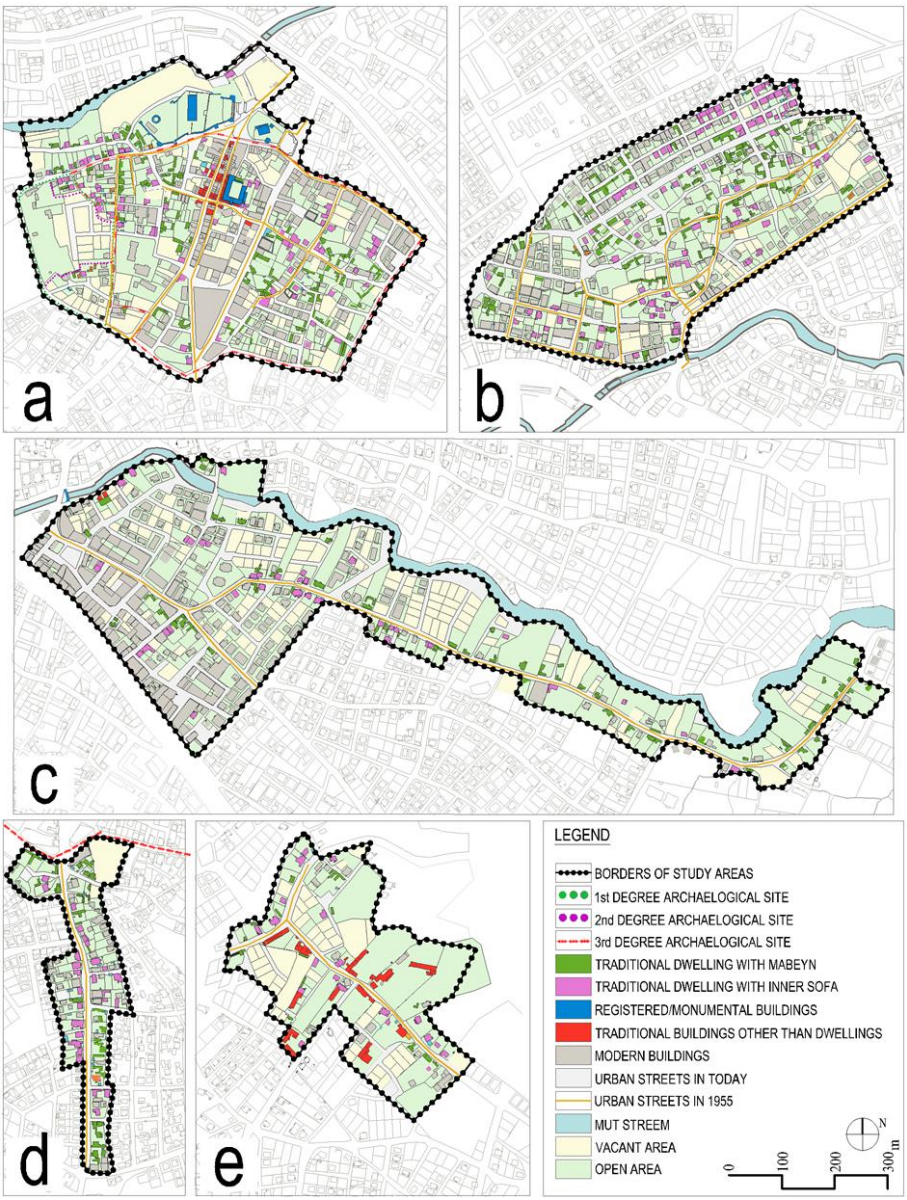

Figure 9. Plan types of traditional Mut houses in regions

The first interior space at the entrance of the building is the sofa. On the sofa, there is a customized sitting area (sedir) separated by an arch or door, a stove for cooking or heating, or other service areas added later (Figure 10B). The fireplace is a special element located in at least one room or sofa/mabeyn, especially on the north façade, and is composed of large stone blocks. It is a plan element that has lost its function today (Figure 10C). Wooden beams on the ceiling are often exposed. The wooden structural element (hasır, pardı), which is the first layer of the roof covering and connects the beams from above, is visible between the beams. In a few examples, the ceiling appears because the beams are closed from below. In only one example, an oval center with a floral motif was created in the middle of the ceiling covering (Figure 10D).

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Figure 10. Outdoor stairs and landings (A), Mabeyn/Sofa views (B), Fireplaces (C), Characteristic ceiling examples with Pardı, uncovered ceilings, timber lathed ceilings (D)

Although traditional Turkish houses have a simple appearance on the outside, their interiors are richly decorated. Mut traditional houses also reflect this expression. For example, room entrance doors are more decorated than building entrance doors. While there are various plant motifs and geometric shapes on the door wings, there are triangular pediments or windows above the doors. The wooden lock system, which keeps the door wings closed, is an important door detail in Mut. In this system, there is a wooden handle inside the room where the door is located, and when the door wing is closed, this handle fits into the notch on it. To open the door, the handle is pushed through the hole on the other side of the door wing and the door wing is released from the notch (Figure 11).

Figure 11. Room entrance doors and special door lock system

The dimensions of the elements in the room were determined according to the alignment of the beams used in the wall construction. The height of the windows closed/open niche cabinets with daily belongings, doors, and cabinets are equal to the distance between the two beams. Along with sizing the equipment in the room, the beams created space on a human scale. The shelf (sergen) at the level of the upper beam or upper level of the cabinet is at a height that the person can easily reach. Examples of the door-closet arrangement, which Küçükerman (2007) frequently mentions while describing the Turkish House room, are frequently encountered in the traditional houses of Mut. This arrangement, which consists of a door, closet (yüklük), bath (gusülhane), and sometimes a small shelf or cupboard with a specialized function, is an important element of the rooms. The closet (yüklük) where bedding, quilts, and similar items are placed, the upper or lower closet (musandıra) where tools used in gardening and similar items and grains are stored, and the bath (gusülhane) adjacent to the outer wall, which looks like a closet when the cover is closed, are parts of this arrangement. This area, where the need for storage and washing is met, is also a dividing wall that separates the two rooms (Figure 12).

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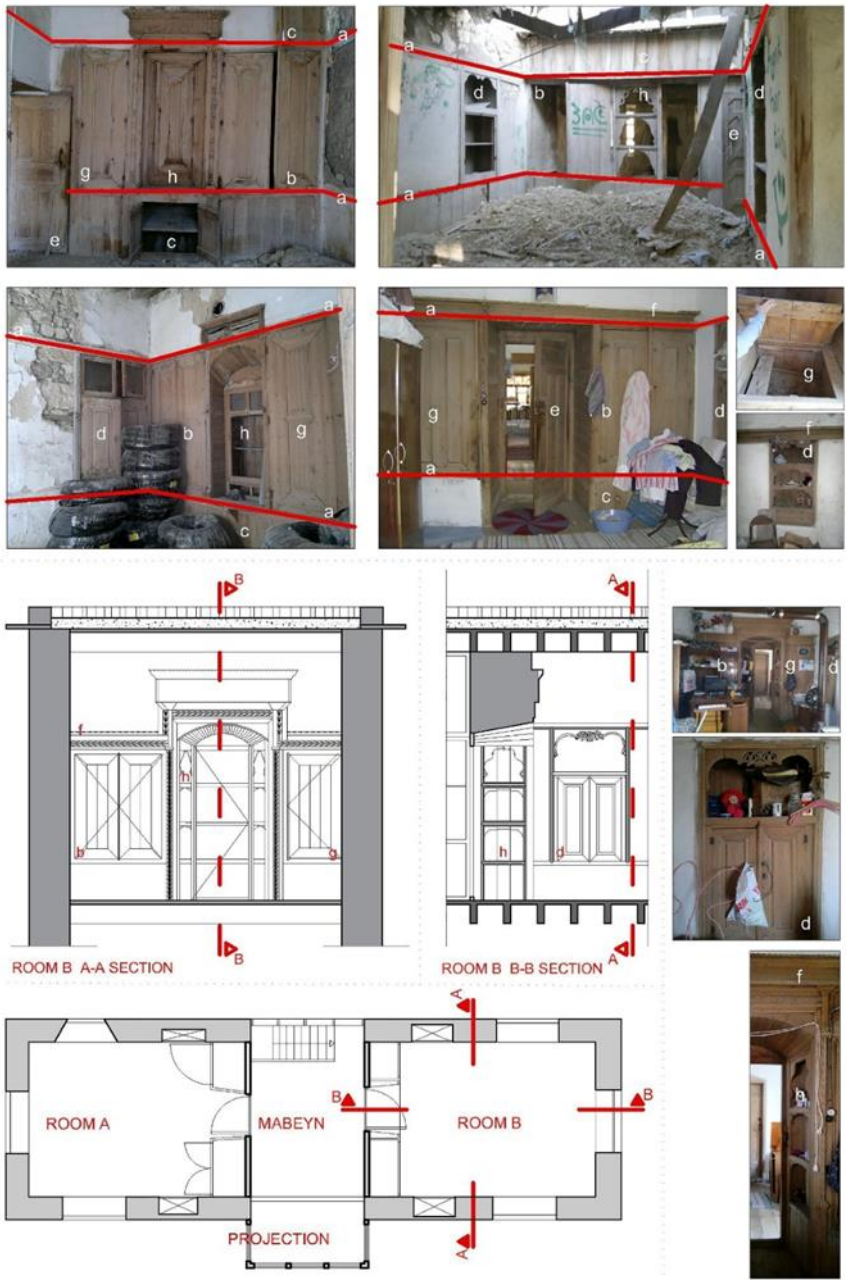

Figure 12. Cabinet-door assembly; A: Beam line (a), Cabinet (Yüklük) (b), Upper/Lower cabinet (Musandıra) (c), Cabinet (Niş) (d), Door (e), Sergen (f), Bath (Gusülhane) (g), Open shelf (Kandillik / Çiçeklik (h), B: The plan and sections of the door-cabinet assembly in Emine Çakır House

Material use and construction systems

The construction techniques of traditional houses of Mut are similar in all regions. The most common wall types are rubble stone walls in 50-60 cm thickness, and with timber frames at approximately 100 cm intervals, in which soil-straw mixture is used as the binder (Figure 13A, 13B). Walls built with unframed masonry stones and rarely adobe masonry systems were also encountered. Timber framed filled wall or bağdadi is used for interior walls or generally on west façade and cantilever walls. The filling material in the timber framed walls is stone. In the traditional houses of Mut, the walls were left completely exposed, and mud-straw mixed plaster was rarely used in some houses or again only on the projections (Figure 13C, 13D, 13E).

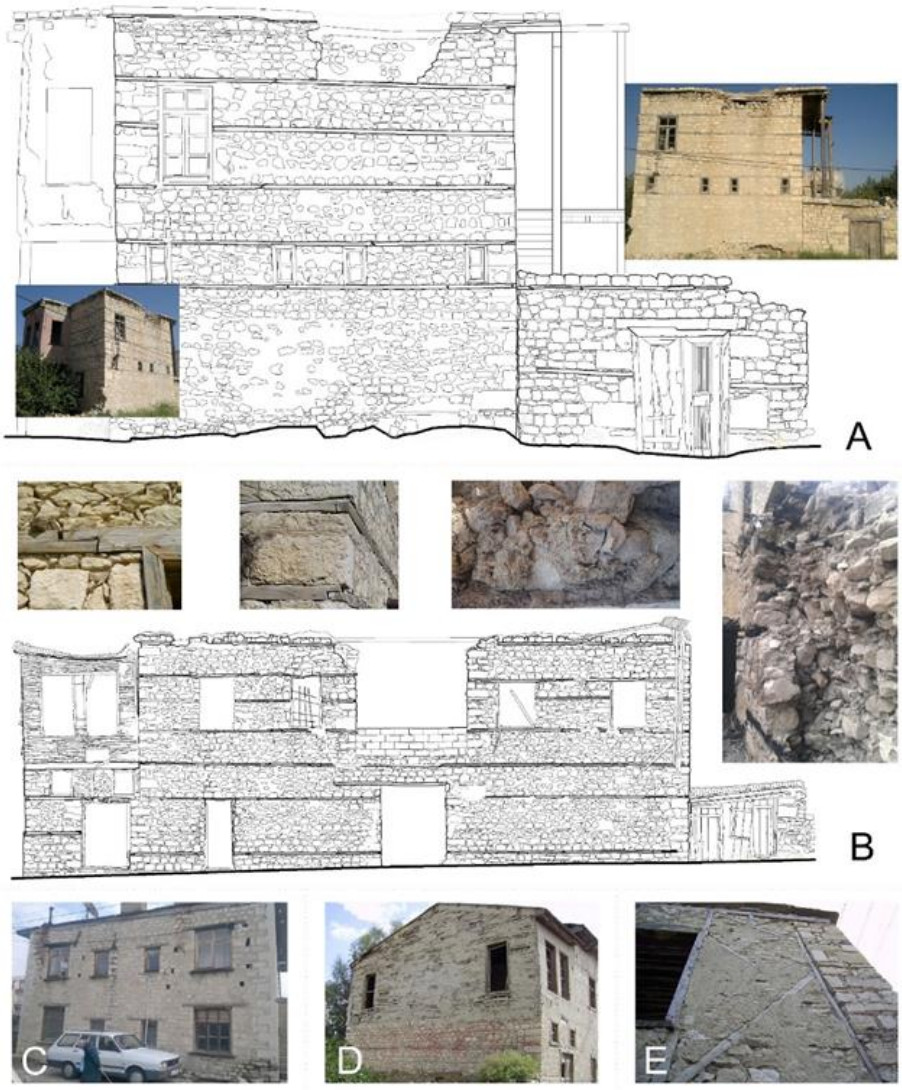

Figure 13. Examples of stone masonry wall with timber bond beams and details: Northwest façade of Hacer Şişik House (A), South façade of Ali Manav House and details (B), Examples of Stone masonry without timber bond beam (C), Timber framed-unfilled-timber lathed (bağdadi) (D), Timber framed-infilled (hımış) (E)

The floors and roofs are formed by covering the circular or rectangular beams with wooden laths placed on the masonry stone walls at varying intervals of 30-60 cm. The coating material on the roof is variable, and as a second layer, pine leaves or barks (keven) is laid to close small gaps. Adhesion is achieved by pouring a straw-added white mud mortar (cirk), on this layer. Red earth and rock salt are poured into this mortar. All layers are compressed with a cylinder stone (yuvak), and the soil is hardened, while water permeability is prevented. The compression process with yuvak is called pressing (yuvalama). Pressing is repeated every year to prevent deterioration of the roof. All these layers are surrounded by a single row of stones, giving this technical building a cubic appearance. The flat-shaped stone (wreath) below this row of stones and protruding 20-30 cm from the façade is a local and original detail at the roof/wall junction (Figure 14). The roof is not just for covering the building; it's also used for various purposes depending on the season. Foods such as wheat and tomato paste are laid on a flat

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earthen roof and dried under the sun, and these foods are consumed in winter. Another function is to turn it into a sleeping area in the summer months. In the hot summer months, beds are laid out on the roof in the evenings, and with the first rays of the sun, the beds are taken up and the day begins.

Figure 14. Earth roof details

Façade features and façade elements

Unplastered walls, projections that look like a separate mass added to the main structure with the material and roof type, and the eaves and finishing details of the building's top cover are the elements that determine the façade character. Different microclimates under the influence of the research areas cause different occupancy and vacancy rates on the façades facing the same direction (Manav 2021). In addition, due to the same effect, as mentioned in the previous section, covered by woodlath (bağdadi) is more used than timber framed filling with stone (hımış) Other original building elements on the façade are upper floor stairs, building entrance doors, windows, and chimneys.

As stated in the plan features and plan elements section, the stairs in the traditional houses of Mut are not inside, at outside, contributing to the façade character. There are examples where wood, stone, or both materials are used together in the construction of stairs. The main entrance doors are wooden, double-winged, and plain. The entrance doors of very few buildings are decorated. The most distinctive and common feature of these doors; are the windows above the door designed to meet the light need of the sofa. Entrance doors usually open towards the sofa (Figure 15A). The windows are small on the lower floors, and The windows are small on the lower floors and larger and in order on the upper floors. Window heights are limited by beamlines in beam structures. Window sizes are variable in the ones that do not use beams and the openings are covered with wooden lintels. Window

sashes are generally lateral rotation, and in a few structures, they are guillotine type. Metal and wooden balustrades are elements found in a few windows (Figure 15B). The projections are elements developed as an extension of the mabeyn/sofa, right in the middle of the façade. Only in some samples were projections observed in the rooms. The projections are separated from the main mass by their material and roof type, giving the façades a different character. Its walls are plastered or covered with wood and its roof is in the form of a gable roof. They are carried by buttresses or columns. (Figure 15C). Another of the most prominent elements of the façade character is the joint detail of the earthen roofs. This item has been described in detail in the previous section. Since the chimneys have lost their function or have been destroyed due to roof renovations, few have been identified. The history stones, in which the word "mashallah" is symbolized, as in the traditional house façades, especially in rural settlements of Anatolia (Budak 2020), are among the most original details of the façades of Mut houses. On the stones: the information of the year of construction, the person who made it, and the builder are engraved, and in some, the word “Maşallah” is symbolized in a circle (Figure 15D).

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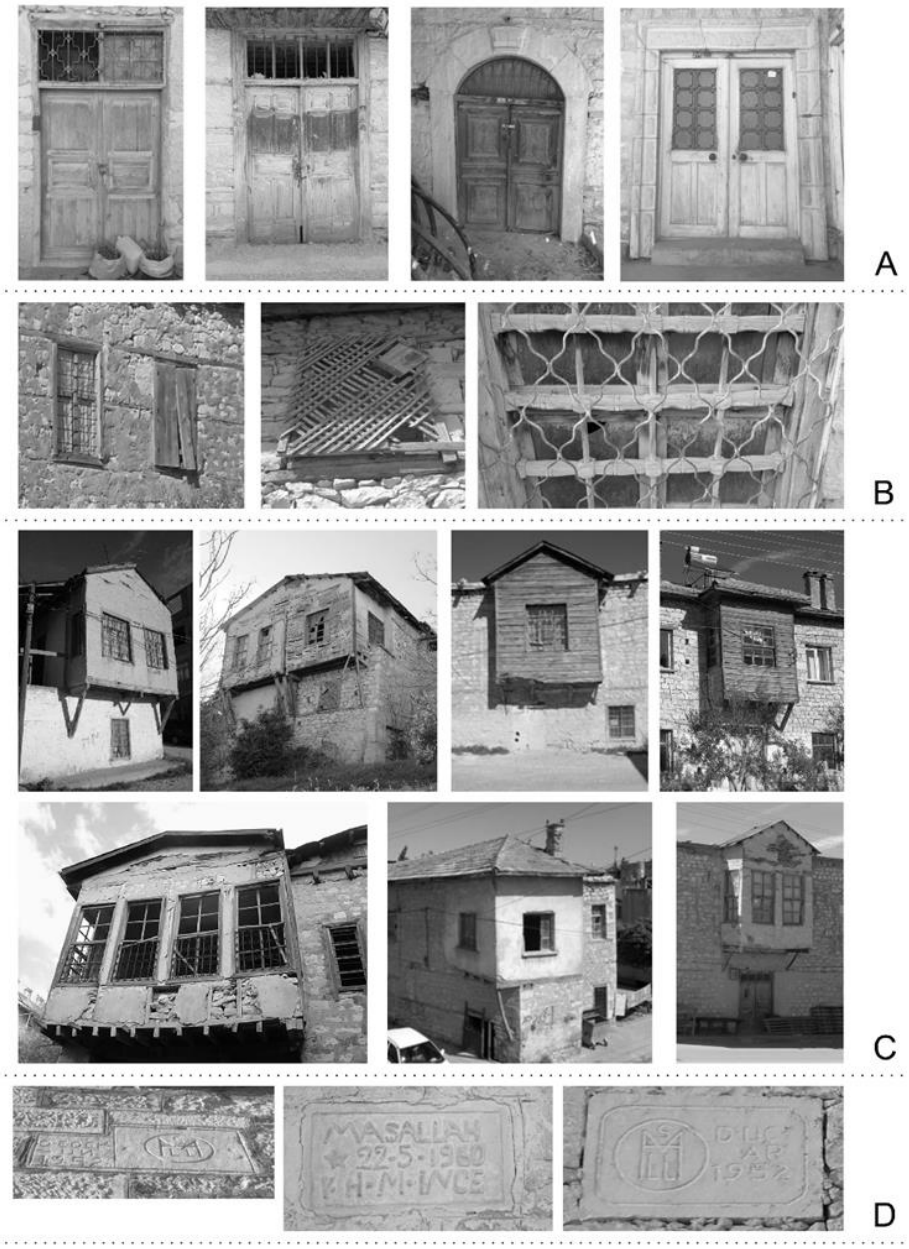

Figure 15. Main entrance doors (A), Windows and railings (B), Projections (C), Date/Maşallah Stones (D)

DISCUSSION AND CONCLUSION

This study, it is aimed to document the Traditional Mut Houses and the settlement pattern with their unique typological values, without completely disappearing. Especially in small settlements, since there is not enough analysis and documentation, the determination of the areas to be protected area is delayed, and the traditional pattern in these areas is deteriorated and transformed. During this transformation, traditional elements are also disappearing. Traditional Mut houses have not been noticed enough yet and are on the verge of losing their pattern integrity. Especially in the central area around the castle, many traditional houses were demolished in a short time because of the decision of the site area, which was taken too late. In addition, in different parts of Mut, the dwellings that are outside the site area and have original value are also rapidly disappearing. However, the

continued widespread use of traditional housing (Table 2) prevents the complete disappearance of this type of building. Thus, detailed typological data could be collected by examining 232 traditional houses.

Table 2. Usage analysis values of traditional Mut houses

ANALYSIS VALUES		Region "a"		Region "b"		Region "c,d,e"		TOTAL	
		Count	Percent	Count	Percent	Count	Percent	Count	Percent
Usage	Building in Use	139	64	155	66	92	73	386	66,5
	Empty Building	79	36	81	34	34	27	194	33,5
	Total	218	100	236	100	126	100	580	100

It was observed that the traditional houses that survive today in Mut District, which was founded on the ancient city of Claudiopolis, were built from the 19th century to the mid-20th century. Traditional Mut houses appear to be a combination of a prism built of rough-cut stone and another prism of wood added to the facade. The combination details of building elements, plan layout and dwelling gardens provide information about the traditional housing tectonics of the region. Using of rough-cut stone and timber bond beams is important in the construction of traditional Mut houses. Wooden frame is used in interior walls, sometimes on one façades and projections, in the "bağdadi" or "hımış" technique. The roof top is flat and covered with earth. Stone eaves and a single row of stones on the roof are a unique appearance to Mut. In two-storey traditional houses, projections are mostly located in the sofa and look like a wooden addition on the facade. In single-storey traditional houses, the cubic form and construction details are the same. Two types of plan layouts and configurations are used in residences. Mabeynli type; It consists of two rooms and a small sofa. In some examples of this type, there is a semi-open transition area such as the outer sofa at the entrance of the building before the mabeyn/sofa. The other and more commonly used plan type is with an inner sofa type. The plan elements reflect examples of traditional Turkish residential architecture. The relationship between street, building and garden creates a irregular and non-dense urban texture that is compatible with the topography, without requiring any intervention on the site. Lastly, another feature of Mut's unique facade is the date stones with the "Mashallah" symbol. Within the framework of all these features, the tectonic integrity of traditional Mut houses can be read as a combination of local materials, traditional construction knowledge and life, and can be compared with other geographies with their similarities and differences.

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These houses, which are examples of the traditional Turkish house spread throughout Anatolia, reveal their identity among others with their unique typological values. On a route connecting Central Anatolia to the south, to the Mediterranean, the structural and fictional formation of the houses has been completed under the influence of the original microclimate.

Traditional Mut houses are similar to the traditional houses of Akseki, Sütçüler, Sarılar, Ermenek and Çamlıyayla in terms of material use and construction techniques. A semi-open transition space, which cannot properly be called an exterior sofa, was used as a part of the plan, both in the dwellings of this region and in the traditional Mut houses. At the same time, it has common features with the general appearance of Konya's Hadim, Beyşehir and Seydişehir traditional houses. In terms of plan layout, the mabeynli plan type, which can be considered a primitive version of the plan type with inner sofa and is a unique type, which has examples in Konya and Karaman (Karpuz, 2011), was used in many buildings in traditional Mut houses. However, the use of mud brick as a building material in the same region does not create a typological value in traditional Mut houses (Figure 16).

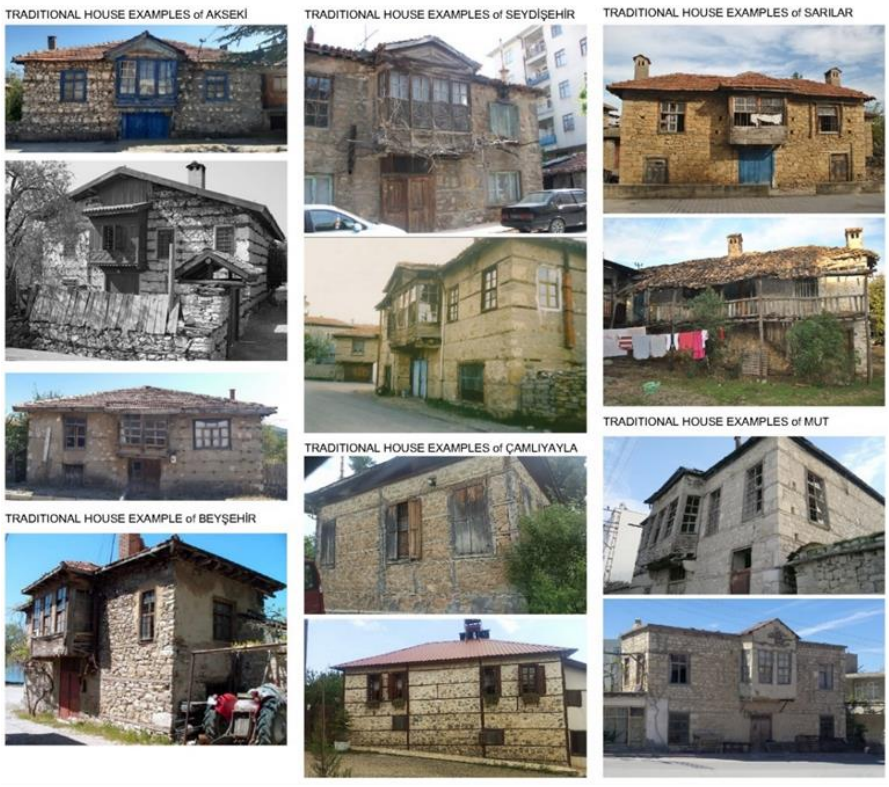

Figure 16. Traditional houses examples of Akseki (Kavas, 2015; Girgin, 2020), Seydişehir (Öztürk, 2011), Beyşehir (Biçer, 2008), Çamlıyayla, Sarılar, and Mut (Taken by corresponding author)

In this context, Mut houses can be considered as one of the unique local examples of Toros Mountains characterized by Günay (1999) in terms of materials, construction technique, and architectural design between Akseki-Pozantı area. On the other hand, based on the regional classification by Kazmaoğlu and Tanyeli (1979) defining the key

features of Anatolian-Turkish residential architecture, it is located in the Konya Region where Anatolia's original synthesis is displayed. According to Küçükerman's (2007) study classifying Anatolian residential architecture based on construction traditions, Mut houses are situated in the Southern and Southwestern regions where wood and stone usage is prominent. In addition to all similarities, Mut houses are particularly distinct from other examples, especially with their roof details. Therefore, it can be interpreted that Mut houses, reflect an original synthesis of the Central Northern Mediterranean Region (Figure 17).

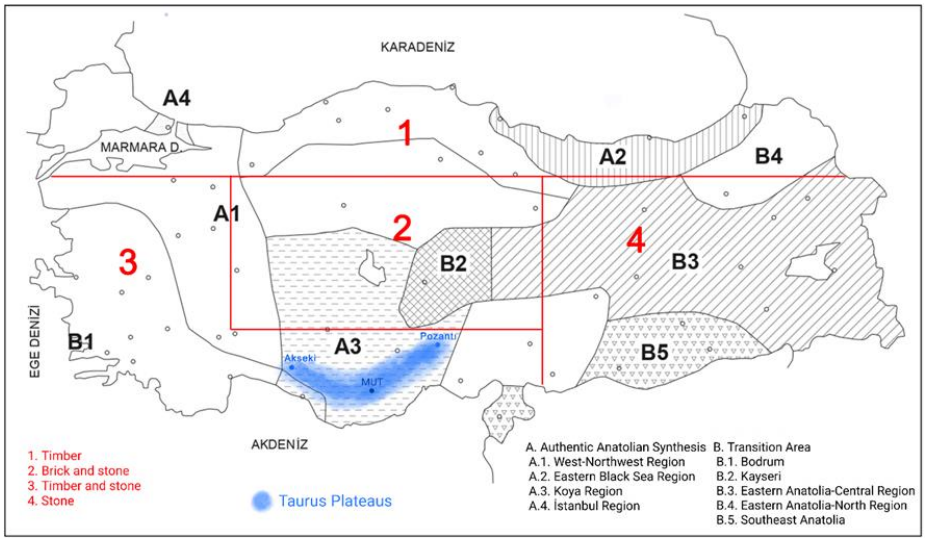

Figure 17. Showing the diversity in the Turkish House, the borders determined by Kazmaoğlu and Tanyeli (1979; (A) Authentic Anatolian Synthesis and (B) Transition Area variations), the borders determined by Küçükerman (2007; in red) and the Toros plateaus region determined by Günay (1999; in blue) overlapping map

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Traces of Aydın Boysan's Architectural Practice in an Industrial City: The Case of Kocaeli

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Abstract

Industrial areas within a city are one of the important components of urban memory, shedding light on the economic and social life, architectural design and building technologies of their era. However, modern research by architects on the industrialization process of Kocaeli, one of the most important industrial cities in Turkey, which has left important traces in the city, is insufficient. Leading architects of the period played an important role in the city's path to becoming an "Industrial City". Architect Aydın Boysan is a valuable professional who realized the pioneering architectural designs of his period in Kocaeli and made significant contributions to the city. Boysan, who designed many industrial buildings in Turkey, is the architect of four large industrial sites built in Kocaeli. These four buildings were not only important centers of production in their respective sectors for the country, but also unique representatives of modern architecture that was influential all over the world. It is an important responsibility of architectural historiography to bring these works of modern architecture, which shed light on an era, to the agenda and into the literature before they are lost. This study examines the structural, formal and functional characteristics of the facilities and their status today through Boysan's architectural identity and design approaches to industrial buildings. These facilities started operations in the 1960s, an important historical threshold in Kocaeli's transformation into an industrial city. Research on these representations of Boysan's unique modernist architectural style expands our knowledge about the production of the built environment for an industrial city and reveals traces of an important architect of the period.

Keywords:
Architectural design, Aydın Boysan, Industrial buildings, Industrial city, Kocaeli.

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INTRODUCTION

Although the history of today's industrial cities dates to the 19th century, the major industrialization initiatives in cities began in the 20th century. With the industrialization process, a new historical layer was added to cities. Separating these historical layers, then understanding and interpreting the conditions, ideas, and contexts that shaped the process of architectural production provides a perspective that can shed light on the period. In an industrial city, these layers are shaped by the architectural form languages that represent the intellectual and ideological approaches of the architects designing the built environment. In this context, analyzing the architects and their products can offer a perspective for interpreting the period.

The 1960s, when industrialization gained great momentum in Turkey, were years in which contemporary and original technologies experimented with a modern style in building production with the influence of global post-war modernism (Elmalı Şen et. al., 2014). Rapid industrialization between 1960 and 1980 began to form the character of industrial cities in the country and these cities began to be populated with pioneering institutions for mass production. Kocaeli, the subject of this study, is one of the most important cities of Turkey that took great steps towards becoming an industrial city during this period (Müştak Sevindik and Şenyurt, 2023). Attracted to the city by the political policies of the period, the industrial investments with large domestic and foreign capital and the industrial organizations established in the city were designed by well-known pioneering architects of the period. It would not be wrong to say that these organizations' buildings, which are the first large-scale industrial enterprises of their sector, are also seen as prestigious representations and reflect the architects' unique modern architectural style along with the latest building technologies of the period.

Architectural research on the industrial buildings of Kocaeli, whose city image is based on a strong industrial identity, mostly focuses on the Paper and Cellulose Factories (SEKA), an important industrial enterprise of the early Republican period, and its transformation processes (Yurtoğlu, 2017; Çakır and Gönül, 2015; Oral Aydın and Çömlekçioğlu Kartal, 2010). Many industrial facilities were built in a modern architectural style between 1960 and 1980, when industrial breakthroughs took place in Kocaeli, which contributed to the city's industrial identity and have not yet been the subject of scientific research. Among these, the architectural works of Aydın Boysan, who is known by the public as a writer rather than an architect, have an important place and been the subject of only a limited number of studies (Altay, 2012; Batur, 2018; Bilsel, 2002; Okumuş and Ediz, 2022; Tuna and Yapıcı, 2004). This research gap constitutes the main motivation for this research.

Aydın Boysan is a pioneering architect who designed many large industrial buildings all over the country. Sütlüce Arçelik Refrigerator

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Factory, Bakırköy Unilever Margarine Factory, Yalova İpek Paper Factory, Orhangazi Döktaş Engine Block Casting Factory, Tuzla Alamsaş Facilities, Trakya Yarn Factory, Bisaş Bursa Yarn Factory and Bursa Dosan Canning Factory are just a few of the 29 large industrial facilities designed by him (Boysan, 1997; Bilsel, 2002; Boysan, 2017; Batur; 2018; Okumuş and Ediz; 2022). With Boysan's unique design approach, his signature can be seen in four large industrial buildings in Kocaeli. These buildings are valuable works of modern architecture that represent the contemporary construction technology of the period and Boysan's unique design approach. The fact there is limited data in the literature on such important buildings and one building has been demolished are among the factors that make the research difficult but necessary.

Within the scope of the study, texts, interviews and photographs obtained from printed and electronic sources such as books and journals were collected, and the research was supported by photographs and on-site observation data from field trips. This article creates a discussion ground for the transfer of important works of modern architecture by architects in an industrial city like Kocaeli to the future by making them visible before they are lost. It is thought that Aydın Boysan's original and poetic architectural and structural approach can guide and pioneer future designs.

AN INDUSTRIAL CITY: KOCAELI

The 19th century was undoubtedly one of the greatest "*change*" in the history of humanity. The industrial age, in addition to creating a new technical style, also gave rise to new techniques for tasks that completely transformed life. This is where the fundamental difference emerges between the technical developments throughout human history and the techniques of the 19th century industrial age. Industrial age techniques have infiltrated daily life, including objects used, working styles and social activities (Freyer, 2018).

Industrialization can be expressed as the transition from a socio-economic system in which agricultural activities are effective to a socio-economic system in which industrial activities are effective. The concept of industrialization is a multifaceted set of phenomena that cannot be explained only by a change in the mode of production, because industrialization has the power to directly affect and transform the city and society. According to Harvey (2012), "*Industrial Cities*" refers to a rationalized and automatized system for mass production and consumption. The "*tendency of industrial cities to be a completed system*" is also expressed by Lefebvre (2016). This is because industrial cities need to be organized like a living organism to survive and meet their housing, production and consumption needs. The main components of industrial cities are production structures, which are usually close to water sources, have accommodation units for workers and middleclass employees located close to the production structures, include

transportation networks (railways) and various streets and boulevards are built in the gaps left by loading stations (Mumford, 2017). With the industrialization process, a new historical layer is added to a city and this impact lasts for many years.

Understanding the historical background of Kocaeli's production relationships before it became an industrial city is important for interpreting the process. Kocaeli has held a strategically important position throughout history due to its location on an axis connecting Asia and Europe and its north–south coasts on the Black Sea and the Sea of Marmara. This has enabled the city to host many civilizations in its hundreds of years of existence. The history of the city dates to early antiquity (Pausanias, 1984). Until the 14th century when it came under the rule of the Ottoman Empire, Kocaeli was one of the most important trade cities of the Byzantine Empire for many years due to its proximity to Constantinople (Istanbul), location on important trade routes between Asia and Europe, and maritime connections (Texier, 2002). It can be said that Kocaeli's first steps towards becoming an industrial city of the future were taken during the Ottoman period. Industrialization movements in the city started in the mid-19th century (Ulugün, 2007).

In the first quarter of the 20th century, the Ottoman Empire was in a period of disintegration and the outbreak of World War I made industrialization difficult and resulted in the destruction of many industrial establishments when they took heavy blows during the war. The basic development policy of the newly established Republic of Turkey, within the scope of the principle of statism, was to open industrial enterprises in priority industries across the country, thus ensuring socio-economic development in cities and for the whole country. In this context, institutions such as the SEKA (paper and cellulose mills), which have an important place in the city's history, were established in Kocaeli (Kocabaşoğlu et al., 1996).

The Democrat Party came to power in 1950 and changed the previous economically balanced and protectionist approach (Tunç, 2016). The general approach that was effective in the country during this period was to support private enterprise and capital, to increase import and export volumes, and to increase foreign trade. Between 1950 and 1960, the Mannesmann - Sümerbank Pipe Factory, a large-scale industrial enterprise, started operations (Borusan Mannesmann, 2008). With the state's support of domestic and foreign private capital in industrial initiatives from the 1960s onwards, many companies that are pioneers in their sectors in Turkey started production activities in different parts of the city. Following the large-scale industrial facilities in the city, it can be said that industrialization movements spread towards the Gebze-Dilovası and Kartepe-Başiskele regions in the 1960s.

One of the most important steps towards Kocaeli becoming an *Industrial City* has undoubtedly been the yearly industrial fairs. Under the leadership of the Izmit Chamber of Commerce and Industry, the first Kocaeli Industry Exhibition was opened in 1966 with a grand ceremony

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and participation of 48 industrial organizations from Gebze to Köseköy (Kocaeli Sanayi Sergisi, 1969).

With all these successive developments in industry between 1960 and 1970, the identity of Kocaeli as an *Industrial City* became more established and the face of the city changed dramatically in this context. While İzmit was the center of industrialization movements in the city in previous years, they expanded to the east (Kartepe-Başiskele) and west (Gebze-Dilovası) of İzmit around the D-100 highway.

AYDIN BOYSAN'S ARCHITECTURAL PRACTICE AND DESIGN APPROACHES ON INDUSTRIAL BUILDINGS

Aydın Boysan, known as a writer by the majority of society, is also an architect who has a place in the history of modern architecture as an important actor in Turkey. For Boysan, who was preparing to start university in Istanbul during World War II, architecture was an alternative option to the medical school. After enrolling in both faculties, he decided to continue as an architect, following his interest in architecture (Boysan, 2008). He graduated from the Academy of Fine Arts, the only school on architecture in Istanbul at the time (Boysan, 2007).

Boysan's architectural practice is inspired by two main components that have been at the core of architecture throughout history: material and construction. It would not be wrong to say that Boysan's sensitivity to materials and structure dates to his early years as a student at the Academy of Fine Arts. He states his beloved teacher, Turgan Samis, whom he met during his Statics course, connected him to architecture (Bilsel, 2002). His search for bold structures from his student years continued throughout his professional life.

In his article "*A Series of Oddities*", Boysan talks about the importance of the correct use and application of contemporary and technological structural systems developed with steel and high-strength concrete materials. However, he also states that aesthetics should be considered after the structure and materials are designed with the right construction (Boysan, 1999). The fact that Afife Batur refers to Aydın Boysan as "*the architect who wrote the poetry of structure*" can be considered an indication that he is known for his unique style in the architectural community (Batur, 2018).

According to Boysan, all quality works that have survived to the present day have been designed with an honest and unforced use of structure and materials (Boysan, 1970a). In a 1993 speech, he expresses how masterfully and aesthetically Mimar Sinan used masonry construction for Süleymaniye Mosque with the building technology of the period and that Kenzo Tange skillfully designed an aesthetic building with a suspended construction design, the contemporary building technology of the period, with a similar approach in the Yoyogi National Sports Hall. He states that Mimar Sinan and Kenzo Tange, as architects belonging to different cultures and periods, were similar in

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the way they designed the aesthetic building fiction with the right materials and contemporary construction systems of the period to create quality architectural works (Boysan, 1970b). In this context, architecture is not only an aesthetic art object, but also an intricate phenomenon that has economic, social and technical aspects and imposes important responsibilities on the practitioner (Boysan, 1970a).

Boysan's architectural design principle is also based on the phenomenon of "*flexibility*". Creating flexible spaces and volumes with the idea that architecture has the potential to adapt to life as it changes and transforms, and does not have sharp distinctions, is a design approach that increases the functionality of architectural works by allowing them to be used for many years. One of the 20th century's most striking statements on architecture, Adolf Loos' "*Ornament is crime*", can be considered another fact on which Boysan's architecture is based. Boysan considers the ornamentation added by the architect as an attempt of deception that complicates people's perception of the building and goes beyond architecture. He clearly states that knowing how to stand at the limit of what is sufficient is also a work of courage and making building elements complex and inconsistent makes architecture arabesque and incomprehensible. Meanwhile, doing the simplest, least costly solution often emerges spontaneously (Boysan, 1987). The phenomena of flexibility and simplicity seen in Boysan's design approach are supported by the idea of modular design. Modular design, which facilitates the planning and production process and allows construction to be completed faster, refers to designing with internationally accepted standard dimensions.

Boysan points out that the human perception of the interior space is one of the main elements to be considered in architectural design. The correct perception of the space from the inside, the ability of people to visually comprehend their position in it and the interior of the building in its entirety, and to feel comfortable and safe with sufficient natural lighting are among the prerequisites for a good design (Boysan, 2017). Consequently, the building establishes a satisfying spatial relationship with its user beyond being aesthetic and functional.

Industrial buildings have an important place in Boysan's architectural practice. Although he does not find it right to define himself as an "*industrial architect*", he is among the few architects of the period who frequently designed industrial facilities in the 1950s and 1960s, when Turkey experienced the fastest industrialization process, and took an active role in their construction process.

Aydın Boysan's architectural design principles are also valid for industrial buildings. The main component of industrial organizations are production structures. The manufacturing flow diagram (layout plan) is the main determinant in the design of these structures. In the manufacturing flow diagram, the location of the machinery and other tools required for production, the area they occupy and their relationships with each other are shown. It also indicates the raw

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material inlet, the stacking location of the prepared product and transfer points for the finished product. Realizing a design in accordance with the manufacturing flow diagram should be the first criterion to be considered in industrial buildings. With this data in the diagram, the architect can decide on the approximate location of the production facility in the site plan, its average size, heights that may be required, number of floors and possible structural form. In the structural form of production facilities, highly effective architectural solutions can be produced with shell-folded slabs, suspended structural systems and space bearing systems. Collaboration with structural engineers is also important to realize successful structural forms (Boysan, 1970b).

Boysan draws attention to the necessity of considering "*flexibility*" in the design of production facilities. While the means and methods of production are improving daily, the production capacity in the sectoral market tends to increase over time. In this context, while designing, it should be considered that the production facility can increase capacity and grow in the future. In the facility design process, the architect should collaborate with electrical and installation engineers for the relationship to be established with ancillary facilities (such as the boiler room and transformer) required for proper functioning of the structure. In structures such as administrative and social facilities, which are not directly related to production, architects can make more individual decisions since they do not require separate technical knowledge (Boysan, 1970b).

MATERIALS AND METHODS

This is a qualitative study focusing on industrial facilities designed by Aydın Boysan and built in Kocaeli province: Kartonsan Cardboard Factory, Turkish Cable Factory, Arçelik Washing Machine Factory and Nasaş Aluminum Sheet and Foil Factory. The study methodology involves, in the first stage, a comprehensive review of archival materials, mainly printed and digital texts and photographs from the national literature. The archives consist mostly of books and journal texts prepared from interviews given by Aydın Boysan. Information and photographs of projects published by Aydın Boysan in Mimarlık journal were also accessed and used in the study. The book titled *"Boysan"*, published in 1997, which contains summarized information about Boysan's architectural projects throughout his professional life, was utilized. The aim was to create a basis for comprehensive understanding with the existing literature.

After this stage, which constitutes the basis of the study, the facilities were visited for on-site identification-observation with official permission within the scope of scientific study. In this process, identification and documentation work was carried out with photographs. The data obtained at this stage provided information about the buildings' current state and gave an idea about the changes they have undergone. With on-site observations and determinations

made, the data previously obtained from printed sources were overlapped with aerial photographs to visualize the changes by giving the legends “original factory area” and “current factory area”. The only exception is the Turkish Cable Factory, which was demolished.

The limitations of the study were lack of access to primary sources of information (Designer-Employer-Contractor) and the limited literature available. In addition, the fact that one of the facilities was demolished made the study difficult. In the light of all the written and visual data obtained, four facilities were examined according to their construction date, original function, total enclosed area, structural system of production and other buildings, architectural style and characteristics of geometry, lighting system and material, façade material and current status and function (Figure 1.).

The findings and insights gained from this research will not only document the modern architectural industrial heritage in Kocaeli, but will also contribute to the understanding of Boysan's timeless architectural and structural design at an international level, guiding and contributing to future designs.

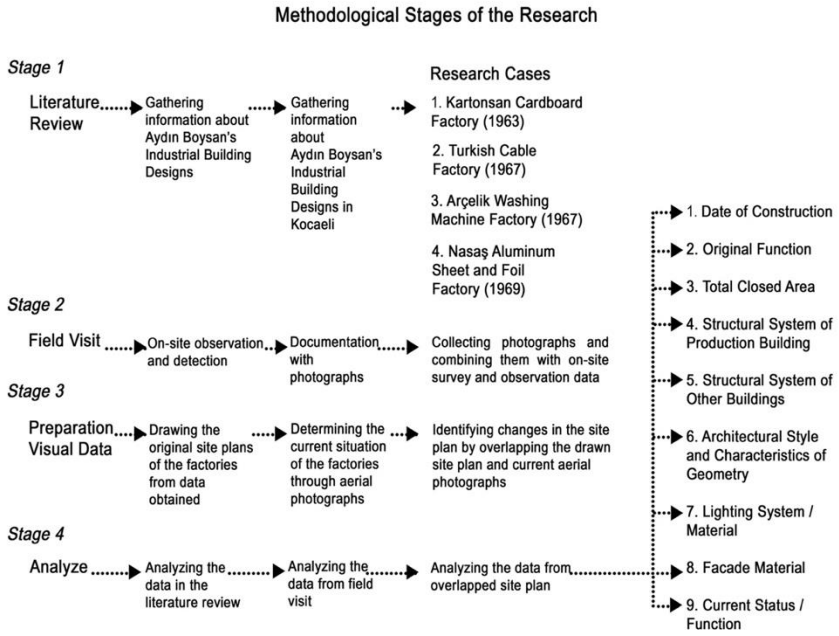

Figure 1. The methodological stages of the research

RESEARCH ON INDUSTRIAL BUILDINGS BY AYDIN BOYSAN IN KOCAELİ

In the 55 years he practiced architecture between 1945 and 2000, Boysan designed a total of 1.5 million m^2 of building space with various functions. Among these designed buildings, 29 large industrial buildings were constructed (Batur, 2018). Four of the industrial buildings are in Kocaeli (Figure 2.).

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Figure 2. Aerial photograph of the locations of industrial buildings designed by Aydın Boysan in Kocaeli

Within the scope of the study, the industrial buildings whose design belongs to Aydın Boysan are analyzed chronologically based on date of construction. The brief history of the industrial organization, location of the building group in the city, site plan and architectural design decisions, structural features and current status are discussed.

Kartonsan Cardboard Factory

SEKA are the most important initiatives of the industrialization steps of the Republican Era in the paper and cardboard sector and have been operating as the first and only large enterprise in the paper sector in Kocaeli for many years. Kartonsan Cardboard Factory, the second institution in Kocaeli to produce paper and cardboard after SEKA, was the first private large-scale production factory established in the city (Figure 3.).

Figure 3. Advertisements from 1971 and 1974 (Kocaeli Sanayi Rehberi, 1974; Kocaeli Sanayi Fuarı, 1971)

Designed by Boysan, the factory was built in 1963 in the Başiskele district of Kocaeli (Figure 4.). It is on flat land east of the Gulf of Izmit and south of the Kiraz Stream (Figure 5.). The entrance to the factory site is provided via Karamürsel Street on the south side of the land. The original building area consists of a 21,500 m^2 enclosed area consisting of the production facility, social facility, administrative facility, warehouses, transformer and boiler room (Boysan, 1997).

Figure 4. Southwest view (Boysan, 1997)

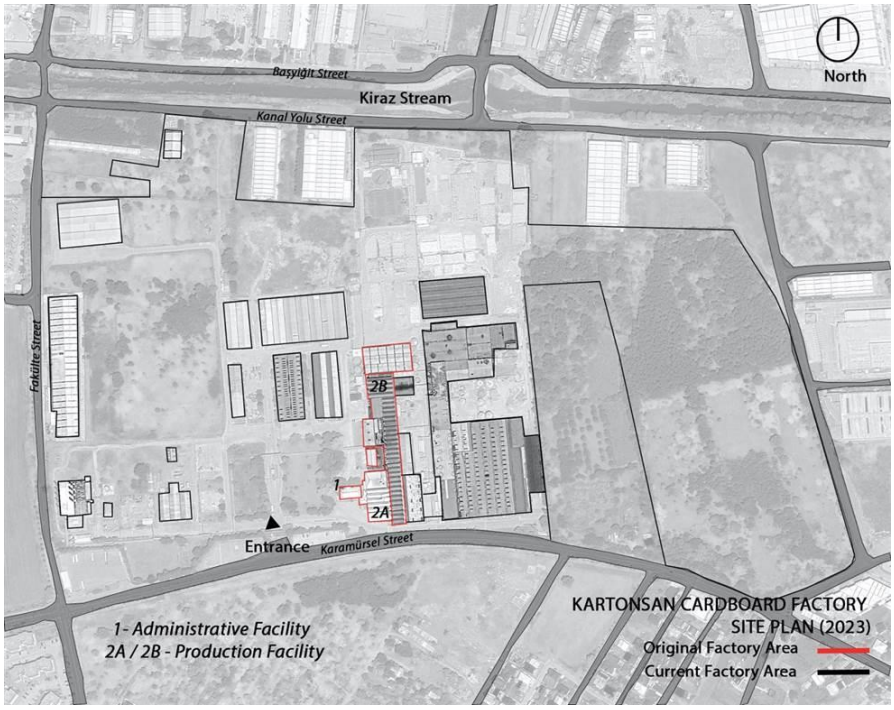

Figure 5. Current site plan (created by authors)

Starting from the entrance of the factory site, all facilities are on the eastern side of the land in relation to each other. In Boysan's approach, it is assumed the west side of the land was left as a development area in consideration of possible future growth potential. When the layout decisions are analyzed, the production facility and warehouses are on the north-south axis, while the social and administrative facilities are on the east-west axis in the opposite direction. It can be said the project aims to capture functionality, which is always prioritized in the relationship between buildings, with asymmetry that provides balance between the masses. The transformer and boiler rooms are to the east of the production facility. Within the factory site, there are open stock areas, raw and finished materials entry/exit areas, and a service road that surrounds the entire land and provides access to all buildings. Since the production facility requires a large spatial space for mass production machine lines, the modular reinforced concrete structural system is

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complemented with reinforced concrete folded gable roof slabs (Figure 6.).

Figure 6. Kartonsan Cardboard Factory administrative and production facility (Boysan, 1997)

The folded slabs create a three-dimensional geometric effect and strengthen the architectural effect of the roof. The natural lighting required in the space is provided by rhythmically repeating band windows above eye level between the modular structural system. In the administrative facility, a modular reinforced concrete structure is constructed with a terrace roof. The horizontal band windows in the production facilities are replaced by vertical windows with larger surfaces and sunshades in the administrative facility.

While the production facilities have a more geometrically emphasized structural expression, the administrative facility is designed in a more modest way. With this approach, the production facilities are the first to attract attention at the factory site (Figures 7. and 8.).

Figure 7. Southwest view (S. Müştak Sevindik Archive)

Thanks to Boysan's flexible and modular design principle applied in industrial buildings, the building maintains its functionality and production today. The fact its shell has the potential to respond to current needs over time has carried the building from the day it was built to the present day. With nearly 60 years of history, the building complex has evolved over time according to the contemporary production needs of the original structures. It still exists in the city as a valuable work of architecture with its simple and modern style of its period and qualified constructive architectural elements.

Figure 8. Administrative and production facility (S. Müştak Sevindik Archive)

Turkish Cable Factory

As with many other sectors, the 1960s were years when Turkey started new initiatives to catch up with the latest technologies in the electricity and telecommunications sectors. Instead of the old types of conductor cables with paper insulation and lead sheaths, modern aluminum conductor cables with plastic insulation, a new technology that had been used abroad for many years, began to be preferred. However, aluminum conductor cables, which could not be produced in the country during this period, had to be imported. This resulted in a high cost and loss of time, including the transfer process in product procurement. T to meet this need in the country, the Turkish Cable Factory was established in 1963 through the initiative of Etibank in partnership with Finland and the United States of America (NTV Haber, 2000) (Figure 9.).

Figure 9. Advertisements from 1974, 1975 and 1982 (Kocaeli Sanayi Fuarı, 1974; 1975b; 1982)

The factory site of Turkish Cable Company, which has an important place in the history of Turkish industry as its first initiative in this sector, was designed by Boysan and became operational in 1967 (Boysan, 1997) (Figure 10.). Turkish Cable Factory is in the Derince district of Kocaeli, south of the D-100 highway, close to the Gulf of Izmit. The entrance to the factory site is via Ergenekon Street, to the east of the site. The two production facilities built to produce aluminum wire and

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telephone cable, the administrative facility and warehouse building have a total enclosed area of 13,800 m^2 (Boysan, 1997).

When one enters the factory site by passing through the security checkpoint on Ergenekon Street, the administrative facility, built with a reinforced concrete frame system, is on the north side. Opposite this facility, where the administrative units are located, are two production facilities located side by side (Figure 11.).

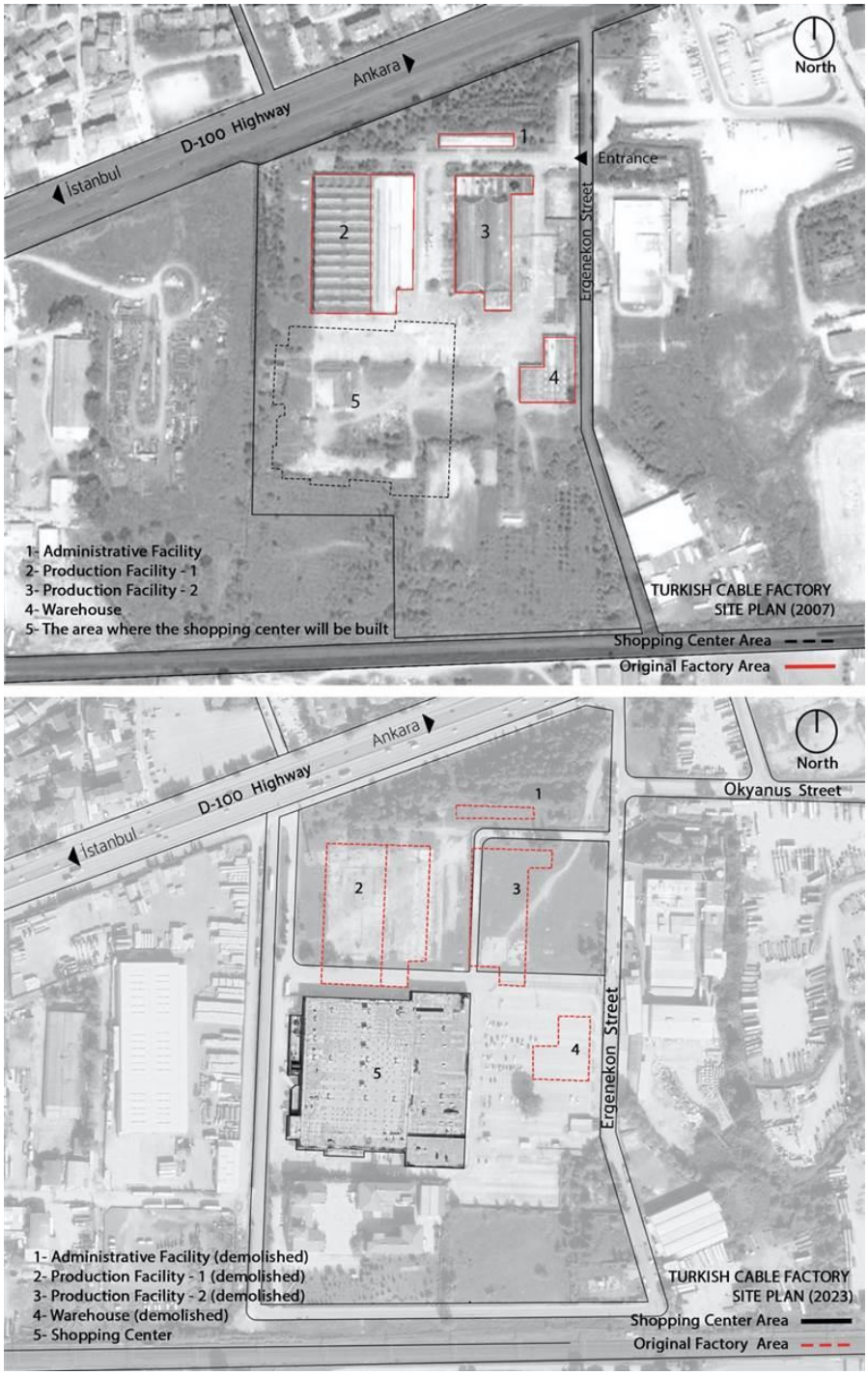

Figure 10. Site plan comparison for 2007 and 2013 (created by authors)

Figure 11. Northwest view (Boysan, 1997)

Constructed with a reinforced concrete frame system, the production facility utilizes Boysan's signature folded reinforced concrete slabs. The construction geometry, consisting of three-dimensional triangular folded slabs, which we will later see in the Arçelik Washing Machine Factory, together with the steel roof construction, forms the building's architectural characteristic. In the production facility, in addition to providing the ideal physical conditions required for manufacturing, attention is paid to the construction geometry and aesthetics in the architectural fiction. In doing so, the idea of designing flexible spaces and volumes that are not ossified, which Boysan is sensitive to in the design of industrial buildings, comes to the fore. In the facility design, he has aimed to produce a replicable module that can respond to possible future spatial needs. The potential to expand modularly over time is seen as the strongest aspect of the production facility design (Figure 12.).

In the production facility, skylights running linearly along the roof are used to illuminate the interior with natural daylight in the large openings crossed by the steel roof construction due to the manufacturing scheme. The interior space is also illuminated by horizontal band windows on the façade. These are designed as reverse transom windows opening to the outside and function as natural ventilation (Figure 13.).

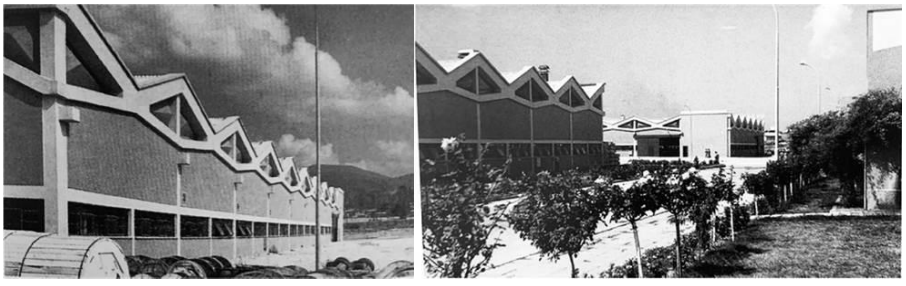

Figure 12. Reinforced concrete folded slab geometry of the production facility (Boysan, 1997)

Figure 13. Roof skylights and windows on the façade, which provide natural light to the interior (Boysan, 1997)

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It was reported in the press that production at the Turkish Cable Factory was halted in 2005 due to a financial crisis (Evrensel Haber, 2005). In 2007 aerial photographs, it was determined that facilities within the factory site were still standing. In the 2009 aerial photographs, it was determined that all buildings in the factory site, except for the administrative facility, had been demolished. In the 2011 aerial photo, it was seen that the administrative facility was also demolished. A shopping center and open parking lot were built on the south side of the factory land. The area to the north is still idle today.

Arçelik Washing Machine Factory

The opening of the economy to foreign markets with decisions taken by the political power in the 1950s increased imports of technological products into the country. In particular, many technological household goods used in daily life began to be imported from Western countries to large cities in Turkey after 1950. With support provided by the state in this period, it was aimed to attract domestic and foreign capital to the country and start production of these imported products in the country's market. One of these initiatives was the establishment of a multi-partner company called "*Erel Çelik Eşya A.Ş.*" in Sütlüce, Istanbul, with the aim of producing office furniture (Altay, 2012). The company name was later changed to "*Arçelik A.Ş.*". A pioneer in the field of machinery technology and production in Turkey, Arçelik produced the country's first domestic washing machine and refrigerator in its facilities in İstanbul - Sütlüce (Ovalıoğlu, 2007) (Figure 14.).

Figure 14. Advertisements of Arçelik (Durur, 2015)

Demand for these products, which are needed in domestic homes, increased as a result of frequent advertisements across the country and the production facility in Sütlüce, Istanbul, was unable to meet this growing demand. The decision was taken to build a new factory in Çayırova, Kocaeli, based on the idea of high-capacity production in a larger area. The new factory was designed by Aydın Boysan. The factory site, which has a enclosed area of approximately 50,000 m^2, includes production blocks, social facilities, warehouses, a transformer and a heat center. On the sloping north side of the plot, a total of 54 residential units were designed in nine blocks.

Built on a large plot of land north of the D-100 highway in Çayırova, the factory site is accessed via Yanyol Street on the south side (Figure

15.). After passing through the security checkpoint, the main production facility welcomes you. Providing physical conditions suitable for the production scheme, which is the main factor Boysan pays attention to in the design of industrial buildings, was the first component that shaped the design. The fact a mass production belt system will be used in the manufacturing process reveals the need for a high volume with wide openings that allow movement. At the same time, a steel roof system was preferred over a reinforced concrete frame system to accommodate the suspension and transfer systems that may be required in serial belt production.

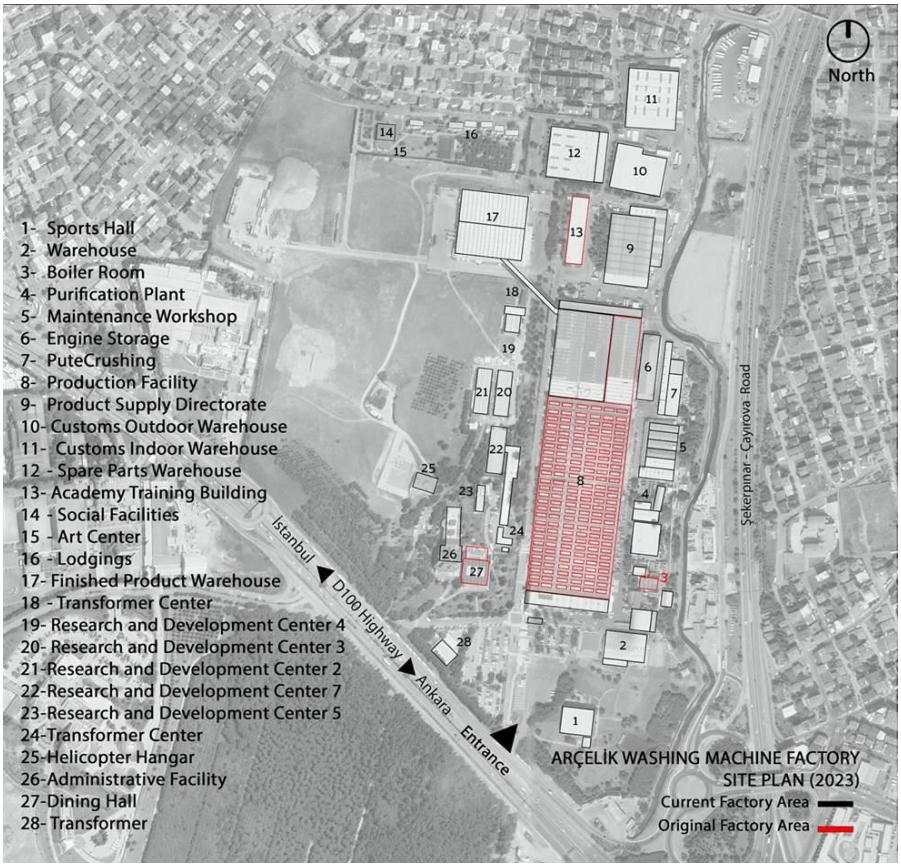

Figure 15. Current site plan (created by authors)

The production facility is equipped with an overhead gantry crane capable of moving in all directions and with a capacity of up to 10 tons. Since the steel roof carriers can also be used for suspension and transfer purposes, care was taken to ensure the roof covering is light so as not to create additional load. Designed to be compatible with different use cases in the future, the production facility is designed as a flexible volume for possible overhead crane movements and hanging conveyors. Modular column axis spacing is also designed to allow for future expansion of the production facility (Figure 16.).

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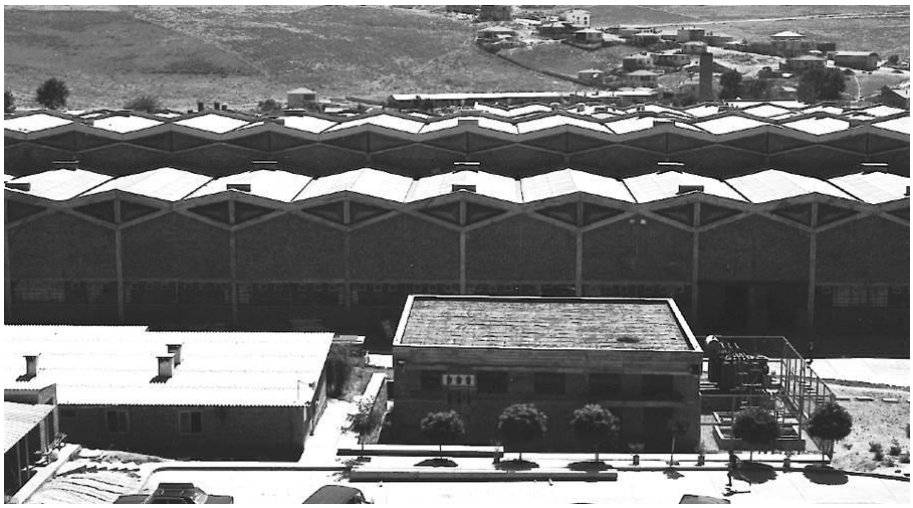

Figure 16. West façade of the production facility (TMMOB Mimarlar Odası İstanbul Büyükkent Şubesi, 2017)

To allow natural light into the interior space and support the lightness of the roof, fiberglass skylights were used in the ridge sections above the main trusses at a rate of 30% of the roof. In this way, in addition to the positive psychological effect of natural lighting in the interior, costs associated with artificial lighting are reduced (Figure 17.).

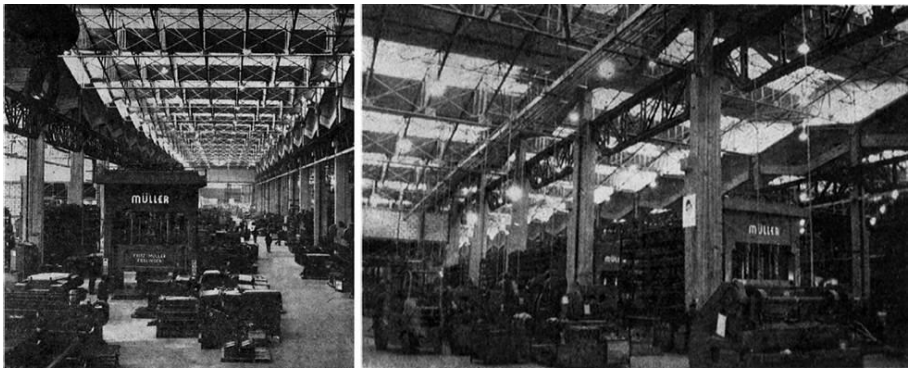

Figure 17. Interior of the production facility (Boysan, 1970c)

On the façade of the production facility, unplastered jointed brick and exposed concrete are used in a simple and plain style. The most striking architectural element on the façade of the production facility is the three-dimensional triangular folded reinforced concrete slabs, similar to those seen in the Turkish Cable Factory. Batur (2018) describes this poetic geometry as a "trio of triangles". This strikingly and precisely constructed structural combination directly reflects Boysan's understanding of architecture. The fiberglass skylights used in the interior space of these triangular reinforced concrete architectural elements allow natural light into the interior space, thus making the aesthetic structural construction functional.

A different construction of folded reinforced concrete slabs was applied in the social facility building. Especially in the "*Menza*" Hall (dining hall) of the social facility, the reinforced concrete folded plate roof system, cantilevered outward in both directions, carried by eight *"V"* shaped columns with triangular openings, strengthens the architectural effect of the mass. In this building, fiberglass skylights are

used between the folded reinforced concrete slabs on the roof. Menza Hall, with its folded reinforced concrete roof slabs and vertical sun shading elements on the façade, "V" shaped columns in the interior and roof skylights, creates an impressive architectural atmosphere indoors and outdoors. At the same time, with its roof and façade movements, it has an imaginary quality that is recognized in the general silhouette of the factory site (Figure 18.).

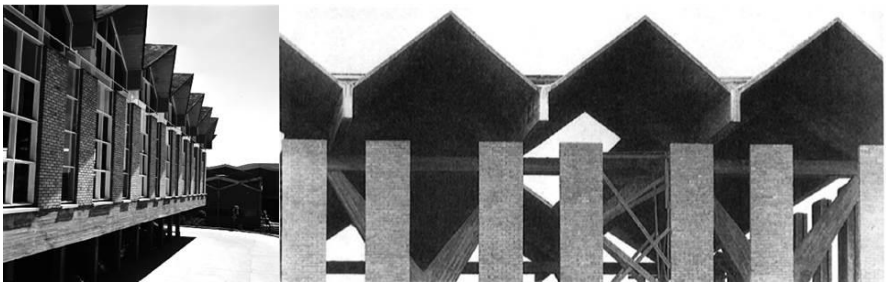

Figure 18. Façade of the social facility (Boysan, 1970c)

Designed in nine blocks on the northern slope of the factory site, 54 housing units are constructed with a reinforced concrete frame system, side by side in a north–south direction. Vehicular and pedestrian roads, parking lots and outdoor sports areas are designed in this section planned as lodging (Figure 19.).

Figure 19. Lodgings (S. Müştak Sevindik Archive)

The factory designed by Boysan is still in use today as it has been able to respond to spatial needs despite changing and evolving technological needs for more than 50 years. However, as a result of increasing production demand over time, some expansions were made in the production facility and additional structures were built within the factory site. Warehouses, research and development buildings, a service academy building where employees are trained, a workshop 4.0 building, an administrative facility, a new social facility and an art center were built (Figure 20.).

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Figure 20. Service academy and workshop 4.0 (S. Müştak Sevindik Archive)

Boysan's modular solution to this situation, which he had envisioned while designing the building, allowed the facilities to be expanded, but the expansions were realized with a different form than the original. Although a common architectural language was attempted on a material scale, the triangular geometric form on the façade, which Boysan envisioned and constitutes the main characteristic of the factory site architecture, was not maintained in the later expansions and additional buildings, which negatively affects the geometric effect of the entire factory site architecture (Figure 21.).

Figure 21. Expansion of the production facility (S. Müştak Sevindik Archive)

Of the bachelor's lodgings, infirmary and dining hall, which Boysan called the social group, only the dining hall units have survived to the present day. The bachelor's lodging was demolished and the infirmary was later resolved within the production facility. The cantilever section, which was designed in the dining hall section of the social facility building and gave the mass the effect of flying in the air, was closed. The air conditioning units added to the façade also damaged its architectural effect. The skylights on the roof were partially closed and the natural light received by the interior from the roof was thus reduced (Figure 22.).

Figure 22. Social facility (S. Müştak Sevindik Archive)

Arçelik Washing Machine Factory, one of the most important industrial initiatives of the 1960s, is an important milestone for the city and country as one of the first large-scale industrial enterprises to use the mass production belt system, which continues production uninterrupted from the day it was built until today. It is also a valuable work of architecture designed in the modern and simple architectural style of the period with a unique brutalist structure formed with triangular folded plates, which is Aydın Boysan's signature. The impressive architectural image of the preserved original structures can still be felt today.

Nasaş Aluminum Sheet and Foil Factory

Aluminum has been widely used in many sectors since the 19th century due to its properties of lightness, corrosion resistance and easy processing. Especially with the modern extrusion method developed in the 1920s, the use of aluminum in architecture gained momentum over time (Uz, 2019). In his article titled "*Metal Roof Coverings*" in *Arkitekt Journal*, Abidin Mortaş mentions that in new architecture, sloping roofs covered with materials such as tiles, eternite and slate are replaced by roofs constructed with metal materials such as lead, copper, zinc, iron and aluminum. The article states that aluminum, which is preferred especially in industrial buildings due to its high resistance to various gases as well as its light weight and ability to be bent into the desired form, is frequently used in America, Germany and Switzerland (Mortaş, 1931).

Although steel construction buildings with metal joinery and large glass surfaces, which was effective in the 1950s, attracted the attention of architects in Turkey, the lack of modern material knowledge and supply made it difficult to implement such buildings (Uz, 2019). In the 1960s, public and private sector initiatives on aluminum gained momentum. One of these initiatives was the Nasaş Aluminum Factory, which was established in cooperation with the private and public sectors. Nasaş Joint Stock Company was established with support from the Industrial Development Bank of Turkey, İş Bank of Turkey, Akbank, Turkish Commercial Bank, Civil Servant Retirement Fund, World Bank and individual capital (Arkitekt, 1973) (Figure 23.).

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Figure 23. Advertisement from 1975 and 1978 (Arkitekt, 1978; Kocaeli Sanayi Fuarı, 1975a)

Located north of the D-100 highway in Kocaeli's Dilovası district, the factory was designed by Aydın Boysan (Figure 24.). With a 40,000 m^2 enclosed area in a 200,000 m^2 factory area, Nasaş Aluminum Factory produces corrugated, trapezoidal and flat aluminum sheets for roof, façade and ceiling coverings from aluminum supplied from outside as raw material (Arkitekt, 1973).

The entrance to the factory site is via Dicle Street, 1010th Street, which is north of the D-100 highway. After the gate control point, there are administrative and social facilities designed side by side and interconnected with each other, and the production facility in the southwest direction. Boysan considered human–vehicle circulation and the possibility of the production facility growing over time while making site plan decisions regarding building locations (Boysan, 1974) (Figure 25.).

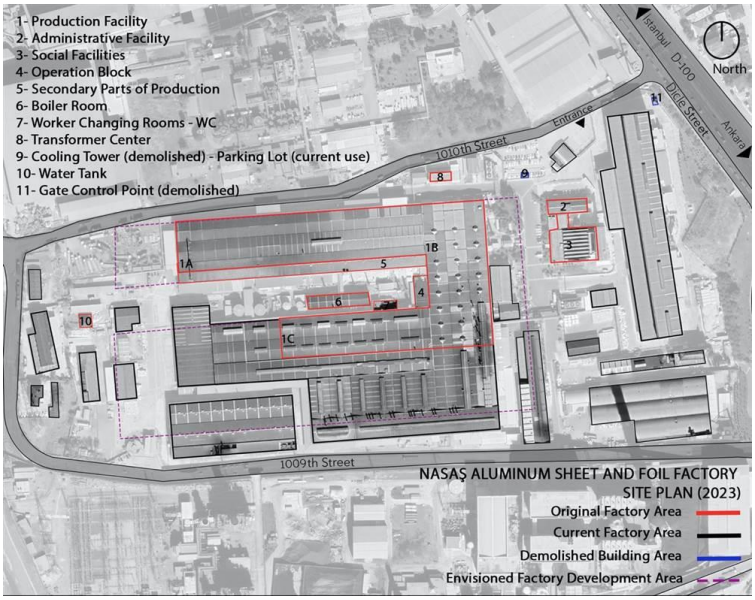

Figure 24. Current site plan (created by authors)

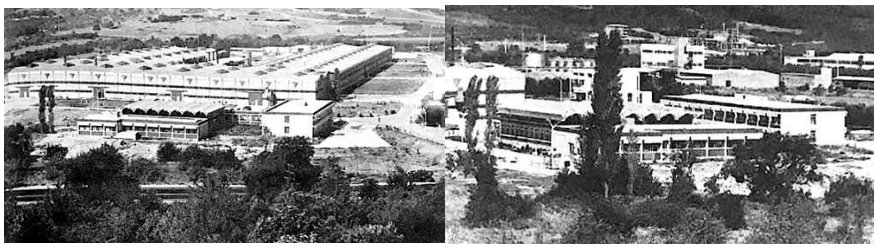

Figure 25. General view (Boysan, 1974)

The *"U"* plan design preferred for the production facility puts the heat plant (boiler room), one of the important components of the facility, at the center, along with the business offices and laboratories. This planimetric form is designed with the assumption that the building can expand in all four directions in the future. According to the flow of materials within the facility, the main circulation scheme is planned linearly according to the entry of raw materials from the east and exit of product to the west. When the ground survey of the design area was examined, it was observed that the ground's bearing capacity was quite low. On the other hand, the necessity of using heavy and mobile bridge cranes in the production facility due to the manufacturing scheme led to the choice of steel in the construction selection. The 21-meter span is formed by using two articulated frames and the construction system ends with a castella beam at the top point (Figure 26.).

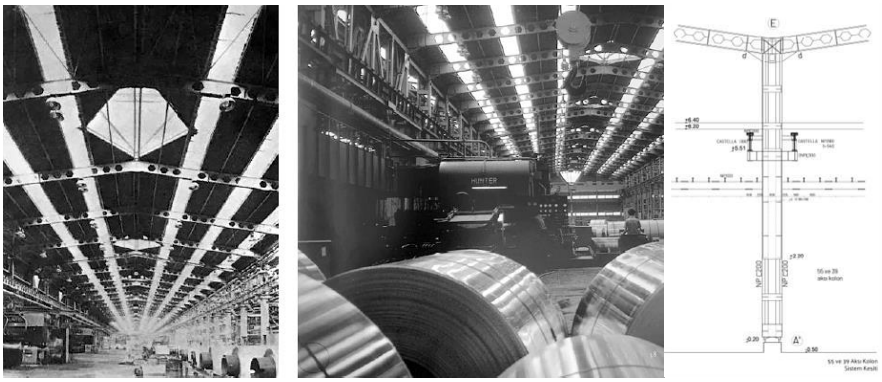

Figure 26. Production facility interior and castella beam detail (Boysan, 1974)

The main characteristic component of the production facility façade is the three-dimensional pyramidal skylights. In the production facility, which is built with a modular system seen in Boysan's other industrial buildings, the pyramidal skylights seem to be glued to the façade, which are used every two modules on average, adding an impressive sculptural architectural aesthetic. Similar to these elements, three-dimensional triangular roof skylights and double rows of band windows running horizontally along the façade provide light to the interior. The façade is clad in unplastered brick veneer with joints (Boysan, 1974) (Figure 27.).

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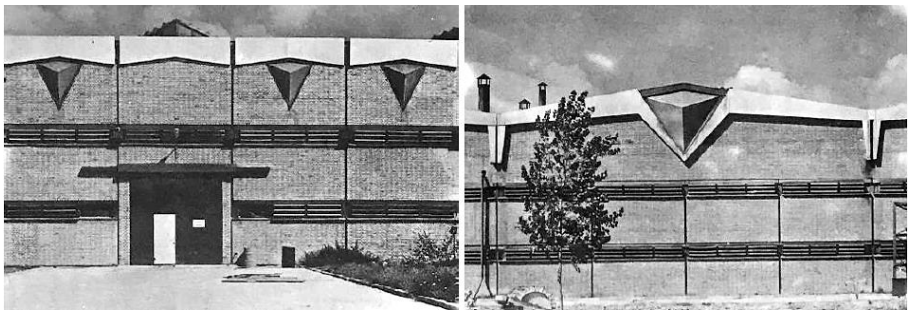

Figure 27. Façade of the production facility (Boysan, 1974)

The administrative and social facilities, which are analyzed in connection with each other, were built with a reinforced concrete frame system. In the administrative part of this section, which Boysan calls the social group, there is an information desk, administrative staff rooms and an exhibition area, while in the social part there is a kitchen, scullery, dining hall, changing rooms and toilets, storerooms and an infirmary. While a flat terrace roof was used in the administrative section, reinforced concrete folded slabs were used on the roof of the social section. The folded slab construction in the social section is supported by "*V*" shaped columns with triangular openings, similar to the one used in the *Menza* Hall of Arçelik Çayırova Facilities (Figure 28.). In both facilities, exposed concrete and constructive sunshades are preferred on the façade.

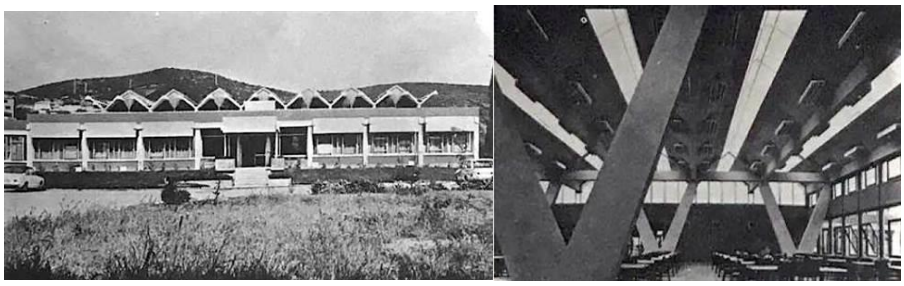

Figure 28. Interior of the dining hall in the administrative and social facility (Boysan, 1974)

The entire factory site is characterized by a functional, modern and simple modular architecture in which the construction system is at the forefront. The factory facilities have changed ownership many times due to the financial crisis (Vatan Gazetesi, 2006). The original designed facilities are still in use within the site today. As Boysan envisioned while designing, the building stock in the site has increased and the production facility has been expanded in line with the increasing market demand and developing technology over time (Figure 29.).

Figure 29. Additional building constructed on the factory site (Sayın İnşaat, 2022)

The new buildings in the factory site differ significantly from Boysan's buildings in terms of architectural form and materials. They have a steel construction with trapezoidal sheet metal cladding on the façade. When looking at the whole factory site, the original group of buildings belonging to Boysan and the large-scale buildings built later are visually differentiated. It is thought that the additional structures built in a different style within the same factory site negatively affect the original architectural characteristic. The original buildings designed by Boysan continue to exist in the factory site as nostalgic witnesses of history (Figure 30.).

Figure 30. Administrative facility (DGD Yapı, n.d.)

FINDINGS AND DISCUSSION

The findings obtained from the written and visual data collected on four industrial facilities designed by Aydın Boysan and built in Kocaeli throughout the research are summarized in Table 1.

Table 1. Research findings of industrial buildings designed by Aydın Boysan in Kocaeli

	1.Kartonsan Cardboard Factory	**2. Turkish Cable Factory**	**3. Arçelik Washing Machine Factory**	**4. Nasaş Aluminum Sheet and Foil Factory**
1. Date	1963	1967	1967	1969
2. Original function	Cardboard production plant	Cable production plant	Washing machine production plant	Aluminum sheet and foil production plant
3. Total enclosed area	21,500 m^2	13,800 m^2	50,000 m^2	40,000 m^2
4. Structural system of production building	Reinforced concrete system and steel roof	Reinforced concrete system and steel roof	Reinforced concrete system and steel roof	Steel frame construction system (castella beams and steel columns)
5. Structural system of other buildings	Reinforced concrete system	Reinforced concrete system	Reinforced concrete system	Reinforced concrete system
6. Architectural style / characteristics of geometry	Modernist / folded reinforced concrete slab	Brutalist / triangular folded reinforced concrete slab	Brutalist / triangular folded reinforced concrete slab	Brutalist / folded reinforced concrete slab

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7. Lighting system/ material	Horizontal band window/ glass	Pyramidal façade and linear roof skylights/ fiberglass	Pyramidal façade and linear roof skylights/ fiberglass	Pyramidal roof and façade skylights/ fiberglass
8. Façade materials	White plaster	Exposed concrete and red brick	Exposed concrete and red brick	Exposed concrete and red brick
9. Current status / function	Functional / coated cardboard production factory	Demolished	Functional / washing machine production factory	Functional / coil, sheet, foil and pre-painted aluminum production factory

The findings of this qualitative research not only provide important insights into the four industrial facilities and Aydın Boysan's architectural and structural approach but also reveal systematic relationships between the buildings. It is possible to see and interpret traces of the development of Boysan's professional practice in these buildings built in Kocaeli between 1960 and 1970. The common point in these buildings with different sizes of enclosed volumes for different industrial functions is that a large interior volume is covered with a light upper cover, as required by the industrial facility. For this purpose, a steel roof with a wide span was preferred in all buildings. In the main structure, a reinforced concrete system was used except for the Nasaş Aluminum plant. This preference may have been made because reinforced concrete is easier to apply and has a lower cost.

Built in 1963, the Kartonsan Cardboard Factory, the first facility in this research, differs from the other facilities in that the original façade material is white plaster. Considering the architectural features of the administrative facility, it can be said that Boysan designed using the modernist principles of the international architectural style in the early period, as he expressed in his interviews. Later, this approach was replaced by a more radical design approach in which the mass geometry became more radical and brutalist with a raw/industrial aesthetic. However, he also partially incorporated red brick on the façades, presumably to break the cold effect of concrete.

The prominent geometry characteristic in all the buildings is undoubtedly the use of modular folded reinforced concrete slabs. All buildings use folded reinforced concrete slabs in their production facilities, while some facilities (Arçelik Washing Machine Factory and Nasaş Aluminum Factory) also use this system in social facilities. While a more primitive version of this geometry can be seen in the Kartonsan Cardboard Factory, it is possible to observe that this geometry has evolved in the production process to create a more three-dimensional pyramidal effect, especially in Turkish Cable Factory and Arçelik Washing Machine Factory.

In this geometry, how light is admitted to the interior and the sculptural effect it creates on the façade have also been important. While

Kartonsan Cardboard Factory, the first facility examined, uses horizontal band windows made of glass material in line with modernist principles, the natural lighting system in Turkish Cable Factory has been replaced by linear fiberglass skylights on the pyramidal roof of the façade. The same natural lighting system was used in Arçelik Washing Machine Factory, but for Nasaş Aluminum Factory, three-dimensional pyramidal fiberglass skylights were preferred on the roof. Here, it can be said that Boysan aims to add sculptural geometry to the lighting and create an effective atmosphere in the interior. When we look at Boysan's design process, it is evident that he strives to use geometry in a more challenging way each time through the structure and capture an international industrial aesthetic.

CONCLUSION

In Kocaeli, one of the most important industrial cities of our time in Türkiye, it is known that the industrial development process accelerated between 1960 and 1980. This process created the city's unique characteristic of the built environment and industrial identity. Architects have undoubtedly played a major role in the formation of this characteristic of the city. In this context, analyzing the works of architects whose traces are found in the city is an important step towards understanding the architectural building technology and design approaches of this historical layer. Consequently, it is a professional responsibility to transfer these important buildings that have significant place in the urban memory to the future and make them visible. With this research, the limited architectural literature on industrial facilities built in the modern period in Kocaeli, known as an industrial city, has revealed that the subject is worthy of research.

The research on the analyzed facilities reveals Boysan's passion for geometry, albeit for a short period of his professional life, from the first industrial facility he designed in the city to his last. Emphasizing that he believed in international architecture under all circumstances, Boysan consistently designed industrial buildings for functional reasons with the dream of creating an "*industrial monument*" using different triangular elements and combinations. Believing that good architecture can be created with an aesthetic balance of material, construction and light, he succeeded in using concrete with a sculptural plastic effect. His passion for geometry in architecture, combined with an aesthetic construction, combined with the technology of the period and an international modernist style, enabled him to create innovative, timeless architectural works ahead of their time, many of which are still actively used today. Located in Kocaeli, a major earthquake zone, these buildings were not damaged in the 1999 earthquake (Boysan, 2007). This gives clues about the earthquake resistance of using structural geometry in this way and can guide future designs.

International standards and a "*flexible*" and "*modular*" design are other important factors that enable buildings to be transferred to the future.

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Except for Turkish Cable Factory, which was completely demolished, all other facilities have been expanded over time, but the original structures can still be used. These facilities, which can be described as pioneering in their sector for their period, differ from many industrial facilities produced in the same period with their aim to go beyond existing building technology in the country and push boundaries. When viewed chronologically, each building is an indication of Boysan's increasing specialization on industrial buildings in his professional practice. Boysan, who designed leading institutions of the city during the 1960-1980 period when Kocaeli's industrial identity was established, transferred his unique discourse on architecture to the city through these buildings.

NOTES

This article was published within the scope of Senem Müştak Sevindik's PhD thesis which was conducted under the supervision of Prof. Dr. Oya Şenyurt and completed in 2023 at Kocaeli University, Institute of Science and Technology, Department of Architecture, Doctorate Program in Architecture.

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Research Article

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Updating Risk Level on Housing Resettlements of Mount Merapi Using a Visual Chart Examination

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Abstract

Permanent housing resettlement (*Huntap*) on the slopes of Merapi from the 2010 great eruption supposedly has experienced development progress. Undergoing adjustments due to environmental circumstances, hazard knowledge, and people's understanding are inevitable and affect the safety performance of the shelter against volcanic hazards. Many dwellings are still in the most dangerous area, while the hazards will strike again sooner or later. This research intends to update Merapi *Huntap's* safety risks to mitigate volcanic disasters. We assessed the safety of 15 settlements and focused on calculating five selected *Huntaps* for their spatial and formal configuration to the dwellers' awareness. Detailed observation by a proposed visual chart method based on the hazard and degree of vulnerability discovered from hazard-prone zones (KRB). Resilience factors to safety, including access for evacuation, the dwelling, and community consciousness of disaster, discovered the disaster risk level. We found that disaster risk in Merapi's resettlement is still high; thus, the people and stakeholders need to pay more attention to the need for precautions. Mitigation should address the potential safety threats related to (1) Hazard-prone levels, (2) Spatial confusion for up-to-date disaster zones, (3) less consideration of evacuation barracks and routes, and (4) people's lower understanding and awareness. Through this research, we also discovered the proposed simple and easy-use method suitable for classifying the risks. The research was limited to Mount Merapi's resettlement housing after the 2010 eruption by examining five *Huntaps* with higher hazard susceptibilities. This study contributes to reevaluating the risk-hazard-resilience by practical measures for driving higher disaster awareness in the future. The proposed method proved its appropriateness in testing the risks and has the prospect of being used in further applications in more massive cases.

Keywords:
Housing safety, Huntap Merapi, Disaster mitigation, Visual chart, Volcanic hazards.

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INTRODUCTION

Mount Merapi is one of Indonesia's most active volcanoes, periodically causing volcanic hazards and often resulting in disaster in Yogyakarta. Its volcanic activity lasts about 2-7 years, and a major eruption is likely to occur every 100 years, with deadly pyroclastic flows up to 15 km (PVMBG, 2014). This volcano was also suspected of causing many disasters, including the fall of the great Javanese Kingdom Mataram in 1006 (Kusumayudha et al., 2019). The fatalities were caused mainly by clouds of super-heated gases (*wedhus gembel*) at 200-300 °C with a speed of 200 – 300 km/h. The deadliest eruption occurred in 1672, with a death toll 3,000 (Dove, 2008). From 26 October to 5 November 2010, Mount Merapi erupted eight times with a high intensity of the Volcanic Explosion Index (VEI) ≥ 4 (Bawole, 2015). The eruptions spread a disaster within a radius of 20 km, causing loss of life, property damage, and changing the mountain landscape. The pyroclastic flows downed towards the Southeastern sector, mainly via the Gendol River, reached up to 17 km away, the Southwestern area on the Krasak Rivers via Bebeng 11.5 km and Bedog 8.5 km, and other rivers less than 8 km (ESDM, 2010). The eruption was the largest in this century after previously recorded in 1822, 1872, 1930-1931, and 1961 (Muktaf et al., 2018). The 2010 disaster claimed the lives of 367 people, displaced no less than 400,000 residents, and 3,931 families lost their homes (Mei et al., 2016; Sukhwani et al., 2021). Although most displaced people returned to their homes after the event, the losses from the eruption of Merapi 2010 were about Rp. 2.14 Trillion or USD 142,7 Million (BNPB, 2011).

The government previously provided resettlement programs by moving the people from dangerous areas, yet mostly failed. Though supported by a world-class scientific service, monitoring, and dissemination, Merapi's problems were still in the intake (Mei et al., 2013). In most cases, people refuse house relocation (Dove, 2008; Griffin & Barney, 2021; Juniansah et al., 2018; Mei et al., 2013). The transmigration of 1905 villagers followed the 1961 eruption, resetting the affected villagers of Turgo in 1978 failed, and relocation of the slope villages in 1994 was unsuccessful likewise. Due to the 2010 eruption, the government completed housing replacement or *Huntap* in 2014. The *Huntaps, mainly* spread over 15 sites in Yogyakarta, have been built, with each family getting about 100 m2 of land and 36 m2 of houses in the lower and safer sites (*see Figure 1*). The permanent housing costs Rp 30 million up to Rp 50 million per family for the house and residential facilities (Bawole, 2015). A community engagement project scheme adopted from REKOMPAK (Community-based settlement for rehabilitation and reconstruction) has built 2,750 shelters as in the 2006 Yogyakarta earthquake (Sukhwani et al., 2021). This project has succeeded in resetting thousands of residents to relatively safer settlements.

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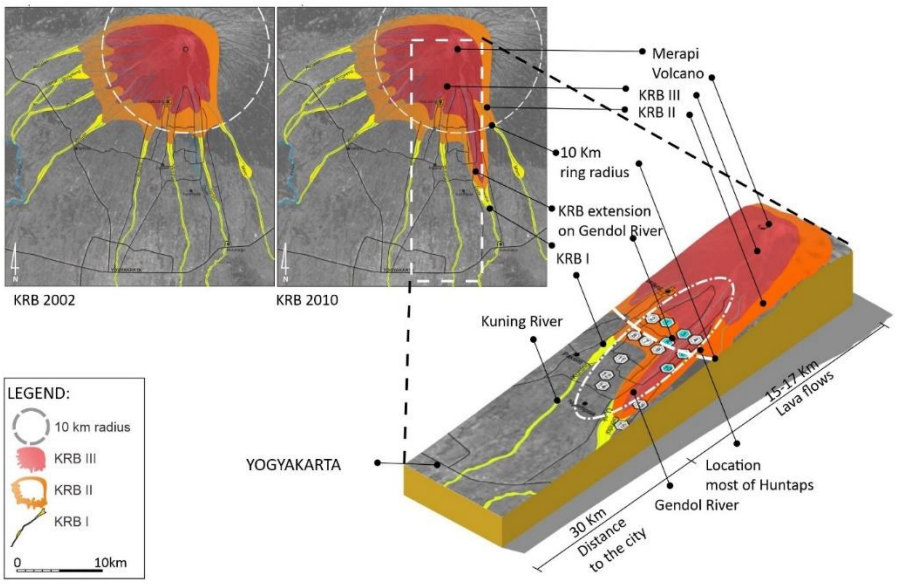

Figure 1. Merapi Hazard-prone extension and impact on the *Huntaps* vulnerability levels.

Nevertheless, the Merapi hazard-prone area or *Kawasan Rawan Bencana* (KRB) has shifted since the unprecedented 2010 great eruption, corresponding to the disaster risk and vulnerability levels. The extended pyroclastic flows have defined more expansive hazard-prone areas and increased the danger status of the Gendol River line 15-17 km down (Geological Agency, 2018; BPBD-DIY, nd; ESDM, 2010; Sayudi et al., 2010). KRB Merapi divides three level zones, from higher to lower threats, namely KRB III, II, I, and an unsafe area inside a radius 10 km from the peak with the potential attack by 2-6 cm flame-rock bombardiers and heavy ash rain (ESDM, 2010; Sayudi et al., 2010). KRB III, or high-hazard zone, is the most dangerous area, which mostly encounters pyroclastic flows in the form of super-heated clouds, ballistic debris, falling ash, and toxic gas. KRB II, or intermediate-hazard zone, is the area surrounding as an extension of KRB III with similar risks in more enormous eruptions. KRB I, or low-hazard zone, is sideways along the main rivers, possibly filled by flooding lahars mainly by cold materials. Dwelling should stand away from the KRB III. Changing the zone status increases disaster exposure and will seriously impact safety.

Huntap Merapi spreads mainly in the Sleman Regency on the southern slope of Merapi, starting from the highest point adjacent to the vent, sideways to the lava flows, or resting in the lower area. All the resettlement locations are close to existing villages nearby, which have proven to be less affected by the 2010 eruption. However, the extension of the KRB puts many dwellings in various zones at KRB III and II, likely increasing the risk of disaster (*see Figure 2*).

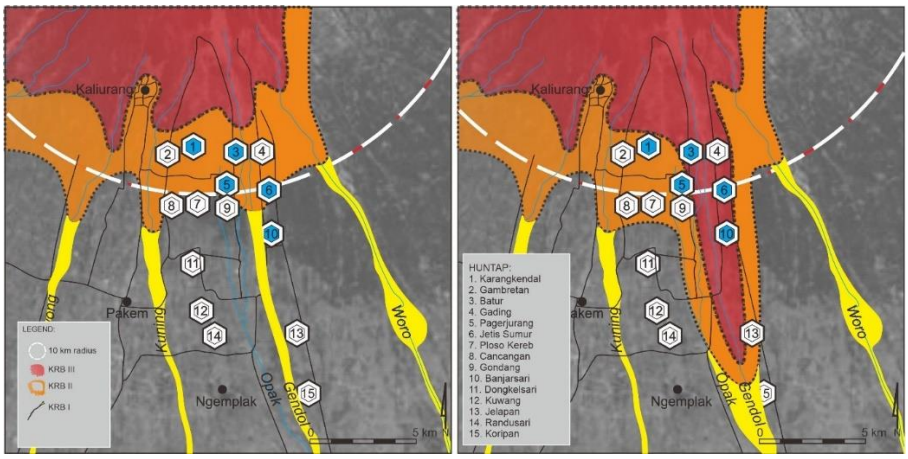

Figure 2. The change in Merapi's hazard-prone zone related to *Huntaps* before and after the 2010 eruption. The blue points indicate the five study locations from 15 resettlements.

The government released the map immediately after the eruption, dated 2010, but its dissemination needed to be better than the residential redevelopment process. Many areas previously considered safer zones are now found in a red zone or KRB III. Five of them, Karang Kendal, Gambretan, Batur, Gading, and Pagerjurang, are still inside the 10 km peak radius. Batur and Gading, together with Jetis Sumur, Banjarsari, and Jelapan, are now also in KRB III primarily because of the path of the main pyroclastic flows along the upstream of the Gendol River (*see Table 1*). Other *Huntaps* are still in relatively safe areas, although the Lahar floods swept down to 25 km away - 500 meters wide, such as in the Putih River, which destructed 22 dams (Hadmoko et al., 2018). The total number of resettlement households was 1709, with more than 7000 inhabitants making up the vulnerable population. The side is the most dangerous area, up to 20-25 km from the summit, threatening more than 400.000 people (Global Volcanism Program, 2011).

The *Huntap* aims not only to provide physical post-disaster resettlement but also to comprehensively mitigate the disaster with the people. Previously, the evacuation of the people was also not easy because of many complicated local factors (Maharani et al., 2016; Mei et al., 2013; Muir et al., 2020). Furthermore, the government still tolerates low-density settlements in the disaster zone, including KRB III, which may result in confusion and complications in the future (Fathurrohmah & Kurniati, 2017). Housing resettlement has been reconstructed to new locations relatively far from the peak. However, it does not mean being free from danger. Some research confirms that most people near Merapi eruption-prone need to be aware of the risk (Donovan, 2010; Dove, 2008; Kusumayudha et al., 2019; Lavigne et al., 2008). People commonly do not consider Merapi eruptions significant threats (Lavigne et al., 2008; Sopha et al., 2018). Potential hazard neglect is also common in other places in the rest of the world. People mostly do not perceive that they are under safety threat and are reluctant to evacuate when hazards are about to strike (Bird et al., 2009; Cashman & Cronin, 2008; Haynes et al., 2007; Sopha et al., 2018).

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Table 1. List of Huntap Merapi in the Sleman Regency area.

No	*Huntap*	Number of households	Area (m2)	Distance to the peak (km)	Distance to the main river (km)	Danger zone (KRB)
1.	**Karang Kendal**	81	13,365	8.0	1.8	II
2.	Gambretan	21	1,890	8.2	2.6	II
3.	**Batur**	204	33,660	8.3	0.6	III
4.	Gading	62	11,282	8.5	0.5	III
5.	**Pagerjurang**	301	49,665	9.5	1.4	II
6.	**Jetis Sumur**	81	12,559	10.2	0.6	III
7.	Ploso Kereb	84	17,922	10.5	1.6	II
8.	Cancangan	92	*8,280*	10.5	2.7	II
9.	Gondang	125	20,972	10.7	0.7	II
10.	**Banjarsari**	178	28,000	11.7	0.6	III
11.	Dongkelsari	147	24,690	12.0	2.2	-
12.	Kuwang	138	23,250	14.7	1.9	-
13.	Jelapan	48	4,320	14.8	0.1	II
14.	Randusari	109	16,387	15.0	2.0	-
15	Koripan	38	5,900	17.5	0.6	I

Settlements' progress is always related to the changes in its citizens' physical and social circumstances, which will affect the level of safety. Unfortunately, the government released the up-to-date hazards-prone mapping while *Huntap* development was in the process without appropriate dissemination. Although the government has promoted international scientific research devoted to Merapi for decades, it was very least involving local knowledge (Dove, 2008). Even in many hazardous events, traditional and local knowledge has saved countless lives (Griffin & Barney, 2021). Thus, safety continuing examination is critical in establishing Mount Merapi shelter progress related to distancing the volcano, avoiding the eruption path, handling evacuation safely, and ensuring the facilities. The people themselves are also vital. This research examines the up-to-date Merapi's disaster risk level in an integrated but simple way of the settlement's evaluation considering the zoning, spatial arrangement, evacuation facilities, housing qualities, and people awareness.

STATE OF THE ARTS

Scholars have discussed Mount Merapi's physical and social issues. Many focused on social aspects, such as how the Javanese deal with volcanic hazards (Donovan, 2010; Dove, 2008; Griffin & Barney, 2021; Lavigne et al., 2008). While on environmental aspects, some studies engaged on physical condition, spatial configuration, and hazard possibilities (Astari et al., 2022; Fathurrohmah & Kurniati, 2017; Muktaf et al., 2018; Pratama et al., 2014; Sari, 2019). In housing subjects, research focuses on the resettlement and its post-occupancy issues (Bawole, 2015; Maly et al., 2015; Mei et al., 2016; Prawitasari et al., 2019). A deeper study on evacuation safety at the Merapi's 2010 eruption has been well explained (Mei et al., 2013). Disaster risk reduction in the aftermath of volcanic eruptions in Merapi was also studied, but financial aid was focused on it (Muir et al., 2020). However, research on safety related to the hazard risk level has been rare since the settlement progressed. This study focuses on Merapi's risk level regarding resettlement for disaster mitigation. It also fills the gap by updating the recent risk evaluation with

a proposed visual chart method for ease of examination and user convenience.

RESEARCH METHOD

The research investigates disaster risk levels on the most exposed *Huntap*s in different areas of Mount Merapi by proposing a simple yet unique graphic examination method. The authors initially evaluate the 15 dwelling complexes based on their position according to the new Merapi's disaster-prone zones KRB. KRB is the sole tool to define the risk levels, which is too general yet only based on physical aspects, despite its revision after the 2010 explosion. We intensify five resettlements by considering their capacity to cope with the hazards, or resiliencies, on physical and social aspects. Evacuation facility and accessibility, the houses and environment, the people's understanding, and safety awareness are the four most considered resilience factors. Three settlements, namely Karang Kendal, Batur, and Pagerjurang, represent the closest *Huntaps* to the volcano under the ring of a 10 km radius. At the same time, Jetis Sumur and Banjarsari characterize the dwelling adjacent to the pyroclastic flows zone in the Gendol River (*Figure 3*).

Face-to-face interviews of 59 targeted occupants from the five locations, with 10 to 12 respondents each, confirmed environmental and social aspects and fit to interpret the social resilience levels. The head of neighborhoods (*Dukuh*/RT/RW), the head of families, and their members are interviewed personally to catch their genuine views. Understanding KRB, how and where to evacuate, how to self-protection, and whether they have the initiative to deal with the disaster are the basic questions to confirm their resilience.

Figure 3. The situation of the dwelling of five *Huntaps* for the sample of the research.

The risk level calculates the hazards and their correlation with the resilience capacity, which follows the formula (1).

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$$\textbf{Risk} = \frac{\textbf{Hazard x Vulnerability}}{\textbf{Resilience}} \quad (1)$$

The level of disaster risk thus follows the chart developed from a linear function of minimum to maximum hazard versus minimum to maximum resilience. A unique chart visualizes the risk level (*Figure 4*). The visualization simplifies the complicated and underlying factors, which will be easier to comprehend and the most effective tool (Li & Qin, 2020; Singh et al., 2023). A scale of 0 – 4 represents the hazard and the resilience magnitude. The upper right-hand side direction of the diagonal line is the function of the balance of the risks, the so-called risk limit or risk cut-off. The higher the hazard level, the more resilience is needed to deal with the risks. The line, which always has value 1, divides the risks into two side zones: disastrous and manageable. On the other side, the opposite diagonal is directing risk extremities from the highest on the upper left to the least on the lower right-hand side. Divided triangles represent the area of risk levels. The chart also shows that remedial effort should bring the object from the upper to the lower AND OR from the left to the right-hand section. It means that bringing the disastrous dwelling to a safer state reduces the hazard-prone AND OR increases the level of resiliencies. The risk classification follows:

Safety areas < 1 < Risky areas, *thus*: (2)
Lowest risk < 0.5 < 1 < 1.5 < 2.5 < Highest risk, *thus*: (3)
INSIGNIFICANT < LOW < MODERATE < SERIOUS < SEVERE (4)

The safety and risky areas are divided by accepted level or risk cut-off with value 1 (2). Further, the risky area divides three zones by values 1.5 and 2.5. Conversely, the safety area split into two by 0.5 value (3). The risks thus come to five levels (4).

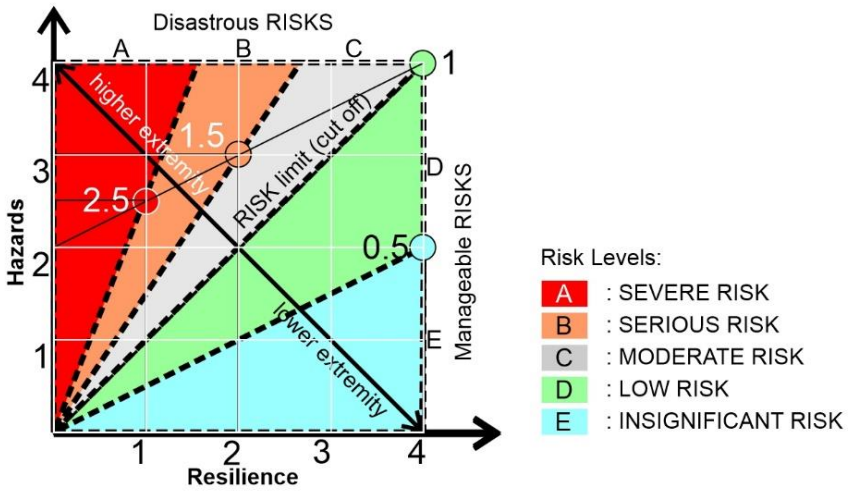

Figure 4. Hazard Risk-Vulnerability Zones Chart.

The result examination of an object will occupy either a disastrous area on the upper left-hand side or a manageable sector on the lower

right-hand side. The position on the chart identifies a level correlated with the five risk magnitudes: SEVERE, SERIOUS, MODERATE, LOW, and INSIGNIFICANT. The first three, in the disastrous area, are further defined as correlations with the safety factors resulting from the accepted level 1, which is from 4/4 to the medium of hazard level 2. As a result, the severe risk starts at 2.5, linked with the lowest resilience 1, while the serious risk starts at 1.5, linked with mid-resilience 2. On the other hand, for the last two manageable risks, the insignificant risk below 0.5 from the middle hazard of 2 correlated with the highest resilience 4. The risk level assessment categorizes potential disaster risks and their possible significance to settlement conditions as follows (*Table 2*):

Table 2. Risk levels and their meanings.

Risk levels	Values	Meanings in risks
SEVERE RISK	> 2,5	**Far beyond the limit** (cut-off) The dwellings have too high hazard level but with very low resilience
SERIOUS RISK	≥ 1.5 – 2.5	**Upper the limit** The dwellings have higher hazard level with low resilience or too high hazard level but with very high capacity to coupe
MODERATE RISK	> 1 – 1.5	**Slightly upper the limit** The dwellings have intermediate hazard level with very high resilience or lower hazard level with higher capacity to coupe
LOW RISK	≥ 0,5 – 1	**Below the limit** The dwellings have intermediate hazard level with high capacity in resilience or low hazard with high capacity to coupe
INSIGNIFICANT RISK	< 0.5	**Far below the limit** The dwellings have no significant hazard level but still have capacity in resilience

Grading applies to scaling the degree of potential risks. A specific form is also developed based on most aspects of the vulnerability: hazards exposure and resilience levels of the Huntap. Hazard is danger proximity; consider the hazard-prone zones (KRB) by how close the location is to the source: the volcano and the main river Gendol (*see Table 3*). Resiliencies include both physical and social factors. Physical resilience links the aspects of the evacuation capacities, including the distance and approaching process, to the permanent barracks for evacuation, the access road, and the building itself. The condition of the structure, renovation, and replacement rate the level of physical quality (*Table 4*). Reducing disaster risk also increases people's ability to respond and recover from hazards (Cashman & Cronin, 2008). People's knowledge and awareness determine social resilience (*Table 5*). Each object's value alternates with the applicable options based on their magnitudes.

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Table 3. Hazard levels of Merapi taken from the hazard-prone KRB.

Hazards zones	Hazards exposure	Max Value (=4)	Object Value
KRB III	The most dangerous area which mostly encounter pyroclastic flows in form of super-heated cloud, lava flow, flaring ballistic debris, and toxic gas	3	
KRB II	The area surrounding as an extension of KRB III with similar risks in bigger eruption	2	
KRB I	Sideways along the main rivers whichispossibilityfilled by flooding lahars and probably hit by hot-cloud extension	1	
KRB -	Safe area outside KRB	0	
10 Km radius ring	The area near the crater which is most probably ruined by ballistic debris in >2-6 cm diameter and heavy ash rain	KRB+1	
			0

Table 4. Physical resilience aspects.

Physical Aspects	Physical Aspects	Physical Aspects	Max Value (=2)	Object Value
Evacuation safety	Access	In range and safe (3-7 km)	0.5	
		In range with potential hindrance	0.25	
		Out range	0.1	
	Barracks	Outside KRB	0.5	
		KRB II	0.25	
		KRB III	0	
Housing safety	Housing environment	Evacuation facilities exist	0.5	
		Evacuation facilities limited	0.25	
		No facilities	0.1	
	House	Strenghtened	0.5	
		Original	0.25	
		Decreasing quality	0.1	
				0

Table 5. Social resilience aspects.

Social Aspects		Level of procentage of the population:	Max Value (=2)	Object Value
Knowledge & Awareness	KRB zones	Understanding their location	0.5	
	Evacuation	Know how location and access	0.5	
	Housing/house	Know how the protection	0.5	
	Safety precautions	Self-initiative for safety	0.5	
				0

RESULTS AND DISCUSSION

Merapi's volcanic disaster depends on the risk vulnerability determined by the degree of susceptibility and resilience of the community and environment on the *Huntap*s. Merapi eruption, which triggers hazard threats, puts the community at risk. However, the risk levels will decide whether a hazard becomes a disaster (Smith, 2013). The five *Huntaps* risk levels are generally beyond the "safe line" or cut-off diagonal. We can see on the hazard risk-vulnerability zones chart application that none of these five samples is in a safe zone (*Figure 5*). According to the chart, the highest to the lowest risk from the five *Huntaps* are **Batur, Jetis Sumur, Karangkendal, Banjarsari**, and **Pagerjurang**. This result comes to light, and we can see elaborately in the following chart for each settlement (*Figure 6*).

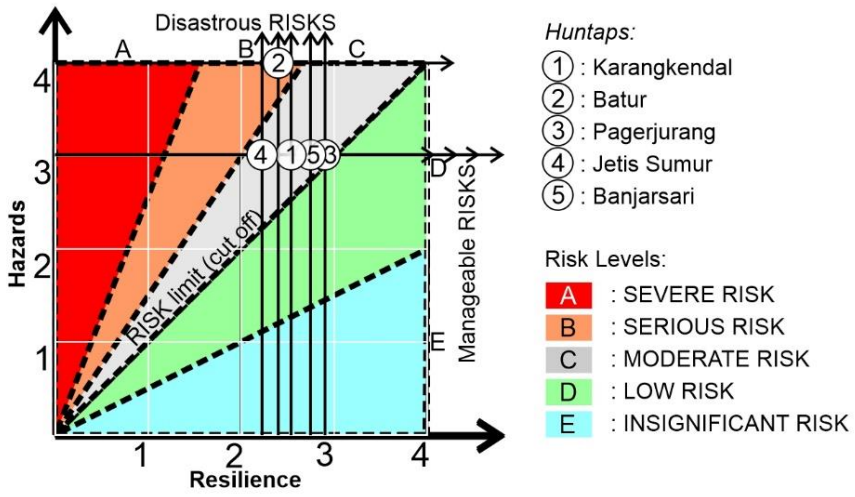

Figure 5. The application of the Hazard Risk-Vulnerability Zones Chart for the five *Huntaps*.

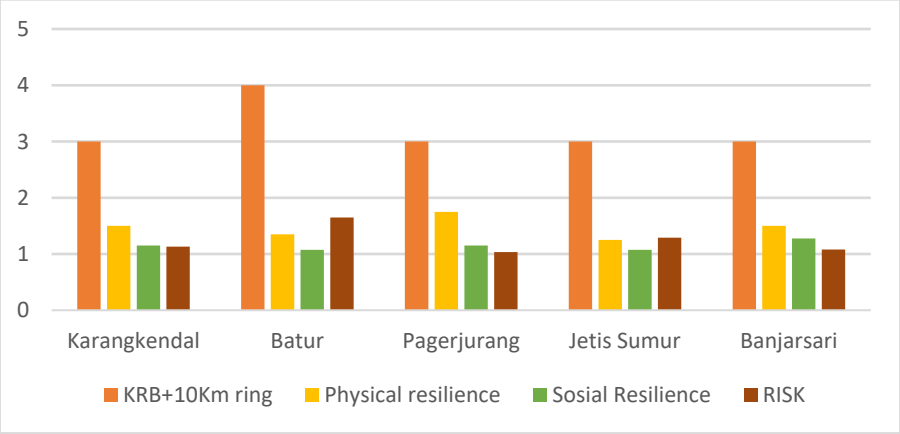

Figure 6. Risk levels between the five *Huntaps* with their components.

Hazard Exposures

According to the regulation, KRB III does not reserve for any settlement. This restriction is also relevant inside a 10 km radius of the peak. However, there is a significant difference in application between KRB mapping zones and their markings in the field. In most cases, the hazard zone map and its development are treated loosely by the authorities and not followed by the people even understood (Haynes et al., 2007). Though KRB III and the 10 km ring area differ, people mostly assume they are identical. Even the ring for them is smaller, only a radius of about 8 km where restriction signs stand in the field. The advanced sloping site near the 8 km radius misleads the signages. As a result, there are still many settlements within KRB III and the 10 km radius areas. This distorted KRB zone is even more apparent with the extended 2010 version. Recently, to confirm the actual position related to Merapi disaster-prone, it has become even more practical to use recent information technology such as Google Maps via http://bit.ly/CekPosisiMerapi. Nevertheless, most people need to utilize it.

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The dwelling sites are among the main rivers for the eruption flows: the Gendol, the Opak, and the Kuning rivers. Most *Huntaps* are still in the dangerous zones caused by their KRB status, under a radius of 10 km from the ring or too close to the lava flowline on the Gendol River 15 – 17 km south. Of the 15 dwellings, five residential locations are still in the zone of flaming rock falls and heavy ash rain at a radius of 10 km from the summit, namely **Karangkendal, Gambretan, Batur, Gading,** and **Pagerjurang**. Six dwellings are very near the riverbanks of the Gendol, including **Batur** and **Gading, with Jetis Sumur, Gondang**, and **Jelapan**. Furthermore, four *Huntaps* are in KRB III**: Batur, Gading, Jetis Sumur,** and **Banjarsari**; seven in KRB II**: Karangkendal, Gambretan, Pagerjurang, Ploso Kereb, Cancangan, Gondang,** and **Jelapan**; and one in KRB I: **Koripan**. Only three are outside the dangerous area**: Dongkelsari, Kuwang, and Randusari** (*Figure 7*).

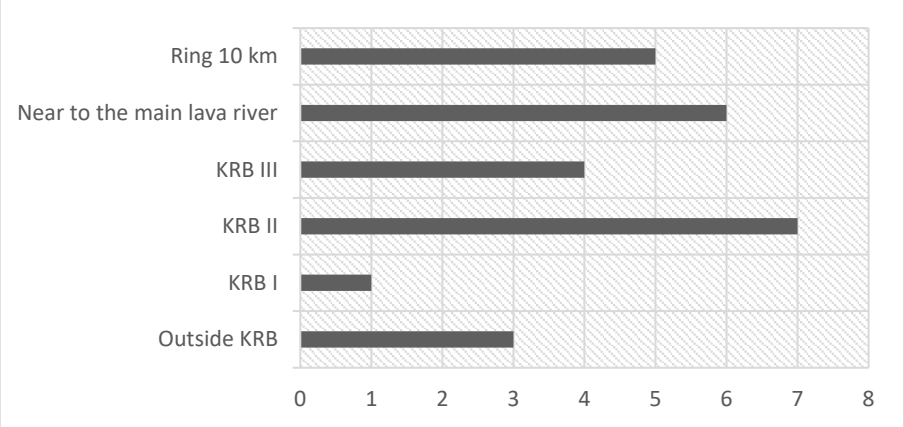

Figure 7. Number of *Huntap* exposure to the hazard.

By focusing on the five *Huntaps,* the chart locates Batur as the most exposed to the hazard. Its location inside KRB III and under the radius 10 km ring makes it the most dangerous site compared to the others. Jetis Sumur and Banjarsari are also in KRB III but slightly less exposed since the location is outside the ring. However, Jetis Sumur's risk is higher and almost touching the next level as Batur. By contrast, Karang Kendal and Pagerjurang are both in KRB II but still inside the ring. Pagerjurang is the least exposed to risk since environmental and social resilience are relatively high. This finding provides the recent levels of hazard vulnerability for the five *Huntaps,* which were rarely available.

Evacuation Route Safety

Accessibility is one of the main aspects of the rescue process, where distance and access are essential. Each *Huntap* has a definite evacuation barracks (TPA). The distance of the evacuation points provided is relatively diverse. Most accesses to evacuation points range between 3-7 km and are still in good condition, though generally, they are narrow in size, 3-4 meters. 76 % of the refugees used trucks and motorbikes for self-evacuation (Mei et al., 2013). Thus, the time needed to evacuate also varies. There is also a potential hindrance to be considered, such as

crossing a river or moving along the road near a river potentially affected by flowing lava. From the five dwellings examination, the evacuation safety can be explained below (*Table 6*).

Table 6. Occupancy and location distribution of evacuation barracks and their distance.

No	Residential	Evacuation Barracks	Distance (km)	Time foot/motorbike/car (minute)	Potential hindrance
1	Karangkendal	Brayut, Wukirsari	5.5	49/9/10	exposed road
2	Batur	Kuwang, Randusari	8.0	90/13/14	cut off road
3	Pagerjurang	Kiyaran, Wukirsari	4.9	57/11/12	n/a
4	Jetis Sumur	Gayam, Argomulyo	3.6	37/7/7	exposed road
5	Banjarsari	Koripan, Sindumartani	5.6	61/10/10	exposed road

Batur, which has barracks in Brayut, Wukirsari, also has a high potential obstruction. The evacuation road is longer than the others, and the safety level is potentially lower when crossing the bridge on the Opak River. The three other refugee lines for Karangkendal, Jetis Sumur, and Banjarsari face the lava flow from the river near the road to the barracks. Only Pagerjurang has relatively lower interference.

Housing Safety

A house within its complex is the first line of protection against disasters at unexpected events, though evacuation is a primary procedure for safety under volcanic hazards. Housing facilities related to the evacuation process, such as a meeting point and signage, are very substantial and should be specific for each case (Bektaş & Sakarya, 2020). The quality of the house for hazard defense is also needed to protect people inside. Merapi resettlement housing has a standard of brick walls with concrete frames and terracotta roof tiles completed by public facilities. The structure quality, in general, is better than that of the previous houses. The people beforehand built houses with various materials ranging from wood to concrete frames, and the quality varied. *Huntaps* have been built almost uniformly in every residential location, although there are slightly different applications.

Materials' use greatly determines the level of building safety against volcanic disasters. Concrete frames and brick walls are generally relatively resistant to volcanic earthquakes and ash rain. However, terracotta tiles are still vulnerable to disasters in locations that are reachable by throwing stones because they break easily. Regarding thermal comfort, terracotta roof tiles are very efficient in creating air comfort because they are suitable for the climate and cheap, but they cannot withstand the onslaught of hail. Sheet metal roofing, in this case, is much better for that purpose, though less comfortable. A reinforced concrete roof is ideal for increasing safety, even though it is more expensive. The abundant availability of sand is beneficial for this purpose. The use of glass windows can also reduce building safety. Volcanic tremors will occur continuously, and the glass material will easily shatter.

Some changes also occurred in Merapi housing according to the needs of its residents. Due to economic growth, people increase their housing

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lifestyle, from replacing the finishing layer to adding rooms and terraces. The abundance of sand is also one of the driving forces behind the renovation of residential units. Many minor additions are made by beautifying the facade or terrace of the house. Renovated houses are generally built with good quality materials, although the impact on building structure may vary. Batur has experienced the least changes, while Jetis Sumur houses have experienced the most transformations. Renovation generally does not affect the strength and ability of the house to protect the occupants inside.

People's Understanding and Awareness for Safety

People's understanding and awareness of disasters also greatly influence building safety. Knowing actions before and after the eruption is essential for mitigating the Merapi Volcanic disaster. Furthermore, knowledge parallels awareness to avoid risks (Wulandari et al., 2023). Apart from the several deficiencies in *Huntaps*, most residents feel that their dwellings are safe. They believe this because they moved from their previous house, which was damaged by the eruption, and moved further down from the peak. Replacement housing provided by the government and donors has fulfilled their sense of security (Muir et al., 2020). Fortunately, a similar event has not happened again since the 2010 eruption. So, in the past 13 years, they have felt safe living in their new settlement. The community also considers that using a better reinforced concrete structure can protect them from eruptions. They said it was easier to deal with an eruption event as a group, including when they should immediately evacuate family members and their belongings.

Public understanding and safety awareness should rely on government information as the most trusted source. Their obedience to evacuation must increase since many neglected the warning, causing hundreds of fatalities in 2010 (Mei et al., 2013). On the other hand, the government has also issued various regulations and renewed hazard-prone areas for KRB mapping. The progress of the regulation and the indefinite field implementation have caused misleading information. Their understanding of hazard-prone zoning is high, but their awareness of the hazards' risks needs to be more profound. This negligence includes the fact that the new settlement is mostly considered safe and will protect them. They mostly needed to follow the evacuation order of the authorities. Though the massive monitoring and emergency plans supported them, the people eventually neglected the official warnings and declined evacuation (Donovan, 2010). They also have a system based on domesticating the threat and see it as a routine catalyst for natural productivity (Dove, 2008). The community has proven to need more awareness related to safety. Providing a regular understanding of volcanic disasters and how to deal with them is very necessary.

SAMPLE APPLICATIONS

Case 1: Karang Kendal

Karang Kendal is a replacement housing still very close to the peak of Merapi, with a radius of only 8 km. Though this residence is the closest to the peak, it stands in KRB II. The site is located relatively far from Gendol River at 1.77 km but only about 600 meters from the Opak River and may become a future threat. For this reason, their hazard prone is in the middle but added with the risk of materials falls graded 3 out of 4. The Karangkendal residence has a refugee facility in Brayut Barracks in the village of Wukirsari, about 5.5 km. The dwellers can reach it easily in 49 minutes on foot or 9-10 minutes by motorcycle or car. However, the facility is very close to the Kuning River, about 170 meters. This facility's vulnerability is relatively high because the river often flows eruption materials from Merapi. Karangkendal refugees do not have to cross a large river to evacuate. There is a less significant issue related to the dwelling, but because the location of the barrack and its track are very close to the river, it could trigger a disaster. Thus, its physical resilience is down to 1.5 out of 2. In the social aspect, the people's understanding of the KRB zone tends to be low, but their knowledge of evacuation is high. However, their self-initiative to have safe precautions could be much higher. For this reason, their level of social resilience is lower by 1.15 out of 2. The total risk level is in MODERATE RISK by 1.13 beyond the acceptable risk line of 1 (*see Figure 5*).

Case 2: Batur

Batur housing site is very close to the source of the disaster, within a radius of 8.28 km from the summit and only 0.56 km from the main lava flows of the Gendol River. The site is also in KRB III, the most dangerous zone, though further from nearby settlements. In addition, Batur is also very near, about 0.35 km to the Opak River headwaters, one of Merapi's principal rivers. This position makes Batur *Huntap* the most vulnerable to Merapi volcanic disasters, graded by 4 out of 4. For resilience, Batur has a permanent evacuation in Kuwang Barracks located in the village of Randusari, about 8 km. People must take about 90 minutes to walk or 13-14 minutes to ride a motorbike on an appropriate-condition pavement road 3 to 4 meters wide. Kuwang Barracks has a significant distance, which is relatively safer because it is far below, but the drawback is its long distance. However, to access it, the resident must cross the Opak River, which can suffer an obstruction if the lava damages the bridge. The access along the banks also has high potential obstacles. The situation and acceptable housing conditions put Batur on 1.5 out of 2 in physical resilience. As for social, the people also need a better understanding and awareness of safety, graded by 1.07 out of 2. The people depend on the government only and, at the very least, on initiative safety precautions. The Batur grade is 1.55 or in SERIOUS RISK for all these conditions, which is relatively far above the acceptable risk line (*see Figure 5*).

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Case 3: Pagerjurang

Located within a radius of 9.45 km from the summit, Pagerjurang is also in a dangerous zone. The residence is further from the headwaters of the Gendol River by 1.4 km to the West but still very close, about 200 meters to the Opak River. The site is also right below the open golf lawn. Pagerjurang is fortunately in KRB II, just outside the red zone; thus, the physical resilience is in 2 out of 4. One significant consideration is that this settlement also has the highest number of residents, about 301 households. The population's vulnerability to disaster is another aspect of their ability to evacuate. Fortunately, the residents have a definite and accessible evacuation shelter, Kiyaran Barracks in Wukirsari Village, 4.9 km away. Rescue access for the occupants is relatively safer, with roads 3 to 4 meters wide also in good condition. The people need about 57 minutes on foot or 11-12 minutes by motorcycle to reach the barracks. They do not have to cross a large river, so their access is relatively free of potential obstacles due to the threat of lava flows in the river. Pagerjurang dwelling is also mostly of acceptable quality, making this Huntap's resilience 1.75 out of 2. Like most of the Huntaps, however, the people have a relatively low understanding and awareness of the danger, having 1.15 points out of 2. For all these reasons, Pagerjurang occupies a MODERATE RISK level with a point of 1.03, just slightly over the acceptable risk line (*see back to Figure 5*). The dwelling has the lowest risk level, almost touching safe line 1.

Case 4: Jetis Sumur

Jetis Sumur is a residence far from the peak of Merapi and is outside the ejection zone, about 10.2 km. However, the location is very close to the headwaters of the Gendol River, about 600 meters. This location situates this residence in KRB III and is graded 3 out of 4. Jetis Sumur also has an evacuation point of the Gayam Barracks in Argomulyo Village to the east of the headwaters of the Gendol River. This barracks is 3.6 km away and can be reached from Jetis Sumur for 37 minutes on foot or 7 minutes by motorcycle. Unfortunately, the safety risk for evacuation is relatively high since the barrack is in KRB II, though the barracks are on the downslopes. The barracks and their access are close to the Gendol River, about 500 meters, making safety potentially highly threatened. Altogether, with the dwelling quality, which is still acceptable, the physical resilience of Jetis Sumur drops to 1.25 out of 2. Another consideration aspect is that this complex is on the east side of the Gendol River. Thus, if there is a significant eruption, there will be a potential accessibility cut-off from the Yogyakarta Province area. However, the people's understanding and awareness need to increase by a grade of 1.07 out of 2. Many people understand their dwelling in KRB III and know where the evacuation point is. Nevertheless, their self-initiative for safety could be much higher. Jetis Sumur's risk is at a MODERATE RISK, but with

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1.29 points almost touching the higher risk area, this dwelling is the second highest risk after Batur (*see Figure 5*).

Case 5: Banjarsari

Banjarsari's residence is just down south of Jetis Sumur, approximately 600 meters from the Gendol River and far from the top, about 12 km. Like Jetis Sumur, Banjarsari is also in KRB Zone III because of its proximity to the main lava flow. Its hazard level is graded similarly by 3 out of 4. *Huntap* Banjarsari is also on the east side of the Gendol River, with the same risks as Jetis Sumur. Banjarsari residence has an evacuation Koripan barracks site about 5,6 Km away, reach by walking for about 60 minutes or by motorcycle for 10 minutes. The shelter is in the form of a permanent functional barracks dedicated building like other *Huntap*s. Reaching this refugee camp is undoubtedly easy. However, the barracks and access are also exposed to the Gendol River, resulting in a higher hazard risk. The potential disruption of the rescue may rise in extreme conditions. Combined with the dwelling, which is relatively acceptable in good condition, the physical resilience is 1.5 out of 2. Unfortunately, though the level of people understanding KRB is also high, their awareness of safety precautions is shallow. The people feel very safe and tend to neglect the threat of hazards. Their social safety resilience is down to 1.27 out of 2. All these facts put Banjarsari also in a MODERATE RISK by 1.08 points, slightly exceeding the acceptable risk line (*see also Figure 5*).

RISK LEVEL VALIDATION TEST

To confirm the result from the proposed method, we apply an alternative examination for the four resiliencies of the five *Huntaps.* A different approach utilizes a risk due to the accumulative threats from the hazard level of KRB and the 10 km radius, incorporating potential risks from the barracks, the accessibility, the dwelling, the knowledge, and the awareness. Three levels of quality, which are high, medium, and low, mark the values. The result is quite similar: Batur is the highest, Pagerjurang is the lowest, Jetis Sumur and Karangkendal are at the upper level, and Banjarsari is at the lower level of the risk rank. However, we cannot easily decide the accepted level from this verification method since the accumulative calculation has no correlation function (*Figure 8*).

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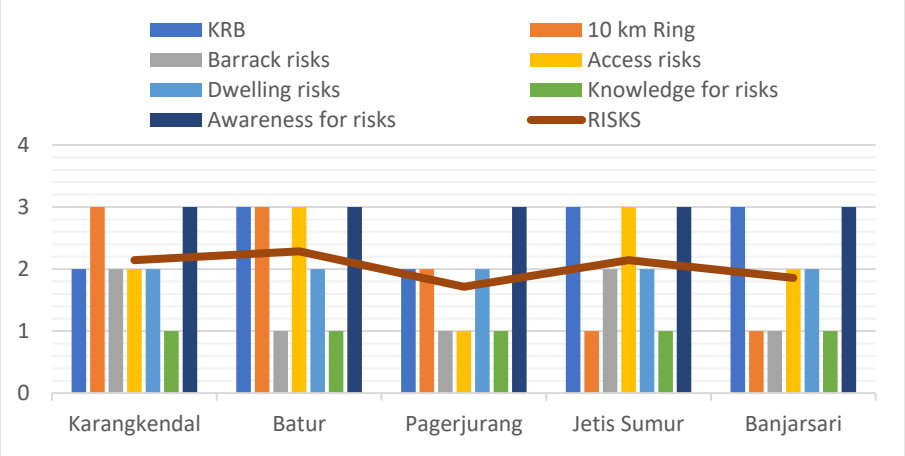

Figure 8. The confirmation chart of the risk level of five *Huntaps*.

CONCLUSION

Huntap Merapi, constructed after the 2010 eruption, is scattered in several areas on the slopes, which vary in safety. Generally, the housing complexes are in better condition and relatively improved in safety compared to the previous settlement in the higher danger zone. Unfortunately, because of the need for immediate shelter, the location determination did not consider the latest hazard-prone zone progress. We discovered that many dwellings are even in dangerous areas, such as KRB III-II, and inside the 10 km ring. Some *Huntaps* are too near the Gendol River, including some of their evacuation barracks and their accesses. Five dwelling samples in this study represent substantial conditions related to safety, starting from too near the peak to the downslope area. From the analysis done by the proposed method, their risk levels are higher beyond the safe line as the minimum level resulted from the degree of balance of hazard and resilience.

Most hazard levels are high because of their higher KRB zone, which directly faces the source of the hazard. Four out of 15 dwellings are in the highest hazard-prone, making the people most vulnerable to disaster. The vulnerability of the people is even higher since this study did not consider the existing villages nearby, which are in a similar zone and have more significant population numbers. Likewise, resilience capabilities were low because physical facilities, including the refugee barrack, were found to have risky access. Even though their building quality is decent, their locations are still in danger. Although the people's understanding is acceptable, their awareness must be higher. Since they feel safer and more comfortable, the awareness of the risks must be more profound. People also need to increase their initiatives to take precautions from potential hazards. Together with the social conditions, five *Huntaps* found themselves at higher risks.

The conditions of the *Huntaps* as replacement settlements, including their evacuation preparedness, are still in good condition, complete with various facilities. Most houses have experienced minor changes without influencing their function and structural integrity. The addition of the front and rear terraces and the completion of the facade finishing are done mainly by residents, along with enhancing the social need for

identity. The authority should develop guidance for house renovation for safety.

The method has successfully proved its practical use in calculating risk levels. Visual charts locate the object in a specific zone related to the risk levels. The accepted level, which results from the balance between threats and resilience, strongly defines whether they are at risk or in safe status. The extremity caused by the hazards or resilience defines the further evaluation needed in safety. This technique also proves that the physical facilities and the community's understanding and awareness are vital to the hazard risk associated with disaster vulnerability.

The government rarely updates the risks, especially when the hazard tends to be less than ever, although a volcanic eruption like Merapi just in time. The risk evaluation is needed not only when the mountain has just erupted. This study found reasonable results by providing a simple way to assess the risk of Merapi's resettlements involving physical and social aspects. Since this study was only limited to specific samples, the application for further massive investigations is needed. Furthermore, we must pay more attention to more detailed aspects of improving safety and mitigating disaster vulnerability.

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Resume

Noor Cholis IDHAM is a professor in architecture and registered architect from Indonesian Architect Board. Prof. Idham has expertise in building safety related to natural disasters, Islamic architecture, and Indonesian architecture. He is the author of several books and papers on architecture and is involved in many architectural design projects in Indonesia.

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Discussing the Development in the Real Estate Sector in the Framework of University-City Interaction

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Abstract

Universities exert a considerable influence on urban economies through the direct and indirect consumption they generate within the city. The former is attributable to the expenditure of students and staff, while the latter is a consequence of the demands they create for accommodation, transport, trade, and services. One of the most fundamental areas where these effects can be monitored is the housing and accommodation shaped by the demands of students and staff. Following the establishment of Kırklareli University in 2007, a notable increase in human mobility has been observed in the city center of Kırklareli, accompanied by significant changes in the spatial order. The principal objective of this study is to examine the housing-based spatial transformation and tendency in the city center of Kırklareli in terms of the defined periods following the establishment of the university. In this context, housing sale data and its distribution were analyzed in a spatial/structural dimension using the "Land Registry Transaction Statistics" and "Parcel Query-Analysis-Independent Section Sales Density Distribution database," which were published by the Republic of Turkey Ministry of Environment, Urbanization and Climate Change-General Directorate of Land Registry and Cadaster. The increase and tendency were evaluated. A statistical query and correlation analysis were conducted on the data, with a particular focus on establishing a comparison between the change in population and the number of students, as well as academic and administrative staff. The resulting data were then subjected to a process of interpretation. In addition, current master plans were evaluated, and suggestions were developed for the factors that should be considered in urban planning. The study revealed that, regardless of the current population development, student-oriented dynamics directly affect the real estate sector in terms of housing sales, mobility, and spatial transformation due to the growth of the urban population and the increase in demand.

Keywords:
University-city interaction, Urban planning, Real estate sector, Housing, Kırklareli.

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INTRODUCTION

Universities are institutions that undertake education, research missions, and they have significant effects and contributions to the development of the cities where they are established and to the mobilization of economic sectors (Felsenstein, 1996). It is believed that universities will have a significant positive effect on the income levels of the regions where they are established and on the employment data in the region. Accordingly, the establishment of universities in relatively less-developed regions of developing countries represents a significant opportunity for boosting economic growth (Phelps, 1998). The possible effects of universities on the regions where they are established are evaluated under the following four main headings (Florax, 1987):

- Economic: increase in regional income, mobilization of the economy and the labor force structure in the region,
- Physical infrastructure: boost in the development of housing, health, transportation infrastructure,
- Socio-cultural infrastructure: increase in cultural diversity, increase in social and cultural activities, improvement in the quality of life, and
- Demographic: increase in educational attainment, decrease in education-related migration.

It is stated that higher education has an impact on the consumption preferences of individuals. As the level of education increases, new cultural and artistic consumption preferences are added. Education, which has a significant role in social development, appears as an effective factor in the distribution of social tasks according to ability and capacity and in increasing productivity (Özaslan, 1998). In addition, universities contribute to the economic development of cities by providing employment opportunities, bringing knowledge, production, and labor to the region, increasing purchasing and technology connections, providing tax opportunities, and creating brand value (Munnich & Nelson, 2003).

For the purposes of this study, Kırklareli city center and Kırklareli University, which made significant spatial, demographic, and economic impact on the medium-sized city since it was established in 2007, were selected as the sample area. (Gündoğdu & Özkök, 2017) is one of the reference sources on this subject, and it served as a guide to identify the changes in spatial layout and typology. As an extended evaluation, the sectoral, social, and spatial reflections of the university-city interaction were summarized as follows (Figure 1):

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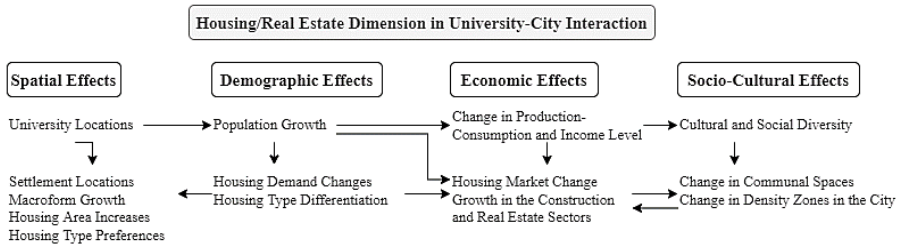

Figure 1. Impacts on University-City interaction
(Reproduced from Gündoğdu & Özkök, 2017, p. 85)

When the direct effects of the establishment of a university are evaluated, it becomes evident that these effects manifest in a multitude of interrelated and multifaceted dimensions, including social, economic, and cultural spheres. It is possible to observe the contributions to the city in the interaction process that starts with the spatial location of the university through a comparative evaluation of the current situation and the developing infrastructure. Figure 1 demonstrates that the "real estate" intersection in the university-city interaction has a wide impact. More precisely, the "real estate" issue in university-city interaction leads to repercussions such as the creation of new housing areas because of increased urban demands, changes in structural/spatial typologies, and increased mobility of sectors such as services and trade with the effect of location. When the change in real estate prices related to housing sales in Kırklareli city center (between 2015 and 2023[1]) are analyzed, unlike the former continuous increase trend, 2017, 2021 and today can be identified as individual breakdown segments (Figure 2). There are studies that show the spatial dependence of these price values (also in the Tekirdağ-Edirne-Kırklareli sub-region including the study area), which are shaped according to the supply-demand relationship (Türkyılmaz, 2023). Analyzing the spatial effects of these breakdowns in values is important in terms of addressing planning, design and urban management issues and analyzing spatial change & transformation processes. In addition, making a thematic inquiry in this context and examining the interrelationships in the study area where post-university change was referred to in previous sentences, constituted the starting point of this study.

[1] The earliest data available on the reviewed sites starts in 2015. The real estate prices presented in Figure 2 calculated as the average of the values obtained from three different online real estate sales platforms (Hepsi Emlak, Zingat, Sahibinden) and one real estate analysis platform (Endeksa) for April each year.

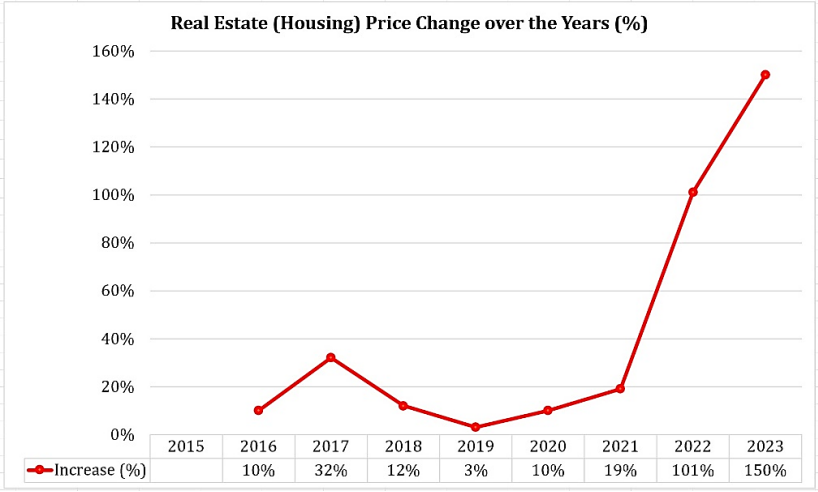

Figure 2. Change in Real Estate (Housing) Prices between 2015 and 2023 (compiled and calculated by authors)

In this context, the research questions addressed in the study are as follows:

1. Are there breaking points in the post-university development in Kırklareli city center? Do these effects have a spatial dimension?
2. Can the effects of the housing and real estate sector be observed in the process of spatial transformation and reproduction?
3. Did the changing and increasing demands in the city create different growth directions? Did the university create an attractive effect in this respect?

Based on the research questions, the main aim of the study is to examine the spatial transformation and orientations in the city center of Kırklareli in the post-university period -specific to the periods that were identified- in terms of housing. In this context, housing sale data and its distribution were analyzed in spatial/structural dimension, and upward trends were evaluated. Statistical inquiries and interpretations were made by comparing these data with population values as well as the changes in the number of students, and academic & administrative staff under the influence of the university. In addition, current master plans were evaluated, and suggestions were developed pertaining to the factors that need to be addressed in planning. The general flow chart of the study is as follows (Figure 3):

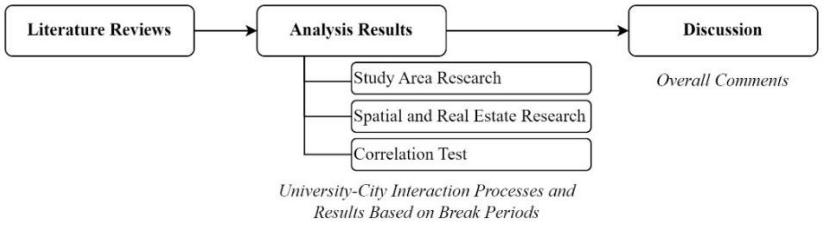

Figure 3. Flowchart of the study

LITERATURE REVIEWS

"The destinies of cities and their universities are inseparable, one cannot develop without the other"(Volker, 1971, p. 6)

One of the first studies on the role of universities within the urban tissue and the spatial/economic/social/cultural transformation effects they create can be seen in (Nash, 1973). Prior to the nineteenth century, universities were isolated and independent from interaction with their surrounding urban settlements. However, following the nineteenth century, particularly in the United States, universities began to be perceived not only as scientific institutions but also as a significant contributor to the reputation and the appeal of the cities in which they were located (Brockliss, 2000, pp. 159–162). This situation led to the establishment of a relationship between university administration and local governments in proportion to the level of urban development, regardless of the location of the university (Bender, 1988; Goddard, 1994). (Nash, 1973, pp. 3-5, 20-25) highlighted the sociological

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dimension of university-city interaction. He stated that universities should play a role that should produce solutions to sociological and cultural problems in cities and provide communication & interaction between groups that experience conflict in the city. However, when the general views during this period are analyzed, it is seen that the impact of universities on urban macroform and development processes is ignored, and universities are considered as institutions independent of urban relationship networks.

The research conducted by (Van Der Wusten, 1998, pp. 4–10) is one of the first sources to include a spatial dimension to the process between universities and urban development. One of his main arguments in this regard is that universities dominate spatial, economic, and social development in the city. The influx of academics, administrative staff, and students from universities to the city inevitably results in an increase in consumption demands, particularly in areas such as the housing market, retail trade, and the service sector. This, in turn, affects the supply of resources within the city. In addition, universities can support the development of different activities in the city with the knowledge they produce or trigger different sectors to relocate to the city[2]. Politically, universities are important urban actors that influence both strategic planning and spatial planning. Therefore, universities play an influential role in urban form and spatial development processes, and the location preferences of land use types change with the attraction effect created by their location. Access to universities is particularly important in urban transportation and public transportation planning. In addition, the housing and accommodation preferences of these "newcomers" with different socio-economic and cultural profiles may lead to different residential areas and/or preferences in the city. Therefore, universities have the potential to rebuild and reshape the macroform with their "urban developer" structure (Ogur, 1973). At this point, Van Der Wusten considers the definition of "urban developer" as a cumulative accumulation of indirect effects over time rather than the direct impact of universities. Furthermore, it is stated that the role of universities as sociological actors, which was discussed in the literature in the 1970s, diminished in the 1990s, and their spatial-economic effects came to the forefront (Rothblatt & Wittrock, 1993, pp. 1–4; Readings, 1997; Van Der Wusten, 1998, p. 8). Similarly, (Bender, 1988, pp. 18–20) states that the university-city relationship consists of indirect effects, and that the role of sociological guiding/unifying actor remains in the background due to the differences between urban culture and academic culture. After the mid-2000s, site selection for universities and related student flows have been used as the main trigger for boosting the urban economy, as well as increasing urban consumption and spatial change[3] (Fincher & Shaw, 2009; Baron & Kaplan, 2011, pp. 10–11; Kinton et al., 2018, p. 247). In this respect, universities are also considered as a trigger in the development of small cities (Berdahl, 2010).

[2] See also (Florax, 1992).

[3] (Cortes, 2014, p. 348) argues that university-community networks are a direct influencer of the housing market.

(Perry & Wiewel, 2005) examined the spatial-economic impacts of universities together with the real estate sector, which is a cross-sectional issue. Sources such as (VerMeulen, 1980; Beeson & Montgomery, 1990; Pick, 1993), prove to be the first studies that addressed "residential area development/location choice-real estate sector development-university impact" for the first time as a distinct perspective. In a detailed and extended study, (Perry & Wiewel, 2005, pp. 6–11) stated that universities have a prominent position in the changes that occur in the real estate sector in the spatial development process. They stated that the urban fabric has changed as a result of university-affected land use location, the provision of housing for students, the increase in parcel prices and the construction of urban projects in idle areas. In their study in Oakland, California (Deitrick & Soska, 2005) found that with the change in the socio-economic profile in the neighborhoods where campuses are located, the existing users had to relocate to other places due to increased demand, rent and land prices. The concept of "studentification"[4], which is translated as "studentization/student-based gentrification", is another issue addressed in the research on "university-city interaction and residential areas". In context, studentification refers to the fact that residential areas in a city are preferred by university students over time, and local users end up moving to another area. (Smith, 2005) was the first to identify this phenomenon in UK "university cities" (namely, Birmingham, Nottingham and Leeds) in terms of spatial effects such as the increase in housing supply, changes in land prices, and the dominance of student-oriented trade and service sectors over other economic activities. In addition, changes in rental prices affect the fluidity and location preferences of urban users over time (Aikman, 2014). Therefore, "university-urban planning-real estate sector" relations have been one of the issues that came to the forefront after 1990s and have been studied with quantitative analysis after 2000s (Perry & Wiewel, 2008). Similar results were found in studies conducted in Germany, Scotland, and Japan (Anacker & Altrock, 2008; Peel, 2008; Takeuchi, 2008).

[4] See also (Yılmaz, 2011; Tuncer & İslam, 2017).

(Cortes, 2014, pp. 348–351) acknowledged the impact of universities on the housing market but noted that measuring these effects is difficult and fuzzy. The reasons are as follows: (1) the university-city relationship has different effects at macro & micro scales and these effects are variable and difficult to measure, and (2) there are data limitations for different parameters that can be considered (for example, housing market indicators). These issues, which narrow the scope of the research, make it difficult to track the housing market effects at the university level. Cortes also suggested that interrogations can be made between quantitative data such as housing sales values, rental prices[5], land market values, etc. and data such as education level, number of students, ratio of the young population, etc. to identify the university effect.

[5] See also (Feng, 2019).

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When the development of higher education and universities in Türkiye is examined, it is seen that different approaches wew adopted in different periods. With the 1933 University Reform, universities, which were designed as a modern institution, have the roles of supporting and developing social reforms and increasing scientific production (Averbek & Yazar, 2018). When the 1960s are evaluated, the view that universities are institutions for training professional people is dominant (Velidedeoğlu, 1967; Başkan, 2001, p. 23). Although there were legislations between 1960 and 1973, a second break can be seen in 1973 with the Universities Law No. 1750. Similar to international literature, universities were considered as a sociological actor in the Development Plan-II for 1968-1972, and universities were considered as institutions that would ensure technological production in the Development Plan-III for 1973-1977 (Averbek & Yazar, 2018, p. 1350). After the 1980s, legislations continued, and in the Development Plan-VI for 1990-1994, it was suggested that universities should increase their capacity, foster university-industry relations, and develop special projects, special training programs, etc. (DPT, 1990, pp. 295–296). Therefore, the number of universities and students began to increase after the 1990s. The periods 1992 and 2000-2006 were other periods when the number of public universities was increased (Günay & Günay, 2017). After the 1990s, there was not a significant difference in the roles defined for universities; however, increasing the number of students was one of the priorities (Gültekin et al., 2008; Işık, 2008, pp. 127–130; Averbek & Yazar, 2018). With the legislations that followed, a university organization was established in each province in Türkiye after 2008. (Sargın, 2007, pp. 148–149) stated that when the location of the universities that were established after the 1980s were selected, medium-sized cities in Anatolia were at the forefront, except for the big cities. The reason behind this was to reduce the development gap between regions, to ensure economic development in cities, and to attract the young population to other cities. In this respect, it is possible to suggest that, after the 2000s, the outlook in Türkiye was similar to what was suggested in the international literature as the objectives and triggering roles of the location of universities. In Türkiye, academic studies on "university-city interaction" started in the late 1990s and increased after the 2010s (Kavili Arap, 2016; Savaş Yavuzçehre, 2016, p. 236). It is seen that the scope of the studies generally address social aspects, while quantitative studies on spatial changes are limited. Another conclusion that can be drawn is that students are the main actors in the development of the city economy, and the main effects are seen in real estate, services and food & beverage services in parallel with housing (Kavili Arap, 2016, p. 115; Kaya, 2014, p. 242). National studies on "residential area development-real estate sector development-university impact" can be summarized as follows:

- In a study conducted in 2005, it was found that in neighborhoods with university campuses in Istanbul, changes

were observed primarily in the retail trade sector over time, housing demand increased, and as a result, there were significant increases in values such as rent/land value (Çetin, 2005).

- In a study conducted in 2008, spatial consequences of the university as a local factor in the housing market in Çanakkale were analyzed. The study mentions a significant population increase following the establishment of Çanakkale Onsekiz Mart University in the central district, and states that this increase affected the development of the services sector, and the city grew by 1,550 hectares between 1993 and 2006 (Çalışkan & Sarış, 2008).
- It was asserted that the dynamism generated by universities in their respective cities had a favorable impact on the urbanization rate in Türkiye. Additionally, the housing sector began to expand concurrently with the establishment of 41 universities between 2006 and 2008. Furthermore, it was indicated that in 41 provinces, there was a 268 percent surge in the production of new housing units (Altıntaş, 2015).
- In another study conducted in 2018, it is stated that Dumlupınar University increased the housing need in Kütahya and caused the formation of new neighborhoods. It is also mentioned that new housing typologies that are smaller (usually 1+1 room) have become widespread (Toprak & Işık, 2018).

When the available studies are evaluated, economic effects (price change, growth of the real estate sector, etc.), spatial effects (formation of new residential and commercial areas, etc.) and social effects (change in user groups, etc.) can be observed in cities after a university is established. This outlook makes it important as a research and urban policy issue to consider the housing sector with a temporal evaluation as before and after the university effect. The spatial dimension has been discussed as an umbrella issue in the literature - in terms of its direct/indirect impact on other social and economic issues. In this study, the spatial effects of the housing issue have been addressed. In the national studies mentioned above -in parallel with the views of Cortes (2014)-, there are limitations in providing quantitative data in studies on university-real estate sector issues.

MATERIALS and METHOD

The methodology of the study is summarized below (Figure 4): first of all, (1) based on the conceptual framework defined in the literature, the break periods in the university-urban interaction in Kırklareli city center were identified. Afterwards, (2) spatial examinations were made and the effects on the real estate sector were identified. The primary data that was used to examine the housing-oriented spatial transformation in Kırklareli city center were obtained from the "Land Registry Transaction Statistics" and "Independent Section (Housing)

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Sales Density Distribution" sections published by the Ministry of Environment, Urbanization and Climate Change - General Directorate of Land Registry and Cadastre (TKGM) (TKGM, 2022a, 2022b). Then, (3) statistical inquiry and correlation analyses were used to evaluate the consistency levels of the relationships and evaluations between the data. Finally, (4) concluding comments were developed under several subheadings. The study aims to contribute to similar comprehensive studies in the future by identifying accessible and temporally interrogable components at the same scale. The limitations of the data sets used during the study period are summarized below:

- Statistics on housing sales in Türkiye are published by several institutions in different contexts, and this study compiles available data in a way that enables comparisons to be made.
- The data obtained is house sales values and there are no temporal statistics on rented dwellings. In addition, there is no data on sales to provide a socio-economic profile (age distribution of purchasers, housing purchase rate per capita, etc.). Therefore, assessments can only be made based on sales transaction values and locations.

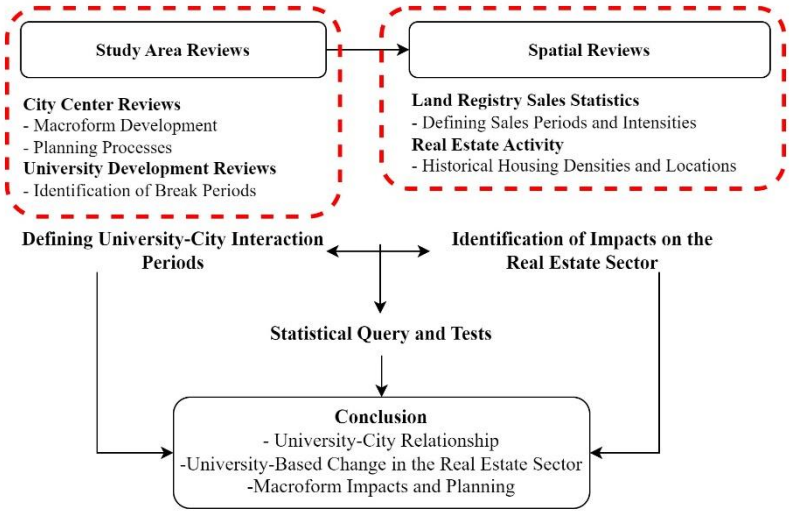

Figure 4. Graphical abstract of study method

FINDINGS

City Center-University Interaction Processes and Breaking Periods in the Study Area

When the historical development of Kırklareli city center is examined, unlike the neighboring provinces with intense urban dynamics such as Istanbul, Tekirdağ, Edirne, it has a rather narrow economic hinterland, has developed with its internal dynamics, and has had limited population growth (Table 1) (TÜİK, 2022a) (Figure 5). Industrialization in the Thrace region started in the 1970s and accelerated in the 1980s. However, Kırklareli province, especially the city center, has not been able to fully benefit from these industrialization trends due to its lack of direct access to main highways, relatively low level of local capital, and insufficient share of investment incentives. Kırklareli was able to receive limited investment in the service and manufacturing sectors (mostly in Lüleburgaz district, which is

connected to the main highways) and remained dependent on the agricultural economy (Aysu et al., 1984; MSGSÜ, 1991; Özkök, 2016).

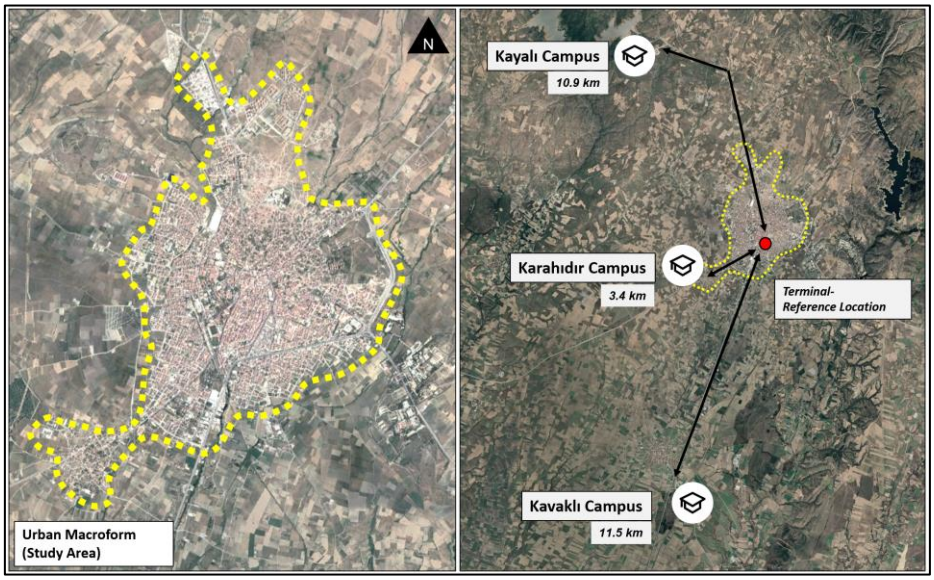

Figure 5. Location of study area

Table 1. Population development in and around Kırklareli province (TÜİK, 2022a)

Years	Province Level (Urban Population)						District Level (Urban Population)	
	Edirne	Increase	Tekirdağ	Incr.	Kırklareli	Incr.	Kırklareli -Merkez	Incr.
1990	210421	---	258940	---	149532	---	43017	---
2000	230908	10%	395377	53%	189202	27%	53221	24%
2007	259809	13%	494342	25%	212390	12%	59970	13%
2014	283845	9%	906732	83%	236502	11%	70161	17%
2021	308700	9%	1113400	23%	267908	13%	83248	19%
2022	313561	2%	1142451	3%	271471	1%	85493	3%

When the macroform development of the Kırklareli is analyzed, the effects of slow economy and population growth can be observed more clearly. After 1980, public facilities and highway investments have been effective in the development of the macroform. After 2006, the establishment of Kırklareli University has been one of the main factors that boosted development in Kırklareli. The urban core which developed with the city's internal dynamics and limited public investments between 1980-2006, has entered an exogenous shaping process in line with the population flows and retail trade, housing and service needs following the establishment of the university. The western, southern, and southwestern regions of the city have been transformed from agricultural areas to residential areas. In addition, different development axes were formed in the north of the city in 2007 with mass housing projects. Today, growth continues in the west and north of the city with a focus on housing and real estate (Özkök, 2016). When this growth process is compared with the planning process in the city, a different picture emerges. The current master plan of the city[6] is a 1/5000 scale master development plan approved in 1986, and a 1/1000 scale implementary development plan approved in 1991. Over the 31 years between 1991 and today, no other planning work was prepared. Urban needs and spatial demands due to the external factors mentioned

[6] In 2023, the new plans approved by Kırklareli Municipality (2022) were suspended by the court (MO, 2023).

[7] The term fragmental implementations refer to specific parcel-based decisions developed outside of the development plan decisions.

[8] The values presented in the cited source have been compiled with new sources and updated for the relevant period.

[9] Monthly parliamentary decisions obtained from the archive of Kırklareli Municipality between 2016-2021 were compiled by the authors.

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above have been tried to be met through fragmental implementations[7]. As a result, with the growth directions that emerged after 2006, the growth of the city went beyond the boundaries that were defined in the current zoning plan. The number and distribution of fragmentary applications between 1995-2021[8] (excluding the period between 2000-2010 due to lack of data) are presented (Table 2). (Gündoğdu & Altın, 2015, p. 321) found that the implementations affecting the urban form increased after 2010 and they were mostly concentrated in the northern parts of the city and the peripheral areas in the west. When the period 2016-2021[9] was evaluated, it was revealed that implementations that involved the transformation of different land uses into residential areas increased approximately five times compared to the previous five-year period, and their value in total increased three times. After 2020, when the COVID-19 pandemic started, -in parallel with the global economic slowdown- the demand for housing and construction-oriented implementations decreased, and in 2021, it was 13% of the total (24 units).

Table 2. Number and types of fragmental imp. in Kırklareli city center by year (see footnote 9)

Fragmental Implementation Types	1995-2000	2010-2015	2016-2021
Effects of Macroform *(For housing and raise development decision (plan decision))*	28	32	165
Total	301	145	249
Percentage (%)	**9.3**	**22.1**	**66.3**
Reference	(Gündoğdu & Altın, 2015, p. 321)		Kırklareli Municipality Archive
Information for the period 2016-2021 (total number of fragmental imp. /imp. for housing): 2016:69/48, 2017:84/74, 2018:43/27, 2019:20/9, 2020:9/4, 2021:24/3			

It is evident that the process of university development is accompanied by changes. Kırklareli University was established on 29.05.2007. As mentioned in the previous section, the influx of students and as well as academic & administrative staff began after 2007. The presence of three campuses close to the city center *(**Kayalı Campus** (Central Campus) (approx. 10.5 km from the city center), **Karahıdır Campus** (Vocational School of Technical Sciences) (approx. 3.4 km from the city center), **Kavaklı Campus** (Vocational School of Health Services and Social Sciences) (approx. 11.5 km from the city center))* (see Figure 5) (KLÜ, 2022a) and the concentration of students in these campuses have increased this effect. The university development process and the increase in the number of students (Figure 6, Table 3) are similar to the macroform development periods. In 2011, the construction of new buildings on the Kayalı campus and the relocation of some departments to this campus affected the flows in the north direction and increased the number of students. The main increase occurred after 2014 when new departments and faculties were opened. The number of students increased by +2409 compared to the previous year and then increased

to approximately +3400. After 2017, the number of students started to decrease (a limited increase was observed in 2022) (KLÜ, 2022b; YÖK, 2024). Differently, the main increases in academic staff occurred between 2009 and 2014, and in administrative staff between 2009 and 2011.

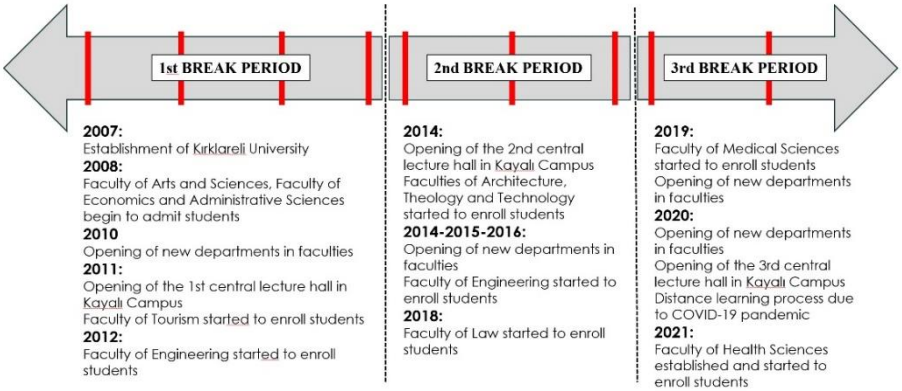

Figure 6. Timeline for the development process of Kırklareli University (compiled by the authors)[10]

[10] This figure includes only undergraduate programs in Kırklareli city center.

Table 3. Annual change in the number of students and staff at Kırklareli University (KLÜ, 2022b; YÖK, 2023)

Years	Student			Academic Staff			Administrative Staff		
	Total	Diff.	Incr. (%)	Total	Diff.	Incr. (%)	Total	Diff.	Incr. (%)
2007	6152	.	.	87	.	.	.	.	.
2008	6796	644	10%	94	7	8%	45	.	.
2009	8912	2116	31%	234	140	149%	120	75	167%
2010	10358	1446	16%	376	142	61%	157	37	31%
2011	12774	2416	23%	441	65	17%	212	55	35%
2012	15518	2744	21%	497	56	13%	238	26	12%
2013	16878	1360	9%	537	40	8%	266	28	12%
2014	19287	2409	14%	616	79	15%	268	2	1%
2015	22671	3384	18%	653	37	6%	284	16	6%
2016	25825	3154	14%	680	27	4%	279	-5	-2%
2017	26664	839	3%	703	23	3%	287	8	3%
2018	27665	1001	4%	722	19	3%	288	1	0%
2019	23793	-3872	-14%	762	40	6%	296	8	3%
2020	24078	285	1%	822	60	8%	300	4	1%
2021	22978	-1100	-5%	838	16	2%	297	-3	-1%
2022	23712	734	3%	863	25	3%	273	-24	-8%

The vision the establish "a university in each province", which was a political, social, and economic decision in Türkiye after 2006, aimed to create economic sectoral mobility in the city (Parlak & Kaynar, 2005). In addition to the production of knowledge and culture, it is reported that universities, which are considered important with their "income-generation" potential especially in small- and medium-sized cities, will indirectly shape the economy primarily in trade, accommodation, and transportation (Çatalbaş, 2007, p. 95; Doğan, 2013, pp. 109–110; Kavili Arap, 2016, p. 109). When the shares of the main sectors in the Gross Domestic Product in Kırklareli between 2007-2021 after the university was established are analyzed (Table 4) (TÜİK, 2023), it is evident that the share of "information and communication, wholesale and retail

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trade, transportation, accommodation, other services" decreased, while the share of "social services, construction/real estate, mining, manufacturing industry" increased[11]. The fact that the construction sector is one of the few sectors that increased in value in the last four years presents a similar structure to the university-real estate relationship presented in the literature. As an outcome of these analyses, three periods with distinct characteristics were defined for the city center. In the following section, the changes in the real estate sector, housing sales statistics and spatial agglomerations are evaluated for three periods.

[11] Similarly, (Öztürk et al., 2013) found that universities established in Anatolia have a limited impact on the socio-economic structure of cities. The impact is specific to expenditures related to the consumption tendencies of staff and students.

Table 4. Value of sectors in GDP in Kırklareli province (%) (2007-2021) (TÜİK, 2023)

Sectors /Years	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Diff.
1	26.9	26	25.4	24.7	26.2	24.3	26.9	29.7	30.1	30.2	31.8	32.8	31.1	30.4	34.4	**7.5**
2	33.4	33.6	32.8	33.7	35.2	32.6	32.2	33.8	33.6	33	35.3	37.7	36.2	34.9	39.9	**6.5**
3	4.6	4.5	3.5	3.4	3.9	4.1	4.9	5.3	6.1	6.3	7.1	7.5	7.7	6.9	7.2	**2.6**
4	8.5	8.5	9.4	9.6	9.5	9.7	9.9	9.8	9.4	9.8	9.4	9.7	10.7	11	9.7	**1.2**
5	1.6	1.7	1.8	1.7	1.8	1.9	2	2	2	2.4	2.2	1.9	2	2	1.9	**0.3**
6	1.2	1.3	1.8	1.5	1.4	1.5	1.5	1.4	1.6	1.7	1.8	1.5	1.4	1.7	1.2	**0**
7	0.8	0.9	0.8	0.8	0.9	0.8	0.9	0.9	0.8	0.8	0.7	0.8	0.8	0.7	0.6	**-0.2**
8	0.7	0.5	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	**-0.4**
9	6.6	6.6	9.3	9	8.4	8.1	8	7.5	7	7	6.5	5.8	5.6	5.3	4.2	**-2.4**
10	12.6	13.3	11.9	13.4	13.3	14.2	13.5	13.5	12.1	11.2	10.8	10.2	11	11.2	9.6	**-3**
11	18.6	18.3	17.4	14.7	13.4	15	14.6	14	15.4	15.7	14.6	14.2	14.4	14.9	14.8	**-3.8**

Sectoral Codes	
1	Manufacturing Industry
2	Mining and Other Industries
3	**Construction**
4	**Public Administration and Social Service Activities**
5	**Professional, Scientific, Technical, Administrative and Support Service Activities**
6	Finance and Insurance Activities
7	Other Services
8	Information and Communication
9	Real Estate Activities
10	Agriculture, Forestry and Fisheries
11	Wholesale and Retail Trade, Transportation and Warehousing, Accommodation and Food Service Activities

In accordance with the analytical findings, the following break periods and their characteristics were identified:

1st Break Period (2007-2013)

- Limited population growth (average 2% between 2007 and 2014),
- Macroform development is externally driven, towards the west and the north, with two triggering developments: (1) the establishment of the university, (2) the creation of additional development areas in the north,
- Increase in the number of fragmental implementations that affect the urban form (22% between 2010-2015),
- Increase in the number of students (average 19% between 2007 and 2014),
- Increase in the share of the real estate sector after 2009 (construction sector is stable),

2nd Break Period (2014-2018)

- Limited increase in population growth (average 3% between 2014-2018),
- While the macroform continued to grow towards the west and the north in 2014, limited macroform expansion and parcel-based changes are observed after 2014,
- Significant increase in the number of (housing-oriented) fragmental implementations that affected the urban form (76% between 2015-2018),
- Decrease in the number of students (average -12% between 2014-2018),
- Increase in the share of the construction sector between 2014-2018 (decrease in the real estate sector),

3rd Break Period (2019-...)

- Limited population growth (average 2% between 2019 and today),
- Macroform development is limited and parcel-based, for increasing story heights,
- Decrease in the number of fragmental implementations that affect the urban form (30% between 2019-2021),
- Decrease in the number of students (average -4% between 2019-2022),
- Developments that affect the national and urban economy: COVID-19 pandemic,
- Decline in the share of the construction and real estate sectors.

Spatial and Quantitative Analysis of the Real Estate Sector

In order to statistically analyze the development of the real estate sector in Kırklareli city center, Land Registry Transaction Statistics from (TKGM, 2022b), District-Based Housing Sales Statistics from (TÜİK, 2022b) and Housing Sales Statistics around the city center from (TKGM, 2022a) were compiled (Table 6). Given the limitations in the data, comments on the 1st Period can only be made in a general manner. Between 2010 and 2013, housing sales in and around the city center gradually increased over time, and in 2013, housing-related transactions (at the district scale) accounted for approximately 38% of sales transactions, with 44% of these sales concentrated in and around the city center. The 2nd Break Period (between 2014-2018) is the period during which a limited increase in the number of students is observed and fragmental implementations that will affect the urban form and growth in the macroform began. Accordingly, as seen in Table 6, housing sales gradually increased. Between 2014 and 2016, housing sales around the city center accounted for over 50% of the total. After 2017, there was a decline in the number of students and a similar decline in housing sales rates. Unlike the 3rd Break Period, only in 2022, housing sales were concentrated especially in the city center.

Accordingly, while there was a 33% increase in the population between 2007-2021, there was a 190% increase in the number of housing sales in the city center between 2010-2022, a 285% increase in the number of students and a 91% increase in academic staff between 2007-2022.

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Therefore, it is apparent that the change in the real estate sector in the city is driven by external dynamics following the establishment of the university, rather than internal population dynamics. When the distribution of housing sales in the city is analyzed, similar findings can be reached about macroform development. It is possible to say that the city form was shaped with the effect of housing areas and additional user demands. Due to data limitations in the source (TKGM, 2022a), the query could only be started after 2010, and maps were analyzed according to the periods that were identified.

Table 5. District and city center level detailed real estate statistics (compiled by the authors)

Break Periods	Years	District Level			City Center Level	
		Land Registry (Sales)	Housing Sales	Percent (%)	Housing Sales	Percent (%)
1st Period	2007-2009	*No data*	*No data*	---	*No data*	---
	2010	*No data*	*No data*	---	571	---
	2011	*No data*	*No data*	---	656	---
	2012	*No data*	*No data*	---	807	---
	2013	5884	2223	37.8	966	43.5
2nd Period	2014	4538	2276	50.2	1183	52
	2015	5271	2419	45.9	1462	60.4
	2016	6419	3231	50.3	1761	54.5
	2017	7299	3921	53.7	1601	40.8
	2018	6810	4291	63	1868	43.5
3rd Period	2019	5597	3027	54.1	1584	52.3
	2020	6236	3544	56.8	1448	40.9
	2021	7260	3307	45.6	1509	45.6
	2022	8323	3306	39.7	1661	50.2
References		(TKGM, 2022b)	(TÜİK, 2022b)		(TKGM, 2022a)	

1st Break Period (2010-2013):

Between 2010 and 2013, house sales in the city center increased by +395 (69%). An analysis of the zones by density reveals that in 2010, the highest density was partially located in the main core (İstasyon neighborhood, followed by Karacaibrahim neighborhood) (Figure 7). In 2012, this density moved towards the western periphery of the city in areas with relatively low land prices, (see also Gündoğdu & Altın, 2015, p. 328). In addition, the emergence of housing estates in the northern part of the city in 2012 led to the prominence of these areas in sales. (Gündoğdu & Altın, 2015, p. 322)'s map that shows the locations of fragmental implementations between 2010 and 2015 (see Fig. 7 in the related study) proved to be consistent with the housing sales density zones. In this respect, it is possible to say that the plan amendments made during the 1st Break Period were aimed at increasing and regulating the housing supply and guiding the macroform development.

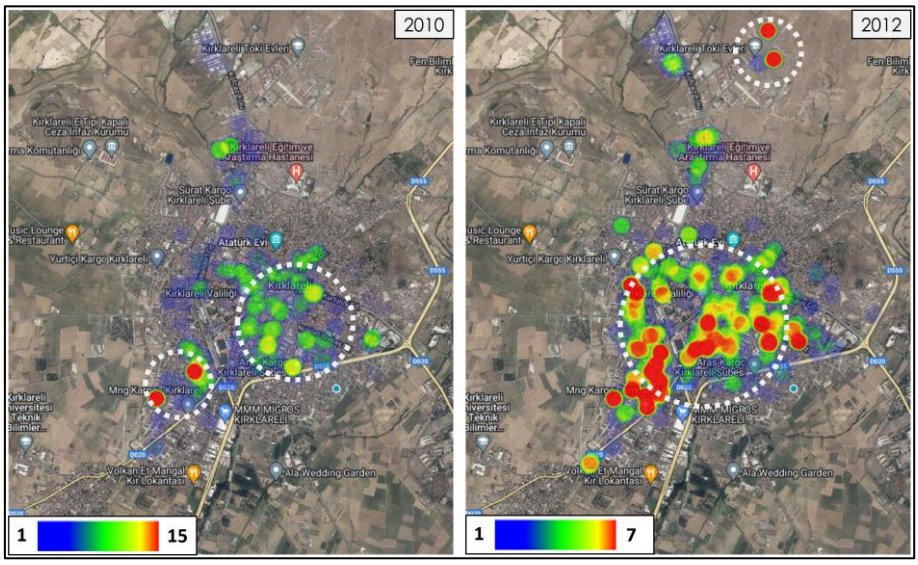

Figure 7. Cluster analysis of housing sales in Kırklareli city center in the 1st break period (Compiled from (TKGM, 2022a))

2nd Break Period (2014-2018):

Between 2014 and 2018, house sales in the city center increased by +685 (58%) and were almost double the value of the previous period. During this period, the main concentration was in the mass housing areas in the western peripheries (the peripheries of İstasyon and Karakaş neighborhoods) and in the north (around Cumhuriyet and Atatürk neighborhoods) (Figure 8). After 2014, the northern part of the city has become a prominent area in urban preferences, especially due to its relative proximity to the Kayalı Campus, and the fragmental implementations that were made in this period were concentrated, especially in this neighborhood. In their studies (Gündoğdu et al., 2019) found that urban dwellers prefer housing that it is "close to the city center and places of work". The residences in this area have become to offer a different typology than those in the city center (higher building heights, larger floor areas, etc.) (Özkök, 2016; Gündoğdu et al., 2019).

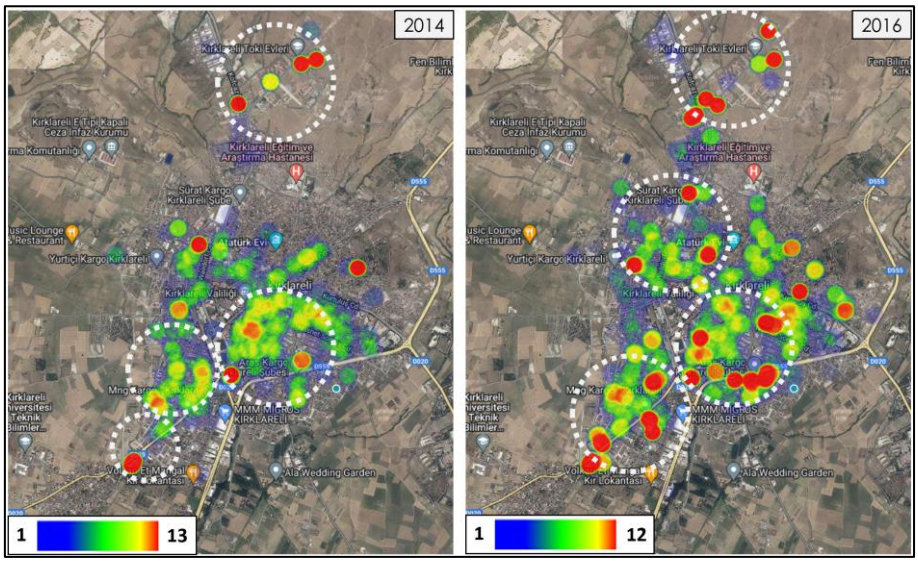

Figure 8. Cluster analysis of housing sales in Kırklareli city center in the 2nd break period (Compiled from (TKGM, 2022a))

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3rd Break Period (2019-Today):

Between 2019 and 2022, housing sales in the city center increased by 29 (5%). During this period, sales were mainly concentrated in the northern region, like the previous period, and then in the western periphery of the city (Figure 9). Similarly, Begen (2020) states that the northern region is at the forefront of urban development due to its convenient location on the Kayalı Campus route. The change in consumer demands after 2019 due to the COVID-19 pandemic, the decrease in urban mobility, and the increase in construction costs have negatively affected the housing sector (Usanmaz, 2021; Üstündağlı Erten, 2021; Toy et al., 2022). However, it is possible to suggest that universities' decision to switch to distance education after 2020 had an impact on the decrease in the mobility of students and academics and the decrease in housing demands in the period until 2021.

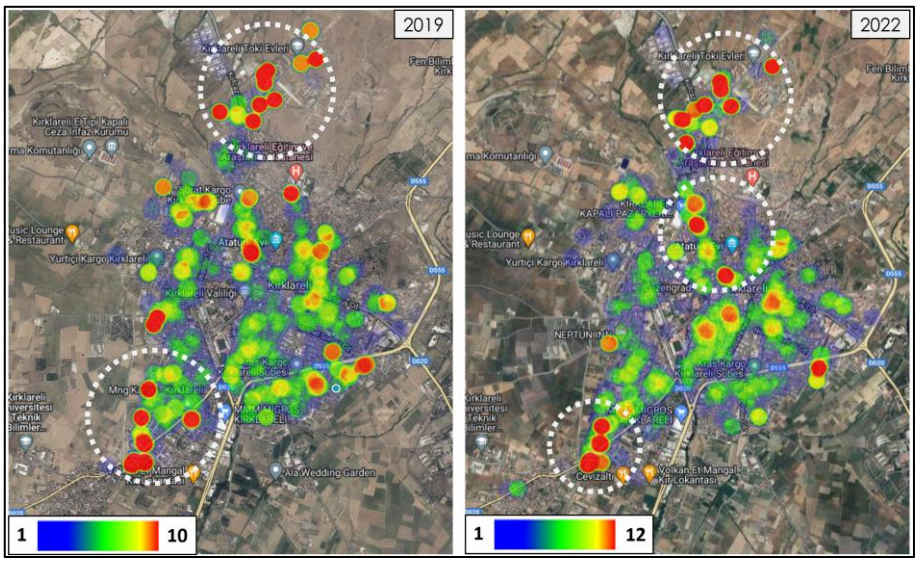

Figure 9. Cluster analysis of housing sales in Kırklareli city center in the 3rd break period (Compiled from (TKGM, 2022a))

DISCUSSION

The fluctuation in the rate of increase in housing sales between 2011 and 2022 is similar the rate of increase in the number of students (the same outlook cannot be observed with the increase in academic and administrative staff) (Table 6, Figure 10). On the other hand, the population growth rate remained stationary and independent of this fluctuation[12]. This is also supported by correlation tests (Table 7) which show a high (p: 0.797) positive correlation (sigf: 0.00) between the number of students and housing sales rates at 99% confidence level (perfect fit: 1.00)[13]. Accordingly, ***"the change in the real estate sector in the city was not caused by internal dynamics but by external dynamics following the establishment of the university"*** statement is supported by the correlation tests. When the synthesis of housing sales density zones between 2010 and 2022 is analyzed (Figure 11), the peripheral regions and the northern part of the city have come to the forefront over the last 10 years. The direction of macroform development was created by increasing the construction limits and

[12] Similarly, (Ogur, 1973, pp. 390–391) determined that the demand trend in non-metropolitan cities is proportional to the student population, contrary to the existing population effect.

[13] For correlation coefficients see (Bhandari, 2021)

transforming peripheral areas (agricultural areas) into residential areas. In this respect, the process of ***"establishment of a university → student influx → increase in housing demand → regulations to supply additional housing → change in urban form"***, which can be extracted from the literature, can be observed in Kırklareli city center.

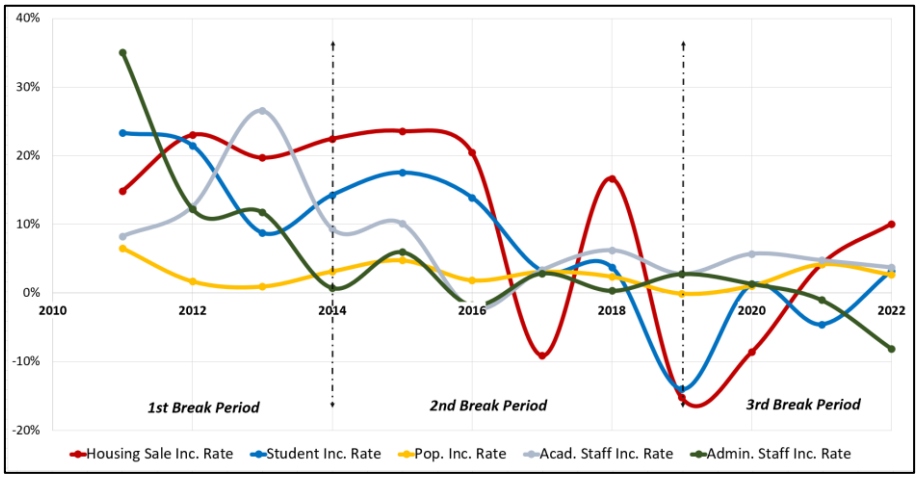

Figure 10. Cluster analysis of housing sales in Kırklareli city center in the 2nd break period (Compiled from (TKGM, 2022a))

Table 6. Population, housing sales, student and staff statistics by periods

Periods	Years	Housing Sales	Inc. Rate (%)	Population (Urban)	Inc. Rate (%)	Students	Inc. Rate (%)	Academic Staff	Inc. Rate (%)	Admin. Staff	Inc. Rate (%)
1st Period	2007	*No data*	----	59970	----	6152	----	87	----	*No data*	----
	2008	*No data*	----	61880	3%	6796	10%	94	8%	*No data*	----
	2009	*No data*	----	64265	4%	8912	31%	106	13%	120	167%
	2010	571	----	62152	-3%	10358	16%	374	253%	157	31%
	2011	656	15%	66226	7%	12774	23%	405	8%	212	35%
	2012	807	23%	67360	2%	15518	21%	456	13%	238	12%
	2013	966	20%	68004	1%	16878	9%	577	27%	266	12%
2nd Period	2014	1183	22%	70161	3%	19287	14%	631	9%	268	1%
	2015	1462	24%	73517	5%	22671	18%	695	10%	284	6%
	2016	1761	20%	74896	2%	25825	14%	680	-2%	279	-2%
	2017	1601	-9%	77226	3%	26664	3%	703	3%	287	3%
	2018	1868	17%	79093	2%	27665	4%	747	6%	288	0%
3rd Period	2019	1584	-15%	79038	0%	23793	-14%	768	3%	296	3%
	2020	1448	-9%	79884	1%	24078	1%	812	6%	300	1%
	2021	1509	4%	83248	4%	22978	-5%	851	5%	297	-1%
	2022	1661	10%	85493	3%	23712	3%	883	4%	273	-8%

Table 7. Correlation test results

Correlation Test		Increase Rate in Urban Pop.	**Increase Rate in Students**	**Increase Rate in Academic Staff**	**Increase Rate in Admin. Staff**
Increase Rate in Housing Sales (%)	Pearson Correlation	0.357	**0.797***	0.411	0.379
	Sig. (2-tailed)	0.254	**0.002**	0.184	0.23
	N	12	**12**	12	12

**** Correlation is significant at 99% confidence level.***

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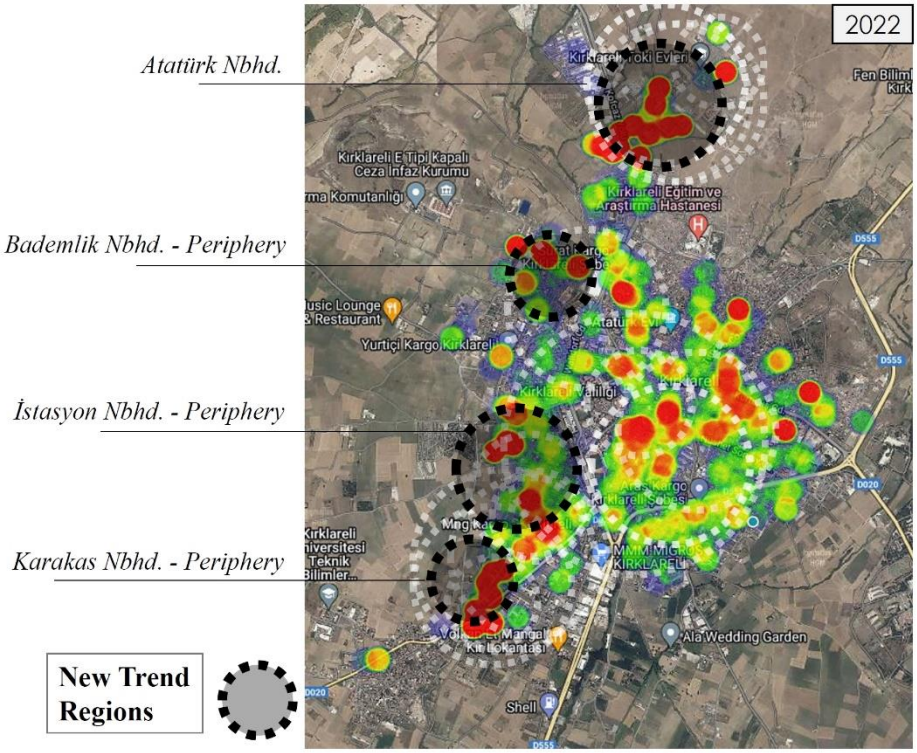

Figure 11. Cluster analysis of housing sales in Kırklareli city center (2010-2022)

CONCLUSION AND RECOMMENDATIONS

This study examined the real estate/housing sector, which plays an important role in the interaction between universities and cities, and investigated the impact of spatial change. By employing quantitative data sets, location-based analyses, and correlation tests, the research defined student-oriented changes in the market and increase levels, and identified break points. In this regard, it is anticipated that the study will contribute by providing a methodological approach and a sample data set approach to the existing literature on the subject. Furthermore, it was established that the implementation of fragmented strategies facilitates the process of change and transformation in the spatial form. It is, therefore, evident that zoning plans, which proves to be one of the most crucial instruments for regulating urban development and spatial form, must be prepared in a manner that will regulate the demands in residential areas and prevent the associated effects the spatial form. Furthermore, an evaluation of the impact of universities on cities after 2007 reveals that the economic focus, as evidenced by the criticisms presented in the literature, puts emphasis on the generation of income. Although numerous universities were established in Türkiye as a consequence of the political agenda with the objective to foster sectors such as the knowledge economy and academic services, the direct impact has been on the real estate and housing production sectors. This reveals that the **"university ←→ city"** interaction should not be considered independently from the physical construct, socio-economic infrastructure and dynamics in cities.

It is imperative to establish initiatives that integrate academic and urban cultures, particularly in medium-sized cities like Kırklareli, where

sectoral developments are limited, and the population is stable. In the absence of such innovations, the contribution of the university to the socio-economic development of the city will remain limited, irrespective of the number of universities. Moreover, it is crucial to adopt a supportive, developmental, and complementary approach towards universities, rather than perceiving them as a burden on the city's economy. The findings and conclusions presented are primarily spatially oriented. However, they can be enhanced by incorporating economic data, such as rental prices and changes in land market prices, as well as social data, including surveys on the needs and requirements of students, academics, and administrative staff.

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Positive Effects of Morphological and Perceptual Boundary Factors on Vitality in the Static Activity Streets: Syntactic and Fractal Approaches

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Abstract

Street vitality is a concept that makes the city more liveable with its economic and sociological gains. Static activities on the street contribute to vitality by supporting social interaction. This study investigates the positive effects of the perceptual and morphological boundary characteristics of static activity streets on the user. Using Space Syntax and fractal method, this research consists of two phases and the use of two different scales. The first step involves analysing the connectivity and enclosure factors of 13 static activity streets in Balıkesir city center at the street scale. By correlating the analysis results with the number of users determined by the observation method, the effect of street-scale boundary factors on user behaviour was determined. As a result of the first step, Aygıt Street, which has the highest boundary factor value at the street scale, was selected for the second step of the research, which is the building-scale analysis. The surrounding and permeability factors that create boundary effects at the building scale were analysed through street facades and sections, and the value was evaluated together with the areas preferred by people engaged in static activities. As a result of the correlation analysis between the boundary factor value and user behaviour, it has been determined that the connectivity, which creates a morphological boundary effect at the street scale, and the enclosure factor, which creates a perceptual boundary effect, positively affect the users. It was determined that elements such as awnings, eaves, flower beds, and signboards, which determine the surrounding factor that creates a morphological boundary effect at the building scale, increase the number of users. It is concluded that the wall surfaces on the street facades, which determine the permeability factor that creates a perceptual boundary effect at the building scale, positively affect user behaviour. The model created in this study, which brings together two different approaches, namely urban and architectural scales and morphological and perceptual boundary factors, is intended to form a basis for the design processes of spaces and streets that support static activities in cities.

Keywords:
Fractal geometry, Morphological boundary, Perceptual boundary, Space syntax, Static activity.

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INTRODUCTION

"A boundary is not that at which something stops but, as the Greeks recognized, the boundary is that from which something begins its presencing."

(Heidegger, M., 1971)

Street vitality is an important theme in the leading works on urban spaces by many well-known researchers in the literature (Jacobs, 1961; Alexander et al., 1977; Whyte, 1980; Carmona et al., 2003; Gehl 2011). Researchers have developed theories by examining vitality based on walking activity (Hillier & Hanson, 1984; Kubat, 2013; Ewing & Handy, 2006). Streets contribute to vitality in daily life by being used not only for people to walk but also for static activities such as sitting, eating and drinking, and resting. Researchers have defined static activities that create vitality on the streets that include standing, meeting, sitting, seeing, hearing and speaking (Whyte, 1980; Mehta, 2009; Mahdzar, 2013; Gehl, 2011; Gürer, 2017).

The morphological and perceptual factors created by the street and the surrounding environment on the street affect human behaviour (Jacobs, 1961; Shultz 1971; Alexander et al., 1977; Carmona et al., 2003).

Researchers have suggested that a low number of street connections has a restrictive effect on pedestrian movement and that this feature affects user behaviour (Jacobs, 1961; Hillier & Hanson, 1984). Whyte (1980) observes that static activities tend to take place in long and narrow spaces that have stronger boundary effects, creating a sense of enclosure in people. While structural architectural elements such as awnings, flower beds, glass panels surround static activity spaces (Ewing, 2006; Gehl, 2011), while impermeable walls on the streets create a boundary effect at the architectural scale (Mehta, 2009; Ataol, 2013) create a boundary effect at the architectural scale. There are studies in the literature that address the relationship between urban space and boundary factors at different scales (Whyte, 1980; Gehl, 2011; Mehta, 2009; Farahani & Beynon, 2015; Hassan et al., 2019).

In the literature, studies have been conducted with different approaches to the level of accessibility of static activity spaces (Mahdzar, 2008), including as a component of vitality (Mehta, 2006; Gehl, 2011), the relationship between the morphological structure of these spaces and user behaviour (Alexander et al., 1977; Montgomery, 1998), and the duration of use of static activity spaces (Gehl & Svarre, 2013). However, only one of these approaches is typically accepted in studies on static activity. There is no model that examines static activity streets at both street and building scales with numerical tools, evaluates two different approaches based on morphological and perceptual boundary factors together, and combines them with user behaviour (Figure 1). This study aims to fill this gap by combining two different approaches to reveal the importance of the boundary factors that are effective in the formation of

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static activity spaces not only at the urban scale but also at the architectural scale.

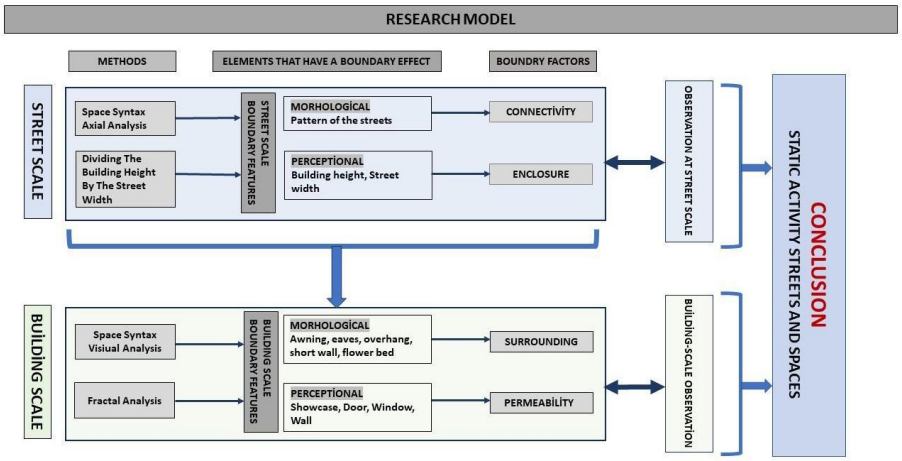

Figure 1. Research model.

Space Syntax, one of the two main methods used in this study, is a set of theories and techniques that analyse the spatial constructions of cities and buildings and how these constructions function at different scales (Hillier & Hanson, 1984; Kubat et al., 2007). The Space Syntax method is effectively used today as a model that offers the opportunity to analyse this spatial network created based on the linear movement and visual perceptions of people. In the research, the Space Syntax axial analysis connectivity value was used to measure the connectivity factor that creates a boundary effect at the street scale. The surrounding factor that creates a boundary effect at the building scale was measured with the Space Syntax visibility analysis controllability value. Ostwald et al. (2008) argued that while an increasing number of scientific or computational tools have been developed for the analysis of architectural plans (Space Syntax), methods for investigating their visual properties are limited. Consequently, the researcher underlined the necessity of applying different methods for the analysis of building heights and the construction of facades (including visual qualities) and emphasized the importance of fractal geometry. The perceptual boundary factor permeability value, which creates a boundary effect at the building scale, was analysed with the fractal method.

This paper focuses on the positive effects of morphological and perceptual boundary factors on static activity streets. In this study, streets used for activities such as sitting, eating, drinking, resting, and meeting, where tables and chairs were spread over the street area in a way that affects pedestrian flow, were named static activity streets. The aim of the research is to analyse static activity streets in terms of morphological and perceptual boundary factors at street and building scales with quantitative methods and to develop a method that reveals the positive impact of these factors on users. The boundary factors considered in the study were connectivity and enclosure at the street scale, and surrounding and permeability at the building scale. The research, in which the streets in Balıkesir city center were selected as the

study area, consists of two steps. One of the objectives of the first step was to determine the relationship between street-scale boundary factors and user behaviours in 13 static activity streets. The second objective was to identify the streets most affected by the street-scale boundary factors. In the second step, the street with the highest street-scale boundary effect was analysed in terms of building-scale boundary factors and evaluated together with the number of people using the static activity spaces (Figure 1). The hypotheses in this study are as follows:

Hypotheses at Street-Scale

- The connectivity factor, which comes from street-scale boundary characteristics, positively affects the use of static activity streets. Streets with fewer connections are used more for static activities, and the number of users increases as the number of connections decreases.
- The enclosure factor, which creates a boundary effect on the streets, positively affects the number of users in a static activity street. As the level of street enclosure increases, the number of users also increases.

Hypotheses at Building-Scale

- The higher the surrounding factor that creates a boundary effect at the building scale, the higher the number of users. The number of structural elements that create a boundary effect will positively affect the number of users in a static activity street.
- The permeability level of facades at the building scale will affect static activity. Facades with impermeable walls increase the number of users in static activity streets.

In urban space, the design of streets where static activities take place contributes significantly to vitality. The knowledge of morphological and perceptual boundary factors on static activity streets can be used to improve these streets, making these areas more liveable.

This paper is organized as follows:

The literature section presents the theoretical framework, focusing on the concept of boundaries and static activity in streets. The next section details the methodology and materials used to measure static activity and boundary relationships, and provides information about the study area. The findings section presents the relationship between the analysis of boundary factors and the counts of static activity users. The study concludes with a discussion and conclusions.

LITERATURE REVIEW

In the literature, morphological and perceptual boundary factors that affect static activity influence user behaviour and contribute to vitality in urban spaces (Jacobs, 1961; Alexander et al., 1977; Montgomery, 1998; Carmona & Tiesdell, 2007). Researchers have examined boundary factors at the street scale (Hillier & Liada, 2005; Songülen, 2012; Gehl, 2019; Ya, 2021) and building scale (Mehta, 2006; Gehl, 2011; Farahani & Beynon, 2015; Hassan et al., 2019).

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At the street scale, the connectivity of streets has a limiting effect on urban morphology and affects the purposes of use (Hillier & Hanson, 1984; Özer, 2014). The connectivity value, which indicates the connectivity of the streets, guides the determination of the level of accessibility (Körmeçli, 2023). Long blocks on streets with low connectivity create a boundary effect at the street scale (Jacobs, 1961; Hillier & Hanson, 1984; Carmona et al., 2003; Van Nes & Yamu, 2021).

The enclosure factor, which creates a perceptual boundary effect at the street scale, is defined as the building height to street width ratio (Stamps, 2002; Cooper & Oskrochi, 2013; Akbarishahabi, 2017). Enclosure is a perception created by the continuity of buildings. This feature has been recognized as one of the boundary qualities that affect perception in spatial organization (Cullen, 1961; Alexander et al., 1977; Cooper & Oskrochi, 2013). The enclosure factor creates a sense of belonging by establishing human-scale spaces and positively affects static activities on the streets (Whyte, 1980; Gehl, 2011; Akbarishahabi, 2017).

The building scale includes values on specific parts of the street, such as facade mobility, permeability, walls, awnings, and flower beds, and refers to the level of observation focused on the building itself (Akbarishahabi, 2022).

In streets, building-scale structural elements such as awnings, canopies, eaves, and short walls create a boundary effect by surrounding static activity places (Ewing & Handy, 2006; Gehl, 2011; Hassan et al., 2019). The sense of enclosure that such architectural elements create in static activity spaces on the streets generates a sense of security in people (Mehta, 2006; Farahani & Beynon, 2015).

Permeability, which researchers consider a building-scale factor in streets, affects static activity (Mehta, 2009; Hassan et al., 2019). At the building scale, doors, windows, and storefronts create important openings in terms of physical or visual relationships and function as permeability (Schulz, 1971; Gehl, 2019). The ratio of doors, windows, and transparent surfaces on street facades affects static activity by creating a wall effect on permeable facades (Ewing & Handy, 2006; Mehta, 2006; Hassan et al., 2019).

The fundamental idea of Space Syntax is derived from the effort to understand evolution and flows within the city: analysing the form of a built environment to understand evolution by examining social activities like human movements within the city. The axial line-based representation of a city's structure is the oldest approach to space syntax (Hillier & Hanson, 1984). Axial lines are used to represent continuous movement and visibility directions, thus representing the longest visibility lines in two-dimensional urban areas (Hillier & Hanson, 1984; Özer, 2014). The connectivity value is obtained by analysing the axial map in the Space Syntax method, showing the number of lines directly connected to each street in an urban system, and lines with a high value provide direct access to other lines (Gündoğdu & Dinçer, 2020).

Hillier argues that the utilization of open spaces is closely tied to the visibility field or isovist properties of space. This suggests that the visual field created by the spatial configuration significantly influences human behaviour. In this context, Turner (2007) suggests that visibility analysis can be used to discuss the morphological characteristics of the built environment, as well as how people can navigate or engage with the visible space. It can also help uncover the importance of objects located within that space. Visual controllability is a concept in space syntax theory proposed by Turner (2007). It focuses on identifying areas within a built environment that may be easily visually dominated by others. This concept helps in understanding how certain spaces can be visually controlled or influenced by the surrounding environment or users.

In the late 1970s, Benoit Mandelbrot proposed that natural systems often exhibit characteristic geometric complexity at different scales, leading to the formulation of fractal geometry in mathematics. Architectural designers, embracing fractal geometry a few years after Mandelbrot's initial formulation, have more widely used it for the analysis of the built environment (Mandelbrot, 1982). Fractal analysis is used as a tool to assess the characteristics of street images (Cooper & Oskrochi, 2008). The fractal method, which analyses the street texture through street images, generates value by calculating the heights of the buildings, decorations, width of the street, landscape elements, silhouette, and other third-dimensional elements. Spaces with fractal characteristics lead to the formation of sensations such as peace, satisfaction, liking, comfort, and happiness in individuals psychologically (Cooper et al., 2008; Kalavi, 2021). Fractal dimension analysis is a method used to measure the relative density and diversity of geometric information in an image or object. To examine architectural design, it is necessary to look at mass movements, door-window openings, and window details at every scale (Ostwald & Vaughan, 2016).

MATERIALS AND METHOD

Study Area

For the study area, 13 streets with static activity spaces in Balıkesir, Turkey, city center were selected. The reasons for the selection of these streets include:

- Location within the boundaries of the central business district determined by local governments.
- Pedestrian streets.
- Proximity to shopping centers and transportation options.

The selected static activity streets had low pedestrian activity. The centerline of the street was primarily used for movement, and the majority of the people were static activity users. These streets have spaces for sitting, resting, meeting, and other activities, and they exhibit a changing user profile throughout the day (Figure 2).

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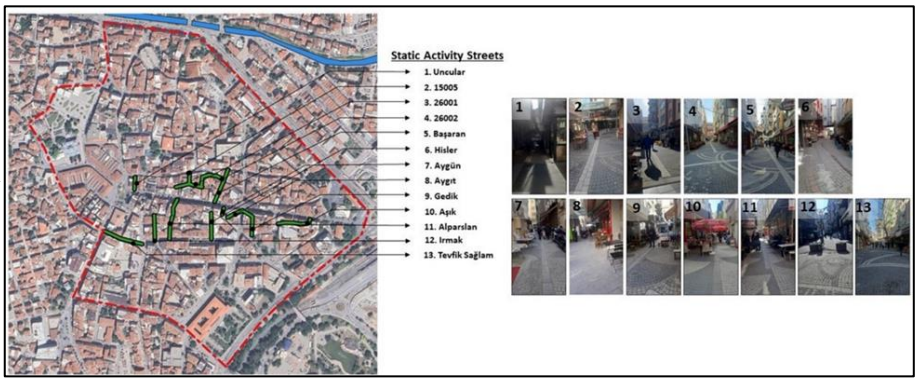

Figure 2. Static activity streets in Balıkesir, Turkey city center. Source: Author.

Data acquisition method

Data on static activity streets were obtained in two steps: street scale and building scale. As a result of determining the boundary factors of the 13 streets that constitute the first step of the research, Aygıt Street, with the highest boundary factor, was selected for the building scale analysis. Additionally, in the first step, the effect of the boundary factors at the street scale on users engaged in static activity was determined (Figure 3).

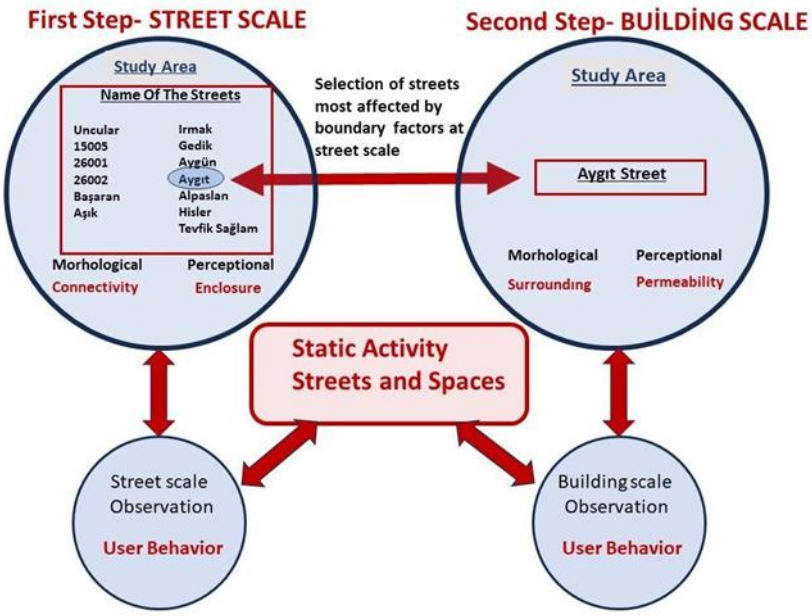

Figure 3. Stages of analysis based on the effects of boundary factors on static activity.

Data Collected at Street Scale:

- Obtaining the connection value of 13 streets with Space Syntax axial analysis.
- Determining the building height/street width ratios of 13 street sections.
- Determining the number of users engaged in static activity as a result of observations made on the streets on three days of the week (Monday, Wednesday, Saturday) and during two different time periods (12:00-13:00; 16:00-17:00).

The criteria that were effective in the selection of the days and hours for counting on the streets are as follows:

Monday was the most preferred day for users coming from rural areas of the Balıkesir city center and therefore offered a variety of users. Wednesday was chosen to determine how many people use the streets on an ordinary day between the other two busy days. Saturday was the only holiday on which shops are open, making it one of the most preferred days in the city center. The selected interval of 12:00-13:00 was chosen because the static activity spaces in the city center are primarily used by employees during these hours. The 16:00-17:00 interval was chosen because it is the time period most used by urbanites shopping in the Balıkesir city center.

Data Collected at Building Scale:

- The controllability value, which determines the surrounding factor at the building scale, was obtained through Space Syntax visibility analysis.
- Fractal analysis provided the permeability value of the facades at the building scale.
- At the building scale, the areas of the street most used by users between 16:00-17:00 on Saturday, when static activity was highest in the previous census, were identified and evaluated together with the boundary data.

Data Analysis

The axial analysis of the Space Syntax method, used in morphological research in urban spaces, was utilized in this study to measure the connectivity factor at the street scale. The data for the study were obtained by drawing axial maps of the streets using AutoCAD software and analysing them with Depthmap software. The sections with low connectivity are long blocky streets where the boundary factor is strong (Jacobs, 1961; Peponis et al., 2007).

The enclosure factor, which creates a perceptual boundary effect at the street scale, was determined by calculating the building height/street width ratio. At the street scale, enclosure creates a perceptual boundary effect (Whyte, 1980; Kaplan et al., 1998).

In the building-scale morphological analysis, the surrounding factor was evaluated using the visibility analysis controllability value from the Space Syntax Depthmap software. Visibility calculates how each grid relates to all other grids in the system (Turner, 2007). Visual analysis is applied by adding eye-level awnings, recesses, signs, canopies, and other elements that create visual barriers on the streets to the plan drawing. The controllability value of static activity spaces indicates the level of influence of the surrounding factor.

The permeability factor at the building scale was analysed using the fractal method. Researchers have analysed building facades, doors/windows, storefronts, and other elements that provide permeability using the fractal method (Ostwald et al., 2008; Kaya, 2010; Ediz & Çağdaş, 2007). In this study, the outline + primary form was used among the five representation forms (Ostwald et al., 2016).

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In the first step of the study, to measure the positive impact of boundary factors on user behaviour, users engaged in static activities on 13 streets on three days of the week (Monday, Wednesday, Saturday) and in two different time periods (12:00-13:00, 16:00-17:00) were counted by observation. The relationship between the user count results and the boundary factor data at the street scale was obtained through correlation analysis. At the building scale, users were observed and counted on Saturdays between 16:00-17:00 to determine which street areas were preferred by users for static activity.

FINDINGS

First Step: Morphological and Perceptual Findings at Street Scale

The connectivity value, which creates a morphological boundary effect at the street scale, and the enclosure factor, which creates a perceptual boundary effect, were evaluated together with the number of users on the static activity streets.

Connectivity Factor

The connectivity value of the streets, produced based on axial analysis, determines the intersection of the streets and the level of their relationship with other streets on a colour scale ranging from red to blue. Red represents the highest, and blue represents the lowest connectivity value.

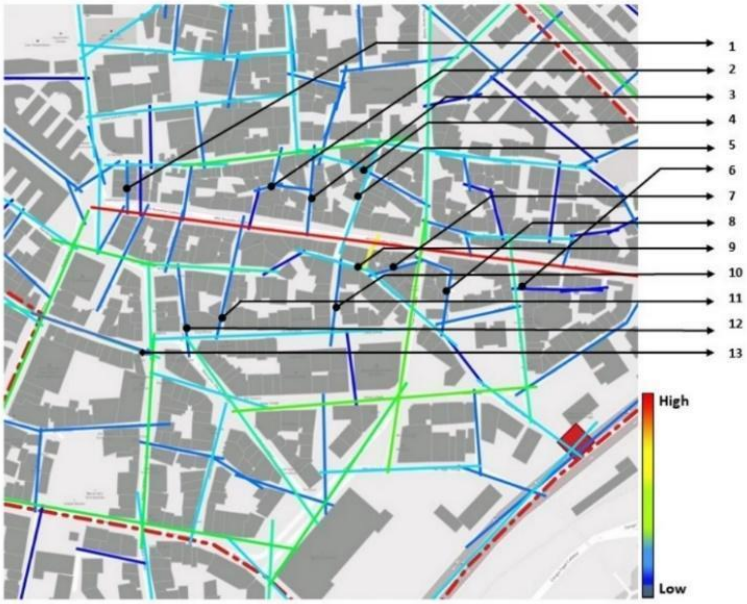

Figure 4. Connectivity value of static activity streets.

The connectivity values of the 13 static activity streets in the study area were evaluated internally. These values ranged between 2 and 4 (Figure 4). In the study area, 6 streets had 2 connections, indicating long blocks and thus a high boundary effect.

Streets 5, 6, and 10 had high connectivity values, indicating the lowest boundary effect. Streets 1, 8, 9, 11, 12, and 13 had a connectivity value of 2, suggesting these areas exhibited the highest boundary characteristics

within the group. Streets with the lowest connectivity factor were considered to have the highest boundary effect (Table 1).

Table 1. Connectivity value of static activity Streets.

	Streets name	Connectivity Value
1	Uncular Street	2
2	15005 Street	3
3	26001 Street	3
4	26002 Street	3
5	Başaran Street	4
6	Hisler Street	4
7	Aygün Street	3
8	Aygıt Street	2
9	Gedik Street	2
10	Aşık Street	4
11	Alpaslan Street	2
12	Irmak Street	2
13	Tevfik Sağlam Street	2

Enclosure Factor Data

The enclosure factor, a perceptual boundary effect, was calculated by dividing the building height by the street width. Enclosure contributes to a sense of comfort and safety (Carmona, 2003; Akbarishahabi, 2017).

Aygıt Street exhibited the highest enclosure factor with a value of 8.6. Streets 2, 8, 9, and 11 had an enclosure level of 6 and above. Among these, Street No. 1 had the lowest enclosure effect (Table 2).

Table 2. Enclosure value of static activity street

	Streets name	Enclosure Value
1	Uncular Street	3
2	15005 Street	7
3	26001 Street	3,75
4	26002 Street	4,8
5	Başaran Street	4,5
6	Hisler Street	4,3
7	Aygün Street	3,4
8	Aygıt Street	8,6
9	Gedik Street	7
10	Aşık Street	4
11	Alpaslan Street	6
12	Irmak Street	3,6
13	Tevfik Sağlam Street	4,5

In the analyses conducted to evaluate the morphological and perceptual boundary characteristics at the street scale, connectivity and enclosure factors were determined for 13 streets. In Table 3, the effect of

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these boundary factors is represented using symbols ***, **, and * in order of value from higher to lower.

The boundary effect of the connectivity factor is inversely related to the number of connections. Streets with fewer connections exhibit a higher boundary effect. Conversely, the enclosure factor's boundary effect is positively related to its value. As the enclosure value increases, so does the boundary effect.

Table 3. Boundary impact levels of static activity streets.

	Streets name	Connectivity Value	Enclosure Value
1	Uncular Street	2***	3
2	15005 Street	3**	7**
3	26001 Street	3**	3,75
4	26002 Street	3**	4,8
5	Başaran Street	4*	4,5
6	Hisler Street	4*	4,3
7	Aygün Street	3**	3,4
8	Aygıt Street	2***	8,6***
9	Gedik Street	2***	7**
10	Aşık Street	4*	4
11	Alpaslan Street	2***	6*
12	Irmak Street	2***	3,6
13	Tevfik Sağlam Street	2***	4,5

Note: The impact levels of the boundary factor are evaluated as ***, ** and * from high to low.

According to the table above, Aygıt Street is identified as the area most affected by the boundary factors.

Count of Users in Static Activity Streets

To measure the relationship between boundary factors and user behaviour, the number of users on static activity streets was counted. The number of users was determined by the observation method on 13 streets where static activity was conducted on Mondays, Wednesdays, and Saturdays between 12:00 and 13:00 and 16:00 and 17:00 hours. The total number of users in 13 static activity streets in Balıkesir city center is 1895. According to this table, Aygıt Street is the most preferred area for static activity by users.

Table 4. Count of users in static activity streets.

	Streets name	Count of users
1	Uncular Street	80
2	15005 Street	205
3	26001 Street	134
4	26002 Street	86
5	Başaran Street	84
6	Hisler Street	66
7	Aygün Street	55
8	Aygıt Street	338
9	Gedik Street	168
10	Aşık Street	108
11	Alpaslan Street	189
12	Irmak Street	125
13	Tevfik Sağlam Street	257

The relationship between the number of users on static activity streets and street-scale boundary factors determines the extent to which these factors affect users.

The Effect of Boundary Factors on User Behaviour at the Street Scale

The relationship between the number of users obtained as a result of observations made in the static activity streets and the factors that create morphological and perceptual boundary effects was assessed using correlation analysis.

The correlation coefficient indicates the direction and strength of the relationship between independent variables. This coefficient ranges between -1 and +1: positive values indicate a direct linear relationship, while negative values indicate an inverse linear relationship. According to the correlation analysis, positive (+) values indicate a positive correlation level, and negative (-) values indicate a negative correlation level (Table 5).

Table 5. Correlation analysis value range.

Correlation	Relation degree (+,-)
Low	0,29-0,10
Middle	0,49-0,30
High	0,50-1,00

In the correlation method, correlation levels are evaluated as low, medium, and high. Low is considered as 0.10-0.29, medium as 0.30-0.49, and high as 0.50-1.0. Data with a value less than 0.10 is not considered a correlation.

As a result of the correlation analysis, the user relationship with the connectivity factor in static activity streets was determined to be negative/strong with a value of -0.55. The low connectivity value

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positively affected the number of users; users preferred streets with few connections and limited pedestrian movement (Table 6).

The correlation between the number of users and the enclosure value of the analysed static activity streets was 0.77 (Table 6). This result shows that there is a strong relationship between the enclosure value and user behaviour. The number of users increased as the enclosure value, which creates a boundary effect, increased. People preferred secluded and enclosed streets for static activity.

Table 6. Boundary factors and user relationship at street-scale

	Streets name	Connectivity Value	Enclosure Value	Count of users
1	Uncular Street	2	3	80
2	15005 Street	3	7	205
3	26001 Street	3	3,75	134
4	26002 Street	3	4,8	86
5	Başaran Street	4	4,5	84
6	Hisler Street	4	4,3	66
7	Aygün Street	3	3,4	55
8	Aygıt Street	2	8,6	338
9	Gedik Street	2	7	168
10	Aşık Street	4	4	108
11	Alpaslan Street	2	6	189
12	Irmak Street	2	3,6	125
13	Tevfik Sağlam Street	2	4,5	257
Correlation connectivity and count of user's value:			**-0,554303468 (High)**	
Correlation enclosure and count of user's value:			**0,770694415 (High)**	

In the analyses conducted at the street scale, which is the first step of the research, it was found that the boundary effect created by the connectivity and enclosure factors positively affects users engaged in static activities. The fact that the relationship between the enclosure factor and the number of users is higher than the relationship between connectivity and the number of users is an indication that the enclosure factor affects the number of users more positively.

As a result, two of the hypotheses of this research have been proven. Another result of the first step of the research is the selection of the street with the highest boundary factor at the street scale. Aygıt Street, which has the highest boundary factor at street scale, will be analyzed at the building scale.

Second step: Morphological and Perceptual Findings at the Building-Scale

In the building-scale analyses, the effects of elements such as awnings, signboards, eaves, doors, windows, shop windows, and walls on the facades of Aygıt Street were examined for their impact on the boundary factors. The building-scale analyses were carried out at the ground floor level, taking into account the human scale. The morphological analysis at the building scale provided value on the surrounding factor, while the perceptual analysis provided value on the permeability factor. The analysis data were evaluated together with the number of people using the static activity patterns of the streets.

Spatial Characteristics Of The Aygıt Street

Aygıt Street was determined to be one of the streets with the highest boundary effect at the street scale, where weekday and weekend visitors engage in static activities such as eating and drinking, meeting, and socializing. There are seven small local shops on the street (Figure 5).

Figure 5. Aygıt Street photos in Balıkesir by Author

The indentations and protrusions resulting from the morphological characteristics of the buildings, along with the horizontal and vertical building elements added later, provided mobility to the ground floor facades. Signage, awnings, and window arrangements do not show continuity and similarity and lack aesthetic appeal. These elements surround and define the static activity areas.

The street is surrounded by seven shops and adjoining buildings, except for two historical buildings and a residence on the entrance side. There are restaurants, barbers, grocery stores, and four cafes on the street (Figure 6). In the static activity spaces, users utilize the tables and chairs placed on the street.

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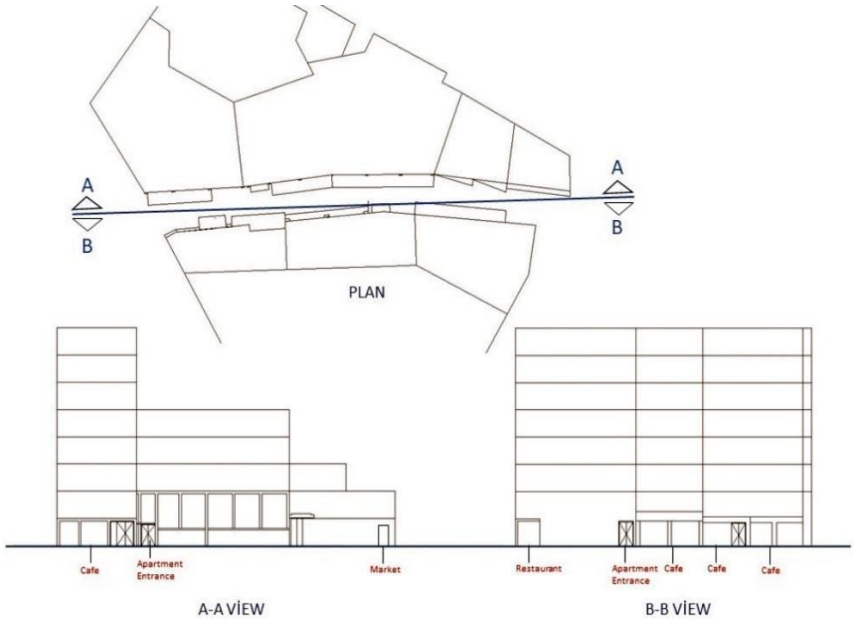

Figure 6. Aygıt Street plan and views, Drawing: Author.

Static activity areas on the street are surrounded by ceiling elements such as awnings and canopies, with vertical signage contributing to the surrounding effect. Tables and chairs are located within these enclosed areas. On the ground floor facades of the buildings, shop doors, windows, and glass surfaces provide permeability, while impermeable walls are used for static activity.

Surrounding Factor Data

Building elements such as awnings, canopies, overhangs, and walls surround areas of static activity, creating patterns of static activity and associating with these morphological features. As the enclosing effect increases, the controllability of these areas decreases (Ewing, 2006; Turner, 2007; El Agouri, 2004).

The effect of the surrounding factor on the street was evaluated using the controllability value from the Space Syntax visibility analysis. Elements such as awnings, short walls, and signboards that contribute to the enclosure factor were analysed by adding them to the drawing in the AutoCAD program.

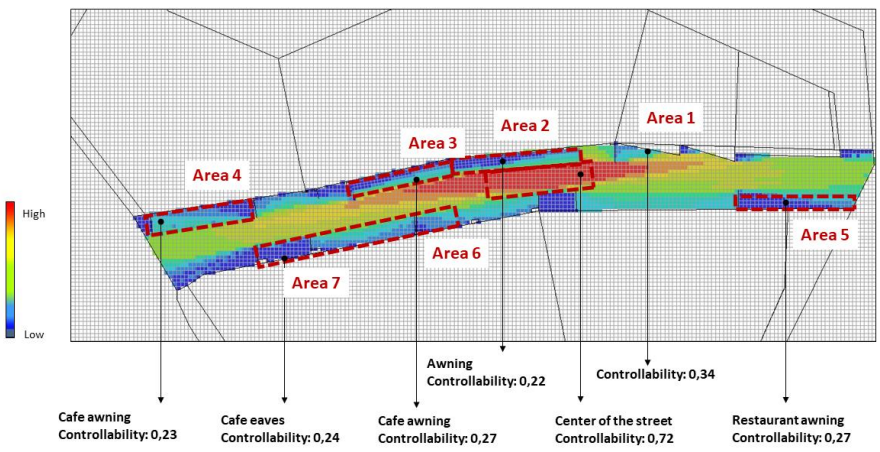

Figure 7. Aygıt Street Controllability Value.

A high controllability value represents visually dominant areas, while areas with low values represent spaces with a strong surrounding effect. The analysis uses a visual scale from red to blue: red represents areas with the highest visual controllability, while dark blue indicates unattended areas.

The visual controllability reference range for the entire street is 0.013-0.73. Areas with low controllability are those under canopies, overhangs, and eaves that create a surrounding factor.

On Aygıt Street, controllability was highest in the central part of the street, with a value of 0.72. Due to its central location, this area has the highest visibility from all directions. The controllability value of the areas surrounded by the awnings and canopies of cafes and restaurants vary between 0.22 and 0.27 (Figure 7). This is below the average controllability values of the street. These spaces with low controllability and surrounded by building elements are static activity spaces (Figure 8).

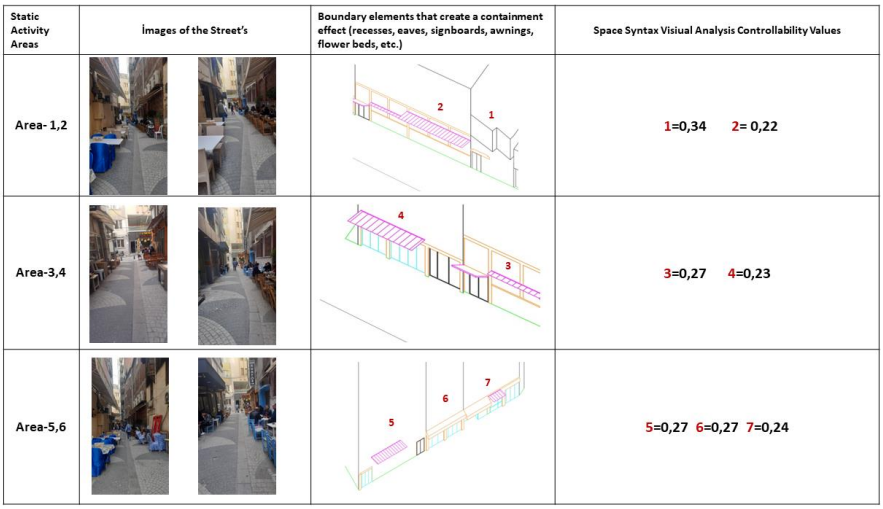

Figure 8. General findings of Aygıt Street controllability values

According to observations made between 16:00 and 17:00 on Saturday, the busiest day and time on Aygıt Street, 83 people used this street for static activity. During the observation, the areas where the users sat and the number of users were recorded.

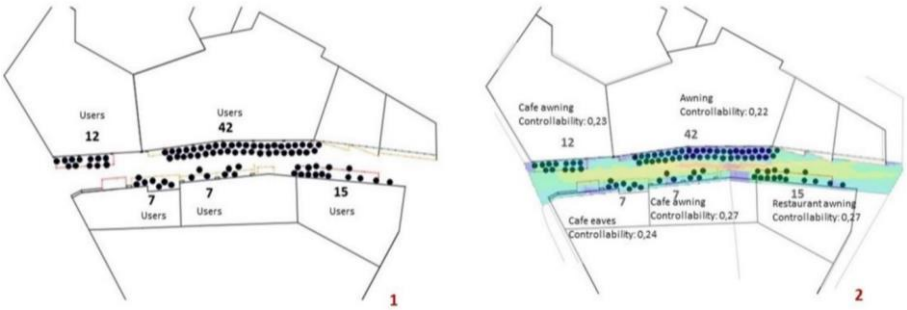

Figure 9. Aygıt Street count of users (1), impact of the surrounding factor on the user (2).

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It was determined that spaces with low controllability, surrounded by awnings and vertical signs, were used more intensively for static activities. 42 users preferred the area with a controllability value between 0.27 and 0.22 for sitting activities. Other parts of the street with the same value were also heavily used, with 15 and 12 people respectively (Figure 9).

A low controllability value at the building scale indicates a high influence of the surrounding factor, making these areas suitable for static activities. The surrounding factor was most effective in areas with the highest number of users, demonstrating its positive impact on user behaviour at the building scale.

Permeability Factor Data

The permeability of this area was influenced by 7 doors and 8 shop windows on the street facades (Ewing & Handy, 2009; Gehl, 2011; Ataol, 2013). Three of the doors are residential and four are café entrances.

The permeability factor in the streets was measured by the intensity of use of doors, windows, shop windows, and wall elements on the facades surrounding the static activity areas. ImageJ Software with the Fraclac plugin was used for this analysis. Storefronts, glass sections, doors, and windows on the ground floor facades of the buildings on the street were drawn in AutoCAD and analyzed using these drawings.

There are 7 buildings on Aygıt Street: 4 buildings on the AA side and 3 on the BB side. Fractal analysis of the building facades measured and drew the window, door, and transparent areas.

In the fractal analysis applied to the building facades, the grids and pixel numbers were set to be equal in each image, and data were obtained using the Frac-lab plugin. DB values were taken as the transmittance data of the structures. The fractal value ranges between 1 and 2, where 1 represents the lowest value and values approaching 2 indicate greater complexity. Permeability of the structures positively influences the fractal value; as the fractal value approaches 1, the impermeability of the facades increases.

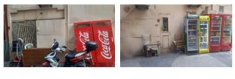
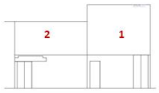
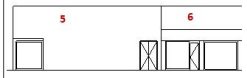
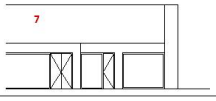
Static Activity Facades	İmages of the Street's	Boundary elements that create a permeability effect (transparent partitions, showcases, door walls, etc.)	Fractal Analysis Values
Facade 1,2			1=1,19 2=1,16
Facade 4,3			3=1,12 4=1,29
Facade 5,6			5=1,19 6=1,29
Facade 7			7=1,29

Figure 10. General findings of Aygıt Street facades and fractal values

In the fractal analysis applied to the buildings on the AA facade of Aygıt Street, it was found that the Db values for facades with walls were 1.19, 1.16, and 1.12. The view with windows, glass, and doors in the last building of the AA facade showed the highest fractal value on the street at 1.29 (Figure 10). Structural elements such as windows, glass, and doors on the facades were found to increase the fractal value. Therefore, facades with lower fractal values indicate surfaces with low permeability and a strong wall effect.

Building 3 on the AA facade was identified as having the lowest permeability with a fractal value of 1.12. This area was used by 42 people. In the fourth building, 12 people used the area with a fractal value of 1.29. Facades with low permeability were associated with higher static activity. Impermeable facades had a positive effect on static activity (Figure 11).

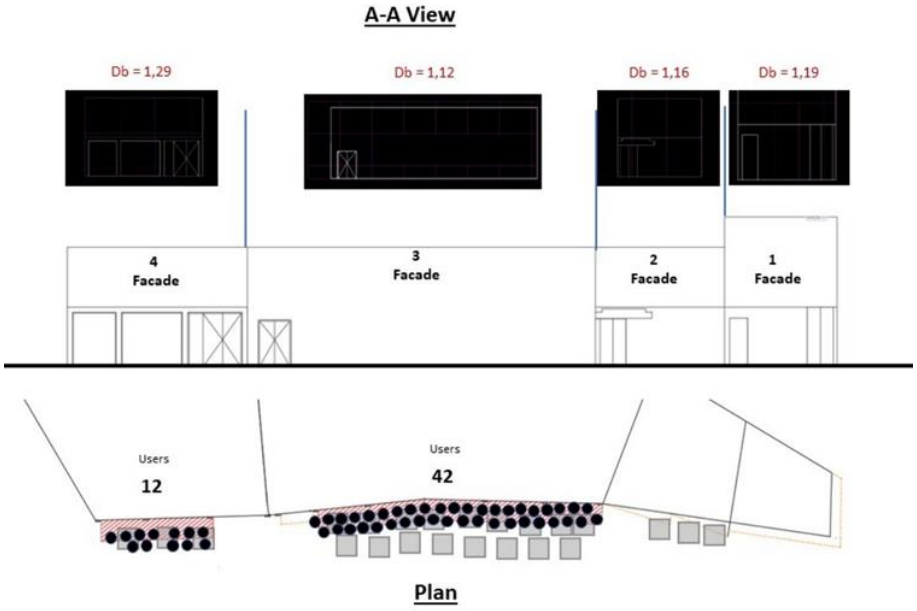


Figure 11. A-A view permeability, table/chair areas and count of users. Drawing: Author.

The fractal value of 3 buildings on the B-B facade were evaluated together with the number of people sitting in the static activity areas. Accordingly, the fractal value of the facade of the 5th building was 1.19, the fractal value of the facade of the 6th building was 1.29, and the fractal value of the facade of the 7th building was 1.29. The number of people sitting in facade 5 with a fractal value of 1.19 was found to be 15 and the number of people sitting in facades 6 and 7 with a fractal value of 1.29 was found to be 7.7 (Figure 12).

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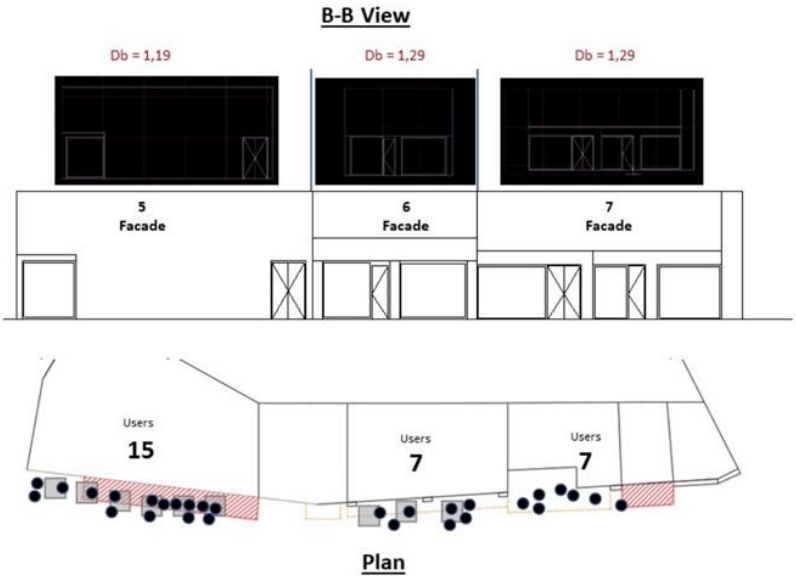

Figure 12. B-B view permeability, table/chair areas and count of users. Drawing: Author

Of the 83 users who performed static activities on Aygıt Street, 42 used the area with the lowest fractal value of 1.12. Impervious facades were found to positively affect static activities.

As a result of the analysis at the building scale, it was concluded that the surrounding factor of the morphological boundary features positively affects user behaviour. It was also concluded that the low permeability factor of the perceptual boundary features at the building scale positively affects static activities by creating impermeable spaces. The hypotheses of the research were confirmed at the building scale.

CONCLUSIONS AND RECOMMENDATIONS

In this study, boundary factors in streets were analysed using quantitative methods according to two different approaches: morphological and perceptual. Their positive effects on the formation of static activity streets were evaluated. The findings of the study demonstrated the effects of boundary factors on the formation of static activity streets.

The case study examined 13 static activity streets in Balıkesir city center. The analysis of boundary factors affecting street scale and building scale was conducted in two steps using Space Syntax and the fractal method.

The boundary factor values obtained in the first step were interpreted together with the observations of the number of users at two different times on three days of the week. The positive effects of morphological and perceptual boundary factors on the user at the street scale, which was the goal of the first step, were demonstrated, and the street with the highest boundary factors was selected for the second step.

The findings of the research are summarized relative to street scale and building scale as follows:

Street Scale:

- There is a strong negative relationship between the number of street connections and static activities. Streets with low connectivity have a positive effect on the number of users. Static activity users preferred streets with less pedestrian movement.
- The higher the enclosure value of the streets, the more static activities were preferred. Narrow and dim streets with high buildings have a positive effect on static activities, and the higher the enclosure effect, the higher the number of users.

According to the results of the first step of the research, it was proved that there is a positive relationship between the connectivity and enclosure factors that create a boundary effect and the user, and for the analysis at the building scale, the street most affected by the boundary factors was determined as Aygıt.

Building Scale:

- Building elements such as awnings, signboards, flower beds, and canopies surrounding the static activity areas on the streets support the creation of static activity spaces. As the surrounding factor increases, the number of users also increases, enhancing isolation and security in static activity spaces.
- There was a negative relationship between the permeability level of the facades on the streets and static activity. Impermeable wall surfaces, without elements such as shop windows, glass, and doors, helped to create static activity spaces and increase the number of users.

As a result, streets with low connectivity, high enclosure, and surrounded by signage, flower beds, awnings, and impermeable walls positively affected users engaged in static activities and increased the use of these areas for static activities.

Mehta (2006), one of the studies in the literature on streets where static activities take place, measured behavioural responses to the physical characteristics and use of such commercial streets. The author's research, which identifies the user behaviours that constitute static activity through detailed survey questions, is important in terms of identifying behavioural responses, but no quantitative method was used to determine the morphological or perceptual characteristics of the streets. The integration value of the Space Syntax method was used to determine the level of accessibility in the research in Pasir Gudang city, where static and dynamic activities were considered together (Mahdzar, 2013). In the research, which is an example where the Space Syntax method was used for static activity and examined 12 streets, it was determined that areas with low integration were actively used by people.

The research is important in terms of comparing the level of impact of Space Syntax integration data on dynamic and static activity, but comparing different data of this method can improve the research. Farahani & Beynon (2015) studied the relationship between vitality and sociability in Australian suburbs, mapping user activities and investigating the physical characteristics that encourage popular activity places. The physical features of the static activity streets in this study

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were identified through observation and counting. While the findings are important in terms of contributing to the understanding of the physical characteristics that influence social life and activity patterns on commercial streets, no quantitative method or approach was used to determine the physical characteristics. Another study, covering three commercial streets in Ankara, discusses the design criteria associated with the basic principles that create public spaces with static and dynamic activities and their impact on user satisfaction. The study concludes that pedestrian streets used for static and dynamic activities should be made attractive to users based on the commercial diversity of the area, pedestrianization, accessibility, appeal to different age groups, high youth use, vitality, social diversity, and street music. In this study, the effects of the characteristics of the streets on user satisfaction were addressed with the survey method, and the characteristics of the streets were not analysed (Gürer, 2017).

This study is unique compared to other studies, as it analysed the architectural and urban scale features specific to static activity streets using quantitative methods. In the study, hypotheses based on observations were confirmed by quantitative methods. Additionally, in this study, the positive effects of boundary factors on the formation of static activity streets in morphological and perceptual dimensions were analysed using quantitative methods, enabling a more comprehensive and reliable examination of the subject, which yielded solid and effective results. In the study, the data obtained by analysing the elements in the plan plane with Space Syntax and analysing the structure formed by the facades and facade units in the third dimension with the fractal method were used to determine the effects on the formation of spaces specific to static activity. The model, which consists of data from two different dimensions supporting each other, created a basis for urban design within the boundaries of the study area by enabling the boundary factors to be handled as an integrated structure.

Today, urban design is an important issue addressed by local governments. It is necessary that projects are carried out to provide citizens with quality, comfortable, and pleasant urban spaces. Static activity streets should be designed to encourage people to sit, socialize, and participate in various activities, creating lively and inviting public spaces. Designs that take into account the positive effects of boundary factors on static activity spaces result in the creation of spaces that urbanites can use.

This study was conducted in a limited area covering 13 static activity streets in Balıkesir city center. Applying the model used in this study to more streets and different cities will reveal the consistency of this model. More studies are needed to increase the duration of determining user behaviour, which is currently limited to counts made on three days of the week and at two different time periods. Another limitation of this study is that user behaviour was counted through observation. The survey method can also be used for an in-depth analysis of user behaviour.

Although the model created in this study provides a valuable formation, it may not be the most appropriate model.

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Research Article

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Tracing What Remains Behind the Natural Coastline: Unpacking the Delivery of Land Reclamation in Yeşilköy through Lot 5

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Abstract

Landfill practices, which have gained momentum within the scope of global urbanization, have drawn attention to coastlines. Presenting opportunities for legitimate urban growth, altering the coastal edges redefines not only the physical split between land and sea but also the social life it engenders. To address this challenge, this article aims to reveal the socio-spatial dynamics of reclaimed urban coastlines, exploring both macro and micro perspectives and their interplay, ultimately proposing a novel methodological approach by employing a narrative lens. Applying this methodological framework, the article traces the historical trajectory of the Yeşilköy coastline in Istanbul, scrutinizing its macro dynamics through the microcosm of Lot 5. The narrative lens of the study is formed by archival sources, including visual and written texts about the Yeşilköy coastline and Lot 5, and semi-structured interviews. Adopting Lot 5 as a micro perspective, the study sheds light on the crucial role it plays as a critical witness to the evolving winds of change in the social and cultural environment, along with the concurrent urban political tendencies that accompany this transformation. Lot 5's significance lies in its connection to Motel Yeşilköy, a renowned mid-20th-century architectural landmark, situated in the same parcel. By acknowledging its association with Motel Yeşilköy, articulating Lot 5 together with the urban context in which it inhabits offers a nested perspective for deciphering the reclaimed coast of Yeşilköy. The paper concludes that the Yeşilköy natural coastline, despite being subjected to landfilling, perpetuates both in urban memory and as a physical boundary. The findings of this paper, therefore, suggest the coastline reclamation to be evaluated within the intricate nature of intertwined spatial narratives at multiple scales, rather than as an expansion of an urban edge isolated from its context.

Keywords: *Coastal edges, Land and sea, Reclaimed urban coastlines, Spatial narratives, Yeşilköy coastline*

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INTRODUCTION

On his last sea voyage from Constantinople to the Vatican, the ship carrying Saint Stephanos' holy relic was forced to dock in the bay of a small fishing village due to a violent storm in the Sea of Marmara. Only after ten days was the case able to set off again for the Vatican, keeping the Saint's name alive in this fishing village. Yeşilköy[1], formerly named Ayastefanos after Saint Stephanos was once enshrined in the urban memory as a refuge for saints, a stormy coast, a lush green landscape, and a fishing village. Over time, it has ultimately had its share of urban growth (Figure 1). Today, with its remarkable history, ethnic and cultural diversity, and strategic location as the home of the first aviation base, Yeşilköy has grown from a suburban neighborhood to one of the important polycenters of Istanbul. While these multiple layers contributed to Yeşilköy's prominent position within the urban context, its growth was further legitimized through the reclamation of its coast in the late 1980s.

[1] Yeşilköy, called Ayastefanos until 1924 (Başgelen, 2011, p. 7), is translated as "Greenvillage" in English.

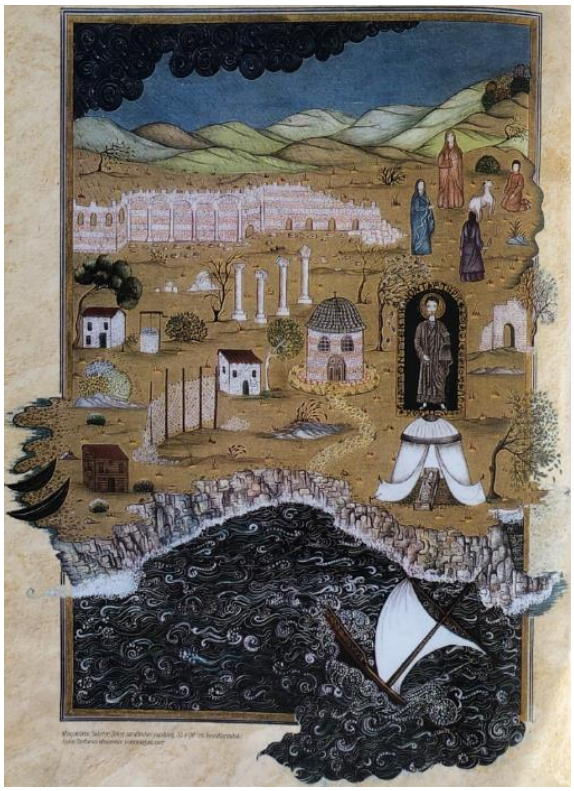

Figure 1. Miniature of Ayastefanos depicted by Sabriye Şeker. Source: Tuna, 2006, p. 14.

What makes this growth more compelling is that the land reclamation not only changed the confines of the Yeşilköy coast but also had inevitable consequences for the built environment, everyday life, and cultural practices. This story is indeed neither unique to Yeşilköy nor the other coasts of Istanbul, as rapid urbanization practices across the world put pressure on the natural coastal boundaries of the urban, and the rising need for urban space is met by growth toward the sea. Numerous instances in Istanbul, other coastal cities in Türkiye, and beyond illustrate that water-to-land transformation is a consequence of the requirements of modernization (Güner, 2017; Akcan, 2004), asserting land reclamation

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as an inevitable outcome and a technical solution within the historical trajectory of urban growth. The result is the formation of a new ground, upon which infrastructure, recreational facilities, and private assets are hosted with the expansion of the urban landscape. This phenomenon has been the subject of extensive research assessing the impacts of landfill practices, raising concerns such as ecological degradation (Erten, Rossi, 2019; de Mulder et al., 1994), commodification (Erkılıç, 2021; AlShehabi and Suroor, 2016; Grydehøj, 2015; Casper, 2013), and coastal legislation (Serim, et al., 2022; Gülbitti, Özüduru, 2020). However, these studies rarely take into account the spatiality of natural borders before land reclamation, often focusing solely on post-transformation conditions. It is in this context, that the study centers around the various events unfolding in time concerning Yeşilköy coastal reclamation and comprehensively analyzes the conflicts and relationships between these events. The interest in this research was particularly aroused by the complex narrative of the Motel Yeşilköy, located on Lot 5 by the reclaimed Yeşilköy coast.

The main aim of this study is to adopt an alternative approach to analyzing urban growth by reversing the conventional focus. Instead of examining reclaimed territories to comprehend the consequences within the confines of the coastline, this research shifts the perspective to unclaimed lands, identifying the drivers and outcomes of land reclamation through the territories that were left behind. This retrospective perspective puts forward a critical methodological stance to analyze the shaping of the coastlines in Istanbul's urban geography. Specifically, the study intends to trace the legacy of the natural coastline as a tool for understanding the historical development of the coast, while also examining the delivery of land reclamation. This approach offers a unique methodological contribution to the literature by acknowledging the act of land reclamation as both an outcome and a catalyst of various political and socio-economic dynamics.

The importance of this study is two-fold: first, it represents reclamation as a socio-political phenomenon that influences urban public space and the lives of buildings adjacent to the reclaimed territory. In doing so, it explores how the reclamation of the coastline redefines the position of architectural space and public life. Second, it highlights the conflict inherent in coastal reclamation, as it envisions yet-to-exist spaces on the reclaimed territory while determining the fate of the existing building stock adjacent to natural confines. To this end, the study revolves around the following refined research question: How do the spatial narratives of Lot 5 contribute to understanding the intricacies of the reclaimed coastline?

Employing the proposed methodological framework in the context of Yeşilköy, the research argues that coastal reclamation is not only a spatial phenomenon that expands ground to make it accessible and suitable for use but also a socio-political phenomenon with significant consequences. By tracing the historical evolution of the Yeşilköy coastline at a larger

scale and concurrently reflecting on this progression through the nuanced changes and life within Lot 5 at a more localized level, the study offers a situated perspective to unravel the complexities of the reclaimed coast in Yeşilköy. Lot 5, connected to Motel Yeşilköy—a renowned mid-20th-century architectural landmark, situated in the same parcel- serves as a critical witness to the social, cultural, and urban political shifts accompanying these changes.

Reading the reflection of macro-level global and national events and urban agendas through the micro-life of Lot 5 enables a deeper understanding of the reclaimed coastline, viewing it not merely as an urban edge but rather as a socio-spatial phenomenon. This critical stance illustrates that the natural coastline, despite being transformed by land reclamation, perpetuates both in urban memory and as a tangible physical boundary. In this regard, our goal in this study is to both incite and simulate a new insight when examining the notion of land reclamation, engaging simultaneously with the variety of tangible and intangible dimensions of urban space.

STUDY AREA

The study area of this research is located in Yeşilköy, situated along the northern coast of the Sea of Marmara on Istanbul's European side (Kurt, et.al. 2010). Yeşilköy has gone through significant transformations, particularly in its coastline. This study further zooms in on Lot 5, located at coordinates 40.956571, 28.819916 (Figure 2), a plot of land once distinguished by the Yeşilköy Motel, a notable landmark of the mid-20th century. The roots of this analysis undertaken in the study date back to the early 20th century, a period when no development has yet taken place on or around Lot 5. Thus, in this study, the history of Lot 5 traces its origins back to an open green field that was later split leading to the construction of a mansion on the land. Nevertheless, the earthquake in Adapazarı, the enactment of laws prompted by the expansion of motorways and the increasing reliance on automobiles resulted in the demolition of the mansion and the subsequent construction of a motel. The dynamics of the coastal landscape took a significant turn in 1982 when a large-scale land reclamation project filled the shore, distancing the subdivision from the sea. To compensate for the loss of proximity to the beach, a pool was constructed on the newly filled land, which had once been a picturesque pebble beach. Consequently, Lot 5 found itself situated far away from the sea it once bordered, altering its relationship with the coastal environment. Subsequently, the subdivision of the motel was eventually demolished, and in its place, a gated community housing project emerged. With this new development, the lot completely lost any remaining connection to the seaside, further highlighting the impact of coastal reclamation on the transformation of the coastal landscape. Against this backdrop, both Yeşilköy, in terms of its exposure to reclamation, and Lot 5, in terms of witnessing reclamation and beyond, mark a critical area of study in this paper.

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Figure 2. Study Area of Research. Left below; Lot 5 from the original title deed. Right middle; 1:5000 map showing property before splitting.

A METHODOLOGICAL FRAMEWORK TO TRACE THE MAKING OF RECLAIMED COASTLINES

Amidst the discussions surrounding globalization and urbanization, it is widely acknowledged that the concept of a unitary city is inadequate to capture the intricacies of our complex world. However, a fundamental paradox lies at the heart of these debates: while spatial strategies aim to control, plan, and administer the essence of a city, there exists an ambiguous succession of interpretations and representations of its attributes (Vigar et al., 2005). Recognizing this perspective requires looking beyond the dominant - in other words, top-down - representations that constitute the city, while at the same time incorporating the portrayal of bottom-up experiences. Consequently, to cultivate a more democratic, pluralistic, and inclusive urban imaginary, Bloomfield (2006) suggests that cities should actively engage with a diverse range of perspectives, thereby incorporating multiple urban narratives. Narratives assume a critical role in this endeavor, acting as a documentation of "spoken or written accounts of connected events" (Niculae, et al., 2021, 4), that contribute to the construction of urban and architectural space.

Embracing the narrative method, the study focuses primarily on archival resources including visual and written text on the Yeşilköy shoreline and Lot 5, and secondarily on semi-structured interviews with people who witnessed the transformation of the coastline. While the visual materials relate to old photographs, land titles, municipal records, and urban plans before and after land reclamation, written documents include regulations, policies, and correspondences with architects and urban planners. These collectively illuminate the evolving social and cultural landscape of Yeşilköy, as well as the effects of urbanization and coastline reclamation.

The study adopts a multi-scalar analysis to explore the intricacies of coastal reclamation and urban transformation in Yeşilköy. This multi-scalar analysis approach intertwines with the personification of Lot 5, a specific lot that has undergone significant transformation over time. This approach allows for a witness firsthand and more nuanced examination of the local implications of coastal reclamation. It further enables a comprehensive examination of the evolution of Lot 5 and its surroundings, considering the socio-political implications of spatial changes across macro, urban, local, architectural, micro scales. As such, it enables the socio-political implications of spatial transformation to be explored at various levels, providing a palpable account for understanding its effects.

As mentioned earlier in the study, since an alternative historical account of the coastal reclamation cannot be realized solely from the perspective of Lot 5, in order to fully understand this polemic spatial transformation, it is necessary to outline the designations of various scales upon which the methodological framework of this research is built, including macro, urban, local, architectural and micro scales (Table 1). At the macro scale, we identify the consequences of global urban growth, recognizing the broad aspects such as infrastructure, transportation systems, and land use planning of the 20th century. It also takes into account contextual factors like wars, disasters, and climate conditions beyond human control. At the urban scale, we specifically analyze the events that unfold in the urban narrative, recognizing the factors in the urbanization of Yeşilköy. Moving to the local scale, we zoom in further to the specific sites within or at the periphery of Yeşilköy. In contrast, the architectural scale focuses on the design and function of structures, interpreting the contextual implications of broader scales. Finally, the micro-scale in the study corresponds to the life of Lot 5. While readings at multiple scales may at first glance appear unrelated and therefore disconnected, positioning these different events across scales according to a timeline becomes a tool for deciphering coastal reclamation, revealing the complexity behind it. In addition to the methodological framework conveyed through Table 1, the following accompanying figures in the article can be considered both as visual tools constructing a visual narrative that bridges the different layers behind this complexity. These layers, corresponding to different archival elements such as coastal reclamation plans, aerial views, ownership status certification, photos approaching the shore, etc., emerge and somehow merge to suggest an alternative historical visualization. In this context, a series of chronologically ordered visuals depicting the dynamic interplay of different elements that shaped the evolution of Lot 5 in relation to Yeşilköy coastline reclamation are presented to illustrate its transformation over 84 years, until it became home to a residential gated subdivision in 1996 (Figure 10).

By giving prominence to the micro-scale through the examination of Lot 5 while simultaneously considering multiple scales, our research not

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only adopts but also applies a methodological framework to trace the interconnected, overlapping, or conflicting narratives, hence providing a comprehensive understanding of the complexities and nuances inherent in the process of urban growth and coastal reclamation. Similarly, Gökçen Erkılıç (2021, 119) emphasizes that the coastline should be considered a social and cultural phenomenon, departing from the traditional representation of the coastline as more than a physical line:

"... [U]rban edge, as a demarcation between the urban and its exterior, becomes more valid in such intriguing contexts of urbanization and ecological crises... [U]rban borders can now only be assembled in multiple scales, with multiple human and nonhuman actors, and within broader temporal frameworks. The urban edge condition is shaped by the entanglements of the political with the ecological; the small and regional; and the historic process with the present day. Beyond the cartographic image of the line, I would prefer to see the coastline as a site for the production of meaning. Presently, the interest in the material agency of the processes that shaped the coastline follows the material flows and their political ecologies. I would argue that the coastline itself, as a materially produced body, holds records, upon which new relations can be deciphered. As long as coastlines demarcate destinies, give birth to stories, and retain mysteries, they remain a subject worthy of further research."

Such a view confirms that a better understanding of the coastline as a social and spatial construct rather than just a physical boundary can be obtained by looking at Lot 5's micro life. Yeşilköy's natural coastline continues to have a profound impact on their lives and is still remembered fondly despite the changes brought about by landfilling. Thus, the article brings together materials from a variety of sources to produce a distinct portrait of land reclamation. We acknowledge the rising interest in a repository of narrative methods inspired by a shared fascination with urban narratives. These methods celebrate the diversity of thoughts and perspectives, gathering not the most established and conventional approaches to interpreting, experiencing, or documenting urban spaces, but a range of innovative and imaginative techniques stemming from various backgrounds. Thus, such a perspective aims to reveal the multitude of ways in which the urban can be understood and expressed, ultimately contributing to its multifaceted nature and ongoing evolution (Machado e Moura et al., 2023, 10).

Following the methodological approach, the next section is structured around three major phases for deciphering the reclaimed coastline of Yeşilköy, each of which is presented by employing a multi-scalar approach discussed throughout the events unfolding over time. Consequently, aligning with the narrative structure, the paper expounds on the subject of coastline reclamation from several directions. Making connections across these fragmented spatial narratives allows for recording the causes, processes, and consequences of the coastal

reclamation, thus offering a comprehensive reading that relates to the making of the Yeşilköy coastline reclamation. By uncovering bottom-up narratives that explore the ramifications of spatial transformation, as well as elucidating top-down visions of transformation in the urban landscape, such an interpretation offers another historical account of the prevailing narratives surrounding the reclamation of the Istanbul coastline. This comprehensive approach sheds light on the complex interplay between individual experiences, community perspectives, and broader urban development agendas, providing a more nuanced understanding of the multifaceted nature of coastal reclamation.

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Table 1. Chronological aspect of multi-scalar socio-spatial analysis of the research

Micro Scale (Lot 5)	Architectural Scale	Local Scale	Urban Scale	Macro Scale	Function	Scales ----- Dates
		Hospitals were established in Ayastephanos.	Deportation to the periphery has begun.	Balkan War and Pandemic outbreak.	The Mansion	1912-13
The mansion was purchased.		Displacement from Yeşilköy took place.				1913
WWI						1914
Soldiers occupied the area surrounding the lot.	Sea Baths started ceasing		Sea baths transformed into beaches.	The occupation took place throughout Thrace and Anatolia.		1919
			Sea baths are replaced by mixed-gender beaches.	Motel Typology appeared in the US.		1920
				The definition and protection of coasts in Turkish law was published for the first time.		1926
The adjacent two 2 acre divisions were consequtively sold to Hilmi Naili Barlo and Fehmi Simsaroğlu. Two parcels housed the Tanaçan and Falez subdivisions.	The motel typology started to evolve in parallel with the development of highways and the increase in automobile use.	Istanbul beaches underwent modernization.	Democrat Party (DP) governance has been elected (1950–1960).	Motel typology became widespread globally and nationally with the vehicle-oriented urban development.		1950
	Local incentives for tourism investment have been encouraged by the government.		The Law on Promotion of Tourism Industry was published.			1953
	The modernization of Florya Beach (1956-1959) was led by the famous architect Sedad Hakkı Eldem. Ataköy Beach has also been developed (1956-1957) as part of the Ataköy Housing Project.		Article 4 (f) of the Municipal Building and Roads Law No. 2290 was promulgated. This law remained in force until the Land Use Law No. 6785 of 1956, which stipulated that "On the waterfront, a 10-meter wide area from the dock or the point where a dock can be built shall be left free for the benefit of the public. The area up to 10 meters inland from the shore is considered the coastline and is protected".			1956
The construction of Gazi Evrenosoğlu Mansion took place.		Yeşilköy Airport has been opened for international air traffic.				1957
	The construction of Ataköy Beach took place.		Decentralization of industry and residence has been suggested by Piccinato.			1958
	The construction of Ataköy Beach Motels took place.					1959
	Motel A and Motel B were established within the Florya and Kilyos facilities. They are the local equivalent of the motel typology, which dates back to 1956 as the first facility of the Tourism Bank, a state institution established in 1955.					1960
An earthquake occurred in Adapazarı.					Motel Yeşilköy	1967
Construction of Motel Yeşilköy has begun.						1969
		Popular sea baths in Istanbul remained intact along with city beaches.				1970
		It has been forbidden to build closer than 10 meters in the coastline.	Law No. 1605 and Additional Article 7 added to Law No. 6785.			1972
Military coup attempt realized.						1980
		Coastal reclamation by natural means, such as aluminum brought in by rivers, or by artificial means was considered to be equivalent.		The coasts became under the sovereignty and savings of the state.		1982
A swimming pool has been built on the reclaimed coastline.	Land Reclamation of Yeşilköy coastline took place.					1984
Motel Yeşilköy remained disfunctional.	Designed by Hayati Tabanlıoğlu on 50 hectares of land on the site of Ataköy Beach, the Ataköy Tourism Complex consisted of a shopping mall, an international marina, hotels and other commercial, food and beverage and entertainment units and included a sea bus pier.			Vested rights introduced through Coastal Law No. 3086 to the Istanbul Metropolitan Municipality.	Disfunctional	1987
	The Yeşilyurt-Yeşilköy Coastal Arrangement, a 3 km coastal project, was designed and implemented by EPA Architecture + BAYTUR Construction.					1988-1989
The Yeşilköy Motel has been demolished.						1992
Gazi Evrenosoğlu Konakları was constructed.					Gazi Evrenos Konakları	1996-97
	The request to declare the Ataköy coast an "urban protected area" was rejected in 2009. Subsequently, motels A, B and C, which were part of the touristic facilities, and the recreational facilities and camping used by the bank in the past were demolished. Today, they are replaced by different housing and touristic facility projects.					2009
		"The integrated management and planning of coastal areas, studies, works and procedures for the regulation of coastal areas and geological and geotechnical studies related to these areas, the determination, approval and registration of the coastal boundary line" and "the preparation, preparation and ex officio approval of surveys, maps and plans of all types and scales related to coastal and filling areas and back areas that are functional and physical continuation of these areas and ensuring their implementation" have become among the duties of the Ministry of Environment and Planning.				2011

FINDINGS and DISCUSSION

Motel Yeşilköy used to be a bustling tourist destination once, attracting crowds of vacationers to enjoy the coastal experience in the 1960's. However, Motel Yeşilköy's popularity ended due to the political circumstances of that period, ultimately leading to its demise caused by the landfill. While at first glance this narrative may seem to offer a limited perspective, the depiction of the building's history through the simultaneous juxtaposition of different narrative layers implies a multifaceted way of examining the consequences of land reclamation, suggesting an alternative historical account that goes beyond a one-dimensional perspective. In other words, this study opts for in-depth exploration, avoiding shortcuts, to unravel how the lifecycle of Lot 5 serves as a methodological gateway for examining the broader political climate, which exhibits parallel characteristics.

State of Being an Edge to the Urban

Although the narratives traced in the article primarily span from the 1850s to 2006, it is important to acknowledge that in 1793, as noted by Guillaume Antoine Olivier, there were "three or four farms in Ayios Stefanos", Yeşilköy (Tuna, 2006). However, entering the late 19th century, the district's connection with the center was strengthened with the arrival of the train line, and the settlement of Yeşilköy expanded further north due to the immigration of foreign migrants resulting from the wars (Aydın, Eres, 2018, p. 38). In the 1870s, notable urban growth was witnessed when the neighboring suburb of Bakırköy was connected by train to Yedikule, followed by railway connections to Yenikapı, and eventually to Yeşilköy and Florya in 1871, which then extended further in consecutive years to Sirkeci and Küçükçekmece (Kariptaş, Güney, 2018, p. 52). Among the newcomers was Salih Efendi, an urban designer at Istanbul Şehremaneti (Municipality), who proposed transforming the coastal center of the town into a main road and planting acacia trees for afforestation purposes (Tuna, 2006). The establishment of the train network encouraged rich families to start building second homes or permanent residences in and around Yeşilköy, thus transforming the neighborhood into a thriving seaside town. This flow, observed not only in Yeşilköy but also throughout Istanbul, is evidenced by the construction of sixty-two sea baths on the shores of the city, as regulated by a set of rules (nizamname) dating back to 1875. Among these, thirty-four were designated for men and twenty-eight for women (Gürel, 2021). According to historical records (Fikriyat, 2018), together with the neighboring suburb of Bakırköy, there were more than ten sea baths in and around Yeşilköy by 1884; yet these were predominantly private rather than public amenities (Tuna, 2006) (Figure 3). The tradition of sea baths by the water continued until the 1920s when mixed-gender beaches with facilities gradually replaced the concept of segregated sea baths. This shift was particularly evident following WWI, as the soldiers of the occupation forces began swimming en masse in the non-Muslim

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settlements of Bakırköy and Yeşilköy (Kaya, 2023). This has exemplified how the built environment enabled the access and use of the coastline while shaping the relationship of the neighborhood dwellers.

Figure 3. Sea baths in Yeşilköy depicted on an old postcard. Source: Tuna, 2006, p. 255.

Tracing the cultural life along the Yeşilköy coastline, the transformation of the coastline from a humble fishing village into a thriving seaside town is evident as urbanization and tourism practices expanded during the late 19th century. Indeed, the maps from 1909 and 1912 provide additional evidence of Yeşilköy being on the periphery of the urban center, with Lot 5 depicted as a vague structure, blending in with the surrounding green fields that border the city of Istanbul. Nevertheless, the suburban territory of Yeşilköy, with its leisurely atmosphere, played a significant role as a critical backdrop for the political events of 1909, particularly during the "March 31" uprising. The mandate for the settlement's presence on the periphery also continued during the Balkan War, as hospitals were set up in Yeşilköy due to the pandemic while the casualties deported from Istanbul to the periphery were buried in the ever-growing green fields of Yeşilköy. Once again, Yeşilköy's existence on the urban fringe positioned it as a protective barrier for the city of Istanbul. In the following years, around 1913, when Yeşilköy was on the verge of abandonment as the majority of its residents, except for approximately 15-20 local families, had left the settlement, the structure on Lot 5 (Figure 4) was purchased from its Bulgarian owner, Mihail Stavro. The building, which featured thirty rooms split into haremlik (women's quarters) and selamlık (men's quarters), suggests that the original owner may have been Muslim. The mansion was occupied and served as a residence from 1912 to 1966 until it suffered damage because of the Adapazarı earthquake (Evrenosoğlu, 2022).

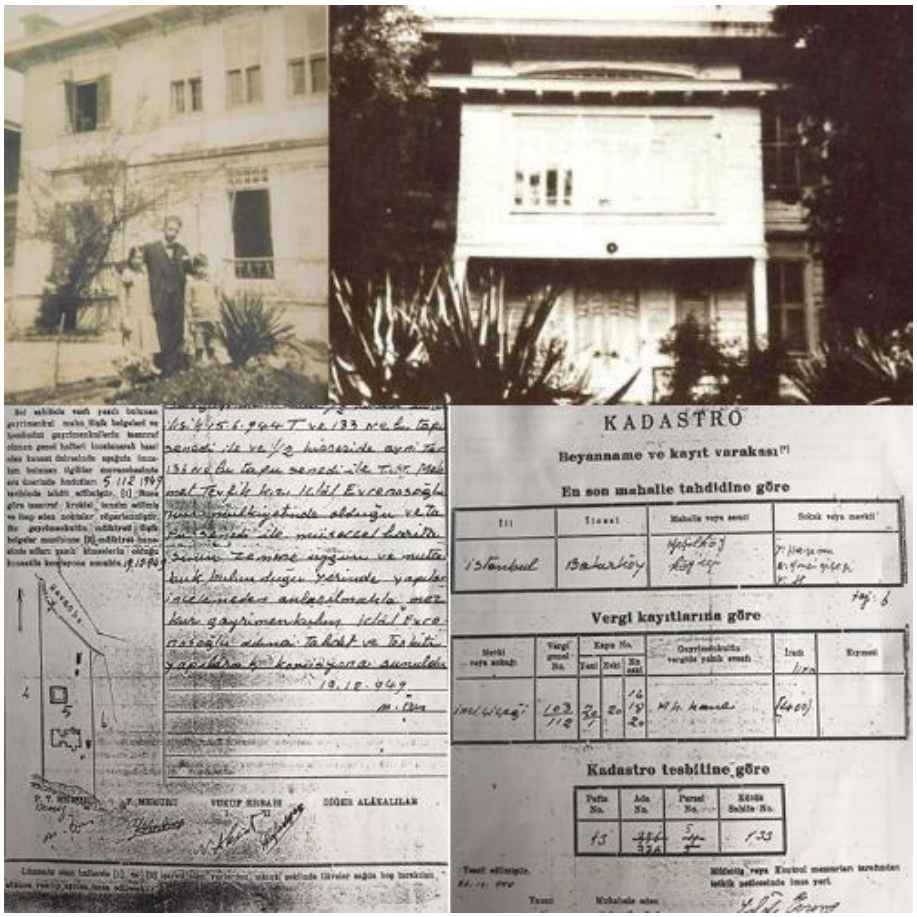

Figure 4. The title deed of Lot 5 split and formed a bigger green field. Courtesy of Özer Gazievrenosoğlu

Over time, the coastal layout transformed, with the green field being replaced by private mansion buildings that defined the coastline. As sea baths were subsequently introduced, this transformation continued, gradually leading to the privatization of the coastal area. Thus, taking a closer look at the extensive history of Yeşilköy reveals a recurring duality between the periphery and the center, marked by a divide between urban and rural. This duality is manifested through Yeşilköy's role as a peaceful refuge during times of war, as well as periods of abandonment and subsequent reclamation. Cultural evidence of this duality can also be observed along the coastline of Yeşilköy, where the presence of both public and private sea baths, as well as gender segregation, is prevalent. By acknowledging the profound impact of the surrounding context on the attributes of buildings and, reciprocally, the influence of buildings on their environment (Latour, Yaneva, 2017), it becomes clear that the buildings effectively mirror their surroundings. This is illustrated by the division of the mansion in Lot 5 into *haremlik* and *selamlık*, providing a clear demonstration of the context of its architectural form and function. The relationship between content and context, as observed in the case of Lot 5, proves that they are not mutually exclusive but rather interconnected elements, reflecting a dynamic and fluid complexity instead of a static state.

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Transitioning From Periphery to Urban Integration

During the latter half of the 20th century, urban waterfront development processes emerged globally, leading to the allocation of diverse functions to coastal territories. However, this transformation brought about several challenges, including limited interaction with the water, reduced physical accessibility, and a loss of historical identity, ultimately impacting the availability of open spaces (Seçmen and Türkoglu, 2021). Türkiye has also experienced its share of this development, and since the 19th century, the alteration of Istanbul's waterfronts has occurred concurrently with urban growth. However, the absence of a comprehensive planning strategy in Türkiye has led to common challenges in the country's coastlines, including unregulated construction, environmental degradation, and a lack of public access to the sea.

To address these issues, Turkish law established regulations to protect the coasts. The Civil Code No. 643 in 1926 stipulated that "unclaimed things and goods whose interests belong to the public are under the jurisdiction and disposal of the state," highlighting the state's role in coastal protection. Further reinforced in 1956 with Article 6785, the principle that the coast is public property was established, reserving a 10-meter-wide space along the water's edge for public benefit (Serim, et al., 2022). These protection regulations designated coastal areas as preserved, prohibiting private property establishments within this zone.

However, contradicting these legislations, a series of economic incentives were introduced in 1953 to investors who intended to construct "tourism establishments" such as hotels, motels, and camping sites, under the Tourism Industry Encouragement Law (Sağlam, 1995, p. 128). The tension between economic development and legal measures played an important role in shaping Türkiye's coastal architecture in the 1960s. The politics of tourism had a significant impact as the government aggressively encouraged the development of contemporary, western-style structures to appeal to foreign tourists. The government encouraged tourism as a means of boosting the economy and enhancing the nation’s urban image globally. This emphasis on tourism led to the transformation of many coastal areas into tourist destinations, often at the expense of local communities and traditional ways of life. Consequently, the prioritization of the politics of tourism at the national level led to the gradual disappearance of traditional waterfront housing structures, including the mansion located on the coast of Yeşilköy in Lot 5.

In parallel with these challenges, the development of motorways, and the global and local expansion of the automobile industry since the 1950s gave rise to the emergence of motel typology (Savaşır and Ultav, 2020). This shift from traditional waterfront housing to motels reflects the changing priorities and values associated with coastal spaces as they transitioned from primarily residential areas to destinations for tourism and leisure. Following the damage caused by the 1969 Adapazarı

earthquake, the owners of Lot 5 demolished the mansion to build a subdivision with smaller residential versions to be shared among family members. However, the economic climate favoured capitalism, and regulations allowed only a tourist facility license. Consequently, on Lot 5, Motel Yeşilköy was built in 1969 as a 30-unit 72-bed touristic facility on four acres (Figure 5). The motel's proximity to the first airport in the country and popularity as a tourist destination were critical to its historical significance, as it served as a hub for city travellers and visitors.

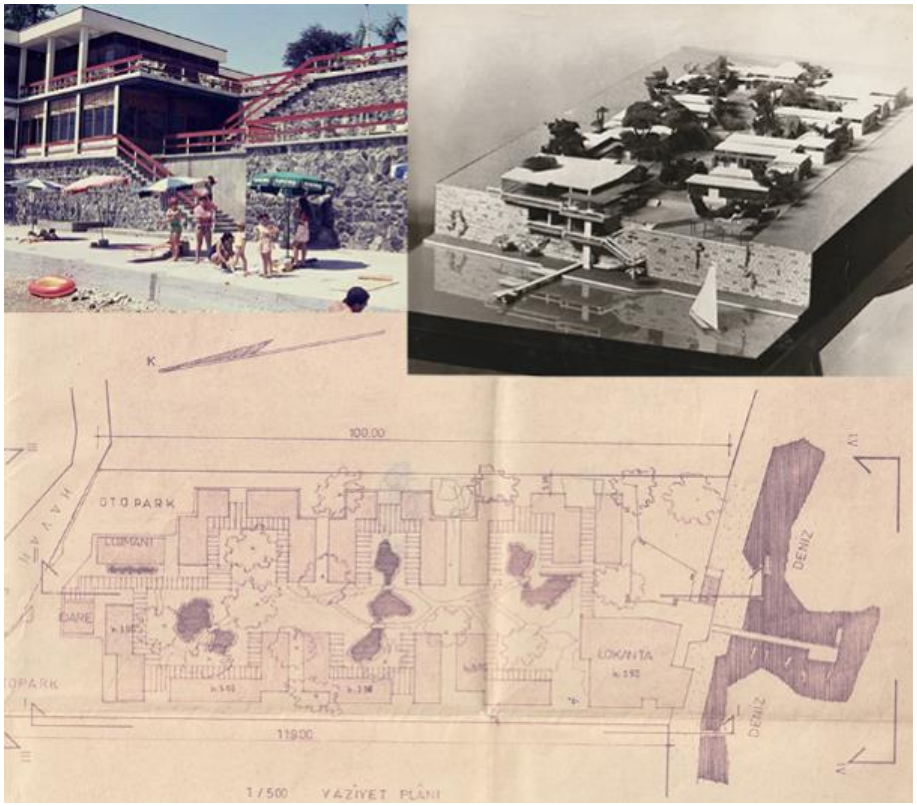

Figure 5. Motel Yeşilköy of Lot 5. Upper left: Cliff stairs. Upper right: Architectural Model Lower: Site Plan. Source: Collection of the Architect, Öztürk Başarır, 1966.

The architectural style of Motel Yeşilköy aligns with mid-20th-century Turkish hotel architecture, featuring unique characteristics, including the fragmented style and incorporation of brutalist elements. The fragmented style was born in opposition to the "single block" style in the period between 1950 and 1980 in Türkiye, but it is an approach that is rarely seen in tourism structures. Buildings such as the Istanbul Hilton Hotel, the Tarabya Hotel, and the Büyükada Anadolu Club are among the important examples of the singular mass approach in Turkish hotel architecture in Istanbul. In the fragmented approach, the primary goal is to establish a more balanced relationship between dispersed masses and spaces, and to ensure that the building blocks receive sunlight and air from all sides. When we look at the settlement plan of Motel Yeşilköy, we see that functions such as accommodation, restaurant and administration are handled in separate blocks, and especially L-shaped accommodation units are arranged on both sides of a circulation axis to create small courtyards. Therefore, Motel Yeşilköy can be considered one of the first examples of the fragmented approach of its period. It stands out for its

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unconventional motel typology, emphasizing human scale by staying limited to the ground floor—a rarity for its period in the country. The structures provide information about the structural contributions of architectural elements (load bearing, cladding, masonry, opening, etc.) thereby reflecting the brutalist style, material, and construction technique on the barely exposed exterior. The load-bearing blind surfaces with vertical brick panels and the masonry stone retaining wall along the coastline are what distinguish Motel Yeşilköy as brutalist. Non-load-bearing window openings also make the brutalist style easier to read, as they are mostly placed without lintels, horizontally or vertically (Pasin, 2023).

Originally, motels were designed to be affordable, practical, and straightforward, resembling suburban bungalows. Unlike upscale hotels near railroads and urban business hotels that primarily served male guests, motels had different locations, parking arrangements, and services. All units had fully equipped parking spaces and access to shared facilities like kitchens, laundry areas, drying spaces, and playgrounds (Savaşır & Ultav, 2020). Motel Yeşilköy's communal atmosphere was further enhanced by its proximity to the beach, which welcomed visitors with a picturesque view accessible via stairs. Additionally, the structure's architectural and cultural significance is further amplified by its appearance in various films, serving as a film set for many Turkish movies still shown on TV today. Before the boom in summer resorts as second houses in the 1990s, the motel hosted well-known families from Istanbul throughout the summer seasons of the seventies (Figure 6).

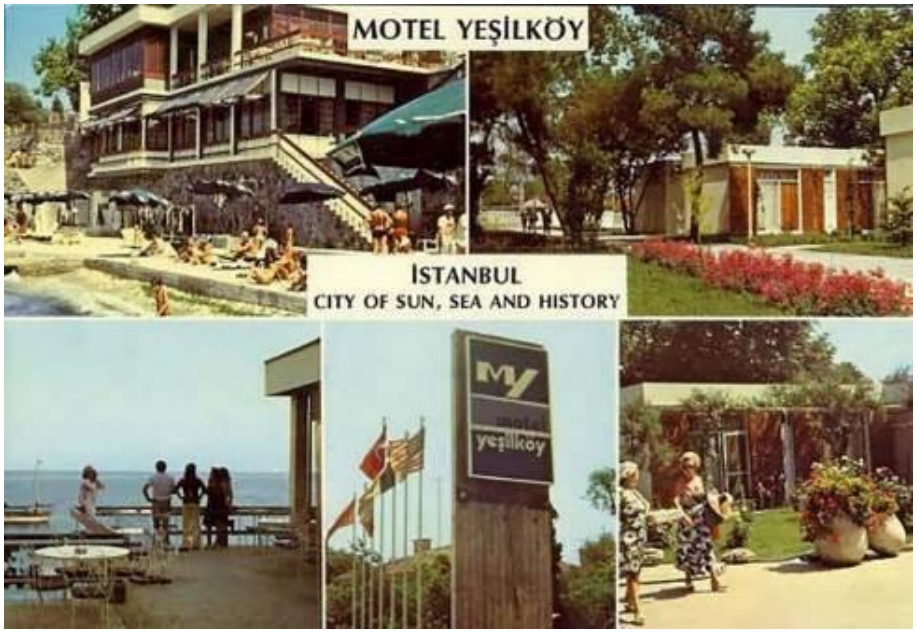

Figure 6. Motel Yeşilköy. Restaurant, Motel room, Sea view from terrace level, Entrance, Room at terrace level. Source: Collection of the Architect, Öztürk Başarır, 1975.

This significance corresponds strongly with the experience depicted by one of the locals of Yeşilköy remembering from his childhood:

"Motel Yeşilköy... They say it's indescribable, you have to experience it, and it's exactly like that, especially in the evenings. As soon as we entered the motel, we were surrounded by flowers. The scent of the jasmine trees and the blooming flowers filled the air as we made our way towards the stairs. Right at the beginning of the stairs, we would look out at the sea, witnessing its pristine and calm state. We would descend the stairs, two or three steps at a time, eagerly anticipating the magnificent taste of the sea as the sun set... Then we would take a shower, completing our delightful evening."

Closed Facebook Group

The concise historical account of Motel Yeşilköy confirms that coastlines saw heightened utilization due to the rise of mass tourism, and the post-1960s era of prosperity bolstered the capacity of urban communities to allocate more time and resources to recreational activities (Eke, 1995). As a result, rapid urbanization has emerged due to the clustering of the global population in a small number of locations, while at the same time, as in Yeşilköy, districts on the outskirts of cities have also witnessed increased connectivity with the center.

Shrinking Use Value of Lot 5 with the Expansion of the Urban Coastline

The interaction of Yeşilköy Motel with the sea and its urban surroundings has evolved, marked by the expansion of the urban coastline and the truncation of its beach through landfilling in 1982. The process of land reclamation not only affected Motel Yeşilköy but also the destiny of the long strip of coast that has a long history of interaction with the sea (Figure 7).

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Figure 7. Aerial Photo of Motel Yeşilköy after reclamation. Source: WowTurkey.

However, the public interest was considered much later than the act of landfilling, and 5 years after, between 1988 and 1989, the three km coastal strip project, initially conceived as a vehicle road between Yeşilyurt and Yeşilköy, was designed and implemented as a recreation area for the Istanbul Metropolitan Municipality (Gürsel, 1988). The representative designer from *Etüd Proje Araştırma* (EPA-acronym for the Study-Planning-Research) Architecture and Urbanism Workshop, who advocated for the creation of a significant green space in the landfill area, mentioned that there was a lack of preliminary information regarding the potential usage of this landfill space. Thus, the envisioned green public space was intended to serve as a communal area, enhancing the overall arrangement and organization of the area (EPA Interview, 2022). In this public space, the design office proposed a pedestrian path that continued along the coast, a coastal promenade starting from Yeşilyurt and continuing to Florya toward the west. As a result, the initial coastline, which had existed as a narrow and abrupt cliff before the landfill, allowing individuals to easily access the sea and unite with it from the shore, was indeed disrupted by the landfill. As confessed by the EPA planner himself, "this modification has cast doubt upon the waterline" (EPA Interview, 2022), a concern that has been substantiated by the enactment of Coastal Law No. 3086 (Ay, 1996). The law has allowed for the creation of landfill areas along the coast, resulting in reclaimed land from the sea, and endeavours to expand coastal recreational spaces. This expansion of coastal recreational spaces reflects the increasing demand for access to the coast and the growing recognition of its importance for leisure, tourism, and environmental conservation. The influence of urban

policies, resulting in planning constraints, is not only apparent in the written content but is also visually manifest. As a visual material, the site plan underscores the intention to restrict the design to the reclaimed land, while disregarding the area extending beyond the natural coastline (Figure 8). The site plan incorporates the zoning layout, yet it does so vaguely, seemingly fading into the backdrop, aided by the similar background tones that contribute to its diminished visibility. A fragmented urban vision is also discernible as the connotations dissect the coastline into segments and analyze them in a piecemeal fashion.

The urban planner in charge of the reclamation project, mentioned in the interview that "the green spaces in this region might be some of the first instances in Istanbul's history of creating public areas along this coastline through this project," which, as seen in Figure 9, introduces a contrasting perspective to the life of the coastline before reclamation. This prompts us to question whether land reclamation implies an effort to make all shores accessible to the public, or under the claim of making public, turns into a new threshold that disregards the history, culture, and everyday life of Yeşilköy. The way context is understood shapes what is included in new phases or undertakings; however, there is some uncertainty as to whether this was the case during the reclamation of the Yeşilköy coast.

Figure 8. Yeşilköy master plan designed by EPA Architecture Office. Source: Collection of the Planner, Ersen Gürsel, EPA.

The term used for defining landfilling suggests an act of claiming back the land lost to the water, yet in the context of Lot 5, it signified the erasure of its inherent identity, defined by its proximity to the water's

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edge. The coastline of Motel Yeşilköy has transformed its once-natural state of pristine beaches and clear waters into an artificial pool that has been excavated within a landfill, all to preserve its original identity (Figure 6-7). If, according to Venturi (2008), context is "what gives a building its meaning", then context that is reclaimed has rendered the motel less accessible and less relevant to current needs, leading to a decrease in the use value of the building. This shift in context emphasizes the dynamic nature of placemaking and the importance of designing and managing built spaces with the evolving needs and values of communities in mind. Motel Yeşilköy was ultimately decided to be demolished in 1992, due to the loss of its historical significance and lack of economic viability. This led to Lot 5's eventual replacement by Evrenos Konakları, a notable gated social housing complex.

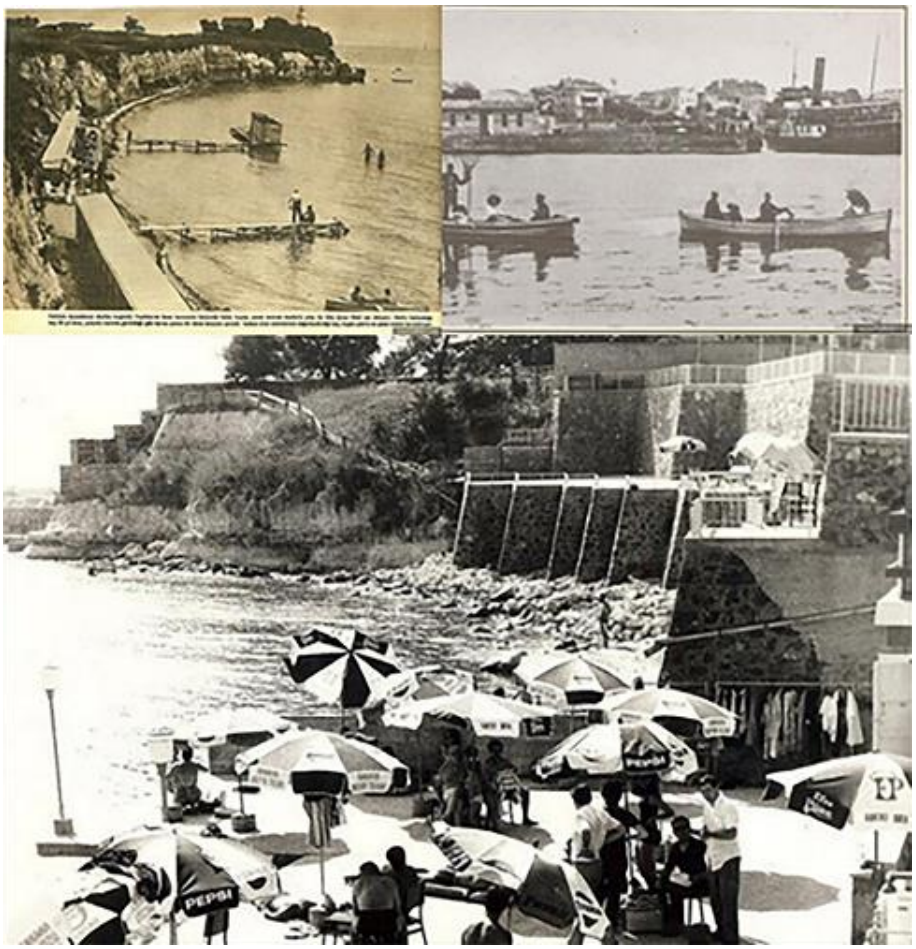

Figure 9. Coastal life before reclamation at different time intervals. Upper Left: Shore of Çınar Hotel in 1920's. Upper Right Yeşilköy Pier, late Ottoman era. Lower: Motel Yeşilköy, 1969. Source: WowTurkey.

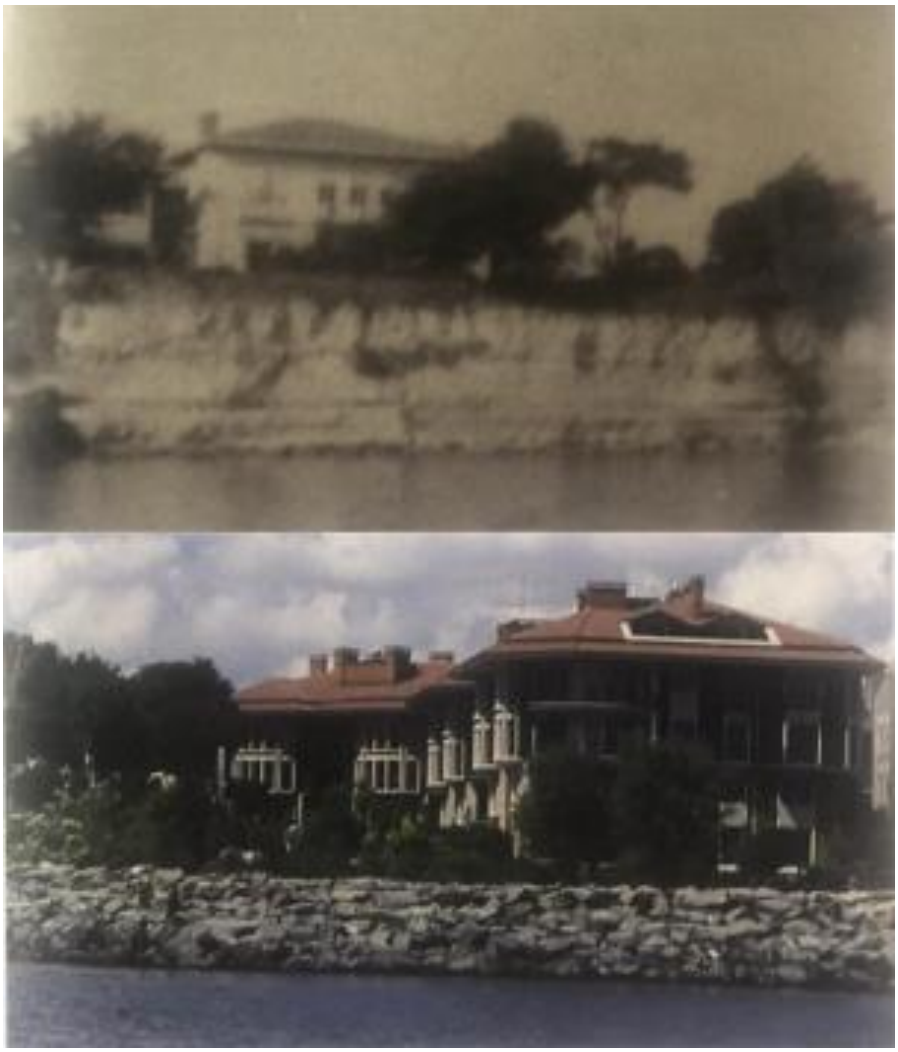

Figure 10. Upper: Lot 5 holding the Mansion, 1960's. Lower: Lot 5 Holding Evrenos Konakları taken from the sea, 1990's. Source: (Gazievrenosoğlu, 2017)

CONCLUSION

The paper centred on *Lot 5,* situated in the coastal district of Yeşilköy, formerly known as Ayastefanos, as an exemplar of the transformation undergone while still holding on to its identity. Through a narrative lens, it looked into the historical trajectory of Lot 5 inside Yeşilköy, offering light on the social, cultural, and political developments that have formed the coastal area throughout time. Questioning how the spatial narratives of Lot 5 contribute to understanding the intricacies of the reclaimed coastline, the paper contends that rather than considering coastline reclamation as a disconnected extension of the urban boundary, appraising it needs an awareness of the intricate interaction of spatial narratives at various scales.

When examining Lot 5 in its present state, although it retains the same residential function after its green field status, its interaction with the sea has undergone a significant transformation. The coastal life of Yeşilköy suburban town, once bustling with sea baths in the late 19th century, has now transitioned away from its beach town character while still maintaining a semblance of coastal life through the presence of a man-made bay. While the natural shoreline remains embedded in the collective urban memory, it has transformed, shifting from a natural

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barrier to a wall that segregates gated housing structures from the public. The study shows that while reclamation and landfilling may change the physical border between land and sea, the natural coastline is still present in the city's residents' collective memories as well as in the form of a tactile presence. This demonstrates the natural coastal landscape's resilience and continuing relevance amidst urban expansion (Figure 10).

While exploring the reclamation of the coastline redefining architectural space and public life through remembrance and an attempt to offer an alternative reading on land reclamation practices, we suggested an indirect lens for the coastline study. This approach presents an opportunity to navigate through the complexities of the making of a coastline throughout a brief history. By shifting the focus from direct observation of the coastline to the examination of the interconnected elements that shape it, we gain a richer understanding of the dynamic forces at play in coastal environments. Therefore, the article not only argues that coastal reclamation cannot be investigated in its current state, but it also emphasizes that this reclamation can only be truly revealed by visiting different scales and dimensions. Consequently, we attempted to address the fragmented state of the urban imaginary in this article. As emphasized by Jude Bloomfield in the introduction, the urban imaginary necessitates a comprehensive understanding that encompasses various constructs and scales, including the ghost stories of places, cultural practices, and public life that have changed and vanished over time. This interpretation of Lot 5's micro-life aligns with the larger narrative of land reclamation.

Future research can extend a similar approach to other coastal sites with reclamation histories for broader impacts on urban and social dynamics. Comparative studies across diverse regions can offer a richer understanding of transformations. Incorporating advanced methodologies such as digital spatial analyses and participatory mapping can improve insights and reveal new dimensions on urban development and narrative formation.

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Resume

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Evaluation on Accessibility in Historical Environments in Turkey: Ankara Ulus Environment Example

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Abstract

Historical environments bear traces of the past and have cultural and historical importance. These places are essential to respect the past, understand history, and preserve cultural heritage. However, many historic neighborhoods face accessibility issues. Accessibility is a fundamental concept that refers to the ability of people to be present and participate effectively in any space. This principle has an importance that cannot be ignored in every academic discipline in its own field of specialization and there is a need to take this principle into account in all kinds of production processes. The most problematic spatial area for this participation to be ensured through universal access is the historical environmen which form a unique part of cultural identity with their characteristic structures and distinctive features. Therefore, accessibility is crucial to ensure the preservation of cultural heritage and the active participation of society in. Problems in these areas restrict access to these spaces for people with disabilities, pregnant women, people with strollers and the elderly, and have a negative impact on the visitor experience. In this study, the Turkish Grand National Assembly / War of Independence Museum located in Historical Ulus, the Turkish Grand National Assembly Museum, Is Bank Museum, Ankara Social Sciences University Campus, and Hacı Bayram Veli Mosque and its surroundings were evaluated. The evaluations were supported with visuals, according to the criteria specified in the Accessibility Guide prepared by the Ministry of Family, Labor and Social Services. The study found attempts to improve accessibility for individuals with disabilities, but correct practices were largely absent. Issues such as dimensional errors, improper material selection and structural inadequacies were common. These problems are summarized in the evaluation section. This study aims to demonstrate that historical buildings can be made accessible by addressing access issues with solutions like tactile surfaces, markings, and ramps.

Keywords:
Accessibility, Historical ulus city center, Historical environment, Historical buildings.

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INTRODUCTION

Historic buildings and open spaces face challenges when it comes to accessibility. Structural obstacles such as narrow doorways, steep stairs, unsuitable toilets, and uneven floors make it difficult, and sometimes impossible for individuals with disabilities to experience the historical environment (Altın & Güngör, 2022). Regarding historical buildings and areas, some restrictions arise at the intervention point. We must pay attention to historical buildings and areas and remember that everyone has equal rights to visit these areas. It is a reality that we cannot intervene in historical buildings and areas like new buildings. However, this does not mean that there will be no intervention in these areas. Just as requirements such as lighting, heating-cooling, and vehicle roads are appropriately integrated in line with modern needs, the needs of disabled individuals should be met as much as possible. When it comes to modern needs, the idea that these needs are necessities comes to the fore. With the same motivation, it should be remembered that each of us is a disabled candidate and that every step taken regarding accessibility is necessary for all of us. When disability is mentioned, many people think of congenital conditions that continue throughout life. However, disability does not have to be permanent; sometimes, short-term disability may occur due to injuries or surgeries. In addition, many applications required for accessibility also provide great convenience for pregnant women, strollers, and the elderly.

It is crucial to make historical places available to increase their awareness. In this context, every individual's ability to visit historical buildings and areas will raise awareness of these values. Carrying out restoration works without considering accessibility is to argue that the past can only be transferred to the future by healthy individuals. Even if this is not done consciously, this result is reached through practice. Even if it is not said in words, people with disabilities are discriminated against and pushed out of society through practices. Creating accessible spaces should be considered part of an important public service provided to society (Evcil, 2018) (S. Vardia, R. Khare, & A. Khare, 2016). According to Şolt, accessibility should ensure that social life is open to everyone. This statement not only means making buildings and environments physically accessible but also includes architectural solutions designed and implemented in ways that offer equal opportunity to all members of society (Şolt, 2019).

Ulus and its surroundings, Ankara's most visited historical region, were selected for this study. Within the scope of the article it is aimed to determine the level of access to five designated points in the historical region. The first stop of the preferred areas is the most visited II in line with 2022 Culture and Tourism Data. The Grand National Assembly of Turkey Museum and the First Grand National Assembly of Turkey / War of Independence Museum are located on the same axis, the Is Bankas Museum, the Ankara Social Sciences University Campus located next to it and the Hacı Bayram Veli Mosque and its surroundings as a continuation

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of the campus. These areas were preferred because they are close to each other and have structures and areas that host many visitors. According to Ankara's Culture and Tourism Report for 2022, prepared by the Provincial Directorate of Culture and Tourism of the Governorship of Ankara, Ankara will host 8,404,052 domestic and foreign visitors in 2022. Also, December 31, 2021 TUIK figures, there are 5,841,180 people with disabilities in Turkey, including 3,337,922 women and 2,503,258 men. According to these figures, approximately one in 14 people in our country is considered disabled (T.C. ASHB, 2021). After the February 2023 earthquake in Turkey, these figures are likely to have increased. When we consider these figures in the context of Ankara, an average of 600,000 disabled people visited (T.C.Ankara Valiliği, 2022).

In addition, the diversity of functions offers the opportunity to be evaluated by three disability conditions: Physical (orthopedic) Disabled, Visually Impaired and Hearing Impaired. Within the scope of the study, it was evaluated how much access was considered for disabled individuals to these structures and areas. It is essential to identify faulty practices and deficiencies, but since it will be instructive to indicate how to compensate for these faults and deficiencies and what the correct practices should be, some suggestions are presented in the tables under the heading of suggestions. With this, it aims to offer practical suggestions, considering the difficulties in historical buildings. Otherwise, they will remain as correct but unimplementable suggestions.

Restrictions: For work carried out inside public buildings, it is necessary to obtain building access permission from each institution. The process of obtaining these permits can be quite time-consuming. For this reason, the evaluations within the scope of the study focused on the accessibility situation to the building entrances. It is surrounded by the Ulus district, the oldest historical country in Ankara, visited by a single person every day. All inspections and evaluations will be carried out within the specified area. This range, product range, and focus were determined considering the challenges and time constraints presented by permits.

ULUS ENVIRONMENT AND HISTORICAL IMPORTANCE

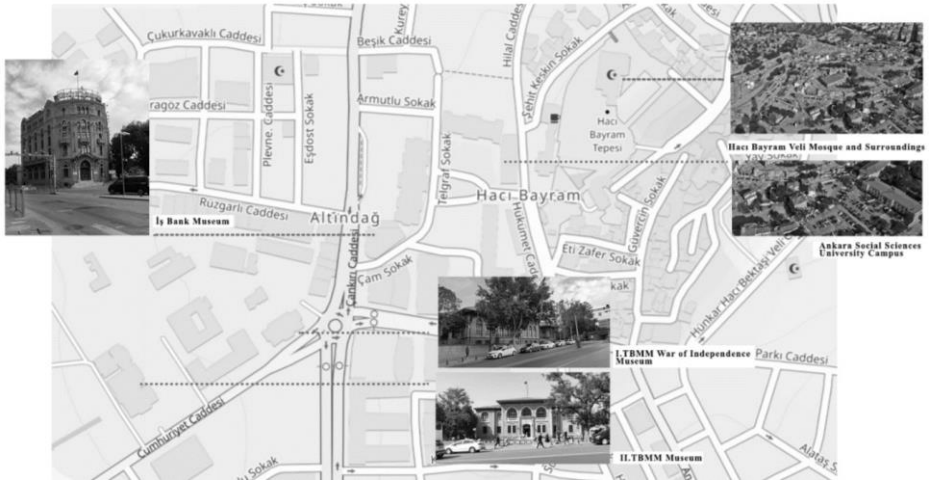

Figure 1. The Structure Examined Within the Scope of the Study

Ankara stands out as a city that offers the oldest traces of our civilization's history. Traces of these civilizations can be found in and around Ulus Historical City Center, the historical center of Ankara. This center was included in the first plans of Ankara and had great historical importance.

Ankara, known as "Avkupa Ankyra" in the Roman Empire, hosted many civilizations, including the Hittites, Phrygians, Lydians, Persians, Greeks, and Galatians, until it came under the rule of the Roman Empire. After the Roman domination, it came under the domination of the Turkish Akhis in 1127, and in 1414, it came under Ottoman domination (Konur, 1997), (Fidan, 2007).

Ankara, which has always had an important position both commercially and politically due to its geographical location throughout all the civilizations it has experienced, was chosen as the capital after the establishment of the Republic. Thus, Ankara took on the role of decision and control center and entered the process of organization and institutionalization (Altaban, 1987).

According to Dinçer, Ulus Square is one of Ankara's most essential and first squares. At the same time, Ulus Historical City Center is Ankara's oldest social, administrative, and political living space (Dinçer, 2014). Ulus Square and the surrounding buildings reveal the city's history and architecture, reflecting different periods of architectural styles from the Ottoman Era to the present day. These buildings have hosted memories for Ankara residents and visitors to Ankara and have an essential place in urban memory. Although some deterioration has occurred due to neglect, these buildings maintain their economic value because they maintain their durability and usability (Tunçer, 2013). (Ankara's annual visitor numbers are given above.)

ACCESSIBILITY ASSESSMENT IN HISTORICAL ENVIRONMENTS

Historical environments and buildings are essential structures that carry the traces of humanity from past to present and symbolize cultural heritage. However, regarding accessibility, historic buildings and open spaces have many obstacles that make their use problematic for individuals with disabilities. These obstacles include structural issues such as narrow doorways, steep stairs, unsuitable toilets, and uneven floors. Therefore, accessibility in historical environments is an important issue today.

Accessibility is a fundamental principle that everyone has the right to experience and use their environment (Altın & Güngör, 2022). Historic buildings are often protected by strict rules and regulations to preserve their original design and texture. Therefore, intervening in historical buildings is a process that requires care. However, this should not mean that the needs of disabled individuals will be ignored. On the contrary, finding solutions for accessibility in historic environments is vital to preserving cultural heritage while enabling more people to experience it. This section documents the current status of the areas studied with

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photographs. T.R. of these areas. The problems were identified, and suggestions were presented, taking into account the criteria specified in the Accessibility Guide prepared by the Ministry of Family, Labor, and Social Services.

The First Grand National Assembly of Turkey (Turkish Grand National Assembly) War of Independence Museum, which will be examined within the scope of the study, was built in 1920. Today, it serves as a museum. Documents, photographs, and objects from the War of Independence period are exhibited. II. The Turkish Grand National Assembly Museum was built in 1961. Today, it serves as a museum displaying the historical and political memories of the Turkish Grand National Assembly. Is Bank Museum was built in 1929. Today, it is a museum displaying essential information about the founding period of Türkiye Is Bank. There are periodic exhibitions. Ankara Social Sciences University Campus, which includes historical buildings such as the First Prime Ministry Building and Ankara Governorship, was transferred to the university in 2013. Hacı Bayram Veli Mosque is one of the historical mosques of Ankara and has a deep-rooted history dating back to the Ottoman period. Hacı Bayram Veli Mosque is still used as an active place of worship.

The requirements mentioned in the Circular No. 2020/3 on Accessibility Monitoring and Audit Forms and the Accessibility Guide are stated below. Considering these requirements, the problems of the buildings within the scope of the study were identified and recommendations were presented.

Parking lot: The markings of parking spaces reserved for disabled people should be designed in a way that everyone can easily see, understand, and read them. The material used for these markings must be durable, easily cleaned, repairable, and replaceable when necessary. In addition, accessible parking spaces should be protected from weather conditions if possible, precautions should be taken for snow or ice conditions, and these areas should even be located in a closed structure (T.C., 2020) (Koç, 2020).

Ramps and slip tactile/Dot tactile paving: The floor must be covered with a material that is level, firm, durable, and non-slip in both wet and dry conditions (T.C., 2020) (Koç, 2020).

Stairs ans slip tactile/Dot tactile paving: Escalators are not considered an accessible solution. Additionally, staircases with spiral steps are not accessible due to difficulty in use. Sensible warning surfaces must be provided at the beginning and end of all stairs in buildings open to public use, except for buildings specified by legislation (T.C., 2020) (Koç, 2020).

Lifts: Buildings with more than one story should have elevators for accessibility. All buildings open to public use must have accessible elevators under the relevant legislation. In residential buildings, it is mandatory to have accessible elevators depending on the number of floors determined by the legislation (T.C., 2020) (Koç, 2020).

Floor coverings: All walking routes must be equipped with a flat, solid, durable, and non-slip coating. These surfaces must be designed to be non-slip, whether wet or dry. This design must comply with the TS 13882 standard, which determines pedestrian walking surfaces' classification rules and necessities (T.C., 2020). Generally, any surface, such as padded floors, makes maneuvering difficult for people in wheelchairs or with walking difficulties. Tactile floors and guide tracks are produced in accordance with the Construction Products Directive and meet the Necessities (T.C., 2020) (Koç, 2020).

Voice cues and guidance: Regardless of the type of use of the building, there should be sufficient number and characteristics of directional and informative signage. Especially in buildings open to public use, there should be informative signs warning against hazards, directing to areas and informative signs to ensure safe and unassisted use of buildings and all equipment in the building (T.C., 2020) (Koç, 2020).

I. TBMM/ War of Independence Museum Accessibility Assessment

Figure 2. The Structure Examined Within the Scope of the Study

Parking lot (PL- CODE.3.1)

Problem: There is no accessible parking space in current use.

Suggestions: There is no accessible parking space in current use. However, vehicles can come close to the entrance. There is sufficient space for disabled parking. This situation suggests that disabled individuals will have ease of use during their visits. However, marking accessible parking spaces is a must for awareness. There is no obstacle to marking in the existing structure and its surroundings. At least one accessible parking space must be placed. A sign indicating disabled parking can be added to the vehicle entrance. There is enough space at the garden entrance (Figure 4).

Ramps and slip tactile/Dot tactile paving (RP- CODE.3.1)

Problem: The pavement is inclined down to road level. However, it creates a problem because the combination of road and pavement is

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broken. There are three steps to the ticket office. There is no ramp. Access to the museum is by stairs only (Figure 3).

Suggestions: There is an area for a fixed ramp to the ticket office. Likewise, there is space for a ramp on the left side of the museum entrance. However, in such buildings, if the ramp length is not visually preferred due to the floor height, a solution can be provided by having a Scewo (Stair Climbing Wheelchair) (Figure 8).

Stairs and slip tactile/Dot tactile paving (SC-CODE.3.1)

Problem: There are no warning surfaces in front of the stairs. There are no anti-slip strips on the stair steps. Handrails must be uninterrupted, as seen in the image. The applications need to be corrected. The staircases in front of the ticket office are projected. This situation causes people with muscle disorders to get their feet stuck on protrusions (Figure 5).

Suggestions: Anti-slip strips should be added to the stairs, and warning surfaces should be added in front of the first and last steps. The risers of the steps of the stairs in front of the box office should be renewed so they are free of protrusions. Handrails per standards: They should be uninterrupted, in Braille alphabet, and of appropriate size on both sides of the stairs.

Lifts (LF-CODE.3.1)

Problem: No malpractice related to the elevator has been detected.

Suggestions: An alternative to our Ramp and Guide/Warning Traces suggestion, a disabled lift can be added to the left side of the building entrance.

Floor coverings (FC-CODE.3.1)

Problem: Some areas have guide and warning marks on the pavement. However, it has been determined that it was not done consciously. The guide tracks coincide with delay covers and grills at some points. There are gaps in some places. Non-slip material was chosen for the floor of the museum garden. There are grills when entering the museum garden. It poses a problem for wheelchairs and visually impaired canes.

Suggestions: Guide and warning surfaces should be added at necessary points. Grilles should be covered with suitable material, or grills suitable for disabled people should be preferred (Figure 6).

Voice cues and guidance (VG- CODE.3.1)

Problem: Points such as parking lots, ticket offices, and pedestrian crossings must be marked to be understood.

Suggestions: Necessary markings should be added to the parking lot, stairs, ramp, ticket office, and building entrance. The purpose of the signs is to enable individuals to enter the building from the street quickly

Figure 3. Ramps

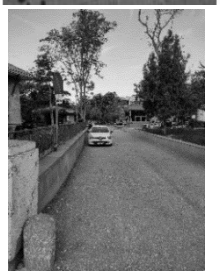

Figure 4. Suggested Area for Disabled Parking Lot

Figure 5. Stairs and Handrall

Figure 6. Rainwater Gratibg Suitable for Disabled Use (URL2, 2023)

Figure 7. Floor Covering and Guide/ Warning Marks

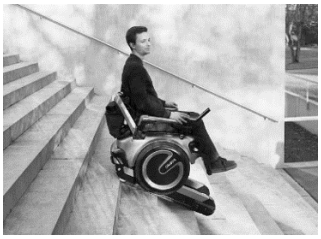

Figure 8. Scewo: Stair-climbing Wheelchair

II.TBMM Museum Accessibility Assessment

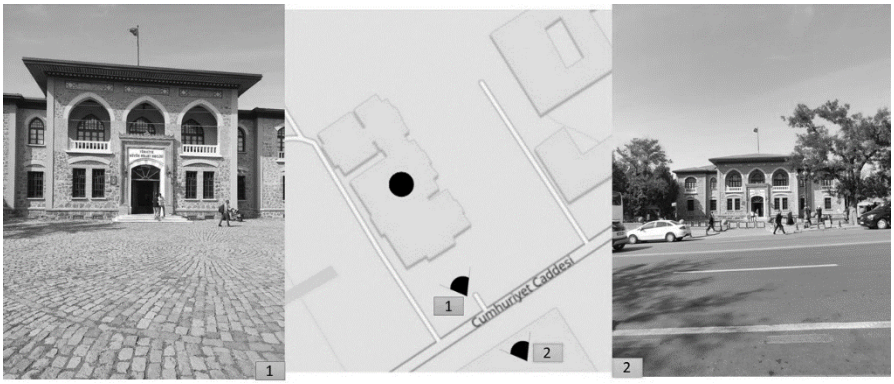

Figure 9. II. TBMM Museum and Its Surroundings

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Parking lot (PL- CODE.3.2)

Problem: There is no accessible parking space in current use, and when necessary, there is a vehicle gate to the entrance where vehicles can be taken. This situation suggests that disabled individuals will have ease of use during their visits. However, marking accessible parking spaces is a must for awareness.

Suggestions: There is no obstacle to marking the existing structure and its surroundings. At least one accessible parking space must be placed. A sign indicating an accessible parking space can be added to the vehicle entrance. Disabled parking can be placed on the left side of the entrance.

Ramps and slip tactile/Dot tactile paving (RP- CODE.3.2)

Problem: Ramps have been added to the sidewalks corresponding to the building entrance. Ramps are included in the standards; It does not comply with the article "Vegetation should be done on the side surfaces of one-way inclined ramps."

There is a level difference between the road and the ticket office of the museum. There are only stairs in this part. However, disabled citizens can approach the building from the entrance where they take their vehicles (Figure 11). As seen in the pictures, portable ramps have been added to the gift shop, ticket office, and museum, but to reach these places, an individual must first go down the stairs. With this application, it is observed that something was thought of, but the plot from the sidewalk to the entrance to the building still needs to be considered. As a result, other existing ramps are unimportant for disabled individuals who cannot go down the stairs.

Suggestions: The area where vehicles can enter can be turned into a corridor up to the ticket office with the necessary dividers for people with disabilities, age groups, and baby strollers. In this way, access to the area is easily achieved.

Stairs and slip tactile/Dot tactile paving (SC- CODE.3.2)

Problem: There are no warning surfaces in front of the stairs. There are no anti-slip strips on the stair steps. Handrails must be continuous. The image shows that the application is faulty (Figure 11).

Suggestions: Anti-slip strips should be added to the stairs, and warning surfaces should be added in front of the first and last steps. Handrails following standards: They should be uninterrupted, in Braille alphabet, and have inappropriate dimensions on both sides of the stairs.

Lifts (LF- CODE.3.2)

Problem: No problem with the elevator has been detected.

Suggestions: As an alternative to our suggestion in the Ramp and Guide/Warning Traces section, a disabled elevator can be added to the stairs.

Floor coverings (FC- CODE.3.2)

Problem: Some areas have guide and warning marks on the pavement. However, it was determined that it needed to be done more consciously. The guide tracks coincide with delay covers and grills at some points. There are gaps in some places. Non-slip material was chosen for the floor inside the museum, but there are many gaps between the cobblestones applied to some parts. These gaps cause difficulty in walking, even for individuals without disabilities (Figure 12).

Suggestions: Guide and warning surfaces should be added at necessary points. Due to the harmony of the cobblestone historical building with its surroundings and location in a small area, it will no longer be difficult for disabled individuals with gap-free applications.

Voice cues and guidance (VG- CODE.3.2)

Problem: Points such as parking lots, ticket offices, and pedestrian crossings must be marked to be understood.

Suggestions: Necessary markings should be added to the parking lot, stairs, ramp, ticket office, gift shop, and building entrance. The purpose of the signs is to enable individuals to enter the building from the street without difficulty.

Figure 10. Ramps

Figure 11. Staircase and Handrail

Figure 12. Floor Covering and Guide/ Warning Marks

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Isbank Museum Accessibility Assessment

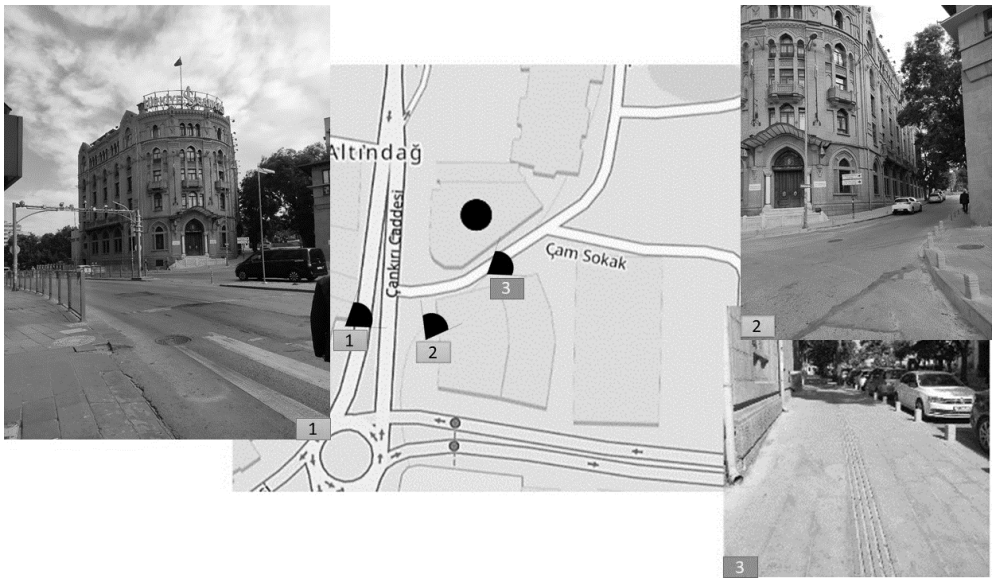

Figure 13. Is Bank Museum and Its Surroundings

Parking lot (PL- CODE.3.3)

Problem: There is no accessible parking space in current use.

Suggestions: There is no obstacle to marking the existing structure and its surroundings. At least one accessible parking space must be placed. A sign indicating an accessible parking space can be added to the vehicle entrance. There is a parking area to the right of the entrance. Accessible parking spaces can be placed in this section.

Ramp and slip tactile/Dot tactile paving (RP- CODE.3.3)

Problem: Ramps have been added to the sidewalks corresponding to the building entrance. Ramps are included in the standards; It was applied as a ramp inclined in three directions. However, there is an application error since a rainwater channel was added. The pavement has a guide and warning surfaces, but the warning surface needs to be placed correctly. In addition, the stimulating and guiding surfaces should be contrasting to the ground color and be noticeable. Currently, it is applied in the same color as the pavement.

Suggestions: A portable ramp can be added to the building entrance when necessary. The water channel in front of the sidewalk ramp should be removed. Guide and warning surface colors should be changed.

Stairs and slip tactile/Dot tactile paving (SC- CODE.3.3)

Problem: There are no warning surfaces in front of the stairs. There is no handrail (Figure 15).

Suggestions: Stimulating surfaces should be added before the first and last steps. There are different alternatives for stimulating surfaces (Figure 16). Surfaces that are visually compatible with the structure should be preferred. Handrails per standards: They should be uninterrupted, in the Braille alphabet, and of appropriate size on both sides of the stairs (T.C., 2020).

Lift (LF- CODE.3.3)

Problem: No problem with the elevator has been detected.

Suggestions: It is not thought that the building needs an elevator outdoors. Access is possible with a portable ramp.

Floor coverings (FC- CODE.3.3)

Problem: Some areas have guide and warning marks on the pavement. However, it was determined that it needed to be done more consciously. The guide tracks sometimes need more continuity at some points. Its color does not comply with standards (Figure 17).

Suggestions: Marble material was chosen for the museum stairs. As seen in the pictures, it covers a relatively small area. It is thought that if there are handrails on the stairs, it will not pose a problem in sunny weather. However, the risk of slipping on the ground is high in rainy weather. In such cases, a solution can be provided with non-slip carpets on the stairs.

Voice cues and guidance (VG- CODE.3.3)

Problem: Points such as parking lots and pedestrian crossings must be marked to be understood.

Suggestions: Necessary markings should be added to the parking lot, stairs, ramps, and building entrances. The purpose of the signs is to enable individuals to enter the building from the street quickly

Figure 14. Building Entrance

Figure 15. Staircase and Handrail

Figure 16. Stimulating Surface Alternative

Figure 17. Floor Covering

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Ankara Social Sciences University Campus Accessibility Assessment

Figure 18. Ankara Social Sciences University Campus and Its Surroundings

Parking lot (PL- CODE.3.5)

Problem: There is disabled parking in current use. It was determined that there were no markings. Floor paints are faded and very difficult to notice (Figure 19).

Suggestions: There is no obstacle to marking the existing structure and its surroundings. Markings should be placed in the disabled park, and the ground drawing should be renewed correctly.

Ramps and slip tactile/Dot tactile paving (RP- CODE.3.5)

Problem: Ramps have been added in places on the campus, but some buildings cannot be accessed (Rectorate Building). The existing ramps were not built consciously. Some ramps do not have curbs, handrails, warning surfaces, and guide tracks. Some of them need help to provide the required slope and landing distance. Some ramps have obstructions such as maintenance hole covers, and there is a level difference between the road and the ramp, and they do not end at the road level. There is a water trough at the ends of some ramps (Figure 21).

Suggestions: Another problem encountered regarding accessibility is the idea that there is no need for accessibility in buildings or areas used by personnel. There may be disabled, temporarily disabled, and pregnant people among the working personnel. Considering this situation, ramps should be added to all buildings, especially the rectorate building. Water gutters should be removed from the parts corresponding to the ramp. The campus is conducive to the addition of ramps.

Stairs and slip tactile/Dot tactile paving (SC- CODE.3.5)

Problem: There are no warning surfaces in front of the stairs. There are no anti-slip strips on the stair steps. Handrails must be continuous. The image shows that the application is incorrect (Figure 20).

Suggestions: Considering that it is only possible for some stairs to open outdoors in a historical building to comply with the standards, efforts should be made to ensure that at least one staircase meets the

required standards as much as possible. Some stairs are difficult to use, even for individuals without disabilities. Blind individuals should be warned by at least warning surfaces on such stairs. If there are no guide tracks on these stairs, they will not be used by blind individuals, but they will be informed that they are an element that needs attention.

Anti-slip strips should be added to the stairs, and warning surfaces should be added before the first and last steps. Handrails following standards: They should be uninterrupted, in the Braille alphabet, and have appropriate dimensions on both sides of the stairs.

Lifts (LF- CODE.3.5)

Problem: No problem with the elevator has been detected.

Suggestions: Considering the costs, it is essential to provide a real solution. In areas with many buildings in a single structure, such as a campus, it is only possible to add elevators to some buildings. In such cases, having a Scewo (Stair Climbing Wheelchair) will be the solution. Adding a disabled information center closest to the campus entrance and asking for help when needed is a feasible and sustainable solution.

Floor coverings (FC- CODE.3.5)

Problem: No warning surfaces or guide traces were found on the campus. Floor materials were generally chosen appropriately, but many gaps exist between the cobblestones applied to some parts. These gaps cause difficulty in walking, even for individuals without disabilities (Figure 22).

Suggestions: Guide and warning surfaces should be added at necessary points. Cobblestone was used in a specific area. It is thought that its replacement will maintain the integrity of the campus. In areas such as campus, guide tracks can be used to a minimum by adding Braille-embossed visually impaired maps at the entrance. This will not affect the stimulating surfaces.

Voice cues and guidance (VG- CODE.3.5)

Problem: Points such as parking lots, pedestrian crossings, and canteens must be marked to be understood.

Suggestions: Necessary markings should be added to parking lots, stairs, ramps, canteens, and building entrances.

Figure 19. Disabled Parking lot

Figure 20. Staircase and Handrail

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Figure 21. Ramps

Figure 22. Floor Covering

Accessibility Assessment of Hacı Bayram Veli Mosque and Surroundings

Figure 23. Hacı Bayram Veli Mosque and Surroundings

Parking lot (PL-CODE.3.6)

Problem: It has been observed that there is disabled parking and markings.

Suggestions: There appears to be disabled parking. Signage is available and located close to the elevator. The floor paint needs to be renewed regularly, which is noticeable in the current situation (Figure 28).

Ramps and Slip Tactile/Dot Tactile Paving (RP- CODE.3.6)

Problem: No warning surfaces appear to have been added in front of the ramps. As seen in the image on the right, a ramp was not added to the sidewalk to the right of the elevator but was added to the one to the left (Figure 24).

Suggestions: Ramps that can be arranged must be made per the standards. Considering that it is not possible to renew some ramps, in such cases, disabled citizens should be directed to the elevators with audio and visual signs.

Stairs and slip tactile/Dot tactile paving (SC- CODE.3.6)

Problem: There are no warning surfaces in front of the stairs. There are no anti-slip strips on the stair steps. Handrails must be continuous. Some step risers are protruding. Sliding material is used in some stairs (Figure 25).

Suggestions: Anti-slip strips should be added to the stairs, and warning surfaces should be added in front of the first and last steps. Handrails following standards: They should be uninterrupted, in Braille alphabet, and have appropriate dimensions on both sides of the stairs. It is obvious that there are too many stairs in the existing area and not everyone can be made up to standard. In such cases, disabled individuals should be directed to the correct stairs with audio and visual signs.

Lifts (LF- CODE.3.6)

Problem: There are many elevators, but some elevators need help. As seen in the image on the right, there is an elevation and a grill in front of the disabled elevator (Figure 26).

Suggestions: It is currently impossible to adapt all elevators to disabled people. Our recommendation is to direct disabled individuals to the elevator that has access to all floors. This elevator's necessary markings and problems can be solved and made accessible.

Floor coverings (FC- CODE.3.6)

Problem: Slippery floor material was used in some areas. No guiding or warning traces were found (Figure 27).

Suggestions: Guide and warning surfaces should be added at necessary points. Contact with disabled individuals in areas where slippery flooring materials are used should be minimized. However, as in the current example, many places used by disabled individuals have slippery surfaces. Such floors should be replaced when costs allow. Care should be taken to keep the areas that cannot be changed or those that have to be used for a while longer dry, and non-slip carpets should be added when necessary (rainy weather, winter months) to prevent slipping. However, this is a temporary solution. These types of carpets present some difficulties depending on their type. Another more practical solution is to use anti-slip solutions.

Voice cues and guidance (VG- CODE.3.6)

Problem: Points such as parking lots, ticket offices, and pedestrian crossings must be marked to be understood.

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Suggestions: Necessary markings should be added to the parking lot, stairs, ramp, accessible toilet (no accessible toilet, but it is written here with the assumption that it will be added), and the building.

Figure 24. Ramps

Figure 25. Staircase and Handrail

Figure 26. Lifts

Figure 27. Floor Covering and Guide / Warning Marks

Figure 28. Disabled Parking Lot

CONCLUSION AND RECOMMENTATIONS

It is observed that something is being done for disabled accessibility in the places examined within the scope of the study. However, correct applications are almost non-existent. In general, the problems encountered in applications appear as incorrect and incomplete applications (Table 1). Accessibility is an area that requires expertise. Experts must complete the project phase, and the same experts in the field must control the manufacturing. In new building construction, it is normal for differences between the project and the site, and they have intervened in the field appropriately. However, when it comes to accessibility, this situation poses a problem. The situations encountered should be evaluated by experts and re-projected if necessary. It should be remembered that this subject needs to be studied very sensitively. One of the solutions is for relevant institutions to create accessibility units within their bodies, train the personnel in these units, and send them to field studies. It is a reality that it will take time for social consciousness to form.

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Table 1. Classification of Problems Encountered within the Scope of the Study

	Problems	Solution proposals			
		Partial repair	Addition of special reinforcement	Replacement/addition of auxiliary equipment	Major renovation
I.TBMM/ War of Independence Museum (.CODE. 3.1)	Measurement error		SC, RP		
	Application error	FC			
	Material unsuitable				
	Lack of marking	RP	RP	PL, SC, FC, RP	
	Lack of structural elements	RP, SC	SC, VG	LF	
II. TBMM Museum (.CODE. 3.2)		Partial repair	Addition of special reinforcement	Replacement/addition of auxiliary equipment	Major renovation
	Measurement error				
	Application error	FC			
	Material unsuitable			FC	
	Lack of marking			PL, SC, FC, RP	
	Lack of structural elements		VG	LF	
Is Bank Museum (.CODE. 3.3)		Partial repair	Addition of special reinforcement	Replacement/addition of auxiliary equipment	Major renovation
	Measurement error				
	Application error				
	Material unsuitable				
	Lack of marking			PL, SC, FC, RP	
	Lack of structural elements		SC, VG	RP, SC	
Ankara Social Science University Campus (.CODE. 3.4)		Partial repair	Addition of special reinforcement	Replacement/addition of auxiliary equipment	Major renovation
	Measurement error	RP, SC		PL	
	Application error	RP			FC
	Material unsuitable			FC	
	Lack of marking			PL, SC, FC	
	Lack of structural elements		SC, VG	LF	
Hacı Bayram Veli Mosque and Surrounding (.CODE. 3.5)		Partial repair	Addition of special reinforcement	Replacement/addition of auxiliary equipment	Major renovation
	Measurement error				
	Application error	RP	RP	SC	
	Material unsuitable	FC		FC	
	Lack of marking			RP, PL, SC, LF, FC	
	Lack of structural elements		RP, SC, VG		

Legend: Parking Lot (PL), Rams (RP), Staircase (SC), Lifts (LF), Floor Coverings (FC), Voice Cues and Guidance (VG) (... Code 3.1-5)

With correct practices, the process of creating social awareness will accelerate. At this stage, institutions, architects, designers and engineers have a responsibility. Architects, designers and engineers who cannot raise awareness about correct practices cannot be expected to carry out project and site control correctly. Even if services are procured during the project design phase, the personnel who control the institutions must be conscious and knowledgeable. The first stage is to train the relevant personnel in the institutions. At the same time, we must recognize that historical sites present particular challenges and that it is only possible to comply with some standards, like new buildings. However, there can be more to be done. Suppose the best-case scenario is to consider what can be done and what technology can be used, considering the current

formation. In that case, solutions can be offered with suitable materials, applications, and new technologies. When it comes to historic buildings and environments, the perfect implementation should not be aimed for, and efforts should be made to make them accessible at the maximum level.

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Adaptive Reuse Suggestions in Interior Architecture Education: A Registered Workshop in Ankara

Mine Sungur*

Abstract

This study aims to determine both the recommendations for the conservation and reuse of historical buildings in interior architecture education and the learning outcomes of the restoration course. A registered building in Ankara, which formerly served as a production workshop for a vocational high school, has been identified as the study's main issue as it is no longer in use after having served its purpose. As part of the restoration course in this case, senior students in interior architecture department of Selcuk University were asked to submit a variety of function concepts for the registered building. The study focused on both qualitative and quantitative research methods, which included four stages: preparation, analysis, design, and evaluation. Through examples of applications from our nation and around the world, students were given the information they needed to understand the restoration during the first phase, preparation. The second stage, analysis, entails taking measurements of the building's interior and exterior as well as photographing and collecting written and visual records of it. The third step, the design phase, begins with the choice of a new function appropriate for the building's location and style in light of all available data and documentation. The students were asked to assess their level of knowledge regarding conservation and adaptive reuse as well as the learning outcomes of the restoration course before and after taking it in the final stage of the evaluation process, which took place after the fourteen-week restoration course. This study helped interior architecture students gain experience with a holistic design process through an adaptive reuse proposal project. In conclusion, increasing the number of courses on conservation and adaptive reuse in interior architecture education is important in training interior architects who are experts and competent in the field of reuse.

Keywords:
Adaptive reuse, Conservation, Interior design education, Workshop.

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INTRODUCTION

Throughout history, human beings have co-evolved with the structures they inhabited. Many buildings have lost their original functions and taken on new ones as a result of the altering lifestyle from the past to the present and the different needs that resulted from it (Küçük, 2022; 10). Historical structures can be preserved by adapting their uses and passing them on to younger generations while keeping them alive in relation to both the past and the present. The idea of reuse is based on "change" (Öter, 1996). Historic buildings undergo various effects over time, such as functional obsolescence, structural wear, and technological advancements. As a result, they lose their originality and become inadequate to their initial function. The reasons for reusing such structures are categorized into social, economic, environmental, and technological factors (Ay, 2013;15). From a social perspective, societies preserve their cultural heritage to maintain social memory and identity (Kaşlı, 2009). Even if a building has completed its functional life, it is important to consider its physical life for the purpose of reuse. Researchers such as Cantacuzino (1989), Altınoluk (1998) and Lewis (2013) emphasize that adaptive reuse is a cost-effective and economically beneficial alternative to constructing new buildings. According to Karslı and Aytıs (2018), three criteria are accepted as success indicators in adaptive re-use: "suitability for current use," "respect for the originality of the building," and "ability to distinguish the intervention made to the building from the original structure by solving them with modern techniques and materials." Unfortunately, as in many other nations, the negative effects and irreparable damage to historical monuments are a matter of great concern due to a lack of technical expertise and academic knowledge on conservation and restoration studies. The significance of conservation education is crucial in this regard (Büyükmıhçı & Yücel, 2012;2721).

It is crucial for students of architecture and interior architecture to receive education on the preservation of historical buildings as a means of safeguarding our cultural heritage (Efe Yavaçcan, 2021;2). Ahunbay (2011;145) stated that the purpose of conservation education is to provide knowledge and experience in the protection of the man-made environment, new design in the historical environment, and to develop a common conservation philosophy, language and method. In their study, Yıldırım Gönül and Balcı Yaşar (2019) emphasize the need for interior architects to receive training that raises their awareness of conservation, as they are responsible for preserving architectural heritage at the spatial scale. They suggest that the education for conservation should be integrated into every stage of interior architecture education, and that training specialized interior architects in conservation and adaptive reuse will contribute to the economy of the country, as it will enable the arrangement and use of existing buildings instead of constructing new ones. It's evident that students who have received education in these subjects can make much more accurate and

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vital decisions regarding the transmission of cultural assets to future generations (Efe Yavaçcan, 2021;13). However, Jahromi (2015) criticized that there is very little research in the field of interior architecture education that emphasizes the importance and necessity of integrating conservation and reuse theories into the academic curriculum. In this context, the study differs from similar studies in that it proposes functions for reuse within the existing shell with a conservation awareness and evaluates the students' learning outcomes for the Restoration Course.

As a result, in the context of the study, a function proposal was created for the II. degree registered-idle building in Ankara-Yenimahalle, in the restoration course with the senior students of the Department of Interior Architecture at Selcuk University. This was accomplished to bring attention to the issues of conservation and adaptive reuse as well as to determine the design choices appropriate for the nature of the historical structure. Ahunbay (2011; 34-35) defined II. Degree buildings as "buildings that create the urban environment, give character to the region, and are built with traditional construction techniques" and stated that the facades, views from a certain direction or some construction details of these types of buildings are preserved. While proposing a function suitable for the building, three factors (Ay, 2013) were taken into account: (i) the location of the building, (ii) the functional setup of the building, and (iii) the volumetric and spatial setup of the building. The students, who suggested a use for the structure, were permitted to add space in accordance with the needs analysis they conducted. The limit of adding units while using modern methods and materials has been established, but only in a way that preserves the registered structure's original integrity in terms of mass, size, proportion, and material (Yüceer & İpekoğlu, 2012;424). There are four stages to the study. The preparatory phase, where literature information was exchanged and data for conservation and adaptive re-use were collected, the analysis phase, where fieldwork was conducted, and the design phase, where recommendations were made in accordance with the written and visual information/documents obtained, all contributed to the completion of the fourteen-week restoration course. After that, through a survey, students were asked to assess their conceptual understanding, practical skills, and methods for conservation and adaptive reuse. The survey includes statements to determine the level of knowledge of the students about the concepts of conservation and adaptive reuse before and after taking the restoration course, and to evaluate the learning outcomes of the Restoration Course.

CONCEPTUAL BACKGROUND: ADAPTIVE REUSE IN INTERIOR ARCHITECTURE EDUCATION

History is the study of changes over time. Removing evidence of these changes would mean erasing history altogether (Kuban, 1969; 344). Experts stress the importance of conserving historical sites and

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artifacts for the sake of continuity. The International Council on Monuments and Sites (ICOMOS) draws attention to the necessity of "It is essential to the conservation of monuments that they be maintained on a permanent basis" (ICOMOS, Venice Charter, 1964, article 4). One of the methods of preserving historical buildings is adaptive reuse (Ahunbay, 2011).

Numerous researchers have defined the idea of adaptive reuse (AR) from various angles. According to Pereira, Post, and Erkelens (2004), historical structures may outlive their usefulness due to social, economic, functional, physical, environmental, or legal factors. Through repairs, additions, and other changes, adaptive reuse enables a building's harmonious use while preserving its historical, cultural, or architectural values (Ijla & Broström, 2015). While Ahunbay (2011; 97) describes adaptive reuse as a process of change and transformation that brings the building back to life, Brooker and Stone (2004) define it as the process of using the building for a different purpose than the one for which it was built or designed. Current conservation theory and practice view adaptive reuse as a fundamental tactic in the preservation of cultural heritage.

The cultural accumulation of the society they serve is expressed in architectural spaces, which are the living indicators of societies (Apaydın Başa, 2002). Reuse's sociocultural contribution prevents the erasure of historical traces and social memory that the historical structure has amassed (Köksal, 2006; Powell, 1999). An intergenerational cultural link will be built by modernizing the historic structure to accommodate modern living requirements and needs. Factors affecting social culture also affect the function and form of architectural structures. Spaces that have a representative feature for people need to be designed in an original and harmonious way with their environment, without being separated from their cultural ties (Noraslı, 2023).

The conversion of old structures to meet the evolving needs of the present is one of the interesting topics in architectural conservation. More spatial units may be required during this adaptation. The Venice Statute about the additional building to be made to historical buildings states "Additions cannot be allowed except in so far as they do not detract from the interesting parts of the building, its traditional setting, the balance of its composition and its relation with its surroundings." (ICOMOS, Venice Charter, 1964, article 13). Whenever a modern annex is built, it should always be subordinate to the historic structure and not compete with it in terms of size, scale, or design. An addition that deviates from the historical form and changes the scale, or that has nothing to do with the proportions and mass of the historical building, will frequently undermine the building's historical integrity (Grimmer & Weeks, 2010; 5). A modern addition to the exterior of a historic building (Grimmer & Weeks,2010;14);

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- should be simple and unobtrusive in design and should be distinguished from the historic building.
- the building materials and color used should be in harmony with the historical building materials.
- should be smaller than the historic building and covered with a matching roof covering.
- should be subject to the historical building in terms of both size and design and should be constructed in smaller dimensions than the historical building.

In light of all of this information, future generations must preserve the historical integrity and texture of our nation, which has long served as a crossroads for various civilizations and is now home to a wide range of architectural and cultural diversity. To safeguard our cultural heritage and sense of national identity, it is essential to raise conservation awareness. It is important to research how to manage this requirement within the educational system and how to keep it up throughout one's life (Büyükmıhcı & Yücel, 2012;2727). As a professional responsibility, the education system of architecture and interior architecture in our country should include raising awareness for the protection of individuals and making the built environment sustainable in terms of cultural heritage. This will ensure that future professionals are equipped with the necessary knowledge to fulfill their duties toward preserving cultural heritage and creating sustainable built environments.

As the human population has grown throughout history, needs have started to change. Unconscious construction has become more prevalent due to the need to build structures that satisfy needs. The cities are being subjected to ecological, sociocultural, and economic wear as a result of the daily growth in the stock of existing buildings. This is why it's crucial for interior architecture education to emphasize the reuse of current building stock and the preservation of distinctive historical built environments (Cordan, Dinçay & Teixeira, 2014;4). When the impact of conservation education—which is provided both theoretically and practically in the education of architecture and interior architecture—is examined, it becomes clear that there is a significant difference between the levels of awareness of students who take conservation lessons and those who do not (Gökarslan & Tuncer, 2023; 383). Similarly, the philosophy of preserving and keeping alive the historical cultural heritage should be guaranteed thanks to the education provided to interior architecture students for the conservation and re-functioning of cultural heritage and historical buildings (Atalan & Sevinç, 2016;1). In their investigation into the effectiveness of interior architecture education regarding conservation and reuse, Yıldırım Gönül and Balcı Yaşar (2019; 308) emphasize the need to enhance the knowledge gained in theoretical and/or practical conservation courses. They continued by saying that increasing the number of interior space projects for reuse in historic buildings is one way to realize gains. Researchers have criticized the idea that it is crucial to focus on the theoretical, scientific,

and technical content of the concepts of conservation and restoration when examining the relationship between restoration, which is a sub-expansion of the concept of conservation, and interior architecture (Gönül and Küçükarslan, 2007; Eren, Demirarslan & Yücel, 2007). The reuse, renewal, and conservation of historical environments and structures, which are the cultural heritage of earlier centuries, are thus among the main goals of the restoration course from this point of view. In the programs organized to achieve this goal, Ahunbay (2011; 145) emphasizes that archaeology, art and architectural history, contemporary documentation techniques, traditional structures and materials, historical construction techniques, conservation theory and techniques, historical environmental protection principles and techniques, laws and organization related to conservation, reuse and rehabilitation of historical structures should be included in the education program.

METHODOLOGY

The article's goal is to suggestion potential modern uses for the currently registered structure, which has served its purpose for interior architecture students but is still in use today in terms of its physical structure. The stages of related studies were taken into consideration in order to properly formulate the design process. The four stages of the study methodology are the phases of preparation, analysis, design and evaluation. The restoration course's re-functionalization project's design phase took fourteen weeks to complete. For senior students at Selçuk University's Interior Architecture Department, the author of the article provided seven weeks of theoretical instruction to build an infrastructure around the concepts of protection and re-functioning. Through examples of applications from our nation and around the world, students were given the information they needed to understand the restoration during the first phase, *preparation*. The second stage, *analysis*, entails taking measurements of the building's interior and exterior as well as photographing and collecting written and visual records of it. Correctly constructing the preparation and analysis phase is of vital importance before proceeding to the design phase (Cramer & Breitling, 2007; 45; Roos, 2007; 35). The third step, the *design phase*, begins with the choice of a new function appropriate for the building's location and style in light of all available data and documentation. In the classroom, draft projects for the functions that overlap with the requirements and principles of adaptive reuse were prepared. The accepted concept projects were developed and detailed. The students had the theoretical framework for conservation and reuse at the end of the semester thanks to their architectural and interior design projects, and they had the chance to practice their design-thinking abilities on the old building. The students were asked to assess their level of knowledge regarding conservation and adaptive reuse as well as the learning outcomes of the restoration course before and after taking it in the final

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stage of the evaluation process, which took place after the fourteen-week restoration course (Figure 1).

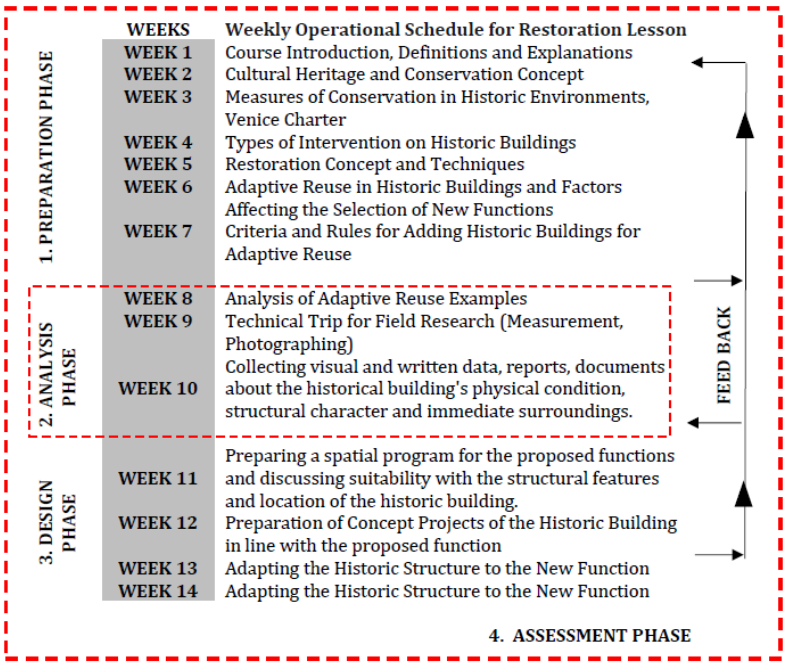

Figure 1. Methodology of the study

Field Study (Analysis Phase)

The second-degree registered property in Yenimahalle district, Güvenlik Neighborhood, Milas Street Nr:82, Block 7358, Parcel 4 in Ankara province was chosen as the study area for adaptive reuse within the context of the restoration course. The registered building has Mimar Sinan Technical High School in the southwest, Gazi Vocational and Technical Anatolian High School, Gazi Vocational Training Center in the northwest, Gazi University Faculty of Technology, and Turkish Volleyball Federation Management Offices in the southwest. (Figure 2).

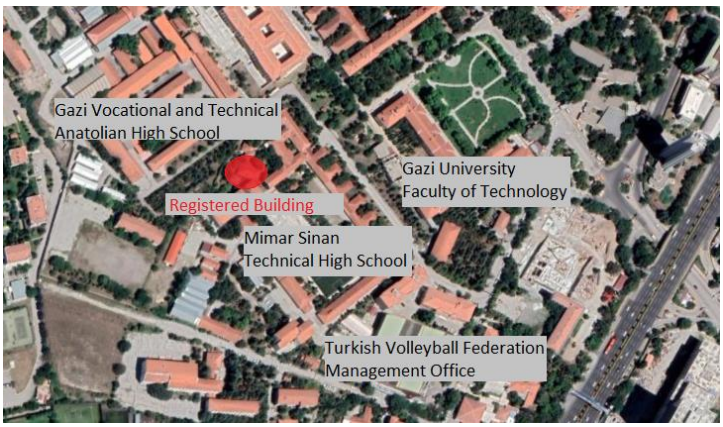

Figure 2. Location of the registered structure (Google Earth, 2023)

The structure, which is one of the educational buildings in the city's center, Ankara, was previously used as a production workshop building, but since it is now vacant, it was selected as a study area. The building is roughly 20.30 meters long and 10.30 meters wide, with a rectangular

ground plan. 8.75 meters is the distance from the ground to the ridge of the roof. The building has two entrances: a double-winged wooden door on the east side and a door with an iron bar on the west side. The majority of the façade is made up of two rows of symmetrical Windows (Figure 3).

Figure 3. Images of the west (on the left) and east (on the right) façades of the building
(Ankara Metropolitan Municipality Culture and Nature Department Archive, 2023)

The building's south façade is the most damaged façade. The wooden joinery and glass in the windows were found to be deficient. Wooden joinery also has color variations, breaks, and cracks (Figure 4).

Figure 4. Images of the north (on the left) and south (on the right) façades of the building
(Ankara Metropolitan Municipality Culture and Nature Department Archive, 2023)

The structure is situated between the educational buildings in the area of lush greenery. According to construction methods, the building's walls, which were constructed as a single story, were made of wooden carcasses from the windows to the eaves and were constructed with masonry blend bricks up to window level. Two different volumes of workshop units are divided, and a briquette wall was later added to the structure (Figure 5).

Figure 5. The immediate surroundings of the Registered Building and its plan scheme
(Ankara Metropolitan Municipality Culture and Nature Department Archive, 2023)

The floor of the building is made of concrete screed material, and the interior walls surround the building in the form of a stone beam border at ground level. The construction system is a masonry structure made up of rows of wooden uprights connected by wooden beams. The walls are made up of a mix of brickwork from the floor to the window level, followed by two rows of wooden windows that extend to the eaves. After the windows, a system of wooden beams has been designed for the

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space's ceiling and roof. In some places, wooden buttresses support the wooden beams. The roof system, which was built with incredibly beautiful craftsmanship, has held up well to the present day (Figure 6).

Figure 6. Interior images of the registered building (Ankara Metropolitan Municipality Culture and Nature Department Archive, 2023)

The structure's roof is a hipped roof with four directions of inclination and is covered in tiles in the Marseille style. The wooden pediment and the coverings under the eaves occasionally deteriorate. At the building's eaves are PVC rain gutters and downspouts, which are also visible on the facades. Additionally, the roof is torn by the threshing brick chimney, revealing itself (Figure 7).

Figure 7. Wooden trusses and beams on the roof of the registered structure (Ankara Metropolitan Municipality Culture and Nature Department Archive, 2023)

Adaptive Reuse Recommendations for the Registered Structure

The registered workshop has been effective in suggesting solutions that can serve as a socialization function because it is *located* between the educational buildings and has a densely populated green environment nearby. As a result, it will provide a chance for users near the education blocks and elsewhere to engage in social interaction. Important social benefits like job creation and crime reduction must also be included (Elsorady, 2013). When considering adaptive reuse in terms of the *spatial and volumetric set up* of the building, it is important to take into account visual, auditory, and communicative data to understand the relational connections between space and spaces of the new function (Arcan& Evci, 1992). The preservation of the spatial and volumetric characteristics of the historical building was taken into consideration when creating the requirement program for the proposed function. A system independent of the construction system of the existing building has been used to solve the circulation areas that connect the spaces from the entrance, the mezzanine floor that is designed as needed, and the stairs that provide access to the mezzanine floor. The partitions in the communal spaces intended for social activities are made of materials that can be taken apart without affecting

how the historical building perceives space and can be put back together again. To create a unique area of use, a second unit made of glass material and steel structure was attached to the existing structure. The designed additional unit has been carefully considered to reflect its own identity while maintaining the textural, proportional, volumetric, and dimensional integrity of the registered structure. Within the registered structure, service units like the preparation kitchen, warehouse, and wet areas have been resolved beneath the mezzanine floor. The primary objective of the architectural program, which was developed in accordance with the needs program, is to provide cutting-edge space solutions using modern building techniques and materials on the original layers, all the while maintaining the distinctiveness of the registered structure. The original facade surface has been preserved, and modern design solutions are displayed inside thanks to the building being registered under second-degree protection under the law (T.R. Presidency Legislation Information System, 2023). Based on the approach that requires preserving the facade and some structural details of II. degree structures (Ahunbay, 2011), some design restrictions have been imposed on students. (i) the facade will be preserved, (ii) material changes can be made without damaging the original roof structure of the structure, (iii) all selected materials will have demountable properties, (iv) the original walls will be preserved and a double-wall wall system can be created with contemporary materials, (v) an additional structure that complies with contemporary addition conditions can be built to the historical structure.

Within the scope of the course, 9 working groups consisting of 4-7 people took into account the environmental analysis for the registered building and presented re-use suggestions such as workshop-cafe, book-cafe and Office-cafe, focusing on socialization (Table 1).

Table 1. Images from student work in groups within the scope of the course

GROUP 1	GROUP 2	GROUP 3
		
GROUP 4	**GROUP 5**	**GROUP 6**
		
GROUP 7	**GROUP 8**	**GROUP 9**
		

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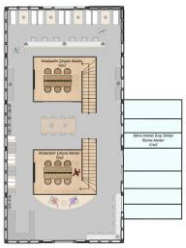
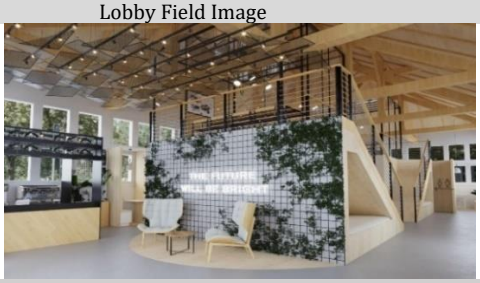
Among the presented final products, the best two projects that are compatible with the environment for socialization, create spatial integrity with material, color, texture, lighting details and evaluate the existing structure as a shell and have the least intervention were selected. Group 1 and Group 2 are the projects selected within the scope of the study, and although the spatial requirement program is similar in the groups' suggested functions, there are also differences. Since the historical structure is under second degree protection, the location and dimensions of the windows and doors on the facade have not been changed. Inside, modern but spatial solution proposals that do not ignore the historical structure were presented by the students. The proposed function for the registered structure by *Working Group 1 (Sarah ALAMERİ- Zeynep AKBAŞ-Elif Tuğçe OĞUZ-Melike SÜT)* is a workshop cafe (Table 2).

Table 2. Re-function proposal prepared by Working Group-1

Working Group-1		**Function Suggestion:** Workshop Cafe
Ground Floor Plan	Gallery Floor Plan	Presentation Poster
		
Lobby Field Image		Gallery Floor Space Image
		
Interior Image		Interior Image
		

The design aims to provide users with a space to socialize and develop their creativity by participating in do-it-yourself workshops in various fields such as handicrafts, painting, ceramics, and textiles, either individually or as a group. The building can be accessed from the main road facing west, and users who prefer to drive can park their vehicles in the mobile car park. The interior of the building cohesively uses wood and steel materials, with green elements incorporated

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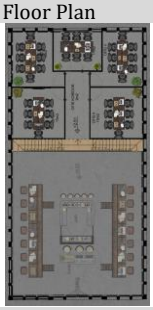
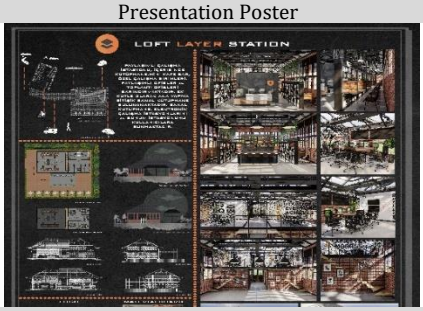
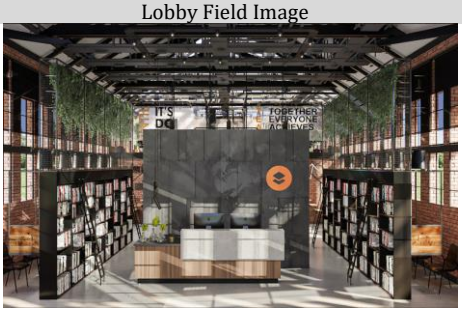
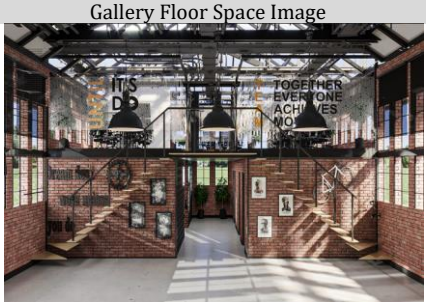
throughout. The ground floor includes both private and common areas for individual and group activities, as well as a mini-amphitheater for talks and social events. The design features two independent mezzanine floors, with the wet areas and warehouse located under one of them. There is no separate kitchen area, but the design is planned to provide beverages and snack service. Working Group 1 envisioned the building interior as a comfortable and warm social space for individuals and groups to relax, chat, and engage in activities.

Working Group 2's (Emir Çağrı AÇIKEL-Doğukan HATİPOĞLU-Süleyman ÖZTÜRK-Miraç YEŞİLOĞLU) suggestion is the office cafe (Table3).

Table 3. Re-function proposal prepared by Working Group-2

Working Group-2		**Function Suggestion:** Office Cafe
Ground Floor Plan	Gallery Floor Plan	Presentation Poster
		
Lobby Field Image		Gallery Floor Space Image
		
Interior Image		Gallery Floor Space Image
		

We spend a large portion of our lives working, which requires us to spend a lot of time in offices. Office cafes have recently appeared for people with flexible work orders, who don't need a specific workspace, or who work entirely independently due to the emergence of new job descriptions that call for working outside the office (Tunç and Sevinç Kayıhan, 2018; 232). By providing collaborative workspaces for various user profiles, such as students and business people, both individually and in groups, the design aims to create a flexible working environment. Additionally, the groups' collaborative efforts allow them to socially

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unite, share the benefits of cooperation, and articulate some shared ideals.

The registered building, which was constructed using the current industrial-style approach to office interiors, has a library, individual and group workstations, a meeting room, a cafe, and a wet area. While there is a welcome desk at the entrance, the library and private study spaces are symmetrically arranged on both sides of the entrance. On the back of the information desk is where the cafe bar area is located. On the other hand, wet areas are dealt with beneath the mezzanine floor. It is planned to put into service for users electronic study and presentation stations, which are resolved as a virtual library in the annex building as a requirement of the digital age.

The study was designed to make the registered building, which is currently unusable, sustainable and livable. As a result of the projects, the students presented suggestions for adaptive reuse in the study. By preserving the distinguishing characteristics of the registered building (roof trusses, façade layout, traditional materials), contemporary and innovative design-oriented results were achieved. The study aimed to make the least possible interventions so that the building would surround the interior like a shell, taking into account the conservation principles (ICOMOS, Venice Charter, 1964, article 4, CARTA DEL RESTAURO, Athens Charter, 1931, articles 3-4). A modern atmosphere was provided in the interior by preserving the original roof trusses, window-door sizes and positions. It is anticipated that the proposals, in which social, economic, and environmental sustainability are integrated into the design, may improve the functional value, economic value, and ecological value of the building. The additional unit has been built using modern construction methods and materials, is smaller in size, area, and height than the registered building, and has been designed in accordance with conservation principles. (ICOMOS, Venice Charter, 1964, article 13, CARTA DEL RESTAURO, Athens Charter, 1931, article 7-8).

Survey Study (Assessment Phase)

The survey consists of four parts and was prepared to determine the theoretical knowledge included in the 8th semester curriculum of the 2022-2023 spring semester of senior-year students at Selcuk University's Interior Architecture Department on the subject of conservation and adaptive reuse within the Restoration Course. It also aims to evaluate the students' learning outcomes for adaptation reuse proposal. The first part of the survey is about the students' demographic structure, followed by statements about the education they received on conservation and adaptive reuse, the instructor's approach to conservation and reuse, and the adequacy of conservation and reuse in interior architecture education in our country.

A total of 61 students who took the restoration course participated in the survey. The survey was conducted using an online form application

created on the Google Survey platform. The students were asked to respond various statements. The obtained survey data was analyzed using descriptive statistical methods, which involve collecting, interpreting, and presenting numerical data. The numerical data was evaluated using Microsoft Excel and SPSS package programs. Descriptive statistics is a set of techniques and methods used to analyze numerical data accurately (Doğan, 2007). To assess the reliability of the measurement method used in the study, the Cronbach Alpha value was calculated and it was found to be 0.897. According to Cronbach (1951; 334) and Panayides (2013; 696), a reliability coefficient of $0.80 \leq \alpha < 1.00$ indicates high reliability. Therefore, it can be concluded that the scale used in the study is highly reliable. Furthermore, the study tested four hypotheses, and the accuracy of these hypotheses was evaluated through the experiment (Table 4).

Table 4. Study hypotheses

Study's Proposed Hypotheses
H.1: "Before and after taking the restoration course, there are differences in the degree of knowledge that interior architecture students have regarding conservation and reuse.
H.2: Students' awareness of their responsibility for creative thinking and protection is positively impacted by the application proposal study prepared for adaptive reuse in interior architecture education.
H.3: The lecturer's (instructor's) conscious approach to the conservation and sustainability of cultural heritage in interior architecture education has a positive impact on the students.
H.4: Conservation awareness is impacted by the interior architecture education program's early emphasis on cultural heritage conservation and adaptive reuse."

The study's results are presented below in a systematic order, part by part. Table 5 reveals that of the 61 students who took the first part of the restoration course and took the survey, 63.9% were female and 36.1% were male.

Table 5. Demographic features

Variables		**f**	**%**
Gender	Female	39	63,9
	Male	22	36,1
	Total	61	100

The restoration course's conservation and adaptive reuse learning outcomes are presented in the second part. Table 6 lists the level of knowledge regarding conservation and adaptive reuse both before and after taking the restoration course.

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Table 6. Knowledge assessments before and after completing the restoration course

	None		Little		Moderate		A lot		Total
	f	%	f	%	f	%	f	%	-
STATEMENT 1	5	8,2	32	52,5	21	34,4	3	4,9	61
STATEMENT 2	-	-	-	-	28	45,9	33	54,1	61

Note: *f: Frequency number, %: Percentage value*

In response to statement 1: "*Please mark your level of knowledge about cultural heritage conservation and adaptive reuse before taking the restoration course in your interior architecture education*," 8.2% of participants had no knowledge of conservation and adaptive reuse, and 52.5% had little. As can be seen, 4.9% responded a lot while 34.4% marked moderate. These findings suggest that prior to enrolling in the restoration course, the participants knew little about conservation and adaptive reuse.

In response to statement 2: *"Please mark your level of about cultural heritage conservation and adaptive reuse after taking the restoration course in your interior architecture education,"* 45.9% of the participants indicated that they knew moderately about conservation and adaptive reuse, and 54% indicated that they knew a lot. These results suggest that more than half of the participants had a lot of knowledge of conservation and adaptive reuse and that the issue was transmitted to the restoration course students well.

These results support the **H1**: "*Before and after taking the restoration course, there are differences in the degree of knowledge that interior architecture students have regarding conservation and reuse*". According to these data, it has been ascertained that the students of the interior architecture department have sufficient knowledge about cultural heritage, conservation, conservation approaches, adaptive reuse in the course curriculum.

By suggesting a function on the registered structure, the students applied the theoretical knowledge they had learned in the course. The students assessed this application's workflow and final results (Table 7).

Table 7. Assessments of the proposal studies prepared by the students

	I strongly disagree		I disagree		Undecided		I agree		I strongly agree		Total
	f	%	f	%	f	%	f	%	f	%	-
STATEMENT 3	-	-	4	6,6	9	14,8	36	59,0	12	19,7	61
STATEMENT 4	-	-	2	3,3	9	14,8	33	54,1	17	27,9	61
STATEMENT 5	1	1,6	4	6,6	4	6,6	33	54,1	19	31,1	61
STATEMENT 6	2	3,3	2	3,3	10	16,4	34	55,7	13	21,3	61
STATEMENT 7	-	-	3	4,9	11	18,0	33	54,1	14	23,0	61
STATEMENT 8	-	-	3	4,9	7	11,5	30	49,2	21	34,4	61
STATEMENT 9	-	-	3	4,9	9	14,8	31	50,8	18	29,5	61
STATEMENT 10	-	-	1	1,6	9	14,8	36	59,0	15	24,6	61
STATEMENT 11	-	-	1	1,6	5	8,2	28	45,9	27	44,3	61

Note: *f: Frequency number, %: Percentage value*

In response to statement 3: *"Although the re-functioning proposal study prepared within the scope of the restoration course limited me with conservation principles and re-use approaches, I learned a lot in terms of protecting cultural heritage. "* It can be seen that 6.6% of participants disagree, 14.8% are undecided, 59.0% agree, and 19.7% strongly agree with the statement. These findings indicate that participants' conservation practices and reuse strategies, even when put into practice within the confines of the law, have a positive impact on the learning process.

In response to statement 4: *"The refunctioning proposal study prepared within the scope of the restoration course increased my interest in the adaptive reuse aspects of interior architecture."* 3.3% of the participants disagreed, 14.8% were undecided, 54.1% agreed, and 27.9% strongly agreed with the statement. These data suggest that the participants' interest in studies on the reuse of registered buildings was influenced by their suggestions and the implementation study.

In response to statement 5: *"The re-functioning proposal study prepared within the scope of the restoration course contributed to the formation of my sense of responsibility for the conservation of historical cultural architecture."* It can be seen that 1.6% of participants strongly disagree with the statement, 6.6% disagree, 6.6% are undecided, 54.1% agree, and 31.1% strongly agree. These findings indicate that the suggestion implementation study has a positive impact on the sense of responsibility.

In response to statement 6: *"The re-functioning proposal study prepared within the scope of the restoration course helped me to understand the sustainability problems of existing historical buildings."* 3.3% disagree, 16.4% are undecided, 55.7% agree, and 21.3% strongly agree with the statement. The concept of sustainability, which is one of the most significant issues facing registered buildings, is apparent from these data.

In response to statement 7: "The re-functioning proposal study prepared within the scope of the restoration course guided me in learning new approaches to conservation and sustainability." 4.9% of the respondents disagree with the statement, followed by 18.0% who are undecided, 54.1% agree, and 23.3% strongly agree. These data indicate that they have implemented the design principles intended to ensure the continuity and protection of the registered structures.

In response to statement 8: *"The reuse proposal study prepared as part of the Restoration course helped me to understand that buildings that are out of use but are still in good physical condition can be conserved by using them".* It can be seen that 4.9% of the participants disagree, 11.5% are undecided, 49.2% agree, and 34.4% strongly agree with the statement. These data indicate that they are aware of the significance of adding a new function, which is one of the key strategies for safeguarding registered buildings.

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In response to statement 9: "The re-functionalization proposal prepared within the scope of the restoration course made me realize that I, as a designer, am also one of the responsible ones in balancing between the original character of the registered building and the new function." 4.9% of the participants disagree, 14.8% are undecided, 50.8% agree, and 29.5% strongly agree with the statement. These facts suggest that they realized the importance of interior architects in ensuring the survival and preservation of the registered building.

In response to statement 10: *"The re-functioning proposal study prepared within the scope of the restoration course guided me in designing spaces that are correctly related to each other within an existing registered shell and respect the registered structure."* It is seen that 1.6% of the participants disagree with the statement, 14.8% are undecided, 59% agree and 24.6% strongly agree. These data suggest that when designing the space within the space, the registered structure's presence is taken into account.

In response to statement 11: *"Although I knew that throughout my career as an interior designer, I would primarily design spaces in existing shells, the proposal study helped me better understand the necessity of designing spaces inside protected and registered building shells."* 1.6% of the participants disagree, 8.2% are undecided, 45.9% agree, and 44.3% strongly agree with the statement. These facts help us to understand how crucial it is to be prepared and skilled during the process of protection and re-functioning.

The **H2:** " Students' awareness of their responsibility for creative thinking and protection is positively impacted by the application proposal study prepared for adaptive reuse in interior architecture education" is supported by these findings. The findings suggest that the project's conservation awareness and adaptive reuse efforts should be taken into account as a whole.

Students were asked to assess the lecturer's (instructor) approaches to reuse and conservation in the third section (Table 8).

Tablo 8. Student assessments of the lecturer's (instructor's) approach to the class

	I strongly disagree		I disagree		Undecided		I agree		I strongly agree		Total
	f	%	f	%	f	%	f	%	f	%	-
STATEMENT 12	1	1,6	1	1,6	7	11,5	25	41,0	27	44,3	61
STATEMENT 13	1	1,6	1	1,6	5	8,2	27	44,3	27	44,3	61
STATEMENT 14	1	1,6	3	4,9	7	11,5	27	44,3	23	37,7	61
STATEMENT 15	2	3,3	7	11,5	11	18,0	26	42,6	15	24,6	61
STATEMENT 16	1	1,6	2	3,3	10	16,4	29	47,5	19	31,1	61
STATEMENT 17	-	-	3	4,9	8	13,1	29	47,5	21	34,4	61

Note: *f: Frequency number, %: Percentage value*

In response to statement 12: *"The instructor clearly explained the concept of reuse in historical buildings and its importance for interior architects."* It is seen that 1.6% of the participants strongly disagree,

1.6% disagree, 11.5% are undecided, 41% agree and 44.3% strongly agree with the statement.

In response to statement 13: *"The instructor contributed to the development of my awareness about the conservation and preservation of historical buildings both in my city and in our country and around the world."* It is seen that 1.6% of the participants strongly disagree, 1.6% disagree, 8.2% are undecided, 44.3% agree and 44.3% strongly agree with the statement.

In response to statement 14: *"The instructor helped me develop an understanding of the relationship between reuse issues and sustainability."* It is seen that 1.6% of the participants strongly disagree, 4.9% disagree, 11.5% are undecided, 44.3% agree and 37.7% strongly agree with the statement.

In response to statement 15: "*The course instructor contributed to my meeting with other professionals (such as architects, restorers, archaeologists, artists) and necessary collaborators*." It is seen that 3.3% of the participants strongly disagree, 11.5% disagree, 18% are undecided, 42.6% agree and 24.6% strongly agree with the statement.

In response to statement 16: *"By restricting me to decisions that could not be undone in the historical structure, the instructor encouraged me to develop my creativity*." It is seen that 1.6% of the participants strongly disagree, 3.3% disagree, 16.4% are undecided, 47.5% agree and 31.1% strongly agree with the statement.

In response to statement 17: *"The lecturer's presentation of many successful preserved, adaptable reuse examples from our country and the world inspired me*." It is seen that 4.9% of the participants disagree with the statement, 13.1% are undecided, 47.5% agree and 34.4% strongly agree.

The **H3:** "The lecturer's (instructor's) conscious approach to the conservation and sustainability of cultural heritage in interior architecture education has a positive impact on the students " is supported by these findings. These findings support the hypothesis that *the instructor's holistic transfer of cultural heritage protection and ecological, economic, and sociocultural sustainability has a positive impact on the participants' proposal project design process.*

The final part requested Turkish interior architecture departments to assess students' knowledge of cultural heritage conservation and adaptive reuse in the classroom (Table 9-10).

In response to statement 18: "In our country, interior architecture education at the current level covers cultural heritage conservation and adaptive reuse." It is seen that 24.6% of the participants strongly disagree, 26.2% disagree, 32.8% are undecided, 6.6% agree and 9.8% strongly agree with the statement. With the help of these data, it can be deduced that the participants offered a critical viewpoint on the educational strategy used to promote conservation in Turkey's interior architecture education system.

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Table 9. Assessments of interior architecture departments on cultural heritage conservation awareness and adaptive reuse in the education process

	I strongly disagree		I disagree		Undecided		I agree		I strongly agree		Total
	f	%	f	%	f	%	f	%	f	%	-
STATEMENT 18	15	24,6	16	26,2	20	32,8	4	6,6	6	9,8	61

Note: *f: Frequency number, %: Percentage value*

In response to statement 19: "*When should conservation awareness and adaptive reuse education be introduced in interior architecture programs in our country?".* The survey results indicate that 18% of the participants believe it should be introduced in the first grade, 39.3% in the second grade, 37.7% in the third grade, and 4.9% in the fourth grade. These findings suggest that the majority of participants feel that cultural heritage conservation and adaptive reuse should be taught earlier in the educational process.

The **H4:** " *Conservation awareness is impacted by the interior architecture education program's early emphasis on cultural heritage conservation and adaptive reuse"*. As per the data, the participants criticized the notion that conservation and preservation awareness should be taught in the early stages of interior architecture education in our country, and that the number of theoretical and practical courses should be increased based on the grade level.

Table 10. *An assessment on when to begin educating students about conservation and adaptive reuse*

	1st Grade		2nd Grade		3rd Grade		4th Grade		Post Graduate		Total
	f	%	f	%	f	%	f	%	f	%	-
STATEMENT 19	11	18,0	24	39,3	23	37,7	3	4,9	-	-	61

Note: *f: Frequency number, %: Percentage value*

FINDINGS AND DISCUSSION

The field of interior architecture has the potential to incorporate social structures' cultural components and link them to interior settings. Since education is a crucial part of professional practice in this field, the concepts of "conservation and adaptive reuse" should be emphasized. The goal of this study is to examine the relevant concepts using an example structure from the interior architecture educational process. In the study, the proposal implementation studies created by the senior interior architecture students as part of the Restoration Course were examined, and the survey method through these studies was used to question the course learning outcomes. The first part of the survey is about demographics, while the second part asks about the participants' knowledge levels before and after taking the course. The answers showed that the restoration course helped students become more aware of conservation and reuse in interior architecture education. It is concluded that students who have been trained in conservation can

make much more accurate and significant decisions about transmitting cultural assets to future generations. This conclusion is in line with the studies of Atalan & Sevinç (2016), Efe Yavaçcan (2021), and Gökarslan & Tuncer (2023), which emphasize the importance of conservation training for professionals working in historical environments. In the study, it is crucial to use holistic approaches to conservation education that foster a deep understanding of the value of cultural heritage and the revival of its ideals. Students developed their understanding, analyzing, and recognition skills of the environmental and structural features of the existing building, inspired by heritage items and contents, with the concept of "adaptive reuse" during the design phase of the proposal application. This approach to learning coincides with the results of studies by Brooker and Stone (2004) and Embaby (2014), which show that conservation processes are vital to teaching and learning. However, Yıldırım Gönül and Balcı Yaşar (2019) emphasized that competent interior architects have important duties in conservation, and the criticism that interior architecture education should be renewed immediately is similar to the result of the study. In fact, the requirement to increase the number of theoretical and applied courses according to the grade level from the early stages of education is compatible with the results of the studies of Madran, (2007), Büyükmıhçı and Yücel, (2012) and Gökarslan and Tuncer (2023). The students who took part in the fourteen-week restoration course helped to support the findings of the studies conducted by Efe Yavaçcan (2021), Cordan, Dinçay & Teixeira, (2014) because they were familiar with the theories surrounding historical environmental protection and re-functioning as well as the methods used for conservation both domestically and abroad. The role of the instructor in teaching interior architecture students about the concepts of conservation and re-functioning is crucial, as highlighted by Van Den Berghe (2014). The instructor encourages students to visit registered buildings to gain a better understanding of conservation, analyze the building's features, and prepare a proposal application project. This approach aligns with studies conducted by Aydın & Okuyucu (2009), Jahromi (2015), Efe Yavaçcan, (2021), and Hasırcı, Bakır Küçükkaya, Edes, Tatari, Rolla, Çalişkanelli, & Kabaçam (2022), which emphasize the importance of interior architecture students' contribution to the development of conservation awareness by actively "using" it. Throughout the study, it was discovered that involving external experts such as restorers and architects, as well as various stakeholders in the proposal process, encouraged students to explore conservation principles and the limitations of reusing. These findings align with similar studies conducted by Jahromi (2015). The data collected during the course also revealed that students agreed with the findings of Lewis (2013) and Celadyn (2016) that the incorporation of these principles promotes ecological, sociocultural, and economic sustainability by encouraging resource consumption reduction and a holistic approach to conservation and sustainability.

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CONCLUSIONS AND RECOMMENDATIONS

Every effort made to discuss and implement sustainability in interior architecture will increase opportunities for people to maintain their current needs and cultural values. There are various factors that have led to the depletion of environmental resources and cultural identity in society, including the acceleration of production and consumption processes, advancements in communication and transportation, increased migration to urban areas, and global warming. As a result, a new approach has emerged that seeks to address this issue holistically by preserving cultural assets and transferring them to future generations in a sustainable manner. This approach, known as "sustainable conservation," involves incorporating cultural assets into the process of use where they can be revived in environmental, socio-cultural, and economic terms rather than simply preserving them as idle historical artifacts.

Actually, this process, which is referred to as adaptive reuse, entails both spatial and temporal transformation. By providing options that can satisfy modern-day needs, this process allows for the renewal of existing structures that cannot satisfy user needs. The organization of modern demands, requests, and renewal proposals within a structure by interior architecture preserves the present and creates a link between the past and the future.

In order to ensure the sustainability of our built environment, education plays a crucial role in the field of interior architecture, as it does in every other field. Studies have shown that the "learning by doing" approach helps to develop an awareness and conservation culture for cultural assets. The primary objective of this study is to evaluate the extent to which students understand, analyze and reflect on the concepts of conservation and reuse, and the suggestions created within the boundaries of conservation principles and adaptive reuse approach. As a result of this study;

- The learning outcomes for the restoration course produced positive outcomes, and the students gained a conservation awareness and embraced the reuse strategy.
- The instructor's effective method of teaching the students about conservation and reuse had a positive outcome.
- The students' original ideas have grown as a result of the boundaries set by conservation elements and principles.

In conclusion, the study is anticipated to serve as a guide for future interior architects who will assess the stock of existing buildings and incorporate it as an extension of a distinctive architectural and cultural past while creating interior spaces in a historical, cultural, or distinctive built environment. The transfer of historical structures to subsequent generations will be facilitated by maintaining them and creating a solid link between the past and the present. Given how inadequate the conservation awareness courses are in the interior architecture education program in our nation, various theoretical and applied

courses ought to be incorporated into the curriculum from the beginning. To develop a skilled and capable interior architect in the field of reuse, it is crucial to increase the number of applied studies in the direction of conservation and adaptive reuse in interior architecture education.

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Resume

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Disruptions in Greenscape Politics in Modern Turkey: A Case Study of Başkent Nation's Garden

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Abstract

Public green spaces can be regarded as an important component of an urban tissue, besides bearing ideological political connotations. The emergence of modern parks as part of public greenscape started with the 19th century Ottoman Nation's Gardens. Following the first modern parks, which started to be referred to as Nation's Gardens in the Ottoman Empire, the notion of the garden was replaced by a park during the Republican Era, which displaced the Ottoman Nation's Gardens from cityscapes. The Nation's Gardens projects, revived as an election promise in 2018 and began to be built, forming part of Turkey's greenscapes in all provinces, differ from the Ottoman Nation's Gardens, to which they explicitly refer in the name. The article will discuss the changes in greenscape projects in Turkey that have been used as ideological tools and have undergone constant changes in every period and government. In line with the findings of the article, it is a fact that the users, contents, and even the locations of these greenscapes have been frequently altered throughout history. The article also provides a comprehensive analysis of the Başkent Nation's Garden project, being one of the most symbolic political projects, for discussing the changing ideologies and political priorities to open up a broader discussion on the nature of Greenscape Politics in Turkey. The research aims to contribute to the discussion of the obstacles created by the design of parks and garden areas, which form an important component of cities, differing with each political approach, thereby hindering the continuity of the urban fabric. It invites a critical examination of how political influence can create fragmentation in the field of city planning, ultimately affecting the sustainability, functionality, and cultural coherence of urban spaces.

Keywords:
Greenscape, Nation's Garden, Park, Public space.

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INTRODUCTION

An analysis of parks and the changes in cities' green spaces in history would reveal the ideological positions of these collective urban landscapes, regardless of a particular geography. Many large-scale urban interventions in history have ended with creating an urban green or park. The most well-known example of such interventions is the transformation of 19th century Paris, named the greening of Paris as a political act of Haussmann (Jordan, 1995). Parks and gardens in the cityscape cannot escape serving political and ideological approaches. Since the emergence of the first modern parks of the Ottoman Empire in the 19th century, public green spaces, parks, and public gardens have become part of the country's political landscape in Turkey. However, from the Ottoman Empire to today, the practices of making parks and gardens and their usage by the citizens have changed radically. A prominent constant in this change is the association of these green spaces with national terminologies, where the concept of 'nation' gets to be defined and translated differently (Ercan, 2018; Şenyurt, 2018), either as millet or ulus, both of which are used to define the urban green spaces.

From this perspective, the Nation's Gardens, once the popular political project of the Ottoman Empire in the 19th century, were re-adopted and became the country's agenda since 2018, this time with different ideological connotations. The new Turkish presidential regime had presidential and parliamentary elections in 2018, and the new construction projects were announced as election promises. Nation's Gardens projects, essentially urban parks, were introduced as a new concept that will transform the existing landscape for the cities. As stated before, the concept is hardly novel as it was influenced by the 19thcentury Ottoman Empire's city park projects, which have the same name as Nation's Gardens. Naming public green spaces, the same as in the Ottoman era and as 'garden' instead of 'park', can be discussed as an ideological consequence of Ottoman revivalism.

In history, the Nation's Gardens of the Ottoman Empire faded away from the cityscapes with the emergence of the Republican parks at the beginning of the 20th century, and therefore, these new garden projects can be argued to take a stand against the greenspaces of the Republican period, namely the parks; such as Gençlik Park and Gezi Park. Therefore, it would not be wrong to assume that there are major ideological breaks in Turkey's urban history and the planning of greenscapes. This change can be traced not only from changing the name from 'garden' to 'park' and back to 'garden' again but also from the changes in the programs and activities proposed for these green spaces. Through tracing the change in the naming of the greenscape from gardens to parks and back to gardens again, the article aims to unfold the changes in the country's political and ideological approaches by comparing green projects of different periods.

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This study determined three important thresholds: the nineteenth-century Ottoman Nation's Gardens, Early Republican (1923-1950) parks, and today's Nation's Gardens projects reference each other differently. It will be argued that all these resulted in the formation of different public landscapes with different users and daily practices of public space. While investigating the relations between different periods, the article will also discuss how the ideological discontinuities and ruptures between these periods are reflected in the urban fabric.

Furthermore, it will try to provide an inclusive analysis of recent Nation's Gardens projects, with a particular focus on Başkent Nation's Garden in Ankara, to argue the different and changing meanings of the concept of a nation (millet), which is common to all greenscape politics of different eras, and which is believed to affect the user profiles and the programs included in parks. This case study aims to contribute to larger urban discussions by offering insights into how the concept of nation, as embedded in the design and function of Nation's Gardens, reflects broader socio-political ideologies and influences urban development. By focusing on Başkent Nation's Garden in Ankara, the research highlights how changing interpretations of national identity shape public spaces, user demographics, and park programs, revealing a direct link between political narratives and urban planning. Based on the hypothesis that public spaces are not just physical entities but also social and cultural constructs shaped by power dynamics, the article is expected to contribute to the understanding urban development in diverse socio-political contexts, especially in case of Turkey.

The expected outcomes of the research is to contribute to various debates on the challenges posed by the design of parks and gardens, key elements of cities, as they vary according to political approaches, disrupting the continuity of the urban fabric. It aims to introduce a critical analysis of how political influence can lead to fragmentation in urban planning, ultimately impacting the sustainability, functionality, and cultural integrity of urban spaces.

METHODOLOGY

Researching greenscape politics through various greenscape projects demands a detailed analysis that goes beyond what this article can provide. Nevertheless, the article attempts to concentrate on particular politically symbolic examples to frame its discussion. Interruptions, discontinuities and disruptions in ideological discourses within this historical analysis has been a key motivation for the study. By underlying the changes in the name and concept of urban greenscape, from gardens to park and back to gardens again, the study seeks to perform a concurrent analysis of the fluctuating ideological and political interpretations of 'millet' and 'ulus' in relation to the assessment of existing urban green spaces. The main methodology of the article involves revealing the transformations of these concepts by comparing different historical periods and examining how these concepts have

evolved in response to ideological shifts and reflected to the design of urban greenscape. The determined historical breaks of the study were examined through a comparative approach between the greenscape projects developed by the ruling governments. The research benefited from various historical sources. 19th and 20th century Ottoman Empire gardens and parks were analyzed through maps, as primary and secondary sources. Especially the Directorate of State Archives Ottoman Archives (Cumhurbaşkanlığı Devlet Arşivleri Osmalı Arşivleri) were analyzed to reframe the terminological complexities, which resulted from Nation's Gardens Guide, reconstructing the historical narrative, about mesire, çayır, garden and park in different periods.

Today's Nation's Gardens were analyzed and mapped based on site selection, the previous functions of the sites, and the design firms involved, using publications from TOKİ, the Ministry of Environment, Urbanism and Climate Change, and occasionally municipalities, which were the primary stakeholders in the projects. Additionally, information from TOKİ Haber, the Nation's Gardens Guide, the official publication of the presidency, and various newspaper reports regarding the Nation's Gardens were compared.

THE NATION'S GARDENS (MİLLET BAHÇELERI) AND THEIR RELATIONSHIP WITH THE NATION (MİLLET) IN THE OTTOMAN EMPIRE

Nation's Garden is a name that is referred to many greenscapes in cities today. It has been a prominent tool for reference to Ottoman idealism in contemporary political discourse. Due to both the name of today's Nation's Gardens and the references to the Ottoman Empire in official statements, the earliest examples of Nation's Gardens in the 19th century Ottoman Empire can be analyzed to understand and compare the references to certain concepts.

The first Nation's Garden of the Ottoman Empire opened after a five-year construction process in Taksim in 1869 (Çelik, 1993). The emergence of the Nation's Gardens in the Tanzimat Era (1839-1871) corresponds to the reign of Abdulaziz (1861-1876). After his reign, urban interventions and the evolution of the so-called modern green spaces continued in the Abdulhamid II Era (1876-1909), also known as the Hamidian Era. Following the Hamidian Era, in the Second Constitutional Era (1908-1920), many public green space projects started to proliferate. Although the first examples of modern parks started to emerge, mostly named as Nation's Gardens, in the last half of the 19th century, the use of public green spaces with modern practices cannot be limited to the emergence of these gardens (Ercan, 2018; Şenyurt 2018).

Traditional public green spaces in the Ottoman Empire, which were generally called mesire and çayır in earlier times, were also got to be modernized and used by people parallel to the foundation of Nation's Gardens. At the same time, the first Nation's Gardens emerged in

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İstanbul and then spread to the Ottoman realm, mesire, and çayır as existing green areas that were often used in each city and province of the Ottoman Empire for the resort, promenading, picnicking, and other activities in the warm weather (Işın, 2018). However, mesire and çayır were unplanned landscapes until the 19th century, especially in İstanbul as they were the extensions of the palace gardens (Arın, 2018; Eldem, 1976; Hamadeh, 2002).

The increasing popularity of utilizing green spaces and the rise of epidemics in the 19th century led to investments in infrastructure and landscape elements in mesire and çayır. Although most of these spaces were located near water sources (Figure 1), some were also significant because of their location as part of İstanbul's water system (Mizbani, 2016). As a result, public-funded and private fountains flourished around the cities within various green spaces. Along with the architectural and infrastructural aspects, recent modern institutions have also impacted the architecture of public green spaces, leading to significant changes in mesire and çayır. The traditional practices continue to coexist with modern ones, thus turning public green spaces into encountering space (Arın, 2018).

Figure 1. Kağıthane Mesire (Frères, 1890).

With the rise in urban regulations in the second half of the nineteenth-century Ottoman Empire and the extensions of the Tanzimat reforms, codes and regulations (expropriation, building), and establishment of the municipality, modern European-style parks started to appear in the cityscape. These green spaces, which were part of the new cityscape of everyday life, different from mesire or çayır, were started to be called Nation's Gardens. Nation's Gardens were initially the new bourgeoisie spaces of the urban which often charged an entrance fee. The first examples of these gardens emerged in Pera district, where the new European population demanded a European-style garden (Demirakın, 2006; Kentel, 2018). The first Nation's Garden, Taksim Nation's Garden, was built on the existing ground of a non-Muslim cemetery (Grands Champs des Morts) in Taksim in 1869 (Çelik, 1993).

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The garden was juxtaposed with the Artillery Barrack (Figure 2), situated in parceled land during the rapid urbanization and parcellation of the nineteenth century in İstanbul (Pinon, 1998). The roads constructed around the garden determined some of the boundaries of this green space. Initially, wooden fences were changed to walls to reinforce boundaries, so the park was one of the "walled-in, paved, and formally landscaped gardens" (Gölünü, 2020).

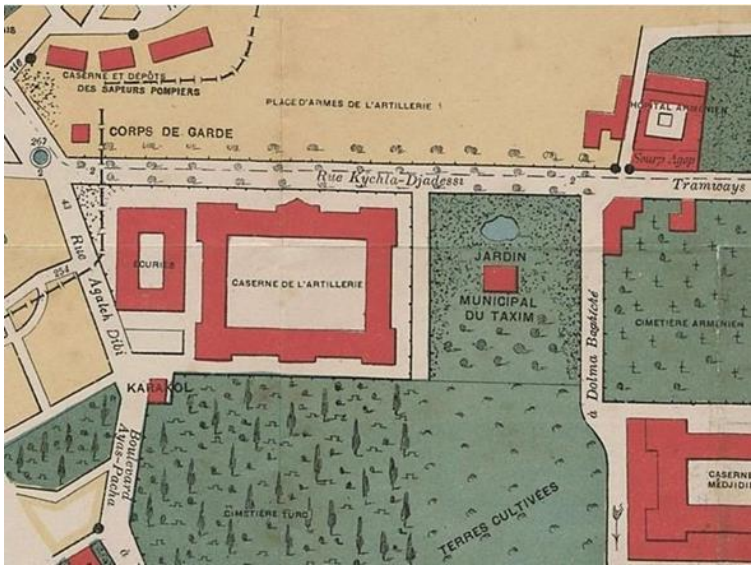

Figure 2. Taksim Nation's Garden Plan (Jardin Municipal Du Taxim) (Godeffroy, 1891).

After the Taksim Nation's Garden, the first Nation's Garden on the Anatolian side was opened in Kısıklı district in 1870 (Yaltırık, 1993). Then, the Pera bourgeoisie demanded another garden for their district, and the Muslim cemetery (Petits Champs des Morts) was transformed into Tepebaşı Nation's Garden in 1880 (Figure 3) (Kentel, 2018). Tepebaşı Garden was neighbor to Kasımpaşa district, which was a working and underclass neighborhood. Kentel's (2018) research about 19th century Pera shows that the new bourgeoisie of the district was getting anxious about the 1865 cholera outbreak because its neighboring district, Kasımpaşa, a stigmatized neighborhood under unhygienic conditions, had its garden in 1880. Those gardens were built by the municipality. The Department of Public Security (Daire-i Zabtiye) was responsible for the process of removal of the cemeteries of each millet for the garden constructions, and the "public benefit" was the main slogan for expropriations, especially the removal of cemeteries for the sake of public health (Demirakın, 2012).

The only difference between these Nation's Gardens from earlier examples like mesire and çayır was not their scale or planning processes, as these gardens got converted from existing green lands like cemeteries. They differed in how they were initiated by the municipality and sometimes in the light of local neighborhoods' requests (Demirakın, 2012). They can be regarded as green spaces that were more organized and created with a budget upon the request of specific users than a

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spontaneously expanding process like mesire and çayır (Demirakın, 2012; Gölönü, 2020).

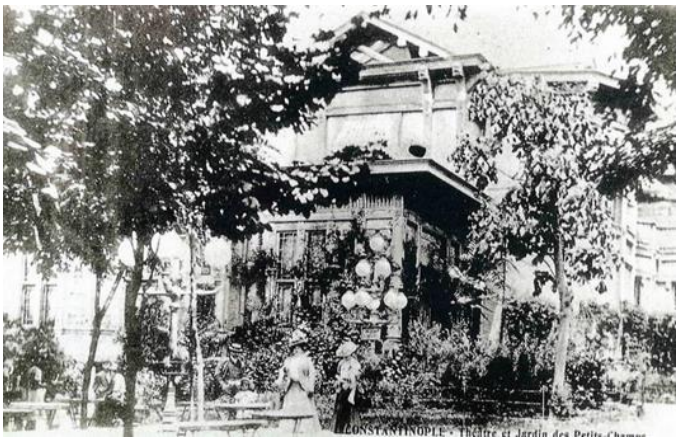

Figure 3. Tepebaşı Nation's Garden Theatre ca. 1900 (URL-1).

Even though the municipal parks were seen as public green spaces, the particular name of Nation's Gardens can be argued to be related to the fact that these gardens were not publicly owned. However, they were often leased to non-Muslim operators, and in the case of İstanbul, the tenants were usually certain non-Muslim communities ('millet' as they were called in the Ottoman era) (Ercan, 2018). While Tanzimat reforms, modernization, new institutions, and especially the municipality created new opportunities for the subjects in the city, new rising classes pleasurably benefited. It seems that the emphasis on the notion of 'nation' or 'millet' in Nation's Gardens was an outcome of them belonging to certain nations in the Ottoman Empire, such as the gardens of this different millet. They refer to the plurality of nations and the emergence of modern uses of public space within the Empire. By the turn of the century, these landscapes started to be called belonging to 'millet' (nation) as a proper identification according to the Ottoman Empire's social and political structure.

Another important terminological discussion is why they preferred to be named a garden rather than a park. Even though the terms 'garden' and 'park' can refer to similar things physically, there is still a differentiation in their connotations. The 'garden' is a term that recalls for dependency of green space on an architectural edifice or an extension of a structure as seen in palatial gardens. On the other hand, the park may refer to a more independent structure that does not belong to an architectural structure as a garden does. The European counterparts were called in certain cases, such as People's Parks or public gardens. However, in the Ottoman tradition, the concept refers to the development of green space that entails extending a structure and, therefore, indicates particular users. This may be related to the historical green space practices, as discussed earlier, like mesire or çayır, which are mostly extensions of the palace gardens (Arın, 2018). Therefore, the definition of a garden has always depended on either an existing entity or a particular user, as it was in the earlier cases of Nation's Gardens. As will be discussed later, the connotations of 'millet'

and 'garden' were radically different in the late 19th century from the connotations of the same notions adopted as of today for naming the urban green areas.

The green space, being the ground for both cultural and political theatre plays and demonstrations, was common ground even in the earlier green lands of the Ottoman Empire. However, as it will be discussed, both activities were transformed radically in using and forming green space in contemporary examples of Nation's Gardens today. Since the middle of the nineteenth century, newly emerged public green spaces cannot be related to a single ideology or nation but get influenced by the multiplicity of populations and brought out novel ways of using public space. Nation's Gardens, Liberty Gardens, sometimes parks, and sports fields have always been politically charged public spaces, and their evolution, coexisting in the urban space, also created a base for the Republic of Turkey's green spaces, which prefer to use the term 'park' rather than 'garden' later in the century.

THE MODERN PARKS OF THE REPUBLICAN PERIOD AND THEIR ASSOCIATION WITH THE CONCEPT OF NATION (ULUS)

As discussed previously, the ideology behind Nation's Garden's emergence in the upper-class neighborhoods was also related to the changing definitions of nation and nationalism in different eras of the Ottoman Empire. After the Republican revolution, the existing modern and traditional public green spaces were subjected to radical changes, including naming from 'garden' to 'park' and from 'millet' to 'ulus'. For example, Ankara Nation's Garden, which was established at the end of the 19th century as a result of the Tanzimat reforms and the modernization of Ottoman urban spaces, started to be referred to as the city garden or municipal garden after the proclamation of the Republic (Figure 4). In the early 20th century, Ankara Nation's Garden was mostly used by statesmen and elites due to the position of the building across the garden, which was started to be constructed for the CUP (Committee of Union and Progress) but later became the First National Assembly. With the construction of new and modern green spaces such as Gençlik Park, Atatürk Forest Farm, Çubuk Dam, the first Nations Garden in Ankara has rapidly lost its role as one of the leading parks of the city (Gültekin, 2013).

Figure 4. Ankara Nation's Garden (Aktürk, 2006).

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Since the Republican regime abolished the millet system, for the sake of replacing it with the notion of 'ulus', non-Muslim population (millet) living in the Republic of Turkey started to be called 'minorities' (Barkey & Gavrilis, 2015). Meanwhile, the Ottoman greenscapes started to fade away from the landscapes by transforming into republican institutions or parks. Some of these transformations are planned to be on new grounds, where some of them transformed the existing parks of the Ottoman Empire, like İnönü Gezisi (Gezi Park) in İstanbul (Çınar, 2005). While Gezi Park contained the former Taksim Nation's Garden in its boundaries, the Gençlik Park was located just across the only Nation's Garden in Ankara (Figure 5), in Çaputçu Çayırı, which formerly was Ayyıldız sports field. Most of the Republican parks were built according to city plans and the green zone belts that are proposed or exist in the city.

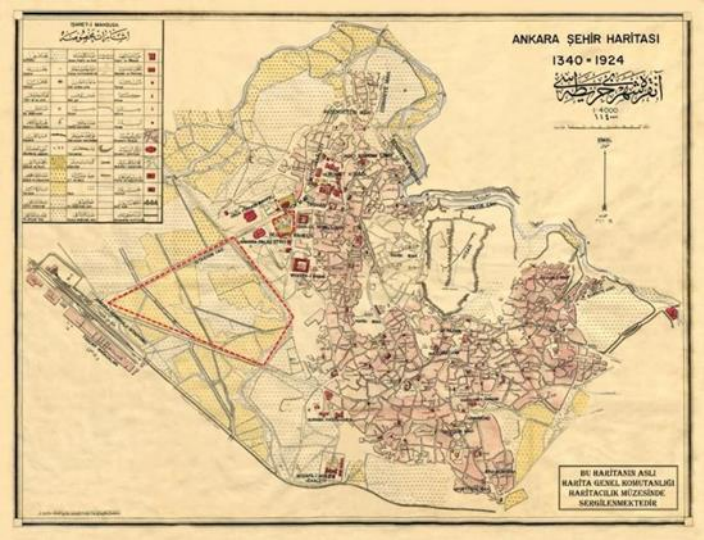

Figure 5. 1924 Ankara Plan, marked areas in the map: Ankara Nation's Garden vs Gençlik Park (URL-2)

This ideological shift in the definition of the terms can also be observed in how the urban green started to change its name from Nation's Garden to Park at the turn of the century (Cengizkan, 2018, p. 122). Compared to the Ottoman Nation's Gardens and parks, the modern urban parks of the Republic of Turkey had new programs, design attitudes, and ideological meanings. City planning required a more holistic approach to public green spaces, in contrast to the previous piecemeal approach of Ottoman municipalities in the planning of Nation's Gardens. The modern urban parks directly affected the emergence of new activities within the city, instead of replicating the existing urban programs. These new programs, such as swimming pools, pavilions with restaurants, and dance floors, also brought out new user profiles within the city. And more importantly these activities required the participation of both men and women in the experience of the green space (Bozdoğan, 2001; Gültekin, 2013; Uludağ, 1998; Yılmaz, 2020). Because Muslim women's access or how they used the mesire and çayır were regulated by the edicts and controlled by gardeners (Arın, 2018; Hamadeh, 2007) and they were banned from using the (Ottoman)

Nation's Gardens, especially where alcohol was sold (Gölönü, 2020, p. 115). Therefore, these new users of green space were nourished not by the city's cosmopolitan identity, as in the Ottoman period, but by an understanding of social cohesion independent of gender and ethnic identity. Therefore, the idea of 'millet' with all its connotations was translated to 'ulus', which envisions another idea of collectivity and new urban practices in public green space.

One of the most important projects of this era was inevitably the Gençlik Park (Figure 6), which also became a symbolic space of the Republican ideals. It was also a model for other parks in different cities. Gençlik Park was the modern urban park in the important location of the capital city where the city's newcomers in the train station saw the park first in the green belt of the Jansen Plan and the city's main axis. Modern urban parks of the Republic of Turkey had new programs, design attitudes, and ideological meanings compared to the Ottoman Nation's Gardens and parks. First of all, these new green spaces of the new regime were not named gardens. As discussed, this change is not limited to a simple name change. However, the fact that these new green spaces had an independent stance and place in the city gave these parks a role far beyond an extension of existing architectural structures such as gardens. The park as an urban entity started to be regarded at the same level as other cultural or social institutions.

Figure 6. View of Gençlik Park in 1950s (URL-3)

A COMPARATIVE ANALYSIS OF TODAY'S NATION'S GARDENS AND EARLIER EXAMPLES OF GREEN SPACE

The naming of green spaces as ‘gardens’ (particularly Nation’s Gardens) reflects more than urban development priorities; it embodies significant political and ideological shifts in Turkey. The transformation from TOKİPARK projects, initiated by the Housing Development Administration of Turkey (TOKİ) in early 2018, to Nation’s Gardens by the end of the same year aligns with broader regime changes. This renaming coincided with Turkey’s transition to an executive presidential system following the 2017 constitutional referendum and

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the 2018 elections, which consolidated political power within the presidency (TOKİ Haber, 2018).

The introduction of Nation's Gardens serves multiple strategic purposes. First, it reinforces a nationalistic narrative by framing urban green spaces as integral to Turkey's cultural and historical identity (Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2020). The concept of a 'nation's garden' emphasizes the role of public spaces in fostering a collective sense of belonging. Second, it reflects symbolic policymaking, with these gardens portrayed as sites promoting social harmony, well-being, and family life. This narrative is intended to counter criticism that the ruling Justice and Development Party (AKP) had prioritized rapid urbanization at the expense of environmental sustainability. This renaming, therefore, illustrates how public spaces are not only functional but also serve as instruments for political communication and regime legitimation.

Both the Ottoman Nation's Gardens of the late 19th century and the parks established during the early Republican period were key urban spaces of modernization, shaping traditional daily life through new public green space practices. These spaces introduced new urban behaviors and social interactions. For example, leisure activities such as visits to cafés, cinemas, theaters, and gazino began to play a significant role, even in some of the earliest Nation's Gardens toward the end of the 19th century. However, the intention behind building Nation's Gardens projects today is rather different. First, they do not bear any role in introducing innovative urban programs or practices for different uses and users. Secondly, these projects have not resulted in a radical increase in green space in cities across the country, as they have been achieved by converting existing green spaces or areas used as sports fields.

An analysis of the Nation's Gardens and the previous uses of their locations reveals that many of the completed projects were originally public green spaces or urban parks, often transformed with minimal alterations—sometimes as little as a name change. As of 2024, the total number of Nation's Gardens projects has surpassed 500, with over 230 already completed (TOKİ Haber, 2024). However, it is almost impossible to be precise about the overall picture of this ambitious picture, as the information in different sources is inconsistent with each other, and there is no clear information on how far most projects have been completed. The article, therefore, will try to pursue a discussion based on available data on the impact of this ambitious project on green space use practices across Turkey.

The selection of sites for the Nation's Gardens appears fragmented, as many projects involve converting existing urban parks into these gardens. Additionally, TOKİ's authority to intervene in protected areas has enabled the creation of Nation's Gardens within forests, coastal zones, and other protected areas. As a result, the implementation of these projects varies significantly across locations, reflecting differing

approaches and contexts. Another criterion that is difficult to compare is the size of the projects as they vary from ten thousand square meters to five million square meters. Similarly, some projects have disproportionately high budgets, even in smaller provinces, making it challenging to assess how effectively these investments resonate with local communities. Similarly, the decision-making processes often disregard urban master plans, focusing more on the visibility and impact of the projects rather than their potential consequences for the existing urban fabric.

Looking at the distribution of Nation's Gardens projects in Turkey, although there is a noticeable concentration of projects in the municipalities of the AKP district, it is challenging to identify the factors that determine the distribution by city. The cities with the next highest number of projects can be listed as Ankara, Konya, Erzurum, Bursa, and Şanlıurfa, which display a constant change in the number of projects. Currently, İstanbul has the highest number of projects, with more than fifty, most of which have been converted from existing green spaces rather than a new attempt to form a green land (Table 1). These green spaces are mostly existing parks, sports fields, TOKİPARKs, urban forests, or military barracks. Hence, the idea of increasing green space per person is unlikely due to projects taking place in already green areas.

Table 1. Nation's Gardens in İstanbul

Name	Area	Former Function	Design Office
Atatürk Airport	2.818.979 m2	Atatürk Airport	
Başakşehir (1st phase)	339.000 m2		
Maslak			
Pendik	285.000 m2	TOKİPARK Pendik	DS Mimarlık
Kayaşehir MB (1st phase)	280.000 m2	TOKİPARK Kayaşehir	ON Tasarım
Bakırköy Baruthane	60.000 m2	TOKİPARK Ataköy/Baruthane	
Zeytinburnu Çırpıcı	223.600 m2	Çırpıcı Urban Park	
Hoşdere	142.000 m2	Hoşdere Hayat Park	
Esenler		Baştapya-Topkule Kışlası	
Ümraniye Hekimbaşı	330.000 m2	Hacegan Forest	
Zeytinburnu Beştelsiz	55.176 m2	Former Military Housing Area	ADD Design Studio
Zeytinburnu Merkez Efendi			
Yıldız Technical University	240.310 m2	University Campus	
Çatalca	35.431 m2		ON Tasarım
Güngören	26.618 m2	15 Temmuz Stadium	ON Tasarım
Beyoğlu Küçükpiyale	9.967 m2	Parking Lot	
Beşiktaş (Rumeli Hisarı)	172.000 m2	Military Zone	
Bayrampaşa	45.000 m2	Pancar Motor Factory	
Çekmeköy	51.000 m2		

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Arnavutköy Bolluca	310.000 m2		
Fatih Land Walls	26.000 m2	Protection Site	ON Tasarım
Kartal Orhantepe	313.000 m2	Quarry	
Kartal Çavuşoğlu			
Silivri	35.000 m2		
Sultanbeyli	67.000 m2		ES Mimarlık
Şile			
Kağıthane Type B Mesire	60.000 m2	Mesire	
Beykoz	100.000 m2	Beykoz Çayırı	
Üsküdar Nakkaştepe	48.676 m2	Military Zone	
Ümraniye Osmangazi	160.000 m2	Osmangazi Grove	
Yamanevler	70.000 m2		
Aydos		Aydos Forest	
Güngören Güneştepe			
Yalıköy			
Ayazma (Kumbaba)	40.910 m2		
Esenler 15 Temmuz	182.556m2		
Küçükçekmece Halkalı	98.467 m2	Green Space	
Fatih	226.137 m2		
Validebağ Grove		Grade I natural site area	
Sancaktepe Samandıra			
Bağcılar Sevgi Forest	62.000 m2		
Bağcılar	57.000 m2		
Pendik Burla Biraderler Grove			
Alibeyköy			
Sultangazi Cebeci	160.000 m2		
Fazlı Hayırlıoğlu	19.000 m2		
Başakşehir Altınşehir			

Variety of the programs, sizes, and locations resulting from Nation's Garden projects have been an important tool for refunctioning different urban entities abolished in the AKP regime. Such re-use strategies, which transform the diversity of use in the existing urban fabric, stripping away their original variety and transforming them into homogenized spaces dominated by standardized programs raises concerns about the loss of functional diversity in urban areas.

The most radical transformation among these can be regarded as the transformation of the İstanbul Atatürk Airport into a Nation's Garden in İstanbul. It is impossible to find clear information about the area, except for the images that appear differently in every source, which promote naïve arguments that 2 million 818 thousand 979 square meters of Ataturk Airport National Garden will increase the per capita green area ratio in Istanbul by 0.17 times. (URL-4). Therefore, many outcomes result from the "emergence of new modes of intervention" (Swyngedouw et al., 2002). For example, the Atatürk Airport Nation's

Garden project contains different paradigms in that it is the largest Nation's Garden, while the Başkent Nation's Garden exists in a Republican space and as part of a large real estate project (Merkez Ankara). The demolition of existing and mostly historic stadium structures within the city and their transformation into parks, on the other hand, have been another way of constructing these Nation's Gardens in many cities. Stadiums in the city centers being rendered dysfunctional by the construction of new stadiums in the peripheries, especially since 2015. In almost 20 cities, including Malatya, Sakarya, Bursa, Eskişehir (Figure 7), Adana, Samsun, Sivas, Trabzon, Diyarbakır, Batman, Ankara, Konya, Giresun, Kocaeli, Ordu, Antalya, İzmir, Çorum, Muş and Karaman Nation's Gardens projects were achieved through the demolition of the existing stadiums in the city centers (TOKİ Haber, 2018).

Figure 7. Google Earth views showing the transformation of Eskişehir Stadium into a Nation's Garden from 2018, 2022 and 2024 (URL-5)

How the level of public use of stadiums changes with transforming these spaces into gardens is an issue that needs to be discussed in future research. This is because stadium buildings are already valuable public spaces, both in terms of their use and their location within the city. Looking at the displacement of existing sporting activity and what kind of activities were replaced for the sake of developing public gardens is an important aspect for public space debates. Because as will be discussed the proposed public use offered by the Nation's Gardens may not always be as inclusive as proposed.

When we look at the effects of these projects across the country, whether these Nation's Gardens have succeeded in increasing the use of public space or remain only as a greenwashing of historical texture throughout the city is an issue that needs to be discussed and examined in more detail. Therefore, in terms of public equality, inclusiveness and diversity, these projects seem to fail in providing a sustainable approach but are utilized to be ideological tools for promoting political inclinations. As can be observed in the transformation of the Atatürk Airport Nation's Garden project, how it has evolved into a more concretized space, losing its characteristics as a greenspace can easily be observed from the serial images. (Figure 8) In this case, greenwashing has worked in reverse, and it would not be wrong to say that the urban fabric, which is challenging to transform into a park, has fallen far short of the intended project. As a result, it remains an incomplete project area, serving as little more than a meaningless void within the city.

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Figure 8. Google Earth views of Atatürk Airport showing the transformation of the site from 2018, 2022 and 2024 (URL-6)

Another example, Başkent Nation's Garden, which is located in Ankara, is among the ideologically prominent examples of Nation's Garden projects not only due to its scale but also to its strategic location, neighboring the Gençlik Park, one of the prominent ideological green spaces of the Republican Period. While a detailed comparison of these reuse-oriented projects is beyond the scope of this article, the architectural approaches generally adopted will be examined specifically through the case of the Başkent Nation's Garden. However, based on the table provided and the reuse strategies outlined, it appears that these projects typically fail to incorporate a design approach that acknowledges their urban context and previous programs. This oversight not only undermines the unique characteristics of the sites but also risks creating uniform spaces that lack a genuine connection to their surroundings. As a result, the potential benefits of adaptive reuse—such as preserving cultural heritage and enhancing community identity—may be lost, leading to developments that do not contribute meaningfully to the urban history and memory.

A COMPARATIVE READING ON BAŞKENT NATION'S GARDEN FOR TRACING DISRUPTIONS IN GREENSCAPE POLITICS

The purpose of examining Başkent Nation's Garden, which was determined as Nation's Gardens in 2018, is mostly related to the selection of the site as it is located on the former hippodrome area, known as AKM Area neighboring the Gençlik Park. The former Minister Kurum for example, mentioned that Başkent Nation's Garden would be "the new Gençlik Park" (TOKİ Haber, 2021). The history of the site reaches back to the Jansen Plans of Ankara. Jansen determined the area as part of the green belt and sports area and the hippodrome was designed by Italian architect Paolo Vietti Violi in 1936. A vast marshy land that was improved and was made a hippodrome ground with human force in the middle of the economic crises of the 1930s has been an ideological open urban space with its modern buildings, tribunes, and racing ground (Özdemir, 2004). However, after the Uybadin Plan of the 1950s, the disconnection of the site from the sports and green line was started, and the spatial connection of the sports complexes and the

Gençlik Park, which was on the green belt and integrity of Jansen Plans was never restored. Also, turning this area into a green space is not a new phenomenon. Park projects have been on the agenda in this area since the 1970s. Mayor Vedat Dalokay (1973-1977), whose administration was considered a social municipalism, proposed an urban park in Hippodrome as an election promise for Ankara as the Hippodrome field, which had limited use because of the horse races (Ayanoğlu, 2020; Öztan, 1974). Not applying park projects in the area and suspending the horse races in the 1970s, the Hippodrome area turned into an "urban void" and a prize-winning project of architects Filiz and Çoskun Erkal, the Atatürk Cultural Center, was built in 1987 in the area (Saner, 2014). Since the 1970s, urban park proposals have been discussed for the land; however, no proposal has been implemented until the Nation's Garden project in 2018 (Ayanoğlu, 2020; Saner, 2014). While the Başkent Nation's Garden (Figure 9) serves as a significant case for examining the Nation's Gardens projects, it also embodies distinct paradigms that set it apart from many other examples. Notably, it plays a crucial role as a landscape within the larger Merkez Ankara real estate development project.

Figure 9. View from Başkent Nation's Garden (URL-7).

The site, promised during the election, was awarded to Yapı-Yapı Construction. Unlike the Hippodrome project of the 1930s and the AKM building of the 1980s, which resulted from national architectural competitions, the Nation's Garden was not subjected to such a process. Consequently, the Ankara Branch of the Chamber of Architects filed a lawsuit against the project due to its non-participatory approach and disregard for heritage conservation. Despite a court ruling that canceled the project plans, the Nation's Garden was opened on October 28, 2021, before the decision was finalized (URL-8). There are various reasons why professionals and some people oppose the project. Primarily, the site embodies Republican heritage and serves as an ideological project that directly addresses the Republic and its architectural values. However, remnants of the Republican Hippodrome, including the stands and modern structures like the AKM building, were not incorporated into the garden's design. Instead, these elements remain disconnected

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and isolated from the proposed experiences and activities within the park. Being one of the largest Nation's Garden examples with approximately 633000 m2, the only two programs declared in the website for the area are mescit space (mosque) (Figures 10-11) & kıraathane (coffeehouse). Of course, there are other activities within the site as library, teahouse, and conference hall, but the website gives priority to the promotion of the two functions above other amenities. However, most of the mentioned programs have not been completed at the garden's opening in October 2021 and not even today (Figure 12).

Figure 10. Başkent Nation's Garden Mosque in December 2021 (Author)

Figure 11. Religious Affairs' Youth Center in Başkent Nation's Garden in January 2023 (Author)

Figure 12. One of the entrances from Hippodrome Street and the construction site of Health Center's transformation into museum in October, 2023 (Author).

It is claimed that more than eighty percent of the park is green space, but the design of the underground parking lot actually limits the distribution of green areas and the potential growth of trees in the area. There is a contradiction between the public claims that argue the amount of green space of the garden and how it is applied in reality. For example, according to a statement from the Chamber of City Planners, the mosque in the master plan was also considered a green space (Aran, 2022). Therefore, the claim that more than eighty percent of the park consists of green space is controversial, as is the claim that the roofs of Kıraathane (Altın Mekan) and Café Park İnci, covered with both natural and artificial turf, were declared as green roofs. Most of the shade areas in Başkent Nation's Garden, which users can use especially in hot weather and sunny hours, consist of pre-established trees from the Hippodrome area. It is evident that the new architectural or landscape elements tend to offer little more than symbolic associations, lacking in functional diversity or spatial richness. Especially the underground parking lot, which transformed the area into a large construction site as stated before, inhibited the processes of soil, green, and water cycles (Figures 13-14).

Figure 13. General view of Başkent Nation's Garden, from Altın Mekan, in the shadow of large-scale real estate project Merkez Ankara and "biological pond" built on a concrete foundation in January 2023 (Author).

Figure 14. General view of Başkent Nation's Garden, large hardscape areas dominating the greenscape of the park in January, 2023 (Author).

Başkent Nation's Garden facilities can hardly be considered as providing novel ways of using the urban public space compared to former examples either in 19th century Nation's Gardens or 20th century Republican parks with modern and relatively secular images. Due to the deliberate avoidance of any connection to the area's history or its current surroundings, the project prioritizes religious references and practices at every stage. As a result, rather than serving as a public space integrated into the urban fabric, it becomes an introverted space that is isolated from the city and disconnected from its context. Referencing the comparison of the concepts of garden and park mentioned at the beginning of the article, it is clear that the newly constructed buildings within Başkent Nation's Garden do not transcend the notion of being mere gardens. Unlike Gençlik Park, which embodies an autonomous, independent, and public accessibility, Başkent Nation's Garden displays a more introverted architectural fabric that evolves as an extension of the buildings rather than as a vibrant public space (Halecki, et. al., 2023). In light of these considerations, it is fair to say that the project represents a more introverted and unsustainable architectural approach, particularly regarding pedestrian accessibility, and is distant from contemporary urban planning practices (Oliynyk, et. al., 2023). The garden fails to engage with its urban context, lacking any meaningful relationship with the surrounding area, including significant urban parks like Gençlik Park. Instead, it remains merely a garden, disconnected from its environment due to its incomplete structures, symbolic elements, and the programs it encompasses. Therefore, it differs greatly from Gençlik Park across Başkent Nation's Garden. Today, the two green spaces that are the products of two radically different ideologies stand next to one another without any relation. It is as if they are unaware of each other's existence. In a recent lawsuit opened by the

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Chamber of Architects, the judiciary suspended the execution of the second plan for constructing a Nation's Garden in the Atatürk Cultural Center area. The project was accused of desecration of history but also of contradicting planning decisions taken at different scales, and many data, including the percentages of hard surface and green spaces do not apply to how they are proposed in the implementation plans (URL-9).

To sum up, although the conditions of the Başkent Nation's Garden are not characteristic of each Nation's Garden project, most of the projects share certain common approaches to the design of the public green space. One of these commonalities is the unfinished look of the projects, and this feature can be seen in most of these examples, where the concern for making an opening takes precedence over the implementation of the design. Only 189 of the nearly 500 projects have been completed; the others are either under construction or not yet started (TOKİ Haber, 2023). Another aspect is that they mostly convert existing park spaces or sports fields within the city, and therefore, they do not increase the green area within the city but transform the already existing green area and often with the building of mosques and other structures in these spaces the percentage of green areas even decrease from the previous conditions. While the concept of a park is an urban element that establishes a relationship with the city, the ideology behind these projects, which recall the concept of a garden, transform the definition of public space as an extension of architectural elements such as mosques, coffeehouses, etc. instead of defining a green space as an independent element within the city.

CONCLUSIONS AND FINDINGS

Emerging modern greenscapes, namely Nation's Gardens in the 19th century Ottoman Empire that were not preserved in the Republican cityscapes, were subjected to today's neoliberal Islamist urban projects. Three different periods, the late 19th century Ottoman Empire, the Early Republican Period and AKP rule have produced not only their own ideologies about the greenscapes within the city. However, as the article discussed in detail the content and placement of these areas within the city markedly differ from past approaches. And this shift often results in the dilution of the concepts they reference, causing a disconnection from their historical origins and often resulting in anachronisms. Additionally, the article examined the strong association between the concepts of 'millet' and 'ulus', which are revisited and highlighted in each era, with urban green spaces. It explores how these two closely related concepts are fragmented and positioned at opposing ends of the ideological spectrum within the discourse surrounding urban green spaces. The ways in which green spaces are utilized, driven by evolving ideologies, are primarily determined by the programs introduced in these areas. As the research findings indicate that contemporary public gardens are characterized more by a range of symbolic and political programmatic elements than by diverse uses of green space. As in most

recent examples of Nation's Gardens, instead of a programmatic diversity, most of the greenscape is organized around two major functions, mosques and coffeehouses (kıraathane). However, these almost stereotype programs for green spaces, which lack contextual relevance, are largely disconnected from Ottoman references and impose limited use of open spaces. This approach, which evaluates urban green space only on a m2 basis, does not aim for diversity in the design and use of these urban greenscapes.

As a result, Nation's gardens today, which draw little reference from Ottoman heritage, are unable to establish meaningful, well-defined, and engaging spaces in their approach to green areas, often resulting in undefined and uninviting environments. The tendency of each ideological approach to disregard the values of preceding periods is a significant factor impacting the integrity of the urban fabric. The most obvious example of this approach can be seen in the case study of Başkent Nation's Garden, as discussed in detail in the article.

According to findings of the research, it becomes obvious that Başkent Nation's Garden, fail to go beyond creating an ambiguous area within the city due to the programs included in the park, limited use of open space and its indifference towards the existing historical urban fabric that surround it. As of June 2023, the new target for Nation's gardens has been updated to 100 million square meters (TOKİ Haber, 2023). Since regime's primarily produce urban green spaces that set the stage for their ideologies, the sustainability of parks in the modern sense and their preservation as heritage have no chance to be realized. Constantly changing greencapes have turned into the practice of producing incomplete gardens in the country for over a century. Unfortunately, today, the idea of creating green spaces in the urban fabric is mostly tied to numbers and figures rather than being urban entities developed in respect to its context and urban setting. The ambiguity they create in the urban landscape is not limited to their locations or how they relate to their environment and the city's history. This ambiguity can even be observed in the names, symbolic concepts they refer to as well as their contents, as they are trying to establish a non-existent relationship with the past.

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Reading Interiors in 1980s Ankara: Transformation of Gallery Art Production and Private Art Galleries

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Abstract

This study examines Gallery Sanat Yapım, one of the first private art galleries in Ankara, as a representation of urban transformation in the 1980s. Gallery Sanat Yapım is analyzed using qualitative longitudinal research and document analysis. This process highlights its spatial and temporal transformations. To provide an understanding of the gallery's role in Ankara's art scene, the research incorporates data collected through interviews in addition to an analysis of written, visual, and audio materials. The evaluation includes an examination of these sources to reveal the impact of galleries on Ankara's cultural scene. In contrast to government-supported art galleries, this research emphasizes the distinctive characteristics of private galleries, such as Gallery Sanat Yapım, which played a pivotal role in shaping Ankara's cultural identity. Thus, as a cultural and urban setting, the importance of gallery spaces is emphasized through the evaluation of interior space and spatial context. Furthermore, a comprehensive understanding of the spatial components offers crucial insights into audience engagement with artworks. In conclusion, the findings shed light on the opportunities and challenges faced by both private and state-supported art galleries during the period. This research contributes novel perspectives on the intersection of space, art, and society within Ankara's evolving urban landscape, thereby enriching scholarly discourse. Ultimately, the study underscores the crucial role of private galleries in preserving and shaping the city's cultural heritage, paving the way for future academic investigations in this field.

Keywords:
Art gallery, Memory, Modern interiors, Oral history, Private art gallery.

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INTRODUCTION

Art exhibitions are typically organized in specific spaces such as galleries or museums, based on particular selection criteria or thematic focuses (Eczacıbaşı, 1997, p. 1642). In other words, art exhibitions involve showcasing art pieces to audiences in a specific location for a set time, enabling meaningful experiences (Üstünipek, 2017, p. 13). In the early years of the Republic, displaying and accumulating art, supported by the state, aimed to promote a fresh ideology by providing artists with tangible opportunities. A vibrant art environment was established, resulting in the creation of a diverse array of works, and artistic activities began demonstrating their impact on society. Art galleries, as institutional spaces, have become important spatial entities that influence modern urban life. In the 1980s, with the gradual withdrawal of the state from the public scene, a public void emerged, which was partially filled by private galleries (Artun, 2014, p. 251). These spaces fostered connections between art and society, solidifying their role as protectors of artistic expression.

In contemporary times, art galleries have evolved into standalone businesses, transitioning from simple exhibition venues to multifaceted platforms. By promoting artists and hosting events tied to exhibitions, they help artists highlight the significance and value of their works, establishing their presence in the art industry. What was once merely a medium to present objects has merged with visual communication design. Over time, interdisciplinary collaboration has increased, and the design of exhibition spaces has become integral (Groys, 2014, p. 96). Groys captures this shift in perception, stating: "Nowadays, the basic unit of art is no longer the object as the artwork, but the art space where objects are exhibited: the exhibition and installation space. Today's art is not the sum of specific things but the typology of specific places" (Groys, 2014, p. 96).

This study aims to uncover the spatial and historical background of Gallery Sanat Yapım, an art gallery that made a lasting impact on Ankara in the 1980s. Within this context, the study, classified as a 'case study,' employs a qualitative data analysis pattern drawing from multiple sources. Particularly, verbal data was obtained through interviews, examining the social and cultural context of the period. The goal is to explore the symbolic value of the periodical art scene in Ankara, the galleries' importance for the city and artists, and their spatial counterparts.

The limited literature concerning gallery spaces and Ankara's recent history has shaped the study's scope. The use of audiovisual materials has been incorporated through semi-structured interviews to obtain in-depth insights, examining urban space on a macro level and the gallery as a case study on a micro level. This study contributes to the literature through a methodology rooted in interior space history (Küçüktaşdemir, 2018) and its content. In tandem with the development of the art scene

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in Turkey, the rise of exhibitions, curatorial forms, and actors has followed a global trend since the 1980s.

The 1980s marked a shift in socio-cultural, artistic, and political dimensions. Aligning with these shifts, art galleries, which became more common due to the cultural industry, continue to thrive and interact with urban culture in the present. The historical dimension of the cultural and artistic scene, along with gallery spaces, has played a significant role in Ankara's growth as a capital city and its modernization process. Although the Republic aimed to establish Ankara as a model city, its development was envisioned not only as a political center but also as a cultural hub. The goal was to disseminate this cultural context to all urban residents. Consequently, the cultural and artistic atmosphere primarily reflected government-shaped urban culture.

The scope of the study develops in the context of Ankara. Within this contextual structure, the micro-scale view focuses on the art gallery as an exhibition space, with the case study of Gallery Sanat Yapım shedding light on a cross-section of this period. This study, which contributes to the literature, also examines the historical physical components of the gallery, which still preserves its original structure.

The scope of the study develops in the context of Ankara. Within this contextual structure, the focus is on a micro-level analysis of the art gallery as an exhibition space. Particularly, the case study of 'Galeri Sanat Yapım' sheds light on a temporal cross-section of the period. This study, contributing to the literature, also examines the historical physical components of the place which has preserved its original structure.

RESEARCH METHODOLOGY

The method of the study is defined as a qualitative longitudinal case study. It involves real-life data, focusing on a limited context including space, environment, and users (Yin, 2009, pp. 34-56). Although case studies are considered a sub-type of qualitative research in the literature, this study adopts a qualitative longitudinal approach with multiple data sources evaluated over an extended period. Multiple data evaluation strategies encompass visual, written, and verbal materials. Oral history testimonies serve as a data collection tool to obtain spatial narratives.

In this context, oral testimonies were collected directly from the property owner, the space, and its spatial extension, serving as primary sources of information, with voluntary participation and permissions obtained. The scope of this study, therefore, focuses on the capital city Ankara. In this framework, the sample of the study is the art gallery 'Galeri Sanat Yapım,' examined for its historical and temporal significance. The selected case study, continuing its existence to the present day and not widely covered in the literature, has been included due to its spatial preservation of historical elements.

The methodology of the study is two-fold. The method primarily involves analyzing the study universe. The research universe and boundaries have been aligned with the socio-economic dynamics of the 1980s, a period marked by intensified neoliberal economic processes.

Understanding the period is crucial to interpreting the art and cultural environment, its spatial transformation, and its impact. By employing a qualitative longitudinal case study approach, this research aims to uncover the gallery's role within the broader context of Ankara's cultural industry and its urban development over time.

The microcosm of the research focuses on relationships between space, time, and users. The selected example was chosen for its representation of its period and its underrepresentation in existing literature. It includes qualitative data analysis with oral interviews focusing on interior space interpretation. Documentation also serves as a key sub-objective of the study.

The integrated use of multiple research methods in social science studies is important for increasing the reliability of the information collected (Bryman, 1988, p.131). The longitudinal aspect of this study allows for examining changes and continuities in the gallery's spatial and social role, providing insights beyond the scope of a single-method approach. A literature review was conducted as part of the initial stage. Approaches and preliminary data pertinent to the case study design were reviewed during the preparatory stage. This literature review emphasizes the limited publications on Ankara's galleries and spatial development, especially in the 1980s, positioning this study as a novel contribution to understanding and documenting this era.

The first section of the study discusses the culture and art environment in Ankara in the 1980s. The study identifies a limited number of publications addressing galleries and spatial development. This research adds to the existing literature by examining and analyzing the cultural and artistic scene in Ankara in the 1980s, providing new perspectives on these aspects. Thus, it provides content that diverges from the literature by understanding the cultural and artistic environment in Ankara during this period.

The secondary perspective of the research details the gallery space and its components through the 'white cube' problematic. Semi-structured questions prepared to observe space, user, and memory were posed to the interviewees. Thus, the obtained verbal data were synthesized and utilized as tools in spatial analysis. Semi-structured questions started with the acquisition of self-life information with ethical approval and included a question group diversified according to the sub-themes explored by the user or property owner.

Accordingly, a question group was organized on the artistic environment of the specified period, participation status, gallery space, usage situations, and the status of gallery spaces in the present timeframe. The symbolic nature of the gallery space, its position on the city scale, its role in the art market, and the sense of belonging with the artist emerged in this context.

The scope of the study encompasses a process extending from the 1980s to the present day, with the location specifically set as the capital city Ankara. A gallery that has been in the same place for several years

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was selected to study changes in space over time. Art galleries without archives or those lacking direct communication with their owners were excluded from the study sample selection. Gallery Sanat Yapım exemplifies connecting urban socio-cultural practices to interior space through memory.

The founder of this gallery space, operating within the same structure since 1982, is İbrahim Demirel. The socio-cultural approach, technological possibilities, and space are intertwined dynamics within a system. These dynamics influence the architecture of a space, giving it a variable characteristic (Asar et al., 2018, p. 123). The research problem stems from the need to understand how the intensified activities and vibrant art scene in Ankara during the 1980s shaped its socio-cultural evolution. The changes in the socio-cultural life of Ankara from the 1980s to the present, the factors influencing this change, and the impact of art galleries on artists, artworks, and society are analyzed. The components and qualities forming the interior space of the gallery, as well as the formation of Gallery Sanat Yapım's interior space, have been examined. The oral history method informs a secondary objective of the study, which is to examine the changes in societal dynamics over a long period. During this period, cultural and artistic activities, largely carried out by the state, played a nurturing role in everyday social life by being transferred to private companies (Artun, 2014, pp. 247-255). The intellectual bridge formed by galleries between society and art emerges as a key factor in this transformation.

The Cultural Environment During 1980s

Within its designation as the capital on October 13, 1923, Ankara gained a new image as the country's diplomatic and administrative center and entered a period of rapid transformation (Soyluk et al., 2017, p. 259). The role assigned to Ankara as a cultural and artistic hub in the early Republican era encouraged initiatives (Artun, 1998, pp. 24-65). The journey of art in Ankara has been a developmental process influenced by changes in residents' social lives, state policies, and economic programs (Adatepe, 1991, pp. 55-66). During the early Republican period, cultural policies aimed to foster a supportive environment for both intellectual and artistic pursuits.

The 1950s marked a transitional period that reflected the multi-party system and economic liberalization. Ankara witnessed the establishment of the first private art galleries. Helikon Society's Gallery, Art Lover's Society Gallery, and Gallery Milar diversified and enriched Ankara's art scene (Önsal, 2006, p. 91). Private galleries provided artists with greater freedom, allowing them to explore new opportunities for artistic expression. During the 1960s and 1970s, Ankara developed further as a cultural hub, with state-funded and privately owned galleries contributing to a varied cultural landscape. The State Fine Arts Gallery in Zafer Passage hosted significant exhibitions and offered various courses. Nevertheless, due to socio-political and economic changes and a lack of

funding in the 1980s, the impact and efficiency of publicly funded galleries declined.

In the 1980s, variables linked to political tensions led to a period where intellectual life became active. The decision to close the Contemporary Stage Culture Center in 1981 significantly impacted the lives of the residents, leading to a quest for alternative spaces. In this context, galleries emerged as spaces for breaking away from the macrocosm, presenting new experiential venues (Ali Artun Personal Website, https://aliartun.com/, Access Date: August 2023). During this period, cultural and artistic activities, largely conducted by the state, played a nourishing role in everyday and social life by being transferred to private companies (Artun, 2014, pp. 247-255). The formation of an intellectual bridge between society and art through galleries emerged as one of the key factors in this transformation.

The transformation of Ankara's cultural landscape during the 1980s can be seen as a response to socio-political challenges. With state-supported galleries becoming more limited, private initiatives, such as Galeri Sanat Yapım, began to fill the void, offering a platform for intellectual and artistic expression. Despite the vibrancy of Ankara's cultural climate, the prominence of metropolises in the context of globalization has positioned Istanbul as the leading art center. Ankara, on the other hand, has maintained its identity as a university city with a strong tradition of nurturing students (Artun, 2014, pp. 247-255). Thus, an art migration from Ankara to Istanbul began.

The departure of significant figures raised in Ankara to Istanbul has created a void for the city. Demirel, indicating that Galeri Sanat Yapım was the only private gallery in Ankara when it opened in 1982, emphasized the mutually nourishing nature of the relationship between galleries and audiences (Artun, 2014, pp. 247-255). He added the following about the galleries of the time (Personal interview with I. Demirel on December 9, 2021):

> "Before Galeri Sanat Yapım, there were no private galleries in Ankara. There was only the state's gallery for fine arts. Vakko had a gallery; they turned the middle floor of their store into a gallery, and I used to go there. Then İş Bankası had a gallery, but there were not many private galleries. I opened this place as the first private gallery. Then Galeri Nev and Galeri Siyah Beyaz opened; private galleries increased gradually, and as private galleries increased, so did the audience. When people visit galleries worldwide, they feel the need for them in their own places too."

The emergence of these art galleries, especially Galeri Sanat Yapım, became a significant marker of the developing art scene, intellectual discourse, and flourishing artistic approaches in Ankara. Since the early 1980s, the role of art galleries has not only been to define spaces for exhibiting artworks. The gallery space also provides a socializing and meeting environment for urban dwellers. While maintaining vibrancy in the cultural and artistic environment through various activities, it

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established itself as an intellectual platform where artistic trends are discussed. Beyond being a place, the gallery space became a symbol of artistic significance for urban inhabitants (Figure 1). The following words of İbrahim Demirel demonstrate the significance of its spatial existence while embodying the characteristics associated with his galleries. According to Demirel, gallery spaces across the geography differ from international examples, particularly in terms of their volumetric dimensions.

Figure 1. At Galeri Sanat Yapım; Necmi Erol, İbrahim Demirel, Filiz Otyam, Fikret Otyam ve Yenal Ansen (Hazırlayan, Ayla Demirel, Galeri Sanat Yapım 30. Yıl Sergisi, Sanat Yapım Yayıncılık, 2012, p. 67, İstanbul)

He emphasizes the readability of the balance between art supply and demand:

> "Artistic activities were intense in Ankara after 1980. Galleries multiplied, and galleries began to open in cities outside Ankara and Istanbul. People need to see, experience, and later realize the purpose of art for galleries to be important. The mission of galleries is to bring art together with society, that's why they exist. The artist will create, and people will share. This is possible with a good space. For example, when a guest from France visited my gallery, he was surprised. He said, 'I've seen all the galleries in France, but I haven't seen one like this.' He showed the size of his gallery like this (drawing a line with his hand to indicate half of the room) (Personal interview with I. Demirel on December 9, 2021)."

Demirel's experience emphasizes the impact of gallery spaces in Ankara, specifically Gallery Sanat Yapım, on the local art scene and its international perception. The rise of private galleries has started to create a challenging atmosphere. Gallery owners who aim to establish long-term relationships with their audiences have been influenced by this environment (Ağlargöz et al., 2015, p. 49).

While İbrahim Demirel acknowledges the presence of competition, he added that he personally does not support the rivalry of spaces that exist

for the same purpose. Additionally, he shared notable observations regarding urbanization and urban duality in the context of Ankara and Istanbul. Ankara is considered a focal point where artists are educated, but its recognition becomes significant in Istanbul:

> "Istanbul had an advantage in terms of population density. In the 1980s, there were three fine arts faculties. One was in Ankara, Gazi Education, which trained music and art teachers; the Fine Arts Academy in Istanbul trained artists and was a very important school. Another was in Istanbul and represented the Turkish branch of Bauhaus in Germany. Therefore, Istanbul had an advantage in terms of education. However, many writers and poets in Istanbul were still raised in Ankara. For example, at the Ankara Art Theater, which is an extremely important theater, actors like Rutkay Aziz come to mind. Many individuals, including Rutkay Aziz, received their education in Ankara and then moved to Istanbul (Personal interview with I. Demirel on December 9, 2021)."

This statement highlights the urban dynamics that influenced the cultural shift from Ankara to Istanbul, shaping the art scenes of both cities in unique ways. İbrahim Demirel emphasized his dedication to presenting artworks in an ideal gallery environment during a personal interview on December 9, 2021:

> "I am against competition. I have my gallery, but I also go to others and help. What matters is support and assistance. My space is different from others. The more artworks we present, the more beneficial it is to society. Why do artists open exhibitions? So that the public can see. I do not hold back my words when I go to other galleries. For example, if I see inadequate lighting, I mention it. When I was a consultant for Halkbank, they worked with their own architects for the gallery they were going to open on Cinnah. One day I went, and I could not believe what they had done! Plaster moldings, mirrors on the ceiling... Is that how a gallery should be? I called the director and said, 'This is not how a gallery should be.' Later, we tried to put the gallery in order."

Gallery Space with Its Components

Interior components play a central role in the creation of the gallery space. In this context, gallery spaces and their components are crucial to the aesthetic and functional values of the space. Reflecting on her experience, curator Ayla Demirel remembers how the gallery was curated thoughtfully aesthetically to create a smooth visitor flow. This enhanced visitor interactions with the space and artwork.

Evaluating the gallery space and its components through Brian O'Doherty's concept of the 'white cube,' one can find a representation of the relationship established with contemporary art galleries (Duncan, 1998). The white cube focuses on the space and viewer perception, strengthening the relationship between art and society (Brian O'Doherty, 2010, pp. 9-36). In O'Doherty's book, the ideal gallery space excludes any element that hinders the perception of the artwork, isolating it from

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anything outside itself during the process of being evaluated as an artwork (O'Doherty, 2010, p. 30). This idea is evident in the layout of Gallery Sanat Yapım, where the focus is on simplicity and eliminating external distractions to showcase the artworks effectively. The perception of the artwork within the space is designed to limit contact with the outside world. The filling of windows and other transparent volumes serves this purpose. These spaces emerge as effective exhibition centers, combining the sanctity of a church, the formality of a courtroom, and the mystery of a research laboratory.

The wall is the most crucial component of the gallery, framing and presenting the artwork to the viewer, and imparting aesthetic value to an object that is not an artwork. The wall does not have a mere aesthetic; it is a necessity within the space (O'Doherty, 2010, p. 33). Lighting is as important for gallery spaces as the wall component.

Figure 2. First Exhibition held at Galeri Nev: representing a 'shadow-free,' 'sterile' gallery space – 1984 (Şenyapılı, Önder, Sanat Yapım Yayıncılık, 1980'lerden Bugüne İbrahim Demirel, 2011, p. 69, Ankara)

Without any shadow, a 'sterile' image of the gallery space is integral to its structure and serves as a metaphor for the exhibition (Figure 2). This phenomenon is reflected in the words of İbrahim Demirel regarding the structure of the gallery space. İbrahim Demirel stated the following (Personal interview with İ. Demirel on December 9, 2021):

> "The space should not overshadow the artwork. It should be quite simple; there shouldn't be an art exhibition within complexity. Of course, not all artists exhibit paintings on the wall surface in the same way; there are also artists who incorporate the space into the exhibition. It is necessary to open the exhibition according to the space. Businessmen see this place and say, 'Wow! How beautiful,' and they inevitably become owners of paintings. They hang one painting on one wall and another on another wall at home, but it doesn't harmonize. When they see this place, they say, 'So this is how paintings should be hung,' and take it as an example."

Figure 3. The interior space of Vakko Art Gallery, known for its multipurpose design and functionality, was one of its most intriguing features, Ankara – 1984 (Şenyapılı, Önder, Sanat Yapım Yayıncılık, 1980'lerden Bugüne İbrahim Demirel, 2011, p. 40, Ankara.)

At this point, the interaction between domestic space and gallery space is intriguing (Figure 3). Demirel's positioning of the public space as a reference point, maintaining the gallery as a landmark, is significant:

> "What is learned comes with new potential spatialities along with a cultural background. Visual comfort, comfort, and aesthetics are fundamental qualities in the formation of art galleries. When created according to their subtleties, the gallery space can transform from a space merely exhibiting ready-made artworks into a unique aesthetic space."

Gallery Sanat Yapım demonstrates how a gallery space can be utilized as a 'tool' for spatial analysis. Considering the context, Gallery Sanat Yapım stands out as a platform that transported art from public to private spaces in 1980s Ankara.

FINDINGS

Gallery Sanat Yapım, opened by İbrahim Demirel in 1982 at Alparslan Türkeş Street Number 7 (Figure 5), continues its activities to this day. Born in 1941 in Malatya, İbrahim Demirel received a good education and opened the first private gallery in Ankara. In the opening period (Figure 4), Cumhuriyet Newspaper mentioned not only the gallery's role as an exhibition space but also highlighted its function as a workshop (Artun, 2014).

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Figure 4. Gallery Sanat Yapım Opening Ceremony Exhibition Invitation 'We are waiting for our opening' (Source: Gallery Sanat Yapım)

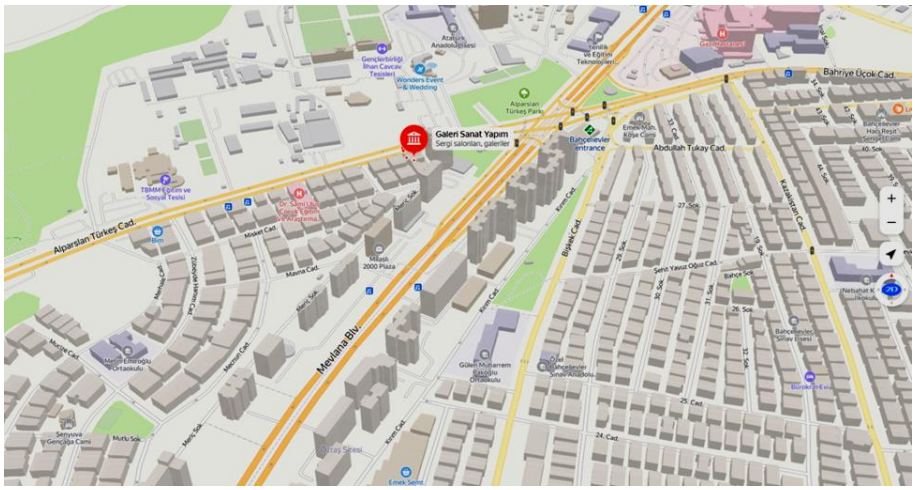

Figure 5. Gallery Sanat Yapım Streetview and Location (Source: Yandex Map; https://yandex.com.tr/)

The location of the Gallery and the layout, lighting of the Gallery have been designed to create a perfect setting for exhibitions. Ayla Demirel mentioned that the original layout of the Gallery Space was created in collaboration with architects. Despite the passing years, the authenticity of the inner space is well preserved.

The location of the gallery and its layout, as well as the lighting, were designed to create a perfect setting for exhibitions. Ayla Demirel mentioned that the original layout of the gallery space was created in collaboration with architects. Despite the passing years, the authenticity of the inner space is well preserved.

Ö.Ö. referred to the gallery as a motivating space for artists and students to exhibit their artworks. İbrahim Demirel frequently voices his dismay at the lack of enthusiasm from younger generations. Still, the gallery maintains a fruitful environment by hosting evening events.

As a guest, D.Ö. admired the ambiance established for a complete gallery visit. They observed the smooth connection between various themes, from contemporary to modern. The exhibition space to the Turkish house-inspired room was praised for its blended image of modernity and nostalgia (Figures 16, 17).

The prominent feature of the gallery is its role as a production space, a meeting point where everyday life and social relationships intersect, and an educational center for urbanites (Özsezgin, 1975). Thus, it communicates with its audience, nurtures new artists, and fulfills its mission (Turani, 1966). Demirel describes the gallery and its content, stating (Personal interview with İ. Demirel on December 9, 2021):

> "Our distinctive feature was this: we were both exhibiting and providing art education. Kayıhan Hoca (Kayıhan Keskinok), one of Turkey's renowned painters, taught here for 30 years, nurturing thousands of students. I, too, was involved in education. While studying at the Faculty of Applied Fine Arts, I started teaching drawing from the first year with the educational background I gained from the teacher's school. Now, Sema continues to provide online education."

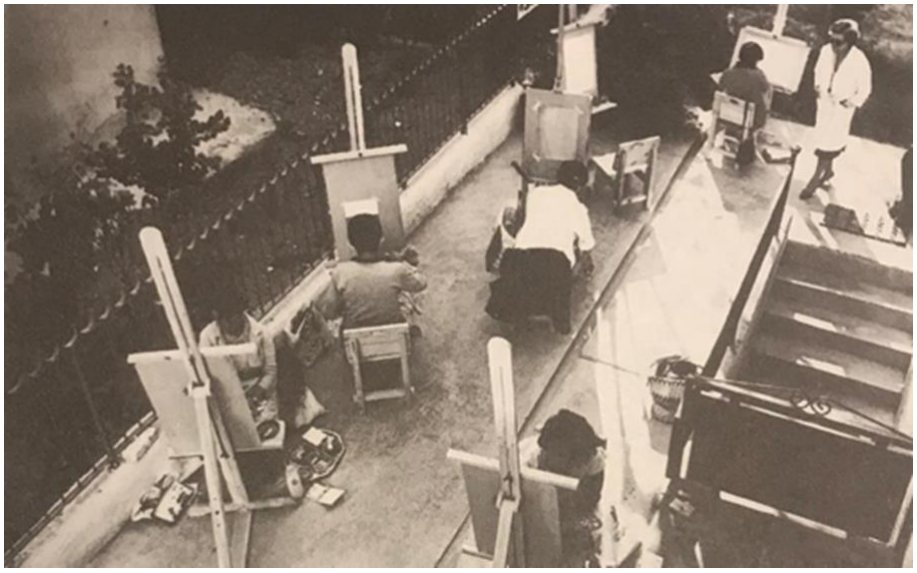

Figure 6. An expanded relationship between the gallery space and the street, Outdoor Teaching; Gallery Sanat Yapım, instructors and students at the green space in front of the art gallery (Şenyapılı, Önder, 1980'lerden Bugüne, Sanat Yapım Yayıncılık, 2012, p. 9, İstanbul)

At the beginning of the historical process of Sanat Yapım, the venue was relatively distant from the center of Ankara. Over time, the relationship between the gallery space and the street (Figure 6), influenced by the city's growing population and the resulting density of daily activities in the region, is explained by the following words of İbrahim Demirel (Personal interview with İ. Demirel on December 9, 2021):

> "This place is not in the center of Ankara; it used to be calmer. Now, traffic is a big issue. People must park their cars in places other than in front of the door, and it becomes challenging. How they get here is just as important as the exhibitions. If people can come easily and comfortably, they visit more often."

Initially, İbrahim Demirel rented an apartment on the top floor of a building. He mentioned that he acquired the current structure through personal connections. He explained the multi-disciplinary and enriched nature of the art realm:

> "I obtained this opportunity through a friend named Necmettin Ökten, a carpenter I knew from my previous work in decoration. We

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became friends, and I taught him photography. When he learned about my profession, he showed me this place. The entire building belonged to him. He showed me this place to help me. It had two rooms; here was the bathroom, and there was the kitchen." (Personal interview with İ. Demirel on December 9, 2021)

As the collection of paintings grew and engagement with the audience intensified, the initial spatial formation became insufficient. The expansion process began by renting half of an apartment and continued with the acquisition of a shop and another apartment, resulting in a total floor area of 400 m^2. Demirel mentioned that he facilitated the expansion process by sequentially acquiring properties:

"Necmettin Ökten also lived here. Over time, he noticed that the place was getting cramped. 'This place feels small for you,' he said. He rented out half of the house and moved to Kuşadası. One day, he came from Kuşadası and said, 'This place is also getting small, come, I'll give you this.' There was a shop and an apartment. I asked, 'How can we settle the deal? I have an apple orchard; I can give you that.' He agreed, and I got the title deed. That's how I became the owner here. It's 400 m^2 now, but still not enough." (Personal interview with İ. Demirel on December 9, 2021)

Figure 7-8. (Left) Gallery Sanat Yapım Exhibition Hall in 1983 (Galeri Sanat Yapım 1. Yıl Sergisi, Sanat Yapım Yayıncılık, 2012, p. 13); (Right) Gallery Sanat Yapım Exhibition Hall in 2024 (Gallery Sanat Yapım Digital Archive, Ayla Demirel)

Figure 9-10. (Left) The gallery space and its interaction with the exterior in 1995 (Galeri Sanat Yapım 1995 Yılı Sergisi, Sanat Yapım Yayıncılık, 2012, s. 59); (Right) Seating space arranged according to the changing needs of the space, located in front of the open-air area in 2022 (Source: Author's Archive)

In the current context, the gallery operates with its entrance door opening onto a pedestrian path, with two openings on the street interface (Figures 7, 8). These openings have been reduced to prevent issues with natural light perception in exhibitions (Figures 9, 10). A counter, where İbrahim and his daughter welcome guests, is elevated two steps from the exhibition hall. Adjacent to the counter, steps lead down to a large collection storage area. Behind the counter is a corner dedicated to Kayıhan Keskinok. The ceiling of this space corresponds to the building's opening and has been covered with frosted and stained glass to integrate with the interior (Figure 11).

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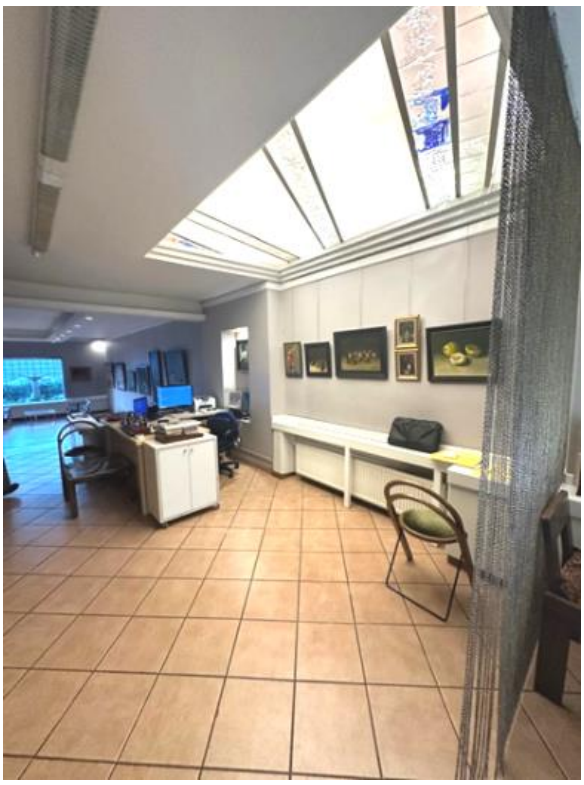

Figure 11. Ceiling of the gallery space corresponding to the opening of the building (Source: Author's Archive)

The painting studio is located along the continued line of the reception counter corridor. Some necessary materials are arranged for educational purposes. The fixtures are ergonomically designed according to user functions. A door from the studio leads to the garden.

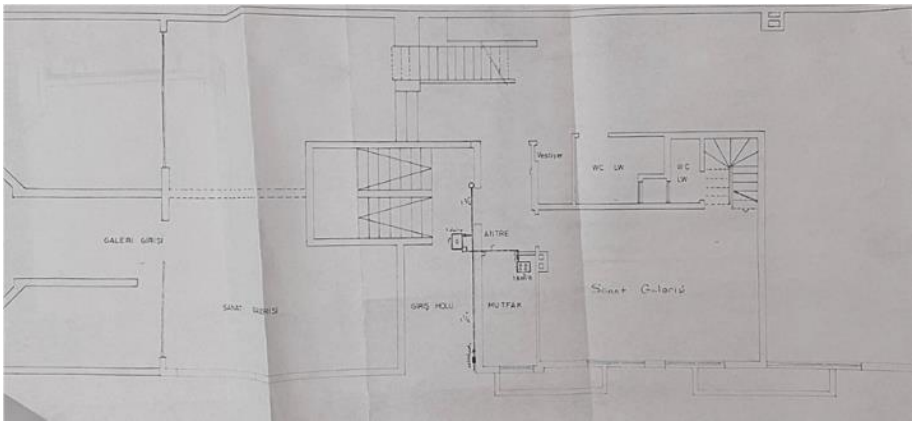

Figure 12. Gallery Sanat Yapım's Floor Plan (Source: Galeri Sanat Yapım,2022)

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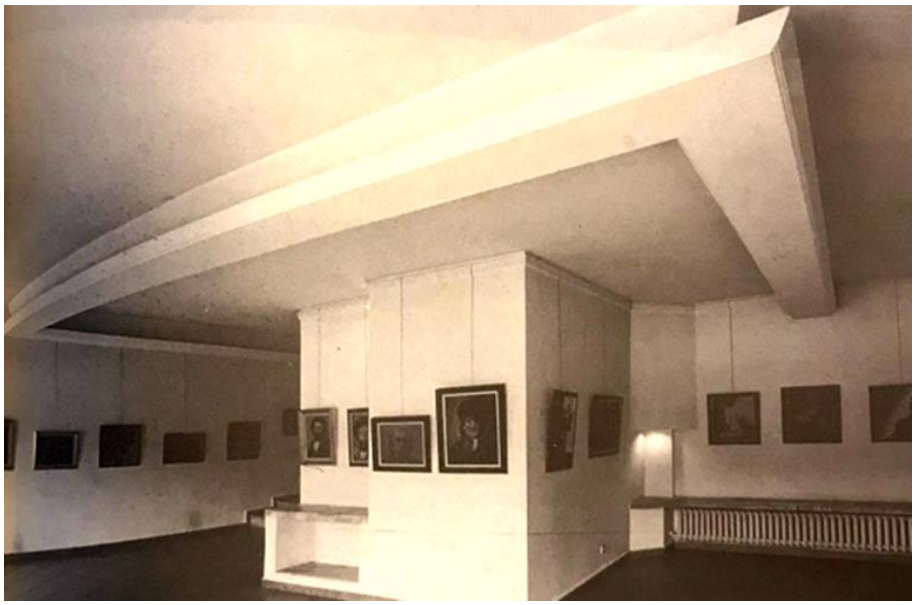

Figure 13. An exhibition at the Art Gallery (Source: Ayla Demirel, Galeri Sanat Yapım 30. Yıl Sergisi, Sanat Yapım Yayıncılık, 2012, s. 60, İstanbul)

The garden has also been incorporated into the exhibition space and serves as an open exhibition area where some artworks are displayed (Figure 14).

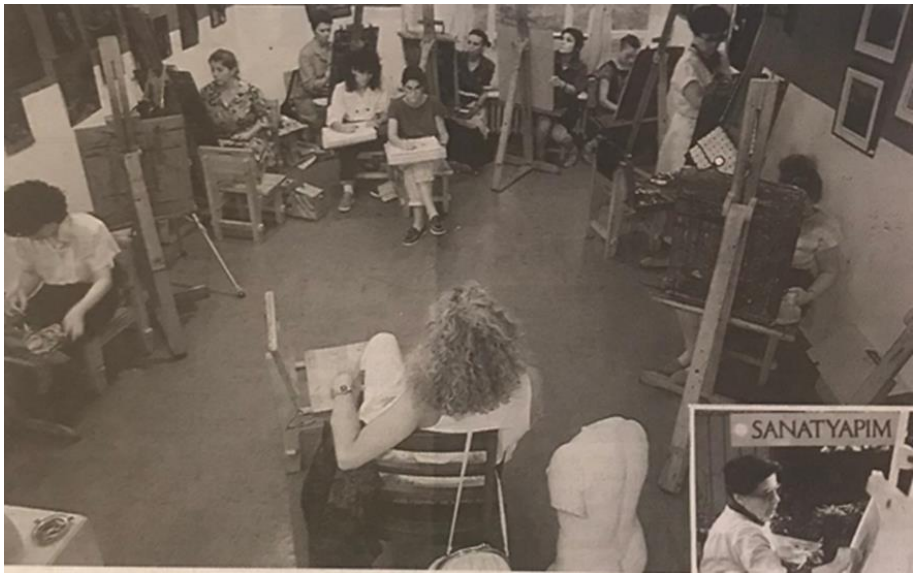

Figure 14. The Art Space in the Gallery in 1992 (Source: Zahit Büyükişleyen, Galeri Sanat Yapım 10. Yıl Sergisi, Sanat Yapım Yayıncılık)

Although there have been additions and transformations in the space, the fundamental goal has always remained the same: to create an 'ideal space' for exhibitions (Figures 12, 13). One of the crucial components for İbrahim Demirel in the gallery space has been the lighting of the space. Regarding the second theme mentioned in the field of closing window openings, he expressed the following about the practices in his own gallery:

> "The physical structure of the gallery is crucial. In addition, the lighting of the gallery is very important; the light must be good. The front facade of this place was entirely made up of windows, one for the shop and one for the hall. I reduced the size of the windows. Natural light is the best, but how it comes in is important. There shouldn't be

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any shadows on the artwork, so the windows had to be reduced in size. I added stained glass and frosted glass to some windows. The door's glass is also stained glass and frosted (Figure 15). I described it to my friend; he drew it and we had it made. To make the space suitable for exhibitions, you first need to see, understand what needs to be done and why it needs to be done." (Personal interview with İ. Demirel on December 9, 2021)

Every object in the gallery space, apart from the exhibited artwork, has the potential to become art. O'Doherty expressed this feature of the gallery space, stating that even an ashtray on the floor can gain the status of a sacred object (O'Doherty, 2010, p. 31). In Gallery Sanat Yapım, almost every object in the space holds a unique identity, becoming a part of its spatiality.

Figure 15. The welcoming area of the Art Space in the Gallery (Source: Authors)

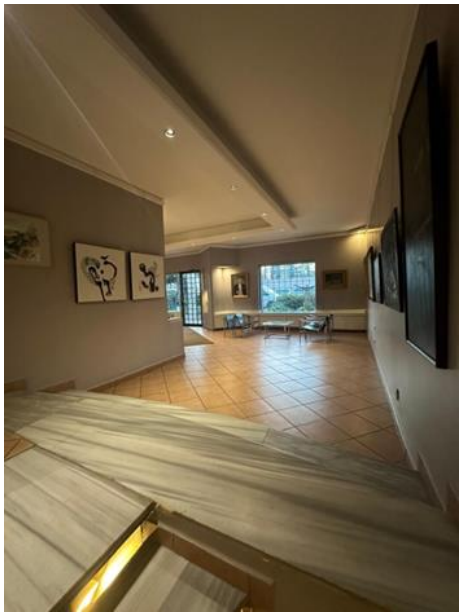

Figure 16. The view from the exhibition area through the entrance (Source: Authors)

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İbrahim Demirel, who tells the story of the antique items in the room, shares a memory from the craftsman who made his furniture and became part of his memory (Figures 17, 18):

> "I came to Ankara and met a craftsman named Ahmet in the Fire Station Square. He used to make old furniture and had worked with an Armenian craftsman before. He was involved in creating the Atatürk Painting and Sculpture Museum alongside those masters. We became friends, and I used to have my furniture made by him..." (Personal interview with İ. Demirel on December 9, 2021)"As people around me became aware of my interest in old furniture, they also began bringing their pieces to Ahmet Usta for restoration. Last year, during an art exhibition, a woman visited with her husband and children. She said, 'This place reminds me of my grandfather.' When I asked who her grandfather was, she replied, 'Ahmet the Craftsman!' I then told her that Ahmet Usta had made much of my furniture. It was a remarkable moment. These shelves, reminiscent of those found in Anatolian homes, were crafted by Necmettin Usta. As for this table, during one of my visits to Koç's vineyard house, I noticed this table (pointing to the middle one) discarded outside. When I inquired about it, they said they were planning to throw it away. I took the table, and I still use it to this day."

Figure 17. The Interior Space and the socializing area located in the Gallery in 1995 (Galeri Sanat Yapım 1995 Yılı Sergisi, Sanat Yapım Yayıncılık, 2012, p. 176); The Interior Space and the socializing area that has been preserved (Source: Author's Archive)

Figure 18. The Interior Space and the socializing area located in the Gallery in 1995 (Galeri Sanat Yapım 1995 Yılı Sergisi, Sanat Yapım Yayıncılık, 2012, p. 176); The Interior Space and the socializing area that has been preserved (Source: Author's Archive)

CONCLUSION

Urban transformations in Ankara since the 1980s have had a significant impact on the lives of its residents, shaping the city's cultural and artistic landscape. As the capital, Ankara, influenced by bureaucratic dynamics, witnessed a rise in private galleries following the tension between official and free art, particularly after the coup. The rise of private galleries, such as Gallery Sanat Yapım, signifies a growing trend toward alternative venues for artistry, moving away from government influence. These galleries played a role in the urban cultural landscape by establishing innovative opportunities for artists and viewers alike.

The formation of gallery spaces emphasizes the importance of both the quality of the artwork and the structural qualities of the space. By examining gallery spaces, it becomes evident that Gallery Sanat Yapım not only supports the development of artistic environments but also contributes to urban identity and social engagement.

It has the potential to create new public spaces within its own period, contributing to urban life. With its mixed functions, it has created a new spatiality beyond serving as an exhibition venue, fostering community engagement and creating a hybrid public space that bridges art and daily urban life.

As the urban realm changes, the accessibility of such art hubs has become more challenging. Due to changes in urban culture, the importance of galleries such as Sanat Yapım in promoting public interaction with art may decline. Nevertheless, the gallery's historical point of view provides important insights on how art spaces can still impact modern urban life.

All the elements and the transfer of history are framed by the memory of the subject, İbrahim Demirel. Thus, as a property owner and a direct information provider, the hidden actors in the formation of the space are

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also revealed. Gallery Sanat Yapım, which has been actively contributing to urban life for 40 years, can be considered an indicator of the sustainability of private art galleries in the rapidly changing urban environment. The ability to preserve its physical existence further emphasizes the importance of such places in the cultural landscape.

The structure, with its design details in its ceiling specially designed not to cast shadows on the works, its openings arranged to bring in the right amount of daylight, and its walls, the most important component for creating exhibition space, continues its role as a bridge between the work it undertook 40 years ago and society. However, as cultural consumption behaviors change, galleries must develop ways to protect their assets when art is consumed through commercial or digital means. Future-oriented meaning and physical sustainability pose a problem in this context.

In the current period, İbrahim Demirel, who runs the gallery with his daughter, expressed concerns for them when he left it to his children as heirs, saying, "I have three children; will they understand? I have concerns about how they will manage." This research shows that gallery spaces are determined not only by their physical features but also by their social functions in society. The gallery's long-standing existence provides an important case study of how it contributes to cultural memory and urban transformation.

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Resume

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Neighborhood Connection Density-Neighborhood Morphology Connection: The Case of Antalya Kaleiçi

Havva Özdoğan*

Abstract

Can neighborhood boundaries be defined in terms of morphological and functional characteristics in cities that have developed different formations due to various influences in the historical process? While neighborhood units in planned settlements are pre-planned with an integrative approach, in unplanned traditional settlements, residences come together as pieces and ultimately form the settlement. In this study, which was carried out in Antalya-Kaleiçi, qualitative and quantitative research methods were used. In the study, the neighborhood formation system was discussed based on the hierarchical structure. A set of buildings including residences that are next to and opposite a residence and directly open into a shared urban space is defined as the neighborhood cell of that residence. The functional relationships among residential elements were defined as neighborhood connections, and a method to determine neighborhood connection density was developed. In morphological development, an arrangement involving religious buildings accepted as focal points, neighborhood cells of different degrees forming around them, neighborhood blocks of different degrees belonging to neighborhood cells of different degrees, and neighborhood units formed out of neighborhood blocks was observed. It is understood that the density of neighborhood connections is influenced by the number of residences defining neighborhood cells, the number of connection points between residences such as building doors and gates, and the spatial sizes of neighborhood spaces in which neighborhood connections take place. In other words, the tendency for dense neighborhood connections emerges in areas with more residences and connections but low square footage area. This situation was considered a reflection of the relationship between the morphological and functional structures. It was concluded that unplanned traditional neighborhood units were formed in a way that did not show the self-sustaining and enclosed character of planned residential units, and this structure was a characteristic that should be taken as an example and maintained in terms of settlement culture.

Keywords: *Antalya- Kaleiçi, Neighborhood connection density, Neighborhood morphology, Neighborhood unit, Traditional settlements.*

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INTRODUCTION

As the smallest areas of buildings that are parts of cities, towns, or villages (Keleş, 1998, 96), neighborhoods are defined by the proximity of their residential buildings to each other, their shared spaces, social interactions, and connections (Pacifico & Truex, 2019, 12). With their unique personality, they are seen as a part of the polyphonic choir of the city (Petruccioli, 2008, 17). The words people, place, and harmony are three keywords that describe a neighborhood (Park & Rogers, 2015, 19). The fact that neighborhoods, which are defined as small communities in Anatolia (Cerasi, 1999, 71), contain homes and clusters of homes at their center shows that homes are the most fundamental component of a neighborhood.

Neighborhoods are formed by the gathering and spread of residential buildings. This way, residential buildings, which gather around urban spaces such as streets, dead-ends, and cul-de-sacs near or across each other, become neighbors of each other. Units that share a border are defined as neighbors, while their relationships are defined as neighborhood relationships (TDK, 2023). Neighborhood relationships take place via the visual, auditory, and actual connections between residences. These relationships are defined as relationships in daily life that are not official (Ruonavaara, 2021, 1), where those inside a neighborhood area with known boundaries share the atmosphere of common life (Aru, 1998, 13). Spatial neighborhood relationships are formed between units that are connected by spatial transitions, and proximity in relationships is considered more meaningful than sharing borders without relationships (Erman, 2017, 166). In establishing neighborhood relations, It is important for people to know each other and trust each other. It is thought that chance encounters resulting from using and sharing the same urban space are effective in achieving this. In this context, by establishing relationships between people who use the same street or the same square and are in each other's field of vision, such as becoming aware of each other, becoming familiar with each other, getting to know each other, and chatting, the way for people to know and trust each other is paved, and healthy neighborly relations can be established.

In 1913, Drummond developed the concept of “Neighborhood Units” with an approach that covered transportation, commerce, parks, leisure areas, industry, trade, and residences and divided the larger city into smaller cities (Johnson, 2002, 232-238; Brody, 2016, 331). While McKenzie argues that a neighborhood unit has two main components as physical proximity and sincerity between people, Unwin defines neighborhood units as self-sustaining suburbs (Johnson, 2002, 239-241). A neighborhood unit is a defined area enabling families to reach essential destinations like schools, playgrounds, and shops without crossing a highway (Perry, 1929, 99). This settlement unit includes a central primary school, parks and playgrounds covering 10% of the area, perimeter commercial units, compatible building groups, inner

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streets, and large roads marking the neighborhood boundaries (Dahir, 1947, 16). The neighborhood community is said to have around 5,000-6,000 residents, including 800-1,000 primary school-age children, covering 160 acres with one side extending half a mile for single-family plots (Perry, 1929, 98). This morphological and functional structure is important for social relationships. This structure is said to bring together individuals with similar lifestyles, foster face-to-face relationships, and support a sense of community (Perry, 1929, 99-100; Bauer, 1945, 109; Isaacs, 1948, 15). Regardless of planned order or social amenities, the neighborhood is a social reality that exists in one form or another (Mumford, 1954, 169). When talking about a neighborhood, one refers to a distinct urban scale, a certain function and a defined structure (Kallus and Law-Yone, 1997, 109). Jacobs considers neighborhood units devastating due to their introverted structure and systems of functional segregation (Silver, 1985, 170), while Hillier et al. criticize these units based on the idea that they disrupt the universal dynamics in the relationships between isolated islands of residences and cities (Mehaffy et al., 2015, 203, 206). It is stated that neighborhoods should be organized in the form of clusters of 8-12 residences gathering in a shared area, away from main roads, for 400-500 users, and in an area of at least 300 yards (275 m) in width (Alexander et al., 1977, 81-85, 202).

It is seen that the traditional Anatolian settlement system bears the characteristics of a 3000-5000-year-old settlement model and related lifestyles (Koca, 2015, 37), and in this model, neighborhoods usually develop around religious centers (Özbek Eren, 2012, 1550). These center points are marked with elements such as fountains or plane trees. There is an inward-looking structure in settlements where there are no examples of planned squares or squares. Social life takes place in residential courtyards, dead-end streets, mosque courtyards, and unplanned squares. Housing elements develop and grow around religious centers. This growth is far from geometric rules. Aru defines this situation as a rhythmic system (Aru, 1998, 11). In fact, it is said that the positions and distribution of mosque minarets in the settlement silhouettes are a reflection of this rhythmic structure. It is seen that a formation system dominated by streets is common. Smooth, non-geometric street systems pave the way for the formation of urban spaces with surprises and rich perspectives. Thus, it is seen that urban spaces are formed that are not the same, do not repeat, but are compatible with each other and speak the same language.

One could argue that planned residential units are shaped by a holistic approach. In unplanned traditional settlements, residential units come together to reach a larger area or the entire area, and this growth continues up to the borders of other neighborhoods. In this study, the functional connections in neighborhood cells that are formed as a result of the gathering of residences and residential units are discussed as neighborhood relationships, whereas their morphological connections

are discussed as the system of neighborhood formation. Thus, it is aimed to analyze the unique structure of traditional neighborhood configurations in Anatolia based on their morphological-functional building relationships. The area of study is the Antalya-Kaleiçi area, which was selected because it hosts different systems of urban texture and has preserved its local architectural identity and settlement characteristics. In the first stage, the building morphology in the area and the urban texture characteristics of the settlement are analyzed. In the study area, which is categorized in terms of organic and geometric urban textures, analyses of the functional structure are carried out by examining neighborhood cells formed in relation to residential units selected systematically in the area and making neighborhood relationship density assessments. Analyses of the morphological structure of the area aim to describe the neighborhood units with focal points, consisting of religious buildings selected as focal points, in the context of neighborhood blocks and neighborhood units. It is seen that neighborhood relationships are influenced by neighborhood spaces, neighboring buildings, and the number of street-facing doors, and there are differences in neighborhood morphologies between organic and geometric settlement areas depending on neighborhood cells.

It is believed that the Antalya-Kaleiçi area is important because it hosts two different characters of settlement that are shaped based on its traditional organization of settlements. In this sense, more irregular developments constitute organic settlements, and more regular/grid-shaped developments constitute geometric settlements. In the study, the functional and formal structure of the neighborhood, neighborhood connection density, neighborhood cells, neighborhood units, and neighborhood morphology are discussed and and the maintenance of elements belonging to this unique settlement culture is recommended.

CONCEPTS AND DEFINITIONS

Morphological Structure in the Neighborhood: Neighborhood Cell with Focal Points, Neighborhood Blocks, Neighborhood Unit

In his urban morphology analyses, Muratori lists four classification scales: interior decoration, building, town plan, and region, while he also divides their forms of gathering into two categories, where those that gather based on adjacency are serial groups, and those that gather based on association are organic groups (Cataldi, 2003, 26; Mosharraf, 2023, 401). It is asserted that this way, all scales can be organically intertwined, and volumes, morphologies, and materials can be combined based on emotion (Maretto, 2013, 94). In urban morphology, it is stated that while neighborhood units in planned settlements are pre-planned with an integrative approach, in unplanned traditional settlements, residences come together as pieces and ultimately form the settlement as a whole. The textural characteristics of settlements that are categorized into unplanned and planned classes (Kostof, 1991) are formed based on the connections of city blocks and roads. In this

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system, clusters of buildings are classified as linear, tributary, parallel, grid, or irregular (Zhang, 2013). The positions of buildings in city blocks determine the residences to which they are connected and the neighborhood areas to which they extend together with other residences. In city blocks, buildings can be located along the street, at inside corners, and at outside corners. Depending on streets and street intersections, neighborhood connection areas can be seen in the form of linear, L, Y, T, X, and multiple intersections.

In Anatolia, neighborhoods are units consisting of 100-200 residences where multiple streets are connected to each other, buildings of worship are not far from each other, and the boundaries are complex (Cerasi, 1999). There is a process of gradual transition and diversity from the neighborhood unit, religious buildings, drinking fountains, trees, and coffee houses to shared spaces on the scale of streets and squares (Başman & Akın, 2018). The center of the neighborhood is formed around mosques, shops, coffee houses, libraries, and buildings such as madrasahs and soup kitchens (Aru, 1998).

As neighborhoods grow around religious structures, religious buildings are considered “focal points”, while clusters of buildings surrounding these focal points are considered “neighborhood cells with focal points”. Neighboring buildings that have a border with the focal point are defined as “first-degree neighborhood cells with focal points”, and those that have borders with “first-degree neighborhood cells with focal points” are defined as “second-degree neighborhood cells with focal points”. Thus, depending on the number of building units they contain, neighborhood cells with focal points result in the formation of new neighborhood cells with focal points. When the farthest expansion points of neighborhood cells of the same degree with a focal point from the focal point are connected, “neighborhood blocks” are obtained. The expansion of neighborhood blocks stops when neighborhood blocks around different focal points intersect, and here, “neighborhood units” are completed. In this sense, neighborhood units are formations that expand around a focal point and can maintain this expansion until they reach another neighborhood unit. Thus, it is understood that the hierarchy of “focal point-neighborhood cells with focal points-residential units-neighborhood” is shaped with an inductive development (Figure 1).

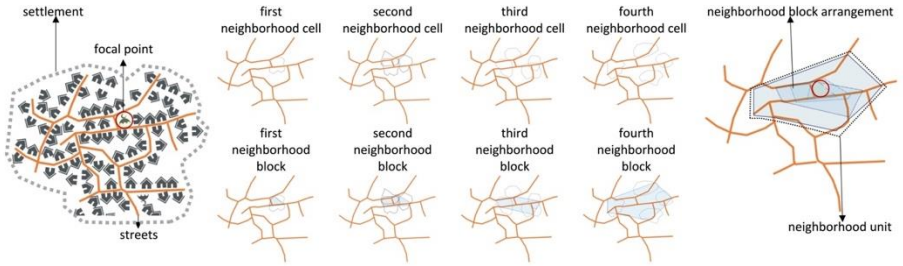

Figure 1. Formation of neighborhood cells with a focal point -neighborhood blocks-neighborhood units around a focal point

Functional Structure in a Neighborhood: Neighborhood Cell, Neighborhood Connections, and Neighborhood Connection Density Values

Urban interfaces are defined horizontally based on building positions and vertically based on the façade features of buildings, and they provide a transition between the city and buildings and between private and public spaces (Eren & Cengiz Taşlı, 2020). Doors are considered "threshold points" that allow transition from interior-private spaces to exterior-public spaces. The ratio of the number of outfacing doors to the total façade length is known as the door opening ratio, and building-street connections are considered depending on the density of thresholds along the total façade length (Palaiologou & Vaughan, 2014). Street-facing doors also have functions as semi-public interfaces through which visual or auditory communication takes place between private spaces and public ones (Gehl, 2011). Semi-public spaces allow people to maintain interactions by keeping them out of public or private spaces for a longer duration (Wilkerson, et al., 2012).

It is seen that the positioning of buildings, the shared neighborhood spaces they open into, and windows and doors along building interfaces are important in neighborhood connections. Doors and gates along building interfaces can facilitate the transformation of neighborhood connections into physical acts. While the word "density", which is also used to refer to crowdedness, is defined as the ratio of the mass of an object to its volume in physics (Kızılcık & Damlı, 2019), it is defined as the number of vehicles along a unit length of road at any time point in the field of traffic management (Taş & Sezen, 2020). From a similar perspective, density in neighborhood connections is evaluated to include the neighborhood relationships among neighboring buildings in shared neighborhood spaces.

It is argued that neighborhood cells can be defined in association with 'building entry-neighborhood space-building entry' network connections. As opposed to neighborhood cells with focal points, sole neighborhood cells take a single residential unit as the center/starting point, and they are accepted as sets of buildings that neighbor this central residential unit and directly open into shared neighborhood spaces. The neighborhood cell of the central residential unit is named a first-degree neighborhood cell. Each set of buildings that takes one of the other residential units in the first-degree neighborhood cell as the center/starting point and covers buildings that neighbor that central unit is defined as a second-degree neighborhood cell (Figure 2). Therefore, if there are three residential units within a first-degree neighborhood cell, this system creates three separate second-degree neighborhood cells. As seen in Figure 2, each residential unit has its own neighborhood cell, and this system expands outward from the center as first-degree, second-degree, third-degree, and further degrees of neighborhood cells.

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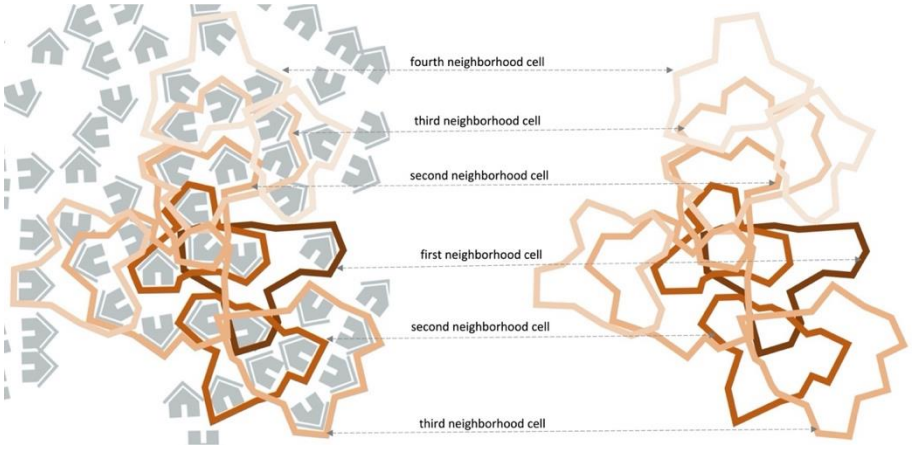

Figure 2. Neighborhood cells

Neighborhood units are defined as urban spaces (e.g., streets, squares) that are shaped based on the boundaries (the farthermost boundary such as the boundary of a building or garden/yard) of residences that are neighbors to a residence that is taken as the center/starting point, are shared by residents, and constitute gathering points. In this context, it is thought that neighborhood connections occur depending on departures/arrivals that are assumed to take place via the doors and gates of buildings that directly open into shared neighborhood spaces. These departures/arrivals constitute the number of neighborhood connections. Neighborhood connection density can be calculated using the number of connections in neighborhood units. In the calculation of the neighborhood connection density value, the total number of connections from all doors of each building opening to the exterior space to all doors of neighboring buildings opening to the same space is determined. The neighborhood connection density value can also be expressed as the number of links within a 1 m^2 neighborhood space that depends on the ratio between the number of neighborhood connections and the size of the neighborhood space. Figure 3 displays a neighborhood cell with three residences. It is seen here that the residence for which the neighborhood connection density value is calculated has a total of two entries opening to the neighborhood space, a building entry and a garden entry, while each of the two neighboring buildings has one building entry opening to the same space. It is observed that the residence for which the neighborhood connection density value is calculated has four neighborhood connections, including two connections to each building via the building and garden entries. Each of the two non-central buildings has three connections to the other two, one connection via the building entry of the other non-central building and two connections via the building and garden entries of the central residence. Thus, there can be a total of ten neighborhood connections in the entire neighborhood cell (Figure 3). If the number of neighborhood connections in a unit area ($1m^2$) is high, this indicates a higher neighborhood connection density, while it is accepted that the neighborhood connection density value is low if the number of connections per unit area is low.

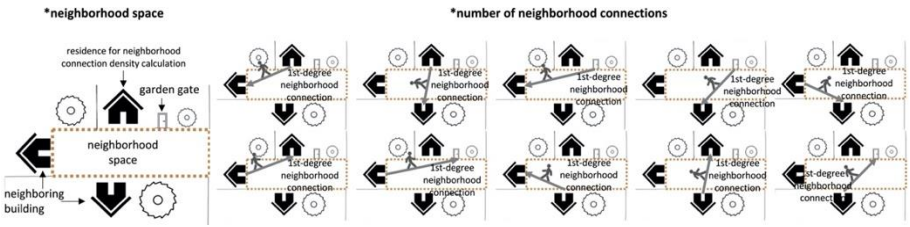

Figure 3. Neighborhood Connection Density calculation

The neighborhood connection density value expresses the number of links within a 1 m² neighborhood space that depends on the ratio between the number of neighborhood connections and the size of the neighborhood space:

- **number of neighborhood connections=** [(number of neighborhood cells–number of entrance points for own residence) x number of entrance points for own residence] + [(number of neighborhood cells– number of entrance points for own residence) x number of entrance points for own residence] +…….. n
- **neighborhood connection density (number of connections / 1m²) =** number of neighborhood connections / neighborhood space

A dense network of neighborhood connections refers to the high number of connections per area of the neighborhood space, while a loose network refers to the low number of such connections.

METHOD

Study Area

The Antalya and Kaleiçi Region has been and is an important settlement area. In the Hellenistic period, the east of the city had a grid-type settlement, an acropolis, and an agora. In the Roman period, with some additions, outer neighborhoods with an organic texture were formed in the southwest of the city. Moreover, in the Ottoman period, Turkish neighborhoods formed in a region with an organic texture, while Greek neighborhoods formed in a region with a grid-type structure (Kılıç, 2022; Canan, et al., 2020; Yağcı, 2009). This region is divided into sixteen neighborhoods with large streets extending from interior and exterior doors to the center, as well as smaller streets extending from large streets into neighborhoods (Dayar, 2020, 62). The city walls of the Kaleiçi area had been preserved until the 1930s, the protective border was updated as Atatürk Street with the large-scale destruction of the walls in the 1940s, and the area was affected negatively by developments related to migration and tourism in the 1970s (Canan, et al., 2020). In the Kaleiçi area, it is seen that the Kılıçarslan and Barbaros neighborhoods display the grid texture belonging to the Roman period, while the Selçuklu and Tuzcular neighborhoods display the organic texture belonging to the Turkish period (Türk, 2014). The main components of morphology were taken as building units. In the examinations about the building stock of the

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Antalya Kaleiçi Region, Development Plans aiming a preservation were taken as a basis, and building traces, garden traces, plot outlines, building entrances, and garden entrances were identified based on sources in the literature and information obtained from satellite images (Figure 4).

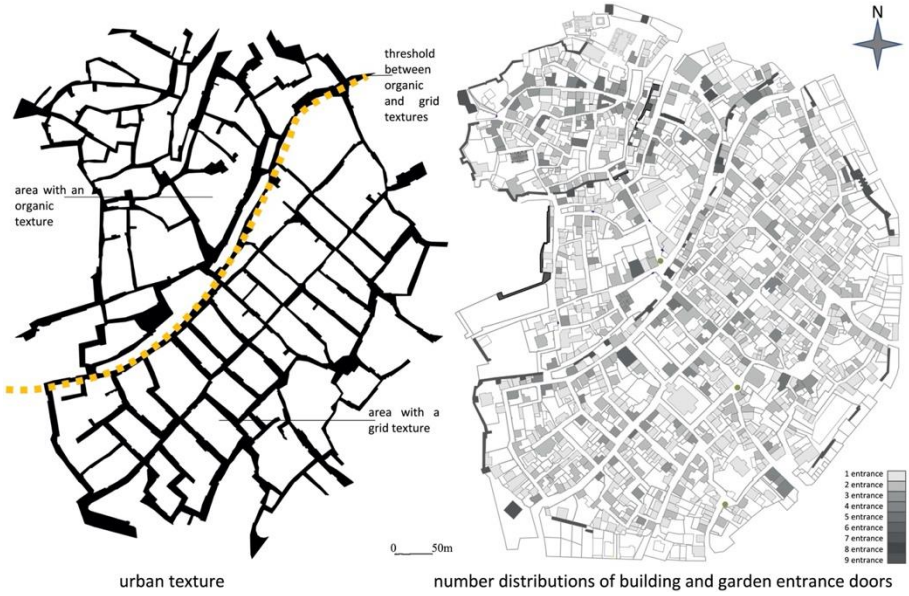

Figure 4. Analyses of the urban texture and numbers of building doors and garden gates in the study area

Antalya-Kaleiçi: Functional Structure

Neighborhood Cells

The Kaleiçi Region, which has been preserved as a protected site since 1973 (Mansuroğlu, 2021, 222) is considered in the context of its urban texture, street system, and historical buildings that have reached our time. Building and garden entrances such as single doors, double doors, and gates opening from buildings into urban spaces such as streets, dead-end streets, and cul-de-sacs are shown on the plan. The building and garden entrances of some buildings, a part of which had been demolished, were identified based on the remaining rubble and development plans aimed at preservation, and it was aimed to have a picture of the original structure. As a result of the preliminary assessments, it was determined that 621 of the 741 buildings were residential units. The study area was divided into 50 m x 50 m zones, selected residences (single residential units) that could preserve its unique architectural identity were identified in each zone, and the first- and second-degree neighborhood cells of these residential units were defined. Among the 621 residential units in the area (excluding apartment buildings), 123 (20%) (45 in the areas with organic texture and 78 in the areas with geometric texture) were examined (Figure 5).

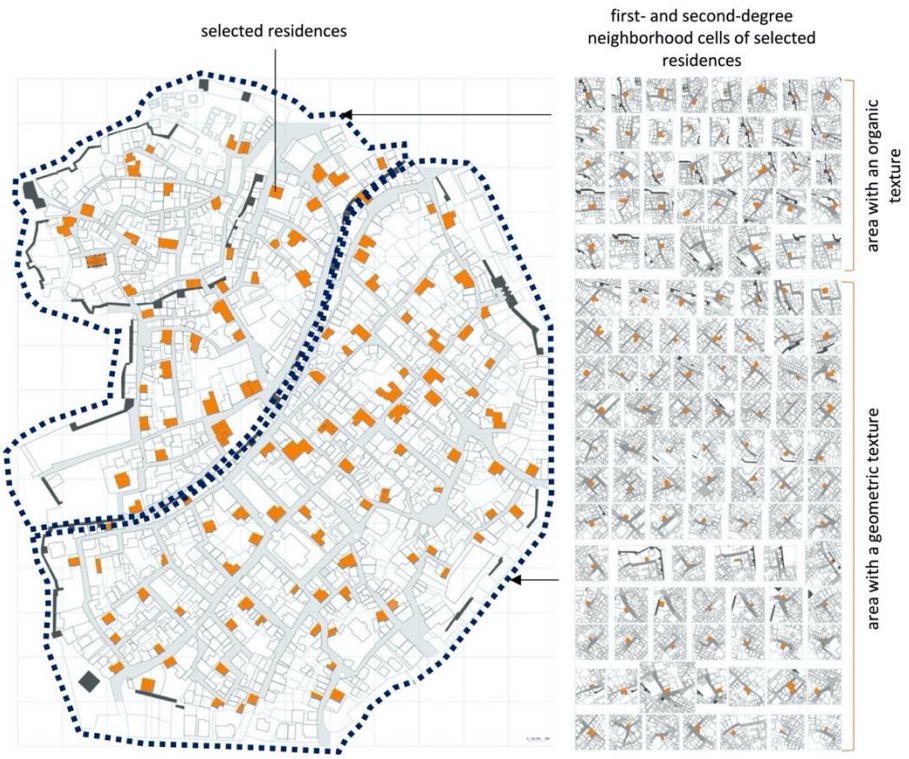

Figure 5. Locations of the selected residences for which units of neighborhood and neighborhood connections were calculated

Neighborhood Connection Density Value

Neighborhood connection density values were calculated for the first-degree neighborhood cells of the 123 residences in the sample. The Neighborhood Connection Density value refers to the number of connections passing through a 1 m^2 neighborhood area. The neighborhood connection density map created based on the density values calculated for the selected residential units in the settlement is presented in Figure 6.

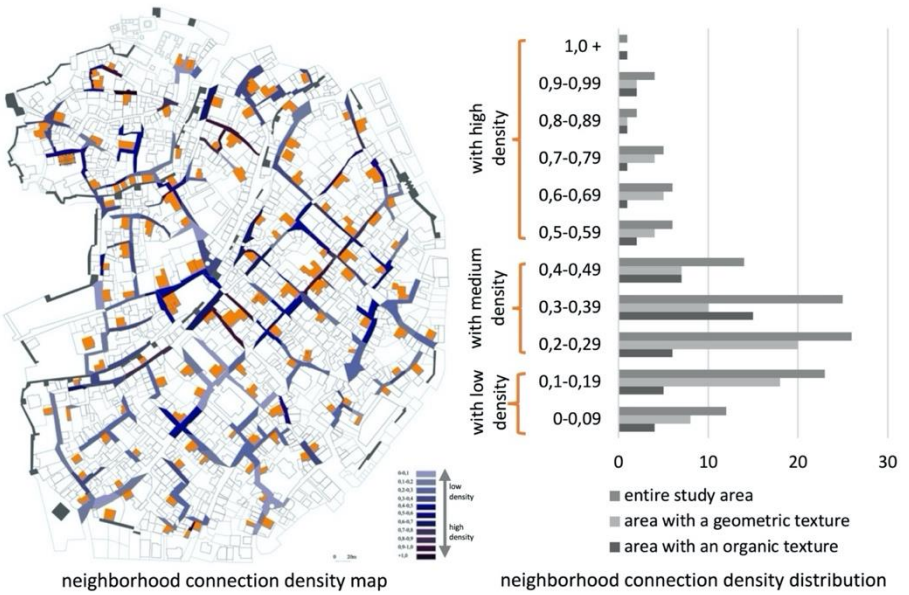

Figure 6. The neighborhood connection density map and density values

Most of the neighborhood connection density values calculated in the organic settlement areas were in the range of 0.3-0.39, whereas most of

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those calculated in the geometric settlement areas were in the range of 0.2-0.29. This result showed that the organic settlement areas had a morphological arrangement that supported neighborhood connections more compared to the grid settlement areas. In the entire examined area, the neighborhood connection density values were in the ranges of 0.2-0.29 and 0.3-0.39.

The mean neighborhood connection density value for the 123 neighborhood cells in the examined area was 0.34 connections/m^2, this value was considered to be within the range of 0.3-0.39 in the ranking of density categories, and when the ranges of 0.2-0.29 under this range and 0.4-0.49 over this range were included, the range of 0.2-0.39 was defined as the range of medium neighborhood connection density. The ranges below this range (0-0.09 and 0.1-0.19) were defined as the ranges of low neighborhood connection density, and those above this range (0.5-0.59, 0.6-0.69, 0.7-0.79, 0.8-0.89, 0.9-0.99, and 1.0+) were defined as the ranges of high neighborhood connection density.

Antalya-Kaleiçi: Morphological Structure

Neighborhood Cells with Focal Points and Neighborhood Blocks

The Kaleiçi Region can be discussed based on its historical buildings that were built in different years and have remained intact so far (e.g., residences, religious buildings, hammams). It is aimed to determine the boundaries of its neighborhoods based on its current structure that has remained intact. Hence, neighborhood cells with focal points centered around religious buildings and neighborhood blocks connected to these cells are defined. Eight religious buildings in the study area (one outside the area was excluded from the analyses) were accepted as focal points, and the neighborhood cells with focal points around these focal points are presented in different colors based on their degree ranking (Figure 7). The farthest distances from the focal point to the neighborhood cells with focal points around the same focal point and of the same degree (first, second, …) were defined as “expansion distances”. “Neighborhood blocks” were formed by connecting the expansion points of the neighborhood cells with focal points of the same degree, and the neighborhood blocks of the same degree around different focal points are shown in the same colors. When the expansion distances of the neighborhood cells with focal points were combined, “movement series of neighborhood cells” were obtained, and these are shown in Figure 7. It is seen that in addition to the main movements centered around the focal point, there were also lower-level movement series caused by the partition of streets toward two or three directions.

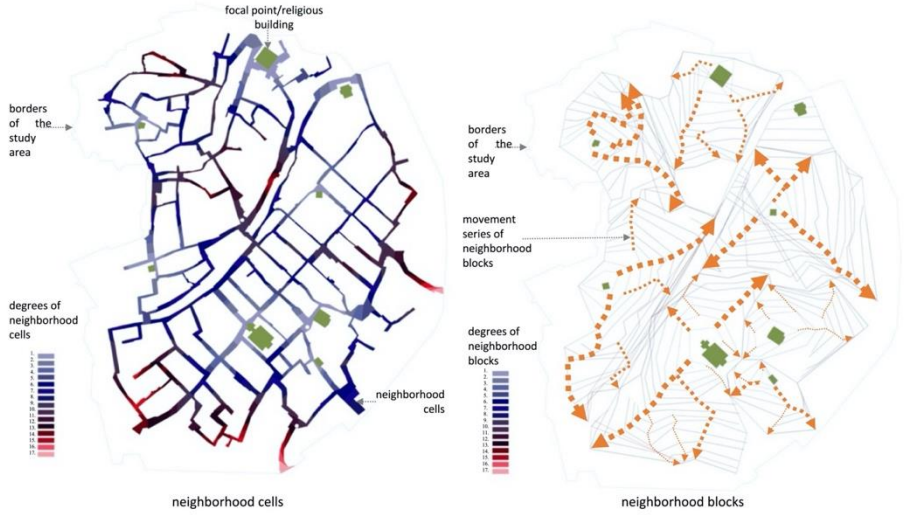

Figure 7. Neighborhood Blocks and Movement Series

Neighborhood Units

The neighborhood cells with focal points surrounding each religious building expanded up to their intersection with the neighborhood cells with focal points surrounding other religious buildings, and these intersection points constituted the boundaries of these cells with each other (Figure 8). It is seen that three of the neighborhood units in the study area (units numbered 1, 2, and 5) were in the organic settlement areas, while five units (units numbered 3, 4, 6, 7, and 8) were in the grid settlement areas.

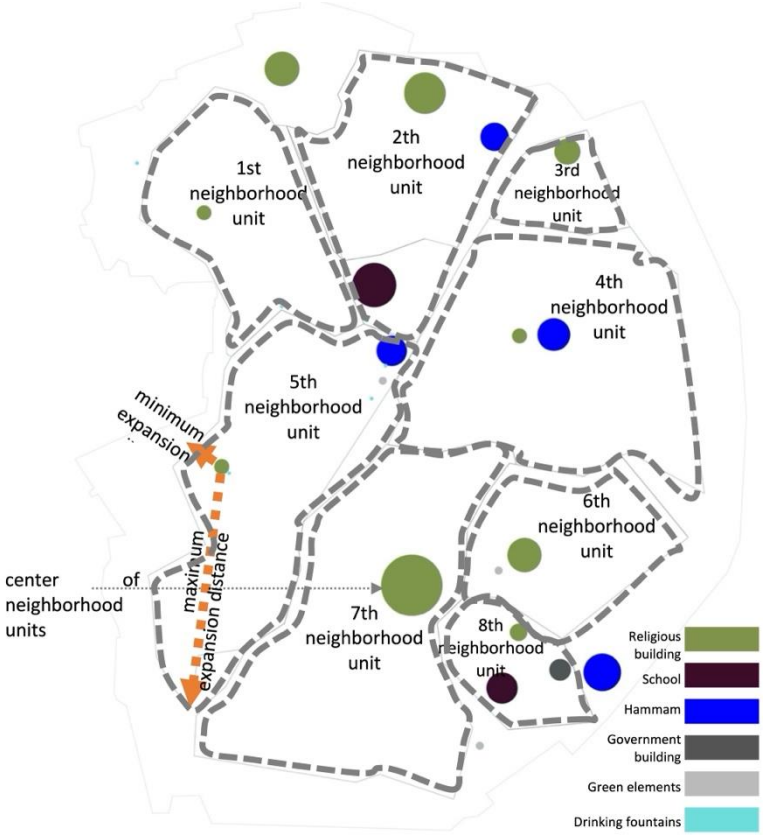

Figure 8. Neighborhood units linked with neighborhood connections

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The data on the morphological structure of the neighborhood units in the study area are presented in Table 1.

Table 1. Morphological structure of neighborhood units

		lowest expansion (m)	highest expansion (m)	lowest number of neighborhood cells	highest number of neighborhood cells	circumference of neighborhood unit (m)	area of neighborhood unit (m^2)
organic settlement areas	Unit 1	36	173	first	tenth	714	25722
	Unit 2	35	222	first	ninth	771	31796
	Unit 5	30	217	second	thirteenth	986	37959
grid settlement areas	Unit 3	13	91	first	sixth	349	7231
	Unit 4	77	217	twelfth	thirteenth	927	47480
	Unit 6	44	147	fourth	ninth	574	20527
	Unit 7	35	257	fifth	fifteenth	1052	50829
	Unit 8	16	104	third	seventh	408	10745

Four neighborhood units had hammams, two had schools (non-historical), one had a government building, two had both schools and hammams, and trees and drinking fountains were usually found at the intersection points of the streets. The neighborhood units had an amorphous morphology, they expanded at distances of 13 m to 247 m from the focal point, there was a hierarchical gradation from the first neighborhood cell to the fifteenth neighborhood cell within this expansion area, the circumferences of the neighborhood units varied between 349 m and 1052 m, and their areas varied between 7231 m^2 and 50829 m^2. The sizes of the neighborhood units were similar in the organic settlement areas and variable in the grid settlement areas. In the geometric settlement areas, the seventh neighborhood unit had the highest degree of expansion, whereas the eighth neighborhood unit had the lowest degree of expansion, which demonstrated this difference.

FINDINGS

While tributary and deviating streets and amorphous city block formations differing from each other were common in the organic settlement areas, the grid settlement areas mostly contained a grid street system, as well as rectangular and square-shaped city blocks. Among the 741 buildings in the area, 83.8% (621) were residential units (function changes for tourism purposes were neglected), 5.6% (42) were apartment buildings, 8.4% (62) were commercial buildings, 1.3% (9) were religious buildings, and 1% consisted of schools (2), hammams (4), and a government building (1). Similar distributions of functions were observed in the settlement areas with organic and grid textures. While 9.2% (69) of the buildings were positioned at the inside corners of the city blocks, 30.7% (229) were positioned at the outside corners, 60.1% (449) were positioned along the streets, and 6 were positioned at

both the inside and outside corners of the blocs. In the entire area, the door opening ratio was 1.55, and the garden gate opening ratio was 1.1 (Table 2).

Table 2. Findings on building morphologies in the study area

		organic texture	grid texture	entire study area
function distribution function distribution	residence	205-%80,3	416-%85,6	621-%83,8
	apartment building	8-%3,2	34-%7	42-%5,6
	school	1-%0,4	1-%0,2	2-%0,3
	hammam	2-%0,8	2-%0,4	4-%0,5
	commercial building	35-%13,7	27-%5,5	62-%8,4
	government building	-	1-%0,2	1-%0,1
	religious building	4-%1,6	5-%1,1	9-%1,3
	total	255-%100	486-%100	741-%100

		organic texture	grid texture	entire study area
position	inside corner	29-%11,2	40-%8,2	69-%9,2
	outside corner	86-%33,2	143-%29,3	229-%30,7
	street	144-%55,6	305-%62,5	449-%60,1
	total	259-%100	488-%100	747-%100
entrance points	building door	1,7	1,4	1,55
	garden gate	1,1	1,1	1,1

Findings on the Functional Structure

It was aimed to identify the characteristics of the neighborhood cells that affected the neighborhood connection density values and how these factors affected these values. The neighborhood connection density values of the first-degree neighborhood cells belonging to the 123 residences in the study area were evaluated based on building numbers, neighborhood area values, morphological structures of neighborhood areas, building arrangements, the position of the buildings in the city block, and the numbers of door openings to the neighborhood areas (Table 3).

Table 3. Characteristics of first-degree neighborhood cells based on neighborhood connection density values

density	neighborhood connection density	number of units	size	type of urban space	building arrangement	building position	mean number of doors
low	0-0,09	4,08	437m^2	linear	linear	street	6,3
	0,1-0,19	5,31	391,4 m^2	linear	intermittent	street	8,5
medium	0,2-0,29	6,53	413,3m^2	linear	irregular	street	10,84
	0,3-0,39	6,6	443,8m^2	linear	irregular	outside corner	13,48
	0,4-0,49	7,71	465,21m^2	t street	grid	outside corner	14,64
high	0,5-0,59	7	311,66m^2	linear	linear, tributary	street	14,33
	0,6-0,69	8	420 m^2	linear and t	grid	outside corner, street	17,66
	0,7-0,79	7,6	245,4 m^2	linear	linear	street	14,8
	0,8-0,89	7	297 m^2	y street	irregular	outside corner, street	17,5
	0,9-1,99	8,25	352 m^2	linear	linear	street	19,75
	+1,0	5	154 m^2	linear	linear	street	15

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The quantitative structures of the low-, medium-, and high-density neighborhood cells were interpreted based on the arithmetic mean values shown in Table 3. In general, for the areas with low neighborhood connection density values, there were 4.7 buildings on average, the mean block area was 414.2 m^2, and there were 7.4 doors on average; in the medium-density areas, there were 6.9 buildings on average, the mean block area was 661.1 m^2, and there were 12.9 doors on average, and in the high-density areas, there were 7.14 buildings on average, the mean block area was 296.6 m^2, and there were 16.5 doors on average. It is seen that the relationships between the number of buildings defining the neighborhood cells, the areas of the neighborhood spaces, and the numbers of door or gate entries affected the calculated neighborhood connection density values. In other words, a small area of neighborhood spaces, higher numbers of neighboring buildings, and higher numbers of entry doors were associated with higher neighborhood connection density values.

The neighborhood connection density values belonging to the selected residences positioned along the streets were generally more favorable compared to those positioned at the inside or outside corners (Table 4).

Table 4. Neighborhood connection density values based on the positions of the selected residences

building position	Neighborhood connection density values											
	0-0,9	0,1-0,19	0,2-0,29	0,3-0,39	0,4-0,49	0,5-0,59	0,6-0,69	0,7-0,79	0,8-0,89	0,9-0,99	1,0-	total
inside corner	3-%21,5	4-%29	3-%21,5	2-%14	2-%14							14-%100
outside corner	3-%7	4-%9	10-%22	12-%26	8-%17	2-%4	3-%7	2-%4	1-%2	1-%2		46-%100
street	6-%9	14-%22	13-%21	11-%17	4-%6	4-%6	3-%5	3-%5	1-%2	3-%5	1-%2	63-%100
total	12-%10	22-%18	26-%21	25-%20	14-%11	6-%5	6-%5	5-%4	2-%2	4-%3	1-%1	123-%100

Most neighborhood connection density values calculated for buildings in neighborhood cells positioned along the streets were in the range of 0.3-0.39 in the organic settlement areas and 0.1-0.19 in the grid settlement areas, most of those calculated for buildings positioned at the outside corners were in the range of 0.3-0.39 in the organic settlement areas and 0.2-0.29 in the geometric settlement areas, and most of those calculated for buildings positioned at the inside corners were in the range of 0.1-0.19 in the organic settlement areas and 0.2-0.29 in the grid settlement areas (Table 5) (Figure 9).

The buildings positioned along the streets and at the outside corners in the neighborhood cells had higher neighborhood connection density values in the organic settlement areas, while those positioned at the inside corners had higher density values in the grid settlement areas.

Table 5. Neighborhood connection density values prominent in neighborhood cells based on their location

	street		outside corner		inside corner	
	prominent neighborhood connection density value	total number of cells	prominent neighborhood connection density value	total number of cells	prominent neighborhood connection density value	total number of cells
organic	0,3-0,39	14	0,3-0,39	22	0,1-0,19	9
grid	0,1-0,19	49	0,2-0,29	24	0,2-0,29	5
entire study area	0,1-0,19	63	0,3-0,39	46	0,1-0,19	14

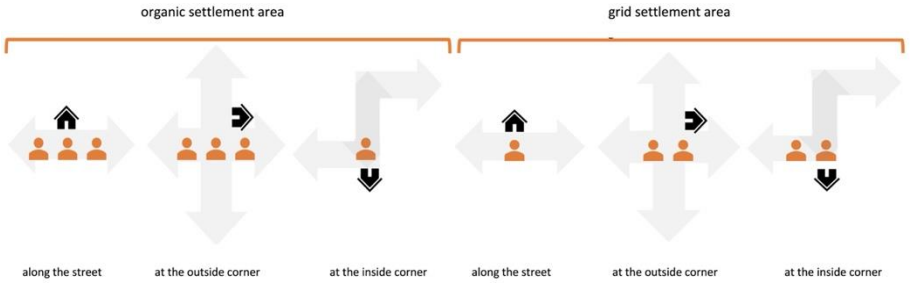

Figure 9. Neighborhood connection density values based on building positions

In general, in the organic settlement areas, 33% of the neighborhood cells had neighborhood connection density values in the range of 0.3-0.39, 15% had density values in the range of 0.4-0.49, and 11% had density values in the range of 0.1-0.19. In the grid settlement areas, 25% of the neighborhood cells had neighborhood connection density values in the range of 0.2-0.29, 21% had density values in the range of 0.1-0.19, and 12% had density values in the range of 0.3-0.39. The neighborhood cells in the organic settlement areas were found to have higher neighborhood connection density values than those in the grid settlement areas.

Findings on the Morphological Structure

Findings on neighborhood cells

The function distributions, positions, building entrance numbers, and numbers of buildings in the first- and second-degree neighborhood cells of a total of 123 residential units are presented in Table 6.

Among the 3174 buildings constituting a total of 123 neighborhood cells, 2708 (85.32%) were residences, 148 (4.67%) were apartment buildings, 16 (0.5%) were schools, 24 (0.75%) were hammams, 216 (6.8%) were commercial buildings, 2 (0.06%) were government buildings, and 60 (1.9%) were religious buildings. The buildings constituting the neighborhood cells were positioned along the street (53.96%), at the outside corner (38.4%), and at the inside corner (7.64%). The mean number of building doors in these buildings was 1.33, while the mean number of garden gates was 0.55. The distributions of the numbers of buildings constituting first- and second-degree neighborhood cells in the organic and grid settlement areas are shown in Figure 10.

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Table 6. Morphological structure of neighborhood cells

		organic first-degree	grid first-degree	total/mean first-degree	organic second-degree	grid second-degree	total/mean second-degree	total/mean entire area of the sample
distribution of functions	residential	208-%81	472-%88	680-%85,7	186-%76	488-%89	674%84,88	2708%85,32
	apartment building	14 –%5	24 –%4	38-%4,8	13-%5	23-%4,2	36-%4,53	148-%4,67
	school	2 – %1	1-%0,2	3-%0,4	2-%0,8	3-%0,54	5-%0,67	16-%0,5
	hammam	2 –%1	2-%0,4	4-%0,6	6-%2,4	2-%0,36	8-%1	24-%0,75
	commercial	25 –%10	28-%5	53-%6,6	33-%13,4	22-%4,1	55-%6,92	216-%6,8
	government	-	1-%0,4	1-%0,1	-	-	-	2-%0,06
	religious	6 –%2	8-%2	14-%1,7	6-%2,4	10-%1,8	16-%2	60-%1,9
	entire area	257-%100	536-%100	793-%100	246-%100	548-%100	794-%100	3174-%100
position	inside corner	36-%13,58	34-%6,31	70-%8,7	19-%7,6	35-%6,15	54-%6,59	124-%7,64
	outside corner	116%43,77	186%34,57	302-%37,6	105-%42	216%37,96	321%39,19	623-%38,4
	street	113%42,65	318%59,12	431%53,67	126-%50,4	318%55,89	444%54,22	875-%53,94
	total	265-%100	538-%100	803-%100	250-%100	569-%100	819-%100	1622-%100
number of buildings	1 building	-	-	-	1-%2,2	-	1-%0,8	1-%0,4
	2 buildings	1-%2,2	-	1-%0,8	4-%8,9	1-%1,3	5-%4	6-%2,4
	3 buildings	3-%6,7	3-%3,8	6-%4,9	6-%13,4	7-%9	13-%10,5	19-%7,7
	4 buildings	10-%22,2	7-%9	17-%13,9	14-%31,1	7-%9	21-%17	38-%15,4
	5 buildings	10-%22,2	10-%12,8	20-%16,3	2-%4,4	15-%19,3	17-%13,9	37-%15
	6 buildings	7-%15,6	21-%27	28-%22,8	7-%15,6	11-%14,2	18-%14,6	46-%18,7
	7 buildings	5-%11,1	10-%12,8	15-%12,1	4-%8,9	8-%10,2	12-%9,9	27-%11
	8 buildings	3-%6,7	11-%14,1	14-%11,3	2-%4,4	8-%10,2	10-%8,1	24-%9,8
	9 buildings	5-%11,1	7-%9	12-%9,9	1-%2,2	8-%10,2	9-%7,3	21-%8,6
	10 buildings	1-%2,2	4-%5,1	5-%4	-	5-%6,4	5-%4	10-%4
	10+ buildings	-	5-%6,4	5-%4	4-%8,9	8-%10,2	12-%9,9	17-%7
	Total	45-%100	78-%100	123-%100	45-%100	78-%100	123-%100	246-%100

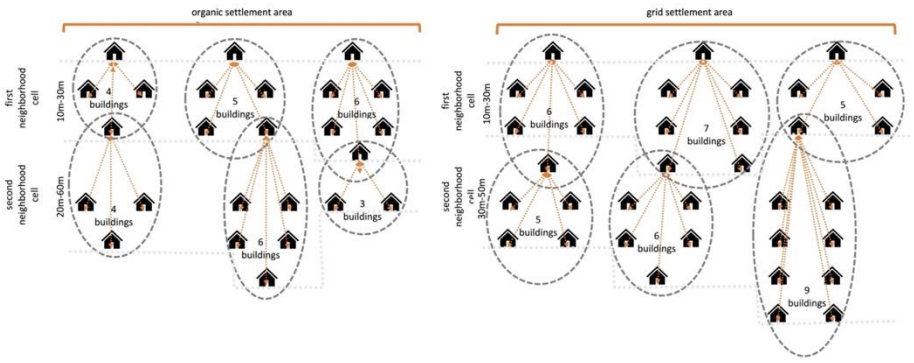

Figure 10. Numbers of buildings constituting neighborhood cells and their expansion distances

In the organic and grid settlement areas and the entirety of the study area, the first-degree neighborhood cells expanded by at least 10-19 m and at most 20-29 m. The second-degree neighborhood cells expanded by at least 20-29 m and at most 50-59 m in the organic settlement areas, at least 30-39 m and at most 40-49 m in the geometric settlement areas, and at least 30-39 m and at most 40-49 m in the entire study area (Figure 10) (Table 7).

Table 7. Distributions of the expansion distances of neighborhood cells

	organic				grid				entire study area			
	first-degree neighborhood connection		second-degree neighborhood connection		first-degree neighborhood connection		second-degree neighborhood connection		first-degree neighborhood connection		second-degree neighborhood connection	
	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
10m-19m	22-%48,9	4-%8,9	4-%8,9		38-%48,8	7-%8,9	2-%2,5		60-%48,8	11-%8,9	6-%4,8	
20m-29m	20-%44,4	18-%40,1	20-%44,4	1-%2,2	34-%43,5	28-%35,8	21-%26,9	1-%1,2	54-%43,9	46-%37,3	41-%33,3	2-%1,7
30m-39m	3-%6,7	15-%33,3	14-%31,2	13-%28,8	6-%7,7	26-%33,3	39-%50	15-%19,2	9-%7,3	41-%33,3	53-%43,1	28-%22,8
40m-49m		3-%6,7	6-%13,3	9-%20		14-%17,9	15-%19,2	27-%34,6		17-%13,9	21-%17,1	36-%29,2
50m-59m		2-%4,4	1-%2,2	14-%31,2		2-%2,5	1-%1,2	17-%21,7		4-%3,3	2-%1,7	31-%25,2
60m-69m		2-%4,4		2-%4,4		1-%1,2		12-%15,3		3-%2,4		14-%11,3
70m-79m		1-%2,2		3-%6,7				4-%5,1		1-%0,9		7-%5,7
80m-89m				3-%6,7				2-%2,5				5-%4,1
toplam	45-%100	45-%100	45-%100	45-%100	78-%100	78-%100	78-%100	78-%100	123-%100	123-%100	123-%100	123-%100

The neighborhood spaces of the first-degree neighborhood cells had areas in the range of 100-199 m^2 (20%) in the organic settlement areas, 200-299 m^2 (30.7%) in the grid settlement areas, and 200-299 m^2 (26.1%) in the entire study area. It was determined that the first-degree neighborhood cells in the entire study area formed in neighborhood

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spaces with linear (39%), Y (19.6%), and X (15.4%) street arrangements. The buildings constituting the first-degree neighborhood cells were positioned irregularly (37.4%), linearly (18.7%), or intermittently (17%) (Table 8).

Table 8. Neighborhood areas, spatial morphologies, and building arrangement structures in first-degree neighborhood cells

	neighborhood unit area (m^2)											
	0-99	100-199	200-299	300-399	400-499	500-599	600-699	700-799	800-899	900-999	1000 üstü	total
organic	2-%4,4	9-%20	8-%17,8	7-%15,6	6-%13,3	8-%17,8	-	1-%2,2	1-%2,2	-	3-%6,7	45-%100
grid	2-%2,6	9-%11,5	24-%30,7	11-%14,1	10-%12,9	8-%10,2	2-%2,6	7-%8,9	3-%3,9	-	2-%2,6	78-%100
entire study area	4-%3,2	18-%14,7	32-%26,1	18-%14,7	16-%13	16-%13	2-%1,6	8-%6,5	4-%3,2	-	5-%4	123-%100
	spatial morphology						
	linear	linear	linear	linear	linear	linear	total
organic	13-%28,9	8-%17,8	2-%4,4	13-%28,9	7-%15,6	2-%4,4	45-%100
grid	35-%44,9	10-%12,9	9-%11,6	11-%14,1	12-%15,3	1-%1,2	78-%100
entire study area	48-%39	18-%14,7	11-%8,9	24-%19,6	19-%15,4	3-%2,4	123-%100
	building arrangement type					
	linear	linear	linear	linear	linear	linear
organic	5-%11,1	7-%15,6	7-%15,6	1-%2,2	25-%55,5	45-%100
grid	18-%23	11-%14,1	14-%18	14-%18	21-%26,9	78-%100
entire study area	23-%18,7	18-%14,7	21-%17	15-%12,2	46-%37,4	123-%100

Findings on Neighborhood Cells with Focal Points, Neighborhood Units, and Neighborhood Morphology

It is thought that neighborhood blocks carry some codes regarding the arrangement structures of neighborhood cells with focal points and their styles of formation. It was observed in this study that the movement lines in the organic and grid settlement areas differed from each other, there were more tributary lines within the neighborhoods in the organic settlement areas, which did not expand much outward, and the grid settlement areas had more straight lines and movements growing by a uniform course of expansion (Figure 11). In general, the formation of the hierarchy of focal point-arrangements of neighborhood cells with focal points-residential units can be observed. It is acknowledged that this structure, which constitutes the neighborhood in the traditional settlement system that is not pre-planned, differs from planned neighborhood units in the literature in terms of scope and content, and this is believed to be a characteristic that is unique to the culture of the settlement.

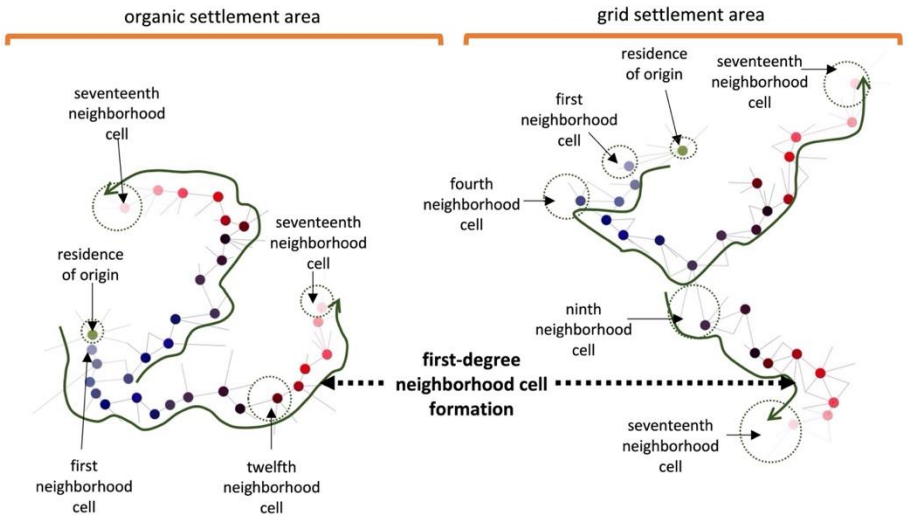

Figure 11. Morphological differences in neighborhood units in settlement areas with different textures

DISCUSSION AND RESULTS

In the study; the relationship between the formal and functional structures of neighborhoods formation with an traditional approach is questioned. Neighborhood systems with organic and grid textures reveal the formal structure, and neighborhood relationships between housing elements in the neighborhoods reveal the functional structure. First of all, the issues of where or at what point the neighborhood formation begins and how it develops and grows come to the fore. In this context, it is accepted that religious buildings representing the center of the neighborhood constitute the starting points or focal points in the formation of the neighborhood. It is acknowledged that this approach is compatible with the study conducted by E. Dayar in which the approximate centers of the sixteen neighborhoods of Kaleiçi in the early 19th century are presented. In the aforementioned study, it is observed that there are mostly religious buildings in the centers of neighborhoods, and the neighborhoods are shaped around these buildings (Dayar, 2020, 63). It is believed that the results of this study in agreement with Dayar's study in terms of the religious buildings reported as central points of neighborhoods (some, including Paşa Mosque, Balbey Mosque, and Makbule Mosque) are important in that they show consistency with and contribute to the literature. It is seen that neighborhood cells are formed when residential elements come together around religious buildings, and neighborhood units are formed when neighborhood cells come together.

Neighborhood relations are thought to represent the functional structure of neighborhoods. It is envisaged that neighborhood relations take place in common neighborhood areas, with residential elements coming and going from building and garden entrances. In this context, it is important that housing elements are arranged side by side or opposite each other and open to a common urban space. Neighborhood Connection Density value is determined depending on the relations between the house and garden entrances, which enable the housing

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elements to open directly to the neighborhood area, and the neighborhood areas where neighborhood relations take place.

Although the buildings belonging to each neighborhood cell had similar morphological structures, there were variations between the organic and grid settlement areas in terms of the number of buildings in neighborhood cells, the arrangements of these buildings, their positions on city blocks, and their expansion distances and areas. It is believed that this situation affected neighborhood blocks, their movement series, and their Neighborhood Connection Density values.

The distances of outward expansion from focal points varied between organic and grid settlement areas. The degree of similarity between the shortest and longest expansion distance values provides information about whether there is a uniform process of expansion from the focal point outwards. In this sense, while the expansion distance difference in the residential units in the settlement areas with an organic texture was 170 m, this difference was 126 m in the settlement areas with a geometric texture. This showed that the residential units in the grid settlement areas grew in a more centralized manner. The results on the differences between the lowest and highest numbers of neighborhood cells in the neighborhood units supported this finding. This difference was 9.3 neighborhood cells in the organic settlement areas and 5 neighborhood cells in the grid settlement areas. That is, while there was an asymmetrical process of expansion in reference to the focal point in the organic settlement areas, there was a more symmetrical process of expansion in the grid settlement areas. This situation was considered to affect the neighborhood connection density values in the organic and grid settlement areas. The neighborhood connection density values in most areas with an organic texture were in the range of 0.3-0.39, while the values in most areas with a grid texture were in the range of 0.2-0.29.

It is understood that neighborhood units that are defined based on neighborhood cells with focal points have their own unique structures other than their meaning in the literature. In particular, it is seen that with their amorphous and geometrically irregular structures, these units did not expand uniformly in every direction, and this situation led to the formation of a rhythmic connection deviating from a geometric order between centers of residential units. It was concluded that this situation was indicative of the identity and uniqueness of the settlement, and it should be maintained in terms of settlement culture.

This study is thought to be important in that it aims to determine the ideal service boundaries of neighborhoods that develop organically with a traditional approach. In this context, it aims to reveal the unique structures of concepts such as neighborhood cells, neighborhood connections, Neighborhood Connection Density values and hierarchical formation of focal points- neighborhood cells- neighborhood units and emphasizes the importance of the protection and sustainability of these unique concepts.

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Resume

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Deep Learning-Assisted Discovery of Analogy-Inspired Designs within Peter Collins' Analogical Architectural Design Classification Framework

Hüseyin Özdemir*

Abstract

This study focuses on analogical reasoning and deep learning models to enhance the innovative design process in architecture. By constructing multi-layered artificial neural networks, deep learning can derive analogical predictions from structured data to solve complex tasks. Deep learning models interact with analogical thinking patterns in the architectural design process, enabling designers to analyze and draw inspiration from analogical design examples. This study aims to develop a deep learning model that categorizes architectural design examples into specific analogical design classifications. For this purpose, a model based on Convolutional Neural Networks was developed and coded in the Google Colab environment using a dataset of 29,596 visual images, employing Peter Collins' classification system of biological, mechanical, gastronomic, and linguistic analogies. During the training process, the model was trained on images classified according to biological, mechanical, gastronomic, and linguistic categories, achieving an accuracy rate of 98%; however, this rate was recorded as 86% during the testing phase. It was observed that adjustments in the learning rate parameter balanced classification accuracy and training time; lower learning rates reduced accuracy while extending training time. Despite the complexity of architectural images indicated by the 86% accuracy rate on test data, the study emphasizes the model's capacity to achieve accuracy above 95% when confronted with distinct architectural features. In this case, the model allows designers to discover which analogical classification the architectural work to be tested is designed according to, allowing them to develop creative solutions to new design problems. Additionally, this research establishes an interdisciplinary dialogue between artificial intelligence and architecture, providing a foundation for future studies.

Keywords:
Analogical design, Architectural design, Deep learning, Peter Collins.

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INTRODUCTION

Deep learning represents a sophisticated methodology within machine learning, designed by constructing artificial neural networks with multiple processing layers to tackle complex tasks (Wong, 2021). This innovative approach focuses on leveraging the capabilities of deep neural networks, which can derive insights directly from structured data. The remarkable ability of these neural networks to replicate the complex connections between input data and the resulting output predictions is noteworthy. Deep neural networks often integrate architectural elements of convolutional, recurrent, and multilayer perceptrons in their design, drawing inspiration from the inner workings of the human brain (Chinnasamy et al., 2015). Pioneering research is being conducted in this field, exploring new models within this comprehensive framework (Jayakanna & Raju, 2022). The domain of deep learning algorithms is characterized by a continuous evolution involving the iterative fine-tuning of weights and biases connected to individual neurons. This gradual improvement process results in a step-by-step enhancement of cognitive abilities, enabling them to adeptly address previously considered complex and insurmountable challenges. Despite significant challenges related to the demand for extensive data and substantial computational resources, the profound potential of deep learning methodologies significantly enhances their flexibility and importance across various fields. These fields encompass recognition and image processing sectors, where deep learning techniques have delivered transformative results.

One of the primary advantages of using deep learning in architectural design is its ability to augment human creativity. As Petráková notes, a well-calibrated artificial intelligence can inspire architects without overshadowing their creative instincts, thus preserving the human touch in design processes (Petráková, 2023). This view is shared by Atwa and Saleh, who emphasize the necessity of understanding how artificial intelligence can impact creativity. It is suggested that architects increasingly leverage the capabilities of artificial intelligence to meet specific design demands (Atwa & Saleh, 2023). Furthermore, Rane states that including generative artificial intelligence in architectural theory represents a paradigm shift, expressing that machine intelligence is blended with human creativity, redefining the essence of creativity in design (Rane, 2023).

The evolution of artificial intelligence in architectural design has also brought about various algorithmic approaches that facilitate the exploration of abstract concepts and the generation of numerous design ideas. Hegazy and Saleh discuss how artificial intelligence has revolutionized the construction industry by providing tools capable of parametric explorations and generating design variations based on mathematically defined parameters (Hegazy & Saleh, 2023). This capability is also supported by Li and others, demonstrating how deep learning models contribute to the intelligent design of architectural

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spaces and enhance design processes suitable for three-dimensional features (Li, Wu, Xing, & Wang, 2023).

Moreover, the ethical dimensions of artificial intelligence in architecture must be considered. Tellios emphasizes that integrating artificial intelligence into architectural applications raises questions about biases in these technologies and that its impact on design innovation and production processes should be subject to critical scrutiny (Tellios, 2023). This concern is echoed in the work of Winiarti and others, who state that artificial intelligence should be used responsibly in digital architecture, addressing potential challenges while enhancing design capabilities (Winiarti, Pramono, & Pranolo, 2022).

Regarding practical applications, recent developments in generative design with artificial intelligence have enabled architects to create high-quality architectural designs from textual descriptions. Chen's research reveals an innovative artificial intelligence method that produces designs with specified features similar to the style and qualities of master architects, significantly enhancing the creativity and efficiency of the design process (Chen, 2023). These findings parallel the work of As and others, discussing the potential of deep learning to create conceptual designs by extracting fundamental building blocks based on functional performance criteria (As, Pal, & Basu, 2018).

Integrating artificial intelligence into architectural design processes also brings a new perspective to the historical roots of architectural theory. In this context, it has been observed that analogies have been used as a significant tool for thinking in architectural design throughout history and have been classified in various forms by experts. Peter Collins' categorization of analogies into biological, mechanical, gastronomic, and linguistic categories demonstrates that design processes can be approached with inspiration from different disciplines (Collins, 1965). On the other hand, Abel classifies analogy models from a broader perspective as spiritual, semantic, utopian, traditional, organic, military, commercial, and mechanical, revealing the transformation of architecture in different periods and contexts and the elements that influenced it (Abel, 1979). William Gordon's classification of analogies into symbolic, direct formal, individual, and cultural (Aydınlı, 1993), along with Tassoul's (2005) categories of personal, direct, paradoxical, natural, and fantastical analogies, provides a crucial framework for understanding the multifaceted use of analogy in architecture and its contribution to design processes.

In this context, integrating deep learning and artificial intelligence into architectural design processes interacts with analogical thinking styles, offering new creative possibilities. Classifications such as Peter Collins' biological, mechanical, and linguistic analogies allow architects to develop a historical and interdisciplinary perspective. While addressing modern challenges such as sustainability and cultural significance, this approach combines artificial intelligence's extensive data sets and analysis capacity, integrating interdisciplinary knowledge

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more effectively. Thus, integrating deep learning into architectural design should be considered a technological innovation and a holistic transformation that enriches the creative process and theoretical foundation.

Integrating deep learning and analogical thinking in architecture represents a new research area with the potential to transform traditional design methods. In architectural design, deep learning models can play a significant role in categorizing architectural design examples into specific classes of analogical design. These models allow designers to analyze analogical design examples and uncover sources of inspiration. Recognizing the source of inspiration enables designers to develop creative solutions to new design problems. This process can enhance both creativity and efficiency in architectural design processes. In this context, the study aims to innovate in the design process by incorporating Peter Collins' analogical architectural design classification system. Using a dataset of 29,596 visual images created according to Collins' analogical architectural design classification, a deep learning model based on Convolutional Neural Networks (CNN) was developed. The CNN model achieved a learning accuracy of up to 98%. However, the accuracy rate was 86% during the testing phase. The study synthesizes the relationship between analogical thinking and deep learning, highlighting the applicability of integrating deep learning models into architectural design processes and opening new horizons for enhancing creativity through automation.

THEORETICAL BACKGROUND

The analogy is a similar relationship between objects or concepts based on standard features. In this context, analogy has become a cognitive component, especially in philosophical fields such as epistemology and ontology. Aristotle's transformation of analogy from a physical similarity into a cognitive tool in logic and science emphasizes the intellectual importance of this concept. The conceptual power of analogy is helpful for understanding, interpreting, constructing arguments, examining, and expanding knowledge. Bartha (2013) notes that analogical arguments have shaped philosophical and scientific thought since ancient times. Analogy is a fundamental part of the design process in architecture. Architectural works can be created by taking inspiration from other objects, structures, or concepts. This approach encourages creativity and enables architectural works to emerge from various perspectives. Analogical design creates new forms inspired by known facts by making inferences from the specific to the general. Consequently, adopting an analogical approach in architectural design facilitates interdisciplinary collaboration and the generation of innovative solutions, which enhances the significance of architectural works and enables them to establish a profound connection with the public.

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Peter Collins' Classification of Analogical Design

Analogies have been significant in the architectural process since ancient times. They are used to express thoughts and beliefs through architectural formations. Therefore, analogy has become a common practice in architecture. Scientists specializing in analogies have classified them into various categories (Aydınlı, 1993; Collins, 1965; Tassoul, 2005; Uraz, 1993). This study focuses on Peter Collins' classification, commonly used in the literature, rather than considering all the experts' separate classifications. This approach provides a basis for future studies to improve different classifications. In his book 'Changing Ideals in Modern Architecture,' Peter Collins, an expert on analogy in architecture, classified analogies into four categories: Biological, Mechanical, Gastronomic, and Linguistic (Collins, 1965). This classification aids in comprehending the use of analogy in the design process. Analogous design involves generating new ideas inspired by existing known situations or objects. Collins' classification helps us understand designers' thinking processes and creative design outputs. Analogical thinking indicates that design is a cognitive activity (Ozkan & Dogan, 2013). This process demonstrates the designers' ability to apply existing knowledge to new problems, allowing for the emergence of creative solutions. Additionally, it has been observed that professionals working in design and engineering commonly use analogies (Goel, 1997). Analogy enables designers to generate innovative solutions.

Collins' classification is a significant reference for analogy in architecture and design. This classification aids in comprehending various aspects of using analogy in design thinking and provides a detailed examination of the design process.

Biological analogy

The relationship between architecture and biology has become more pronounced with the emergence of the organic architecture movement. Organic architecture emphasizes using natural forms and processes in building design to achieve a profound harmony between the building and its surroundings. The principle of functional adaptation observed in biological organisms is applied to building design in this context. Biological analogies have often been used to explain the formation of artistic and architectural products, from Herbert Spencer to Raymond Unwin and F.L. Wright (Uraz, 1993). Samuel Taylor Coleridge's concept of organic form emphasizes that buildings should have a structure resembling naturally evolved, unshaped structures, untouched by external interventions.

In modern architecture, organic architecture is a fundamental concept that emphasizes harmony with nature, respect for local materials, and the importance of environmental factors. For example, F.L. Wright's approach to organic architecture advocates integrating buildings with their surroundings and drawing inspiration from natural forms. This principle has also influenced the designs of contemporary

architects (Ayyıldız, 2001). Architects such as Tadao Ando incorporate Japanese cultural and belief systems into their designs, thereby perpetuating the principle of organic architecture. This approach emphasizes the importance of a harmonious relationship between the built environment and nature.

In this context, using biological analogies in architecture ensures that architectural design is in harmony with the natural environment and shaped to respond to human needs. Organic architecture adheres to the functional adaptation principles observed in biological organisms, combining functionality and aesthetics in building design, thus establishing a solid foundation (Kortan, 1992). Therefore, using biological analogies in architecture highlights the significance of interdisciplinary collaboration and promotes innovative solutions in the field.

Mechanical analogy

Mechanical analogies refer to the comparison between architectural structures and mechanical devices. This concept emerged in 18th-century literature, highlighting the difference between mechanical and organic concepts (Collins, 1965). In architectural discourse, the debates surrounding mechanical analogies gained momentum towards the end of the 19th century. The early 20th century is widely regarded as a period in which technology played a significant role in architectural thought, often referred to as the 'age of the machine' (Artun & Balcıoğlu, 1982). During this period, architectural texts focused on technology-related themes, with architecture perceiving the machine as an aesthetic object. It was observed that the machine generated a 'mechanical aesthetic' within architectural space and became fetishized (Artun & Balcıoğlu, 1982). Antonio Sant Elia, a representative of Futurism in architecture, advocated for modern buildings to resemble giant machines (Kortan, 1991). Le Corbusier expressed his admiration for industrial products and emphasized the lessons to be learned from them in architectural creation (McLeod, 1996). In modern architecture, mechanical models were used to emphasize functional form. In High-tech architecture, these models acquired a complete machine-like appearance (Uraz, 1993). Norman Foster is a prominent architect in the field of High-tech design. He is known for incorporating technology into his structures and drawing analogies to machines (Uraz, 1993).

Gastronomic analogy

In architectural art, gastronomy has emerged from discussions surrounding flavor and taste, positioning these concepts at the center of aesthetic evaluations. Building upon Croce's emphasis on the creative taste of the artist, investigations have been conducted into the impact of architectural works on individuals and their gratifying qualities (Croce, 1983). This approach highlights the significance of aesthetic pleasure and preference in architecture. Within architectural literature, alongside

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gastronomic analogies, there is an examination of how aesthetic attitude and sentiment can be expressed in architectural works. According to Tunalı, aesthetic attitude entails not only adopting a stance for enjoyment but also experiencing aesthetic pleasure towards an object (Tunalı, 2012). In this context, the concepts of aesthetic taste and preference in architecture are utilized to comprehend and assess the positive effects of a work on individuals.

Gastronomic analogies are also employed to determine correct design principles in architecture. Fergusson has suggested that reading cookbooks can be beneficial in understanding architectural design principles (Alexander, 1979). This approach underscores the importance of flavor and taste concepts in architecture. The significance of Romantic and Picturesque influences in gastronomic discussions is also substantial. Picturesque denotes an artistic attitude aiming to mimic the randomness and diversity found in nature rather than adhering to mathematical arrangements, while Romanticism focuses on emotional and natural beauties (Tuğlacı, 1983). The influence of these movements in architecture has played a crucial role in determining how architectural works appeal to human emotions and sensations.

In the works of renowned architects such as Carlo Scarpa, it is observed that the sense of taste predominates in architectural production. The structures created by Scarpa convey a pronounced sensation of taste uncommon in architectural works (Ayyıldız, 2001), thus reinforcing the significance and influence of taste and flavor principles in architectural design. Consequently, gastronomic analogies form the foundation of aesthetic evaluations in architecture and provide a significant tool for understanding the effects of work on individuals. Considering flavor and taste concepts in the design of architectural works can contribute to creating aesthetically satisfying and gratifying spaces.

Linguistic analogy

In architectural literature, language is defined as a set of elements and rules that enable the transmission and interpretation of thoughts, emotions, and desires within society (Aksan, 2000). However, considering language as a category in architecture is a relatively recent phenomenon and only came to the fore in the middle of the 20th century (Yücel, 1981). Some art philosophers, such as Bruce Allsopp, have approached architecture by adapting R.G. Collingwood's aesthetic theory to architecture, leading to linguistic analogies in architectural philosophy. Linguistic analogies offer superiority over biological and mechanical analogies because they better explain the expression of structure and human emotion through language's structural and semantic nature (Collins, 1965). Particularly with the critique of modernism, architectural language's meaning and structural character began to intersect with disciplines such as linguistics, semiotics, structuralism, and semantics.

According to Şentürer (1995), architecture uses language to express and convey messages. The importance of architectural language is also emphasized in the works of Robert Venturi, who claims that architecture's autonomous language has an abstract and conceptual structure that expresses the meaning of structures (Venturi, Brown, & Izenour, 1968). In Venturi's applications, it is observed that architectural language conveys precise and mass-oriented meanings (Akın, 1990). Consequently, linguistic analogies provide an essential tool for understanding and explaining language's structural and semantic character in architecture. The influence of language on architecture plays a crucial role in determining the meaning and expression of structures, thus enhancing the communicative power of architectural works.

METHODOLOGY

In this study, a Convolutional Neural Network (CNN), an artificial neural network model used in deep learning for tasks such as image classification and object detection, was developed and coded in the Google Colab environment. This neural network model forms the methodology of the study.

Components of the Convolution Neural Network Model

The CNN model is significant among artificial neural networks based on image processing. This model comprises a series of specialized layers designed to extract features from data and perform classification tasks. The CNN model includes an input layer, a convolutional layer, a Rectified Linear Units (ReLU) layer, a pooling layer, a flattened layer, and a fully connected layer.

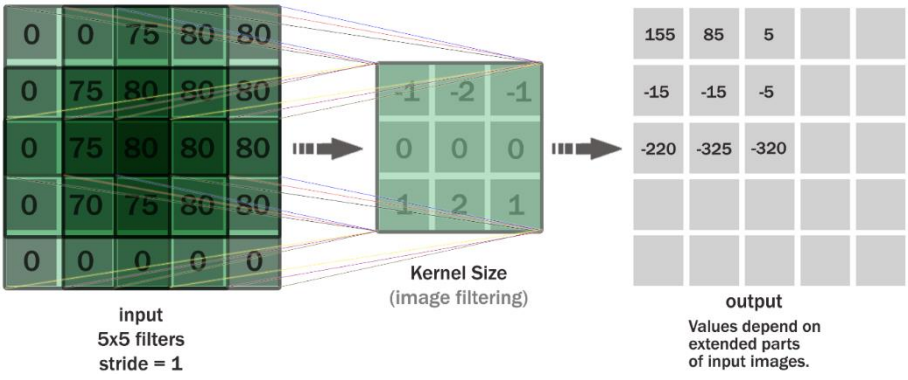

Figure 1. An example of kernel size 3x3 in the convolutional layer of channel 1.

The input layer serves as the initial stage, ensuring subsequent layers receive data in a format suitable for processing. Raw image data is typically prepared in this layer to be forwarded to other model layers.

The convolution layers are responsible for discovering the features of the object to be classified through elemental accumulations. Each filter aims to reveal a unique feature of the object. The output image obtained from these layers contains as many activation or feature maps as the number of filters used. The convolution layer typically applies to a

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matrix with dimensions of 3x3 or 5x5 as a filter to the input image (Figure 1).

This layer operates on an image input with dimensions of W1xH1xD1. The convolution layer is characterized by the parameters K number of filters, F spatial extension, S stepping, and P zero padding. Each filter on the input image undergoes a convolution process to learn specific features. Applying the specified stepping and zero padding in the convolution process obtains the W2 × H2 × D2 dimensions output. These output dimensions are determined by mathematical expressions calculated based on the width, height, and depth dimensions of the input image (Equ. [1]-[3]) (Hatir, Barstuğan, & İnce, 2020). The input image's width, height, and depth dimensions are essential components of the convolution layer that enable extracting features from the image.

$$W2 = \frac{W1 - F + 2P}{S} + 1 \qquad [1]$$

$$H2 = \frac{H1 - F + 2P}{S} + 1 \qquad [2]$$

$$D2 = K \qquad [3]$$

The Rectified Linear Units (ReLU) layer, widely used in CNN models, is applied to the previous layer's output by reducing negative values to zero and leaving positive values unchanged. In the designed model, this layer is integrated after the convolution and fully connected layers. The pooling layer is typically applied after the ReLU layer in Convolutional Neural Networks (CNNs) (Figure 2).

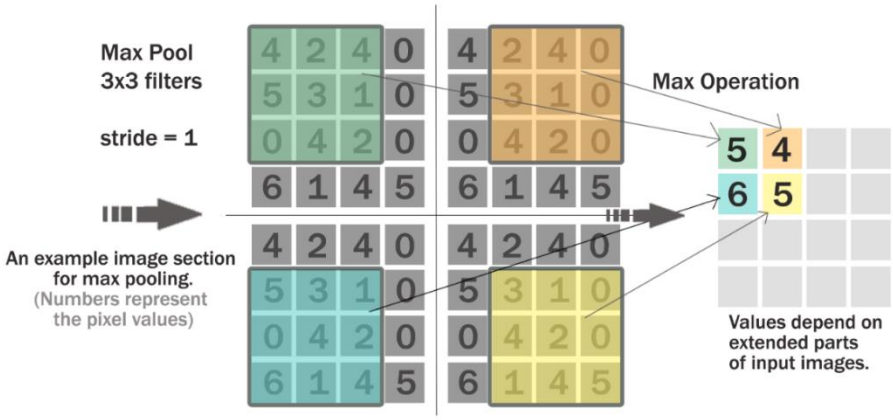

Figure 2. MaxPooling layer example with 3x3 filter.

The primary purpose is to reduce the size of the input image while maintaining the depth of the image. This reduction in input size leads to a loss of information about the image. However, this reduces the computational cost of the subsequent network layer and prevents model overfitting. Max pooling is generally preferred as it tends to exhibit better performance. The proposed CNN model includes a pooling layer. Max pooling achieves this by selecting the most enormous value within each region. This layer uses P (i, j) to represent the element at position (i, j) in the output of the pooling layer. I (i. s+m, j. s+n) represents the

element at position (m, n) of the input matrix within the pooling region. The variable 's' represents the pooling step, and 'k' represents the size of the pooling region (Equ. [4]).

$$P(i,j) = \max_{m,n} I(i.s + m, j.s + n) \qquad [4]$$

The flattening layer in the CNN model is typically used to convert the input data from matrix form into a flattened vector (Figure 3). This layer is responsible for converting feature maps into a format that can be inputted into the following fully connected layers, enabling the model to learn more complex features.

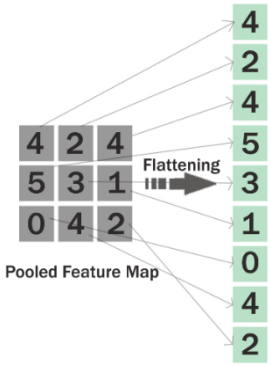

Figure 3. Flatten layer example with 3x3 pooled feature map.

The Fully Connected layer is usually positioned at the network's end and flattens the feature maps from previous convolutional and pooling layers. This process connects each pixel in the feature map to one another. These layers are commonly used for classification or regression tasks, utilizing the features learned by the network beforehand. However, when working with datasets with large input sizes, they may overfit and encounter factors such as computational intensity. Therefore, such networks often require regularization techniques (e.g., dropout, batch normalization) and architectural optimizations. The Fully Connected layer connects to all units in the preceding layer, with connections determined by weights. The general equation for fully connected layers is as follows (Equ. [5]):

$$y_i = f\left(\sum_{i=1}^{n} w_{ij}.x_i + b_j\right) \qquad [5]$$

In this equation:

- The output of the j-th unit in the fully connected layer is represented by y_i.
- The output of the i-th unit in the previous layer is represented by x_i.
- The weight of the connection from the i-th unit to the j-th unit is denoted by w_{ij}.
- The variable b_j represents the bias of the j-th.
- The activation function is represented by $f(.)$.

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The categorical layer constitutes a stage utilized by Convolutional Neural Network (CNN) models to classify or predict class identifications. This particular layer commonly employs a mathematical function called "SoftMax" to transform the outcomes of the CNN network into probability distributions associated with various classes. Consequently, this layer generates a vector containing probability values linked to class identifications. This layer typically provides a probability value for each class in multi-classification dilemmas. The probability distributions generated by the model enable it to allocate input information to the appropriate classes effectively. Typically positioned as the final layer of the model, the categorical layer serves to solidify the ultimate output of the model.

Data Collection

This study has prepared a specialized visual dataset for processing by a CNN model. This dataset is organized according to Peter Collins' four categorical classifications based on the concept of analogy in architecture: biological (based on the form and function of living organisms), mechanical (based on the operational principles of machines), gastronomic (drawing aesthetic inferences from gastronomic processes), and linguistic (referencing the structural rules of language). The images are 1024x768 pixels in size and have a resolution of 72 dpi, chosen to optimize the temporal processing of the model and ensure that the images are distinguishable and perceivable by the CNN model.

The dataset comprises 29,596 images, systematically organized into training, validation, and test sets. The training set contains 27,525 images, the validation set 1,009 images, and the test set 1,062 images. This distribution has been strategically implemented to facilitate effective learning and evaluation of the CNN model. The images are categorized according to Collins' four analogical design classes: 3,133 biological images, 8,352 mechanical images, 9,421 linguistic images, and 6,619 gastronomic images (Table 1). This categorization is crucial for the model to recognize and classify architectural elements based on analogical reasoning. Data augmentation techniques have been employed to enhance the diversity and volume of the dataset. These techniques include random horizontal and vertical shifts, rotations, zooming, and reflections, contributing to the model's learning capacity and accuracy in object prediction.

Table 1. A number of images used in analogy design classes.

Class	Number of images		
	Test	Train	Validation
Biological	474	3133	465
Mechanical	161	8352	113
Linguistic	118	9421	120
Gastronomic	309	6619	311
Total	1062	27525	1009

Data Analysis

As illustrated in Figure 4, the classified images are processed within the CNN model to enable the artificial neural network to analyze the data. This process begins with transferring images, which constitute the analysis data, to the input layer of the CNN model. Initially, the first convolutional layer is applied, utilizing 32 filters of size 3x3 to extract fundamental features. At this stage, the ReLU (Rectified Linear Unit) activation function is employed to zero out negative values and retain positive values in the feature maps. Subsequently, the first layer performs a max pooling operation with a 2x2 filter size, reducing the spatial dimensions by half.

In the second convolutional layer, 32 filters of size 5x5 are used to extract more complex and higher-level features. The ReLU activation function is again applied to zero out negative and preserve positive values. A second max pooling operation with a 2x2 filter size further halves the spatial dimensions.

The third convolutional layer employs 32 filters of size 3x3 to extract more detailed and specific features. The ReLU activation function is applied once more, and a third max pooling operation with a 2x2 filter size is performed, further compacting the feature maps. After completing the convolutional and pooling layers, the resulting two-dimensional feature maps are transformed into a one-dimensional vector through a flattening layer. This feature vector is fed into a fully connected layer, where class probabilities are calculated using four neurons. Finally, in the classification layer, the sigmoid activation function obtains probability values between 0 and 1 for each class, thus providing the classification result for the input data.

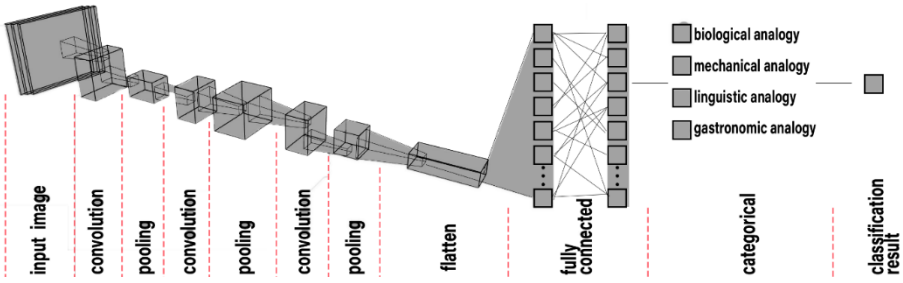

Figure 4. Proposed stages for deep learning processing.

EXPERIMENTAL FINDINGS

The dataset consists of 5000 visual images divided into four distinct classes: biological, mechanical, linguistic, and gastronomic. However, a larger dataset of 29,596 architectural images was generated to train the model effectively using data augmentation techniques, such as random horizontal and vertical shifting, rotation, zooming, and reflection (Figure 5). This augmentation aims to improve the model's learning capacity and increase the accuracy of object prediction. The CNN model was trained using 27,525 images, with 1,062 for testing and 1,009 for validation. The training dataset consists of 3,133 biological images, 8,352 mechanical images, 9,421 linguistic images, and 6,619

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gastronomic images. The test dataset includes 474 biological images, 161 mechanical images, 118 linguistic images, and 309 gastronomic images. Meanwhile, the validation dataset consists of 3,133 biological images, 465 mechanical images, 120 linguistic images, and 311 gastronomic images. The training process used a batch size of 64 and lasted 24 epochs.

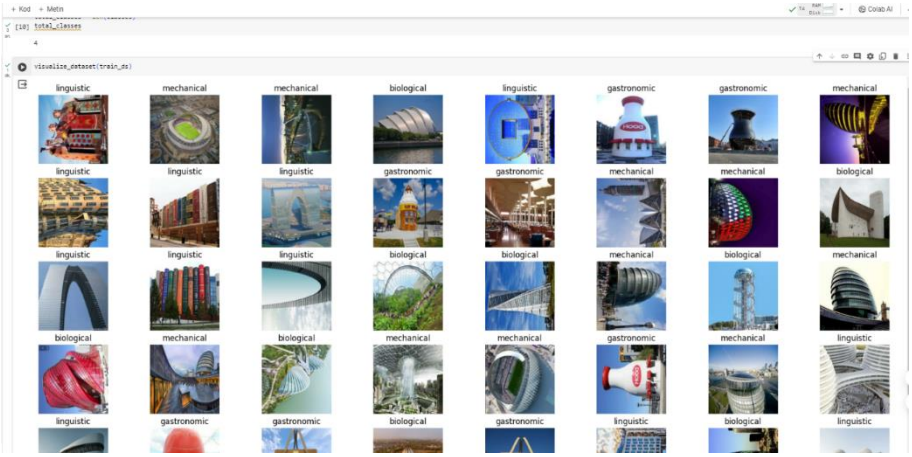

Figure 5. Training dataset in the deep learning process.

The Deep Learning model displays the convergence graph obtained due to the learning process performed on the training dataset in Figure 6. In the training phase, 98 % accuracy was achieved in four classes of 29596 images. The accuracy values in the validation data reached 80-86 % after the 20th epoch. Figure 6 displays the accuracy and loss plots of a CNN model trained over 25 epochs on a dataset containing analogy architectural classes.

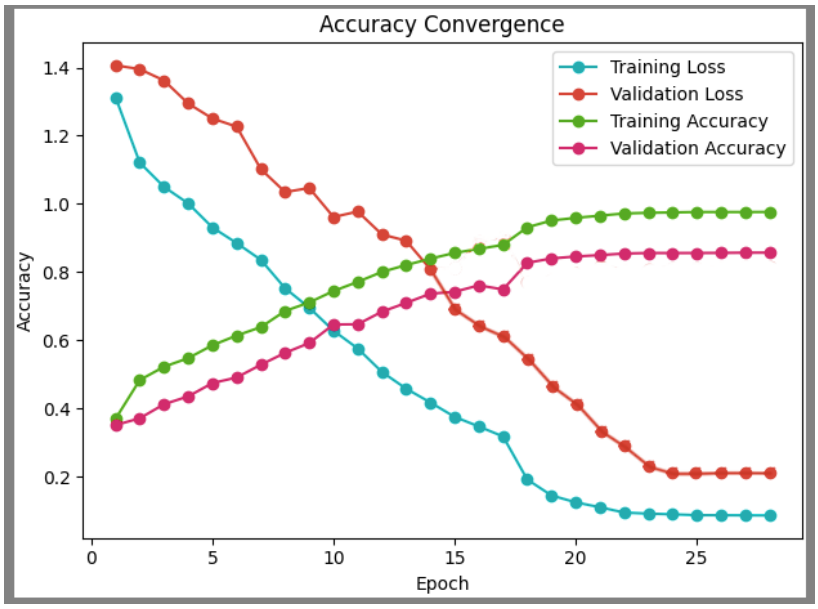

Figure 6. Accuracy and Loss of Convergence Graphs of CNN Model.

The model architecture includes convolutional, max pooling, flattened, and fully connected layers. The plots demonstrate that training and validation accuracy increases as training progresses while training and validation losses decrease. The model achieved high

accuracy (1.2%) and low loss (0.2) on the training data, indicating effective learning. However, the higher training accuracy and loss compared to the validation accuracy (1%) and loss (0.4%) suggest a risk of overfitting. Overfitting happens when the model memorizes the training data and cannot generalize new data. Various methods can be employed to mitigate this risk. These include increasing the amount of training data, utilizing data augmentation techniques, exploring different model architectures, and applying regularization techniques. Additionally, it is essential to consider factors such as dataset size and complexity, the optimization algorithm used, and tuning the model's hyperparameters to evaluate its performance better.

The model achieved an accurate rate of 86% on the test data. The confusion matrix obtained at this stage is shown in Figure 7. The model faces difficulty extracting the intrinsic qualities of images when classifying architectural images of the four classes in the dataset due to the presence of concrete and abstractly designed architectural structures. Despite the challenge, the model successfully classified the four classes with the desired accuracy. The reduction of the learning rate parameter resulted in a decrease in both classification accuracy and training time. Graphs indicate that deep learning algorithms tend to learn more general features as the learning rate decreases. The model in this study presents training durations and accuracy values based on data weights. The classification results show a 98% accuracy rate. The best outcome was obtained using a learning rate parameter 10000e-04 and a batch size of 10.

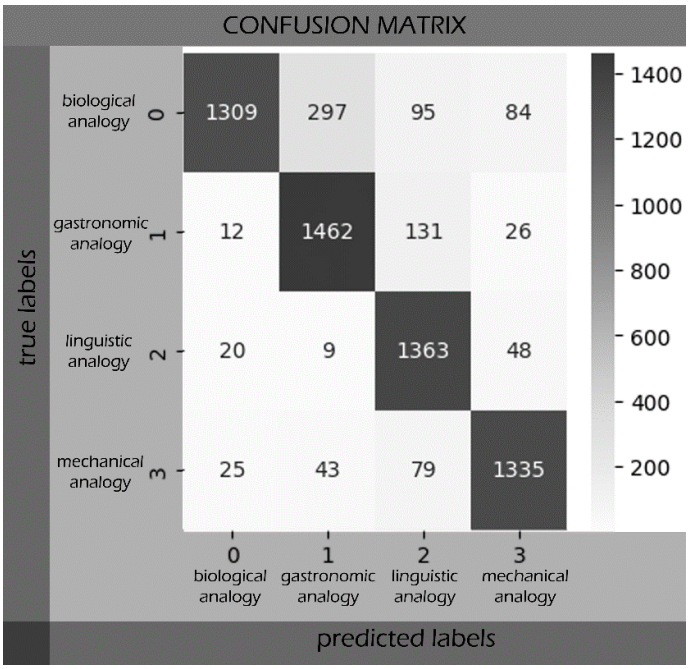

Figure 7. Understanding the Confusion Matrix in the CNN Model.

The CNN model produced analogical design classes as outlined by Collins. Table 2 displays its classification performance for the four classes: biological, gastronomic, linguistic, and mechanical. The precision, recall, and F-measure values yielded an average of 86-87%

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accuracy. In the Biological Analogy class, the model's classification achieved a precision of 0.96. However, the recall value was lower at 0.73, indicating that some biological analogies may not have been accurately recognized. The F-Measure, representing the balance between precision and recall, was 0.83. In the Gastronomic Analogy class, precision was measured at 0.81 and recall at 0.90. The model demonstrated balanced performance in recognizing gastronomic analogies with an F-measure of 0.85. In the Linguistic Analogy class, precision and recall values were 0.82 and 0.95, respectively, indicating a tendency to recognize linguistic analogies with high precision, resulting in an F-Measure of 0.88. Precision and recall values were measured at 0.89 and 0.90 for the Mechanical Analogy class, respectively. The model demonstrated a successful ability to recognize mechanical analogies, achieving an F-measure of 0.90.

Table 2. Performance values of the model according to analogical design classes

Class	Precision	Recall	F-Measure
Biological Analogy	0.96	0.73	0.83
Gastronomic Analogy	0.81	0.90	0.85
Linguistic Analogy	0.82	0.95	0.88
Mechanical Analogy	0.89	0.90	0.90
Macro Average	0.87	0.87	0.86
Weighted Average	0.87	0.86	0.86

The Macro Average and Weighted Average values summarized the performance across all classes. The Macro Average provided an equally weighted average for each class, while the Weighted Average indicated the weighted average based on the sample sizes of the classes. In this context, the model's average precision, recall, and F-Score were determined to be 0.87, 0.87, and 0.86, respectively.

DISCUSSION

Integrating artificial intelligence into architectural design processes transforms how architects conceptualize and execute projects. The studies by Hegazy and Saleh demonstrate that AI can facilitate parametric explorations by generating various design alternatives based on defined parameters, thereby expanding creative possibilities in architectural practice (Hegazy & Saleh, 2023). Zakariya's research highlights the innovative use of AI art platforms in mosque facade design, showcasing AI's role in enhancing aesthetic evaluations suitable for cultural contexts (Zakariya, 2023). This intersection of technology and creativity makes the design process more efficient and promotes a more inclusive approach to architectural expressions.

In light of these developments, integrating Peter Collins' analogical design classification with the deep learning model CNN presents a significant innovation in architecture. Achieving a training accuracy of 98% indicates that analogical thinking categories can be effectively combined with deep learning models. However, while this classification has been successful with biological and gastronomic analogies, it faces

challenges with linguistic and mechanical analogies. The model's validation accuracy of 86% suggests that the distinctive features of classification, particularly in linguistic and mechanical analogies, have not been fully analyzed. Nevertheless, the accuracy of the 98% training demonstrates the successful integration of analogical thinking categories into the deep learning model.

This success could serve as an inspiration for future studies. The model's performance can be further enhanced by expanding the dataset and optimizing the learning rate. The broader application of AI in architecture, enabled by the model's versatility across various fields and architectural topics, facilitates the rapid classification of studies and the seamless integration of new information. The following could help bridge the gap between traditional and innovative design in architecture. However, there are limitations in extracting specific architectural features, necessitating further exploration in future research. Additionally, evaluating the model's performance across different architectural styles and expanding the categories of analogical design could be addressed in future studies.

In conclusion, this study successfully integrates the analogical thinking of architecture with deep learning models. However, further work is needed to achieve tremendous success in expanded application areas and to overcome specific challenges.

CONCLUSION

This study aims to develop a method for identifying architectural designs using deep learning within Peter Collins' analogy architectural design classification framework. The deep learning model extracts design patterns from a diverse architectural dataset and identifies significant similarities and differences between architectural styles. Collins' classification framework integrates design patterns and associates them with characteristics specific to different stages of the architectural design process. The model enables designers to improve the quality and diversity of their designs by using a data-driven and analytical approach to the architectural design process.

The study focused on understanding the importance of analogy designs in architectural design and evaluating the effectiveness of deep learning models. The results show that the deep learning model correctly classified architectural elements with 98% accuracy during the training phase. On test data, the model achieved 86% accuracy. When classifying the architectural images in the data set prepared for the deep learning model, particular and abstractly designed architectural works made it difficult to extract the essence of the images. This resulted in the model achieving 86% learning accuracy on the test data. The deep learning model can be increased to an accuracy level of 95% or more for classifications with entirely distinctive features. The successful performance of the model despite images lacking fully discriminative features was attributed to reducing the learning rate parameter and

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setting the fragment size to a specific value. Peter Collins divided the analogy designs into biological, mechanical, gastronomic, and linguistic categories. This made it easier for the deep learning model to identify similarities between architectural elements. The model's ability to draw inspiration from different aspects of architectural design and creatively integrate them into projects is demonstrated. The study demonstrates the contribution of the deep learning model to the architectural design process by identifying similar designs and adding unique elements to projects. It provides a valuable perspective on the dynamic relationships between tradition, innovation, and inspiration in the interaction between architecture and artificial intelligence disciplines.

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Resume

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Musical Comfort Evaluation of The Natural Acoustics and Architectural Design of Three Performance Spaces in Kocaeli-Izmit

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Abstract

This study was conducted to evaluate the auditory comfort level of Western art music performances performed in natural acoustic conditions in multi-purpose performance halls, which are widely preferred today, on the listener. In this context, first the reverberation time, one of the acoustic comfort parameters, is expressed and the Sabine formula, which is the empirical method used in the study, is explained. Subsequently, the table "absorptivity coefficients of various materials at different frequencies" is presented, as it will be used in the calculation of reverberation time, and the graph "recommended optimum reverberation time for volume-dependent speech and music" is presented to make comparisons at the end of the calculation. Then, information was given about the geometry of performance spaces and acoustic defects that may occur due to structural errors in closed volumes were explained. After explaining why this study was conducted in Izmit district of Kocaeli province, the selection criteria of the three selected performance halls were explained. After giving brief information about the historical background of each place, the reverberation time of the halls was calculated. As a result of the calculations, the acoustic comfort conditions of the halls in natural acoustics and when used for musical purposes are presented comparatively in the table, and it has been revealed that all three halls will not provide a suitable acoustic comfort experience to the audience. The improvement suggestions that can be made to ensure acoustic comfort during the Western classical music performance without the use of an electro-acoustic system are presented in tables for each hall.

Keywords:
Acoustic comfort, Concert hall, Interior, Performance hall, Reverberation time.

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INTRODUCTION

Performance halls are important spaces for the execution of entertainment and cultural activities, which are expressions of the values that constitute the social fabric of society. Multipurpose performance halls, which can host a multitude of events in bustling and dynamic cities, are preferred over single-purpose auditoriums because of their versatility and economic feasibility, effectively serving as 'social facilities' (Gao et al., 2020: 1).

There are numerous examples of multipurpose halls around the world that employ automation systems. For instance, depending on the genre of music to be performed at the Pier Boulez Saal (Pierre Boulez Saal, 2020), solutions are produced by reducing the number of seats. Another example is the “The Concert Hall of Aarhus”, equipped with panels that transform the hall within seconds with an automation system, ensuring optimum sound experience and performance for various music styles from choir to chamber music, from band performances to rock concerts, with ideal reverberation time in every frequency band without visual changes (Flex Acoustics, 2024; Niels w. Adelman-Larsen, 2022).

The aim of this study is to illustrate the status of three multipurpose halls in Izmit, and to shed light on the importance of acoustic values in future hall designs. While there are examples of multipurpose halls in the world that are designed to serve both techno and natural acoustic sounds, there are only techno-acoustic hall designs in Izmit that can transform according to the genre of music using the automation systems mentioned above. Feasible solution proposals for implementing natural acoustic capabilities have been generated based on the results of the study. The selection of performance halls was based on the following criteria:

- Being designed as spaces completely closed to atmospheric effects and environmental noise,
- Being located in central areas of the city, where residents can easily access,
- Having a seating capacity of at least 400 considering the density of the urban population,
- In addition to different usage purposes, having hosted Western music performances.

Halls meeting these criteria have been selected as Sabanci Cultural Centre, Suleyman Demirel Cultural Centre, and Kocaeli Congress Centre, listed according to their construction years.

LITERATURE REVIEW

According to the literature review on the subject, Ozis and Vergili, in their 2008 study, stated that concert halls, as one of the primary venues for music listening, face quality demands from musicians, conductors, and listeners (Ozis & Vergili, 2008: 35). Von Joachim Mischke, in a 2017 news report, wrote that in a concert hall opened in Hamburg in 2017,

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listeners expressed their dissatisfaction by saying, "We can't hear anything from here" (Mischke, 2024).

In his 2008 study, Vergili emphasized that the reverberation time calculation is a useful indicator for determining the average acoustic properties of enclosed spaces (Vergili, 2008: 10). Kurtay et al., in their 2021 study, stated that various formulas have been developed to calculate reverberation time, but the Sabine equation is particularly preferred in the context of room acoustics (Kurtay et al., 2021: 2072).

Ahnert and Schmidt argued that reverberation time calculations should be conducted separately for speech and music, depending on the volume (Ahnert & Schmidt, 2024).

In his 2006 study, Long identified the acoustic defects that need to be avoided for musical purposes and outlined performance criteria for acoustic comfort (Long, 2006: 589, 697-706). Barron, in his 2010 study, wrote that the accepted standard for stage height in halls designed for musical purposes should be at least 50 centimeters above the ground floor level (Barron, 2010: 59). Maekawa, in a 2011 study, stated that the optimum volume per person for venues designed for concerts should be between 8 and 10 m^3 (Maekawa et al., 2011).

Toktas, in his 2011 study, emphasized the importance of designing the stage area as a reflective surface to ensure adequate early reflections in the listening area (Toktas, 2011: 9). Similarly, Turk, in his 2011 study, stated that the maximum distance between the sound source and the farthest listener should not exceed 40 meters, and to prevent a narrowing hearing angle toward the back rows, the audience area should be elevated with an increasing slope (Turk, 2011: 28).

Elbas, in his 2016 study, stated that the design of reflective ceilings is one of the most important acoustic features of a theater or auditorium (Elbas, 2016: 26). Everest and Pohlmann, in their 2000 study, advised against balcony designs where the depth exceeds twice the height, as this would result in inadequate reflected sound levels for audience members seated beneath the balcony (Everest & Pohlmann, 2000: 389).

METHODOLOGY AND METHODS

The acoustic comfort situation of the chosen three performance halls will be examined first from a design perspective. Criteria such as the suitability of the volume per person, the materials used in the stage portal and the side and rear walls of the audience area, the presence of parallel walls or concave design in the audience area, the inclination of the parquet floor, the distance of the rear-most listener to the stage, the height of the stage from the ground, the ceiling material, and the balcony design will be compared with accepted standards (Long, 2006: 697-706) to make determinations. Subsequently, the empirical method, namely the Sabine reverberation time formula, will be used to calculate the reverberation time of the halls. Reverberation is defined as the time it takes for the sound intensity in a closed space to decrease by 60 dB from its original level in seconds (Everest & Pohlmann, 2009: 153). This

is because the sound continues after it has decreased by 60 dB however the brain cannot analyze or process it. Nowadays, the calculation of reverberation time is a useful indicator for establishing the average acoustic properties of closed spaces and, in addition, is a value that can be easily estimated from the absorbency characteristics of the materials used in the volume and the geometry of the hall (Vergili, 2008: 10). Therefore, in this study, the reverberation times of the three selected performance halls will be calculated. Various formulas have been developed to calculate reverberation time. These include the Sabine, Norris-Eyring, Millington-Sette, and Stephens & Bate methods, as well as the Hopkins-Striker and Fitzroy methods, which are used differently from these equations. However, particularly within the scope of volume acoustics, the Sabine equation has been preferred (Kurtay et al., 2021: 2072).

RT_{Sabin}= 0.161 x V/A

RT= Reverberation time (sn)

V= Volume (m^3)

A= Absorption (m^2 sabin)

0.161= Empirical constant (sn/m)

The average absorption coefficient of each material used in reverberation time calculations will be included in the calculations based on Table 1.

Table 1. The absorption coefficients of various materials at different frequencies.

Material	125 Hz	500 Hz	2000 Hz	Average (NRC)
Parquet (Polished wood surface)	0.03	0.06	0.10	0.06
MDF (13mm)	0.11	0.22	0.30	0.21
Acoustic Panel (30 cm thick with 5cm air gap)	0.21	0.19	0.06	0.15
Linoleum	0.02	0.03	0.04	0.03
Acoustic Panel (Without air gap)	0.42	0.22	0.06	0.23
Synthetic Carpet	0.03	0.07	0.29	0.13
Rock wool perforated absorber material (5 cm thickness with 5 cm gap)	0.90	0.94	0.98	0.94
Perforated acoustic plasterboard material	0.60	0.70	0.80	0.70
Soft seat with human sitting	0.25	0.40	0.45	0.37

In the reverberation time calculations, the optimum reverberation time of the spaces will be determined by using Figure1.

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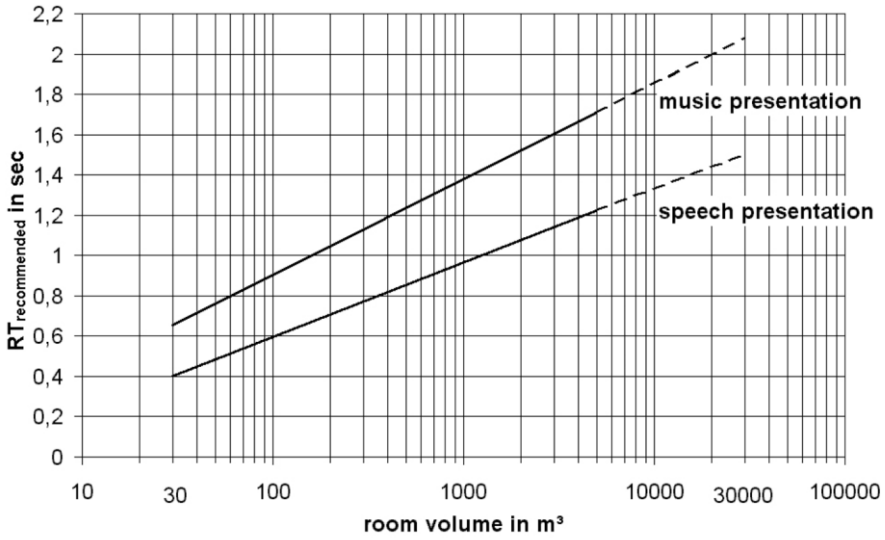

Figure 1. The Satellite Image of Recommended reverberation time for volume-dependent speech and music (Ahnert & Schmidt).

Salon volume, being directly related to the reverberation time, is one of the key variables within the design parameters that significantly influence the acoustic properties of the hall. The most suitable volume is one that does not require additional absorption beyond what the audience provides. Since the total absorption in volumes is largely influenced by the number of listeners, this ratio can be a significant measure to consider in the initial stages of design (Budak, 1994: 55). In halls intended for concerts, the optimum volume per person is typically in the range of 8-10 m^3 (Maekawa et al., 2011: 234).

The geometry of performance halls is directly related to their acoustic properties, therefore the architectural plans of these spaces should be examined in congruent forms. According to the deductions made from the literature review, the architectural plan variations of halls can be categorized into seven headings. These are: rectangular (shoebox), fan-shaped, horseshoe, arena, hexagonal (diamond), terraced (vineyard), and irregular plans for those beyond the mentioned six plan types.

Rectangular plan halls are advantageous for providing rich lateral reflections, but parallel surfaces may cause the pronounced echo seen in Figure 2. Examples of rectangular plan concert halls, considered among the top three performance halls worldwide by nearly everyone in the Western world, include Het Concergebouw Main Hall, Grosser Musikvereinssaal, and Boston Symphony Hall (Beranek, 2004: 425, 47). Fan-shaped halls provide excellent sight lines and acoustics while offering a spacious audience area. An example of this design is Richard Wagner's Festspielhaus, designed to allow the composer to hear his own compositions as desired. Although the spatial form prevents pronounced echoes on side walls, sound reflected from the rear wall may reach the front of the hall with significant delay. This issue can be mitigated by covering the back wall of the audience area with absorbent material. Horseshoe-shaped halls provide good sight lines and a sense of proximity to the sound source. The presence of numerous boxes and

rich interior decor contributes to distributing sound favorably, concealing possible acoustic flaws, and providing an appropriate ratio for direct reverberate sound. However, the presence of many listeners and boxes may lead to excessive sound absorption, thus achieving a relatively lower reverberation time suitable for opera (Kamisiński, 2010: 78). Halls with horseshoe plans, such as Usher Hall in Edinburgh, may suffer from adverse effects on acoustic comfort due to the concave shape of the rear wall, which causes reflected sounds to converge at a single point. This issue can be addressed by using absorbent material on rear surfaces (Ozis & Vergili, 2008: 39). The defining feature of the arena plan is that the orchestra is surrounded by seating. As evident from events held in halls like Pierre Boulez Saal, the advantage of this plan lies in fostering the greatest intimacy between the audience and performers. However, it creates a balance issue where if a listener purchases a seat facing the back of a musician positioned on stage, their spatial perception will be reversed, resulting in a loss of acoustic balance according to psychoacoustics (Teke, 2012: 7). Hexagonal plans, besides providing visual advantages, are among the useful forms due to the high level of lateral reflections. However, similar to rectangular shapes, the acoustic flaw caused by parallel walls is a disadvantage of this form. Therefore, it is advisable to avoid shapes such as regular hexagons, squares, or octagons (Long, 2006: 700). Bunka Kaikan Main Hall in Tokyo serves as an example of halls with a hexagonal plan. The terraced plan, first exemplified by the Berliner Philharmonie, opened in 1963. This plan, similar to the arena form, brings the audience closer to the performers by encircling the stage with seating, albeit offering a larger audience capacity. Moreover, instead of balconies, interconnected terraces with varying heights are preferred in this type of hall. The front and side surfaces of these terraces are carefully designed to provide early reflections to the audience. Another significant feature of these halls is the time it takes for direct sound to reach the listener. Due to the hall's form, sound reaches all points in approximately the same time, resulting in a similar initial transportation delay (ITD) throughout the hall (Ozis & Vergili, 2008: 39). Examples of halls with irregular plans, deviating from the mentioned architectural plans, include Beethoven Saal designed in the form of a grand piano (Kultur & Kongresszentrum Liederhalle, 2024) or Marian Anderson Hall designed resembling a cello body (Ensemble Arts Philly, 2024).

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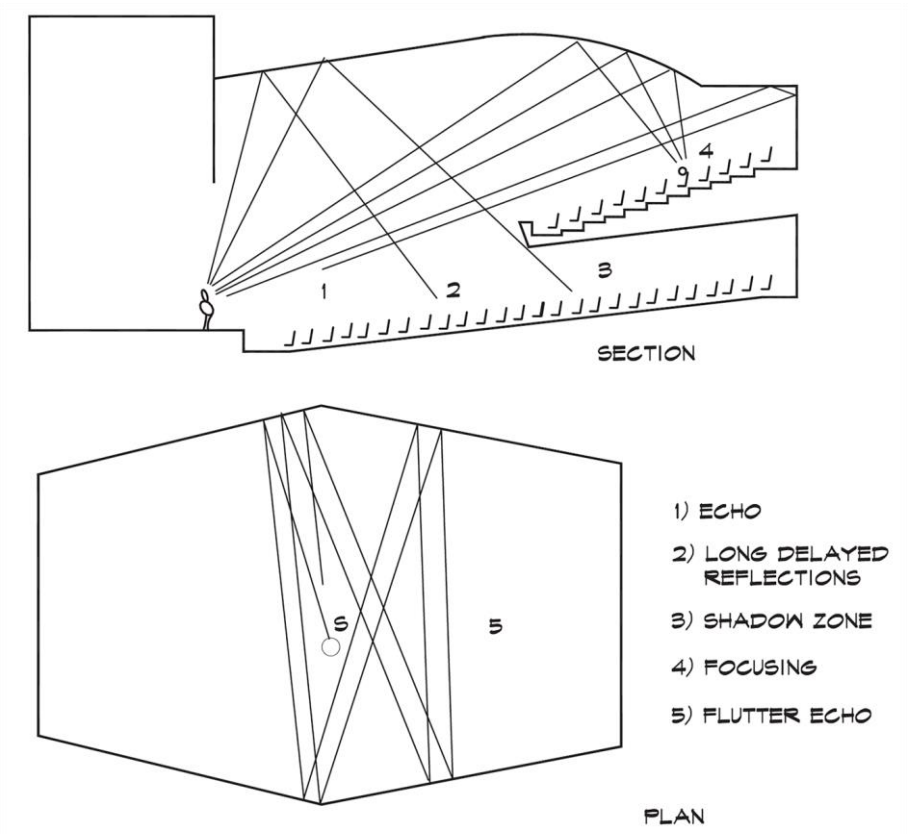

Figure 2. Acoustic flaws that may occur in performance halls (Long, 2006: 589).

In performance halls, particularly the reflective design of the stage area is important for adequate early reflections in the audience area (Toktas, 2011: 9). As the distance from the source increases, according to the inverse square law, the direct sound reaching the listener will decrease inversely with the square of the distance. For instance, the direct sound level for a listener 100 meters away from the orchestra will be half as much as that for a listener 30 meters away from the orchestra. Therefore, the distance between the source and the listener are crucial for ensuring sufficient direct sound reaching the listeners. Studies have indicated that this distance should not exceed 40 meters (Turk, 2011: 28). When determining the stage floor height, it is known that having the stage at a certain height from the seating area ensures visual comfort for the audience and facilitates easier access to direct sound for the audience. For music-oriented halls, the accepted criterion for stage height is at least 50 centimeters above the ground floor level. Heights exceeding 100 centimeters may result in parts of the orchestra not being visible to the audience (Barron, 2010: 59). It is crucial for the point where the seats are located to provide a direct view of the stage. Tilting the audience area is preferred for this purpose. However, if the tilt is fixed, towards the rear seats, hearing impairment may decrease. This may cause more direct sound to be absorbed in the front rows and reach the rear rows. If the audience area is elevated with an increasing tilt, this issue can be resolved. In this case, each row of the audience will have equal viewing and hearing comfort (Turk, 2011: 28). Additionally,

for providing an ideal line of sight and facilitating direct sound transmission, it is appropriate to position the seats staggered.

In a hall intended for music, the audience desires to feel enveloped by sound that comes from all directions. This sensation is not solely achieved through lateral reflections provided by side walls. In addition to lateral reflections, there is a need for reflective, diffusive, and absorptive materials to be used on the ceilings. These reflective surfaces, in wide and high rooms, work to minimize the time delay difference between indirect and direct sounds. Otherwise, reflections arriving with a significant time difference can be perceived as echoes by the audience (Ergin, 2014: 62).

Another point to consider in performance halls is the design of the balconies. Balcony designs should avoid depths exceeding twice their height (Everest & Pohlmann, 2000: 389). Otherwise, individuals in the audience areas beneath the balconies may not feel adequately enveloped by sound or may not receive sufficient reflected sound. Alternatively, as indicated in Figure 2, acoustic shadowing, a flaw in the balcony area, may occur.

IDENTIFICATION OF EXPERIMENTAL AREAS

According to the 2022 data from the Turkish Statistical Institute (TUIK), Kocaeli ranks among the top 10 most populous cities in Turkey and is one of the fastest-growing provinces, particularly in terms of industrialization (TUIK, 2024). One of the most significant industrial establishments in Izmit, which has hosted numerous industrial facilities throughout the Republican era, is the Izmit Paper Factory, which was established in 1934. The factory was completely closed in 2005 and transferred to the ownership of Kocaeli Metropolitan Municipality, after which a transformation project called 'Seka Park' has been in progress (Oral Aydin & Comlekcioglu Kartal, 2020: 23). The formation of the Kocaeli Congress Centre, one of the performance spaces examined in this study, is related to this transformation. The other two venues are the Sabanci Cultural Centre, constructed by the Sabanci Foundation, one of the leading actors in the country's industry, and the Suleyman Demirel Cultural Centre, located within the Yahyakaptan Housing Complex, a project similar to the mass housing initiatives implemented in every industrial city, carried out by Emlak Bank.

Sabanci Cultural Centre

One of the largest cultural centres provided by the Sabanci Foundation, the Sabanci Cultural Centre was designed by architect Hayati Tabanlioglu, with architectural drawings completed by architects Mehmet Tepeler, Levent Atay, and Mete Tepeler. The Cultural Centre opened on December 3, 1988, but was closed in March 2020 to prevent the spread of the COVID-19 pandemic. In September 2020, activities at the Sabanci Cultural Centre were suspended due to collapses detected in the foyer area of the building. The hall, which has a seating capacity of

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606, five backstage areas, and a single balcony, has not been given a specific name. However, it is referred to as the 'Grand Hall' in posters and ticket sales for concerts, theater performances, and similar events. For convenience in this study, the hall will also be referred to as the 'Grand Hall.' The plan for the Grand Hall at the Sabanci Cultural Centre was obtained from the website of the Kocaeli Provincial Directorate of Culture and Tourism, while the section drawing was provided, with permission, from the archives of Mete Yapi Incorporated.

Suleyman Demirel Cultural Centre

The Grand Hall, with a seating capacity of 514, located in the Suleyman Demirel Cultural Centre, which was opened on September 22, 1998, and for which Prof. Dr. Selma Kurra (dB-KES Engineering, 2022) provided acoustic consultancy, will be examined within the scope of this study. There is no digital plan or section available for the Grand Hall; only the visual representation of the plan and sections shown in Table 3 and the AA section scanned into a computer format exist. The plan and section show 602 seats, but after renovations carried out in 2022, the number of seats was reduced to 475. No plan or section drawing depicting the renovation process or its outcome has been produced. The drawings used in this study were obtained from the Directorate of Building Control of the Kocaeli Metropolitan Municipality.

Kocaeli Congress Centre

The construction of the congress centre, designed by Ozer/Urger Architecture, began on November 19, 2017, and was completed in 2020. The Akcakoca Auditorium, which will be evaluated for its acoustic comfort in this study, has a seating capacity of 1,301 and was designed to host concerts and theater performances. The auditorium features two backstage rooms and a single balcony. The drawings used in this study were obtained from the Izmit Metropolitan Municipality Directorate of Building Control.

DATA ANALYSIS, CASE STUDY, DISCUSSION

In this section, the reverberation times of the performance venues located within the Sabanci Cultural Centre, Suleyman Demirel Cultural Centre, and Kocaeli Congress Centre will be calculated based on their opening dates. The calculations will be conducted using Table 1 and the Sabine formula, aiming for the acceptable reverberation time as shown in Figure 1, according to the volume of each venue.

Sabanci Cultural Centre

The volume of the Grand Hall is 2568 m^3. Utilizing the optimum values from Figure 1, the acceptable reverberation time for a concert hall of this volume appears to be ~1.55 seconds.

There are 9 panels on each side wall, and each panel is made of reflective material with a wooden surface and polished finish. The

length of these panels is approximately 1.70 m and the width is measured 1.65 m. Therefore, the area of one reflective panel is calculated as 1.70 m x 1.65 m = 2.8 m^2. When calculating the total area of the panels on opposite walls, considering 9 panels on each side, the total area is 2.8 m^2 x 9 panels x 2 walls = 50.4 m^2.

Out of the 9 panels with a length of ~1.70 m on each side wall, 3 panels have reflective panels installed on them. The length of these panels is 5,5 m, and the width is 1.65 m. Hence, the area of one reflective panel is calculated as 5.5 m x 1.65 m = 9.075 m^2. When considering the area covered by 3 panels on opposite walls, the total area of the reflective surface for 6 panels is 9.075 m^2 x 3 panels x 2 walls = 54.45 m^2.

The total reflective area on the side walls, denoted as $S_{wall\ reflective\ panels}$, is calculated as 104.85 m^2, which is the sum of 50,4 m^2 and 54,45 m^2. The absorbing material on the side walls consists of MDF covered with acoustic fabric. To calculate the area of the absorbing panels on the side walls, subtract the area of the reflective panels from the total area of the side walls:

$S_{wall\ absorbing\ panels}$ = 222.75 m^2- (50.4 m^2 + 54.45 m^2) = 117.9 m^2.

A sound-reflective surface treatment is applied to the ceiling. Aluminum-covered wooden panels with voids are used for this purpose. The area of the ceiling is determined to be 320 m^2, denoted as $S_{ceiling}$. The absorption coefficient αceiling is assumed to be 0.15 Sabins. The product of $S_{ceiling}$ and $\alpha_{ceiling}$ is calculated as follows:

$S_{ceiling}$ x $\alpha_{ceiling}$ = 320 m^2 × 0.15 = 48 m^2 Sabins.

Hence, the absorbing area on the ceiling, denoted as $A_{ceiling,}$ is 48 m^2 Sabins.

The total number of seats in the auditorium is 606. Assuming each seat occupies an area of 1 m^2, denoted as $S_{seats,}$ and considering the presence of 606 occupants during full occupancy, the absorption coefficient per person, denoted as αseat, is assumed to be 0.37 Sabins. The product of S_{seats} and αseat is calculated as follows:

S_{seats} × α_{seat} = 606 m^2 × 0.37 = 224.22 m^2 Sabins.

Thus, the absorbing area due to the seats, denoted as A_{seats}, is 224.22 m^2 Sabins

The area of the circulation axis outside the seating area on the floor is approximately 60 m^2, denoted as $S_{circulation\ axis}$. Considering that the linoleum material used on the floor has an absorption coefficient of 0.03 Sabins, denoted as αcirculation axis, the absorbing area due to the circulation axis, denoted as $A_{circulation\ axis}$, is calculated as follows:

$S_{circulation\ axis}$ × $\alpha_{circulation\ axis}$ = 60 m^2 × 0.03 = 1.8 m^2 Sabins.

Hence, $A_{circulation\ axis}$ is equal to 1.8 m^2 Sabins.

The six boxes located on the audience rear wall, positioned on the right and left sides, with heights ranging from 1.10 m and widths varying from 1.40m to 1.78 m to 1.10 m outward from the center, will act as resonators across a wide frequency band. A resonator, in this context, connects to the cavity surrounding it through a narrow opening

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called a neck within the wall, forming an airspace where sound waves propagate. While primarily serving decorative purposes, or acting as sound absorbers at very low frequencies, they can also behave as sound absorbers in volumetric applications. By virtue of their ability to behave as sound absorbers at low frequencies, they help eliminate the need for absorption surface treatments in volume applications, thus economically facilitating reverberation control (Erol, 2006: 83). Consequently, they will neither positively nor negatively affect the reverberation time in the volume and will not be included in the absorption calculations.

The rear wall is equipped with reflective and absorptive panels in equal proportions and in a rhythmic pattern. The width of the rear wall is calculated as 24.6 m, with a height of 7.2 m. Therefore, the total area of the rear wall, denoted as $S_{rear\ wall,}$ is 177.12 m^2. Since half of this area is covered with reflective material and the other half with absorptive material:

$S_{rear\ wall\ reflective} = 88.56\ m^2$

$S_{rear\ wall\ absorptive} = 88.56\ m^2$

Considering these values, the calculation of the full occupancy scenario of the hall, without considering air absorption as a significant variable, will be as follows:

Total Reflective Material:

$S_{side\ wall\ reflective\ panels} + S_{rear\ wall\ reflective\ panels} = 104.85 + 88.56 = 193.41\ m^2$

$A_{reflective} = 193.41\ m^2\ \alpha_{reflective} = 0.06$ Sabins

$A_{reflective} = 193.41\ m^2 \times 0{,}06 = 11.6\ m^2$ Sabins

Total Absorptive Material:

$S_{side\ wall\ absorptive\ panels} + S_{rear\ wall\ absorptive\ panels} = 117.9 + 88.56 = 206.46\ m^2$

$A_{absorptive} = 206.46\ m^2\ \alpha_{absorptive} = 0.21$ Sabins

$A_{absorptive} = 43.3566\ m^2$ Sabins

$A = A_{reflective} + A_{seats} + A_{ceiling} + A_{circulation\ axis} + A_{absorptive}$

$= 11.6 + 224.22 + 48 + 1.8 + 43.3566$

$= 328.9766\ m^2$ Sabins

$RT = 0.161 \times V / A$

$RT = 0.161 \times 2568 / 328.9766$

$RT = 1.25$ sec.

Suleyman Demirel Cultural Centre

The volume of the Grand Hall is 3150 m^3. Utilizing the optimal values of reverberation time from Figure 1, the acceptable reverberation time for a concert hall of this volume appears to be ~1.6 seconds.

Due to the preference for a sloped floor but a flat ceiling, the side walls form a trapezoidal shape. Accordingly, the area of one side wall is 157.5 m^2, and since there are two side walls, a total area of 315 m^2 is calculated. Both side walls are designed with a portion being reflective and a portion absorptive. For the reflective material on the side wall, an area of 65 m^2 is chosen. The reflective coefficient of the polished surface of smooth wood used as the reflective material is 0.06 Sabins.

A_1 (For the reflective portion of the side walls): S_1=65 m² α_1=0.06 Sabins
$S_1 \times \alpha_1 = 65 \times 0.06 = 3.9$ m² Sabins
$A_{\text{side walls reflective}}$ = 3.9 m² Sabins.

The area of the portion of the side walls chosen for absorption is 250 m². The selected absorptive material is seamless acoustic paneling, with an absorption coefficient of 0,23 Sabins.
A_{1-1} (For the absorptive portion of the side walls): S_{1-1}=250 m² α_{1-1}=0.23 Sabins
$S_{1-1} \times \alpha_{1-1} = 250 \times 0.23 = 57.5$ m² Sabins
$A_{\text{side walls absorptive}}$ = 57.5 m² Sabins

In the ceiling area, from the region up to the lighting fixtures, absorptive material was used, while reflective material was employed from the point where the lighting fixtures begin to the stage boundary. In this case,
A_2 (Ceiling Absorptive): S_2=145 m², α_2=0.23 Sabins
$S_2 \times \alpha_2 = 145 \times 0.23 = 33.35$m² Sabins
$A_{\text{absorptive ceiling}}$ = 33.35m² Sabins
$A_{2\text{-}1}$(Ceiling reflector) $S_{2\text{-}1}$=330 m2 $\alpha_{2\text{-}1}$=0.06 Sabins
$S_{2\text{-}1}$ x $\alpha_{4\text{-}1}$= 330x 0.06=19,8 m² Sabins
$A_{2\text{-}1}$ = 19.8 m² Sabins
$A_{\text{reflective ceiling}}$ = 19.8 m² Sabins

The total number of seats in the hall is 475. Each seat is assumed to occupy an area of 1 m². Since the examination is based on a full occupancy scenario, the absorption coefficient per person will be taken as 0.37 Sabins.
A_3 (For Human and Seat Absorption): S_3=475 m², α_3=0.37 Sabins
S_3 x α_3= 475x0.37=175.75 m² Sabins
A_{seats} = 175.75 m² Sabins

On the floor, the area of the circulation axis, including the stairs and corridor outside the seating area, is 400 m². The absorption coefficient of the carpet used here is 0,13 Sabins.
$S_{\text{circulation axis}}$ x $\alpha_{\text{circulation axis}}$ = = 400x0.13=52 m² Sabins
$A_{\text{circulation axis}}$ = 52 m² Sabins

On the wall behind the audience, there are 6 windows belonging to the sound and light room, each measuring 1162 cm in width and 80 cm in height. Since 4 of these windows are completely open, without glass, they will act as resonators over a wide frequency band range, and therefore, they will not have a positive or negative effect on the reverberation time in the volume. Therefore, their absorption will not be included in the calculation.

On the back wall, absorbent material has been used. The absorption coefficient of the air used is 0.23 Sabins.
A_4 (Back Wall) S_4= 120 m² α_4 =0.23 Sabins
S_4 x α_4=120x0.23= 27.6 m² Sabins
$A_{\text{back wall}}$ = 27.6 m² Sabins

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According to these values, the calculation of the condition when the Grand Hall is fully occupied will be as follows, without taking air absorption as a significant variable:

$A = A_{\text{side walls reflective}} + A_{\text{side walls absorptive}} + A_{\text{absorptive ceiling}} + A_{\text{reflective ceiling}} + A_{\text{seats}} + A_{\text{circulation axis}} + A_{\text{back wall}}$

$= 3.9 + 57.5 + 33.35 + 19.8 + 175.75 + 52 + 27.6$

$= 369.9$ m² Sabins

$RT = 0.161\ V/A$

$RT = 0.161 \times 3150/369.9$

$RT = 1.37$ sec.

Kocaeli Congress Centre

The volume of the Akcakoca Auditorium is 11.074.986 m³. Utilizing the optimal values from Figure 1, the acceptable reverberation time of a concert hall in this volume appears to be approximately 1.85 seconds.

The total area of the side wall panels is 551 m². The back of these panels consists of perforated material made of 5 cm spaced rock wool, with an absorption coefficient of 0.94 Sabins.

$A_{\text{side walls}} = 551 \times 0.94 = 517.94$ m² Sabins

For the ceiling, 4 circular perforated acoustic plaster panel materials are preferred. The total area of these reflective ceiling panels is 654.73 m². The absorption coefficient of the material is 0.70 Sabins.

$A_{\text{ceiling}} = 654.73 \times 0.70 = 458.311$ m² Sabins

The total number of seats in the hall is 1300. It is assumed that each seat occupies an area of 1 m². Since the examination is conducted during full occupancy of the hall, the absorption coefficient per person will be taken as 0.37 Sabins for the 1300 seated individuals.

Total area for absorption due to audience:

$A_{\text{seats}} = 1300 \times 0.37 = 481$ m² Sabins

The area of the circulation axis on the ground floor is 56 m². The absorption coefficient of the carpet used here is 0,13 Sabins.

$A_{\text{circulation axis}} = 56 \times 0.13 = 7.28$ m² Sabins

The area of the rear wall located behind the audience is 95.475 m². Since the same material as the reflective side walls is used, the absorption coefficient is 0.94 Sabins.

$A_{\text{back wall}} = 95.475 \times 0.94 = 89.7465$ m² Sabins

According to these values, the calculation of the reverberation time of the auditorium when fully occupied, without considering air absorption as a significant variable, would be as follows:

$A = A_{\text{side walls}} + A_{\text{ceiling + Aseats}} + A_{\text{circulation axis}} + A_{\text{back wall}}$

$= 517.94 + 458.311 + 481 + 7.28 + 89.7465$

$= 1554.2775$ m² Sabins

$RT = 0.161\ V/A$

$RT = 0.161 \times 11074.986/1554.2775$

$RT = 1.147$ sec.

In this case, the current reverberation time of the three performance venues and the expected reverberation time are represented in Table 2:

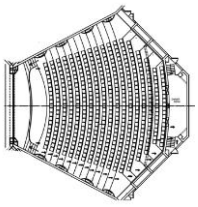
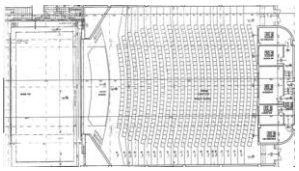
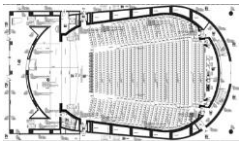
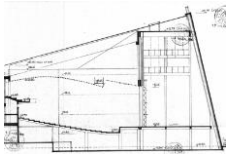
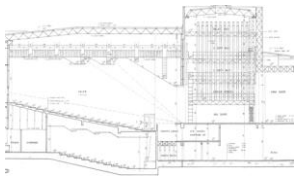
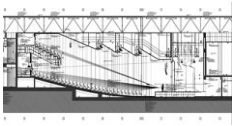
Table 2. Current RT and optimum RT values of three selected performance halls

Halls	Current RT values of halls	Optimum RT values
Sabanci Cultural Centre Grand Hall	1.25 s	1.55 s
Suleyman Demirel Cultural Centre Grand Hall	1.37 s	1.6 s
Kocaeli Congress Centre Akcakoca Auditorium	1.147 s	1.85 s

EVALUATION OF PERFORMANCE HALLS IN TERMS OF DESIGN FEATURES

For the evaluation based on the architectural features of the three selected performance venues, an analysis of each venue's architectural plan, seating capacity, acoustic design considerations, audience area, stage height, balcony features, area and nature of surface materials used in the hall, and other design characteristics has been examined in light of the theoretical information provided in Section Two. These have been presented comparatively in Table 3.

Table 3. Investigation of Three Performances Halls in Terms of Design Features

Performance Halls / Design Criteria	Sabanci Cultural Centre Grand Hall	Suleyman Demirel Cultural Centre Grand Hall	Kocaeli Congress Centre Akcakoca Auditorium
Plan			
AA Section			
Format	Hexagon (Diamond)	Rectangular (Shoe box)	Horseshoe
Session Capacity	606	475	1300
Volume per capita (V/N) ratio	4.23 m³ NOT SUITABLE for concert purpose.	6.63 m³ NOT SUITABLE for concert purpose.	8.5 m³ SUITABLE for concert purpose.
Stage portal	Covered with reflective material: The listener area will receive sufficient early reflection.	Covered with absorbing material: The listener area will not receive sufficient early reflection.	Covered with reflective material: The listener area will receive sufficient early reflection. SUITABLE

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	SUITABLE	NOT SUITABLE	
Side wall material	Of the 9 panels on a single wall, 6 of them are covered with acoustic fabric on MDF, i.e., absorptive; 3 of them are covered with lacquered material on wood, i.e., reflective. SUITABLE	One of the two materials used is a treated wood reflective panel, the other is a hollow acoustic panel. SUITABLE	Highly absorbent material with 5 cm hollow back and 5 cm stone wool perforations. NOT SUITABLE
The presence of parallel side walls	None, so there is no problem of emphatic echo. SUITABLE	None, so there is no problem of emphatic echo. SUITABLE	None, so there is no problem of emphatic echo. SUITABLE
Concave form presence	None, so there is no acoustic focusing or sound creep. SUITABLE	None, so there is no acoustic focusing or sound creep. SUITABLE	None, so there is no acoustic focusing or sound creep. SUITABLE
Feature of ceiling panels	Reflective material SUITABLE	The area up to the lighting elements is absorptive, and reflective material is used from the beginning of the lighting elements to the stage portal. SUITABLE	Reflective material SUITABLE
Parter	Constant inclination: The hearing angle towards the rear seats will be reduced. NOT SUITABLE	Constant inclination: The hearing angle towards the rear seats will be reduced. NOT SUITABLE	Increasing slope: The hearing angle towards the rear seats will not be reduced. SUITABLE
Seating position	Surprising: FIT for providing an ideal field of view and direct sound transmission. SUITABLE	Surprising: FIT for providing an ideal field of view and direct sound transmission. SUITABLE	Surprising: FIT for providing an ideal field of view and direct sound transmission. SUITABLE
Stage height	111 cm NOT SUITABLE	114 cm NOT SUITABLE	90 cm SUITABLE
Source – farthest listener distance	18.5 m: FIT for adequate direct sound reaching the listener. SUITABLE	23.3 m: FIT for adequate direct sound reaching the listener. SUITABLE	35 m: FIT for adequate direct sound reaching the listener. SUITABLE
Balcony Depth D ≤ 2H	300 cm ≤ 500 cm No sound shadow is created. SUITABLE	No Balcony	760 cm ≤ 710 cm Sound shadow occurs. NOT SUITABLE

CONCLUSIONS AND RECOMMENDATIONS

This study highlights the importance of designing multipurpose halls with attention to acoustic criteria from both musician and audience perspectives. The reaction of audiences in a concert hall that was opened in Hamburg in 2017, who expressed dissatisfaction with the acoustics, supports this notion (Mischke, 2024). Similarly, the remarks of Serdar Yalcin, the resident conductor of the Istanbul State Opera and Ballet, about a private multipurpose hall in Istanbul provide another supportive example: “Everything has been well thought out acoustically. There is no 90-degree angle; the sound hits the boards and reflects. The acoustic feature is very suitable for performances such as choir, chamber music, and recitals. It is especially suitable for chamber theater, so much so that even whispers can be heard by the audience. It

is important for the sound to be evenly distributed throughout the hall; thus, for small to medium-sized performances, the acoustics of this hall meet all the desired qualities. Another supportive comment comes from violinist Seda Subasi: "... it has suitable acoustics for classical music performances with small ensembles. The performer can better control their voice because the sound is heard at the same volume from every part of the hall (including above the stage). This acoustic provides great comfort in nuance making. This, in turn, strengthens the communication between the performer and the audience. Thus, it creates a warm atmosphere." (Talayman, 2024).

As seen in Table 2, since the reverberation time of the venues is below the optimum values, it is evident that the selected venues will not perform well for the intended purpose. Therefore, none of the three venues will provide a lively, rich music experience to the audience.

When evaluated in terms of design characteristics, the outcome for the three performance venues is shown in Table 3. Accordingly, it is evident that there are deficiencies in the design criteria for leveraging natural acoustics in the musical use of the examined venues.

The suggestions for addressing these deficiencies are presented in Table 4 for the Sabanci Cultural Centre, Table 5 for the Suleyman Demirel Cultural Centre, and Table 6 for the Kocaeli Congress Centre. These tables were created based on the optimal reverberation time specified in Table 2 and improvement recommendations tailored to the design characteristics outlined in Table 3 for each hall.

In Table 4, improvement suggestions are provided for the Grand Hall of the Sabanci Cultural Centre regarding the optimal number of attendees, audience area, back wall material, parterre slope, stage height, and reverberation time.

Table 4. Current situation and improvement suggestions for the Sabanci Cultural Centre Grand Hall

Sabanci Cultural Centre Grand Hall	Admissions	Current Status	Suggestions for improvement
Volume/ Person m^3	The optimum volume per person determined for venues to be used for concert purposes is in the range of 8-10 m^3 (Maekawa et al., 2011: 234).	4.23 m^3	In order to make is suitable for concert purposes, the number of seats should be maximum 320 and minimum 255.
Listener Area Back Wall Material	In order to prevent echo in the volumes, the reflection distance should be shortened; especially the back wall of the hall should be absorptive (Turk, 2011: 33).	Hall of the 177.12m^2 rear wall is covered with reflective and half with absorbing material.	The entire back wall should be covered with thick fabric with a coefficient of 0.45 Sabins.
Parter	It is important that the audience area is comfortable enough to see the stage directly. For this, it is preferable to slope the area. However, if it is raised with a constant slope, the hearing angle towards the back rows in the audience area will be	Constant slope.	In order not to reduce the hearing angle, the slope should be destabilized and listening seats should be placed on the increasing slope.

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	reduced. This will cause direct sound to be absorbed more in the front rows and reach the back rows. This problem is solved if the listening area is raised with increasing slope. In this case, listeners in each row will have equal visual and auditory acuity (Turk, 2011: 28).		
Stage – Floor Height	The accepted criterion for stage height in halls to be used for music purposes is at least 50 cm in relation to the ground floor slab. At heights exceeding 100 cm, the middle and back parts of the orchestra may not be seen by the audience (Barron, 2010: 59).	111 cm, high.	The stage height should be reduced to at least 100 cm.
RT	According to Figure 1, 1.55 s or 1.39 s which is the minimum 10 percent.	1.25 s	When 320 seats are used and the entire back wall is covered with a thick fabric with an absorption coefficient of 0.45 Sabins the desired reverberation time range of 1.48 s will be achieved.

In the table 5, the optimum number of people, stage portal, parter slope, stage height and reverberation time are suggested for the Suleyman Demirel Cultural Centre Grand Hall.

Table 5. Current situation and improvement suggestions for Suleyman Demirel Cultural Centre Grand Hall

Suleyman Demirel Cultural Centre Grand Hall	Admissions	Current Status	Suggestions for improvement
Volume / Person m^3	The optimum volume per person determined for halls to be used for concert purposes is in the range of 8-10 m^3 (Maekawa et al., 2011: 234).	6.63 m^3	In order to make it suitable for concert purposes, the number of seats should be maximum 390 and minimum 310.
Stage Portal	The listener area should be covered with reflective material to ensure sufficient early reflection.	Covered with absorbent material	The absorption coefficient is less than 0,20 Sabins; it should be covered with reflective material.
Parter	Ensuring that the audience area provides comfort in directly viewing the stage is important. For this purpose, inclining the seating area is preferred. However, if the incline is fixed and elevated, the auditory discomfort diminishes towards the back rows. This leads to a situation where direct sound is more absorbed towards the front rows, reaching the back rows less effectively. If the audience area is	Constant slope.	To prevent auditory discomfort, the stability of the incline should be disrupted, and the listener seats should be placed on an increasing slope.

	elevated with an increasing incline, this issue can be resolved. In this case, each row of the audience will have equal viewing and auditory comfort. (Turk, 2011: 28).		
Stage – Floor Height	When determining the stage floor height, it is known that having the stage positioned at a certain height above the seating area contributes to the audience's visual comfort and facilitates the direct transmission of sound to the audience. For music-oriented venues, the accepted criterion for stage height is a minimum of 50 centimeters above the ground floor level. Heights exceeding 100 centimeters may result in parts of the orchestra not being visible to the audience. (Barron, 2010: 59).	114 cm	The stage height should be reduced to a minimum of 100 cm.
RT	According to Figure 1, either 1.6 seconds or the minimum of 10%, which is 1.44 seconds.	1.37 s	With the use of 390 seats, the desired reverberation time range can be achieved within 1.49 seconds without the need for any other structural changes.

In Table 6, improvement recommendations are provided for the audience area, side wall material, ceiling panel material, balcony design, and reverberation time for the Akcakoca Auditorium at the Kocaeli Congress Centre.

Table 6. Current Situation and Improvement Recommendations for Akcakoca Auditorium in Kocaeli Congress Centre

Kocaeli Congress Centre Akcakoca Auditorium	Admissions	Current Status	Suggestions for improvement
Listener area side wall	The design of side wall surfaces as sound reflective is directly related to subjective acoustic parameters such as balance and blending. The objective criterion of Clarity is associated with its subjective counterpart, spaciousness, through the design of side walls. If a sense of spaciousness is desired, it is necessary to ensure the characteristics of early sound arrival and sufficient lateral reflection.	The absorptive material consisting of perforated stone wool with a 5 cm air gap behind it has an absorption coefficient of 0.94 Sabins, indicating its absorptive rather than reflective quality.	Covering the side wall panels with solid gypsum panels with an absorption coefficient of 0.50 Sabins will contribute to an increase in the reverberation time in the space.
Ceiling panels	The reflective ceiling is one of the most important acoustic features of a theater or auditorium. (Elbas, 2016: 26)	The absorption coefficient of perforated acoustic plasterboard material is 0.70 Sabins, therefore it has an	The material preferred for use on the ceiling should be air-gap MDF with a coefficient of 0.28 Sabins.

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		absorptive rather than reflective quality.	
Balcony Depth D ≤ 2H	Balcony under designs that exceed twice the height of the depth should be avoided. (Everest & Pohlmann, 2009: 389).	760 cm ≤ 710 cm A sound shadow is created.	Reducing the number of seats in the balcony from 239 to 139 will help to decrease the depth of the balcony.
RT	According to Figure 1, 1.85 seconds or the minimum of 10%, which is 1.66 seconds.	1.147 s	When the number of seats is reduced to 1200, and the side wall panels are covered with solid gypsum panel material, and the ceiling panels are chosen as air-gap MDF, the desired reverberation time range of 1.78 seconds will be achieved.

People's need to hear, understand, and enjoy is as important as their need to see in every space and time. Regardless of the purpose for which a performance venue is programmed, it should provide the audience with auditory comfort. This is an indication of the importance given to culture, art, and the human beings nourished by them. According to the results, none of the three performance venues will satisfy the audience from the listener's perspective; and from the performer's perspective, they will not allow the performer to showcase the desired performance.

Ultimately, it is evident that the common issue to be addressed in the three venues is the number of seats. Among the three venues, Kocaeli Congress Centre Akcakoca Auditorium lacks the most in reverberation. Kocaeli Congress Centre, Suleyman Demirel Cultural Centre, and Sabanci Cultural Centre are multipurpose performance venues, and in terms of acoustic comfort and volume size, the existing facilities are unable to meet the needs of the city's residents. This study has identified a clear requirement for multipurpose performance venues or music-functioning halls with a seating capacity of over 1000, which provide optimal auditory comfort, to be constructed in the city.

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Resume

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Understanding the Role of Spatial Configuration on Social Behavior in Educational Buildings

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Alper Ünlü**

Abstract

Educational buildings, which appear as a design problem when viewed through the historical process, appear as a whole of structures consisting of educational units of different functions and sizes, shaped through a main corridor space and attached to this main space. On the other hand, when educational buildings are considered through their plan schemes or spatial layouts, it is possible to say that they positively or negatively affect different but interrelated parameters such as students' potential to come together, their motivation in crowds, and their involvement with each other in social relations. In the space syntax theory, buildings are separated from each other in terms of programming; that behavior is shaped and determined by the configuration (strong programming) or possible new forms of behavioral patterns occurring against the layout (weak programming). This study uses a comparative methodology to investigate the effect of the spatial layout of educational buildings on how social interaction is generated and motivated in the relations of 'syntactic programs' in school settings. The study focuses on recess time behavior in relation to the spatial layout and uses behavior maps and space syntax methods to examine the effects of the spatial setups programming parameters in educational buildings. Results show that if an educational building has a flexible structure (weak programming) with its spatial organization, socialization is oriented naturally by the layout with enriched behavioral patterns. However, when the design starts to behave strongly programmed, social behavior becomes monotonous and prevented. As a result, this study shows the importance of understanding social logic in the architectural design of educational buildings in structuring social relationships. Revealing the relationships between these concepts is thought to guide the evaluation of the design criteria of educational buildings and the contents presented for new designs.

Keywords:
Architectural programming, Educational buildings, Spatial configuration, Spatial behavior, Space syntax.

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INTRODUCTION

The communication between the physical environment and the child occurs through symbolic messages. Proshansky and Wolfe (1974) state that adults' intentions or values about that environment transform the setting over which they have control in a pragmatic role. The overall setting is designed and controlled by adults in educational facilities, but in several academic research studies, the child's point of view has recently started to be considered. In many research studies, the child and environment are considered through learning. Studies state that the learning process does not simply occur within the physical setting; it is affected by the relationship between the setting and the nature of behavior (Backman et al., 2012; Woolner et al., 2012; Coelho et al., 2022). Education becomes effective and meaningful when children connect with the place, interact socially, and gain identity. Therefore, it is necessary to consider the structure of school environments as places where real life happens for students instead of dull places where they are informed about specific educational programs.

Besides being a learning facility, school environments allow children to expand their social ties with others, encouraging them to make connections between themselves and develop a sense of group and individual attachments to the social environment to become connected (Kohlberg, 1971); cited in (Cotterell, 1996). The school is considered a behavior setting, influences the students, and motivates them to achieve new things. It is also a setting where the environment is integrated into the relationships between the learning and social development of the child (Lippman, 2010).

On the other hand, the social structure of space is a dimension that can be understood through the physical setting of the space (Hillier & Hanson, 1989). Hillier (2007) states that physical configurations of forms and elements represent the social organization as we see in everyday life construct the social organization of everyday life. Furthermore, it is possible to understand the effect of spatial form by making configuration-based measurements of social and behavioral patterns with the space syntax method.

In this context, recess time is essential for examining the child's behavior to understand the social structure in educational buildings. Recess is a period when students behave accordingly free rather than the class. Therefore, recess is the time for unstructured and undirected behavior in school environments. Rhea (2016) states that the definition of recess is abstract, like the play itself, and essential for the child to experience whatever they want to refocus. It could be role play, physical activity, sitting and reading, socializing, imagining, or reflecting. Recess can potentially affect the whole child—offering academic, cognitive, emotional, physical, and social benefits— (Ramstetter et al., 2010). In several studies focusing on recess time behavior (Lever, 1976; Finnan, 1982; Harper & Sanders, 1975; Pellegrini, 1992), the physical environment and behavior are related to each other, and recess time

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significantly affects overcoming the difficulties of stages in child development through social interactions.

Within this framework, this study aims to examine the relationships between socialization and spatial order in recess time behavior. The main question of this study is how space is structured and how it affects students' social behavior. In the first part of the study, the theories of behavior and spatial order are discussed within the framework of school environments. Then, the field study, findings, and general evaluations are presented.

SCHOOL ENVIRONMENT AS SOCIAL SETTING

Educational buildings, the most basic public spaces where children interact, are emerging as an area of ecological psychology because of their behavioral environments and perceptual infrastructures. Rather than defining the physical environment in a school setting as where students are exposed to a particular education system, it is necessary to think of it as where real life occurs. School settings are physical environments where children can expand their social ties with others, thereby interacting with peers, older and adults, to connect and identify with society.

There is an unlimited number of school settings (configurations) that specify only the design features of school environments without considering social phenomena such as the activities of students and teachers and their organization in school environments. Based on the classifications created by Brubaker (1998) and Perkins (2001), it is possible to categorize school structures according to different educational philosophies that have developed over time (Figure 1). However, Perkins' classification does not reflect what kinds of visual and physical connections are provided between individual areas and what types of activity and movement patterns can be produced.

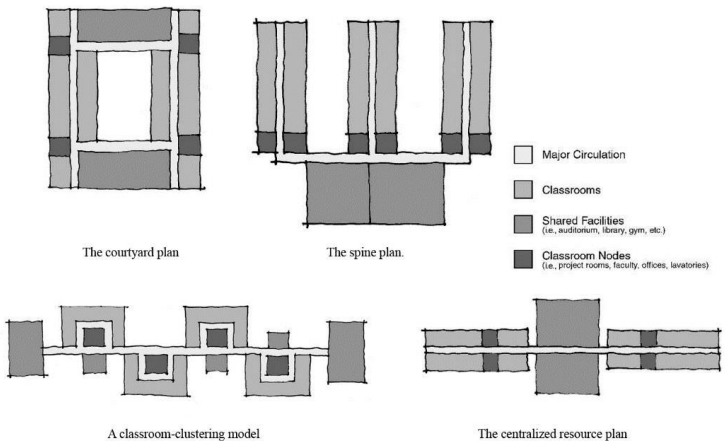

Figure 1. Examples from Perkins' classification of school building layouts (Perkins, 2001).

According to Peponis and Wineman (2002), to look at the relationship between space and behavior, it is necessary to understand

the relationship between built spaces and their social functions, as well as the boundaries, connections, and divisions created in spaces.

Bell et al. (2001) divide the spaces where we live, learn, and play into primary and secondary spaces. Primary spaces constitute primary purpose-oriented environments that allow people to meet regularly and where personal relationships can be developed, while secondary spaces are generally temporary and anonymous environments for relationships (Lippman, 2010).

As individuals interact in primary environments, bonds are formed between each other. It is more accurate to define these spaces as the environment (milieu) in which the person becomes individualized rather than simply calling them home or the immediate environment. Instead of rules to be followed, learning takes place in these places through observation and internalization. While secondary environments can be flexible, malleable, and integrated like primary environments, they are essentially more defined areas. Lippman (2010) emphasizes that although school environments, which can be considered secondary spaces, are environments where different individuals come together, various activities are carried out, and different skills are acquired, designs made to control undesirable student behaviors come to the fore in these spaces, and that the educator's and administrator's He argues that there is a system in which he acts as an authority and rules are imposed.

In educational areas consisting of corridor systems, which are generally double-sided classrooms, the general school design is carried out through specific arrangements to accommodate the student population of the building. Lippman (2010) defines corridors as "active" areas for activities, while classrooms are "passive" areas. While corridors are designed to enable users to go from one educational location to another as quickly as possible, they are areas where other behaviors are exhibited (such as waiting to enter the classroom, working, reading, and reaching personal lockers). While order appears through the teacher in classrooms that support passive interaction, both corridors (active areas) and classrooms (passive areas) need to be re-evaluated for children's educational practices and allow interactions at different levels, including individual, one-on-one, small groups, and large groups (Lippman, 2010).

Gür and Düzenli (2004) define free time (recess) as the education that takes place in the hours allocated for the student to relax mentally and physically through entertainment and recreation between scheduled lessons. Kıncal and Genç (2002) state in their study that the concept of recess (free time) is an essential part of education/training in terms of time and space and that in these free times, students can meet their basic needs as well as play games and play games. In their study, Polat and Ünişen (2014) emphasize that recess spaces are attractive environments where individuals of the same age and cognitive level, who cannot come together in any environment other than school, can

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leave the classrooms, which are synthetic learning environments and have real-life experiences - socialize and gain experiences about social life.

Therefore, the school setting encourages the establishment of bonds between students and the development of group consciousness, so a connection occurs between the individual and the social environment (Kohlberg, 1971); cited in (Cotterell, 1996). Saeki (1995) states that learning happens in an environment structured by the dialogue between the child and the adult. Physical space can be supportive or discouraging for social interaction for children in terms of their relations with each other and their teachers (Itoh, 2001). Tarçın Turgay and Ünlü (2017) also emphasize that the functional and syntactic qualities of the space in educational buildings are effective on the levels of social attachment established with that space. Children should engage in rich social interactions for effective and meaningful education, establish a connection with the place, and gain an identity. In this context, it is possible to investigate the space with the concept of psycho-social territory and to examine the forms of behavior that individuals have developed to create, protect, and even defend their fields.

UNDERSTANDING THE SOCIAL BEHAVIOR

Gibson (1986) emphasizes a strong relationship between environment and individual experience, and it is impossible to examine the interaction process without focusing on the lived and experienced environment. Barker (1968) also describes the environment as a natural medium in which artificial or virtual environments are created daily and can be interpreted as multidimensional regarding socio-physical relations between man and the environment. Proshansky et al. (1983) point out that our physical surroundings are not just physical but also social as we configure them, so understanding the physical universe's behavioral effects is a great extent through understanding the social relations of that physical environment.

According to Ünlü (1998), spatial behavior is a critical point in environment-behavior studies and consists of the interaction where different dynamics are effective. The behaviors that stand out in the space are mutually related to where the behavior occurs. Also, Barker (1968) states that spatial behavior is the identity consisting of pieces of thought related to the social and cultural position, including the interaction of mental perception and all the temporal, social, and physical dimensions.

Behavior is also shaped by the content of that space when it provides enough visual and physical spaces for the individuals with the order that the space creates. Lawson's (2007) Language of Space emphasizes the spatial distances people make and how spaces generally tell people how to behave. The physical space modifies our behavior, constructs our relations with each other, and causes us to exhibit the behaviors appropriate to that space in the spatial arrangement. As the central

element of the fundamental and universal form of communication, space could bring people together and separate them.

Behavior setting theory focuses on the fact that people's behavior cannot be handled independently of the environment and the factors in the environment (Barker, 1968). It is a homeostatic equilibrium involving all living or non-living beings and their chain of relationships. Bechtel (2000) quotes Barker's original definition, "A behavior setting has been defined as a standing pattern of behavior and a part of a milieu which are synapomorphic and in which the milieu is circumjacent to the behavior." (Barker & Wright, 1955, p.45). Moreover, Skinner's quote (1972, p.185), "People are extraordinarily different in different places, and possibly just because of the places." explains the argument that behavior is shaped by the environment.

In the most basic case, behavior studies start with the individual, and the individual is surrounded by an invisible border around his own body (Sommer, 1969). Hall (1966) identifies this boundary as an irregularly shaped soap foam that is a proper mechanism between individuals. This boundary is also defined as the personal area, determines the spatial limits of the person, and provides compatibility with the person's behavior and space. Hall (1966) emphasizes that people interact with each other within four different distances, including intimate, personal, social, and public, and suggests that living things exhibit various forms of behavior within different social groups (Figure 2).

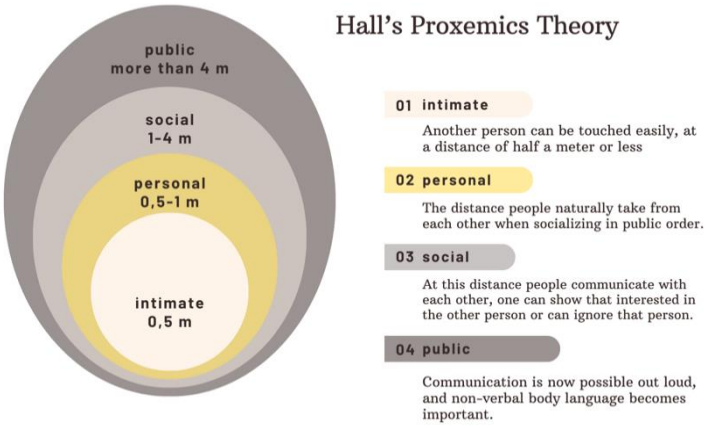

Figure 2. Hall's (1966) proxemics zones

Hall (1966) created the concept of space, stating that each culture or arrangement has its own rules. His observations about human interactions define these as proxemics and are directly related to the social meanings and the design and use of the spatial order. There are several studies that are using proxemics to understand the behavior in an environment. Marquardt and Greenberg (2012) use this theory to examine Informing the Design of Proxemic Interactions on how devices could have knowledge of nearby people and other devices and exemplify how it might exploit that knowledge to design interaction techniques. Was (2010) uses proxemic theories on crowd dynamics modeling to understand the motion mechanism in pedestrian dynamics. Aliakbari et

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al. (2011) searched the proxemic behavior of Iranian professors and university students on the effects of gender and status. They stated that status-organized behavior and physical distance of the lower-status individuals differed significantly. Raje and Ojha (2022) use Hall's proxemics theory to understand the natural relationships and the prospects it creates for 'quality' play that can accommodate a child's needs and behavior. Do et al. (2019) explore different behaviors of residents in an open space in Da Nang (Vietnam), which can support the future development and improvement of local open spaces by the proxemics theory. Gao (2020) uses the proxemics theory to focus on the impact of landscape design elements and features on crime prevention in commercial districts. Eyüboğlu and Zorlu (2021) search for the role and importance of personal space and territoriality in spatial behavior and user preferences in Library spaces using Hall's proxemics theory.

SYNTACTIC STRUCTURE OF SPATIAL CONFIGURATION

According to Hillier and Hanson (1989), the space is created by a social structure. Therefore, it is a dimension that can be understood through the physical setting of the space. Moreover, the physical setting is a social dimension that affects the different factors that make up that space, regardless of the scale. According to Hillier (2007), spatial configuration can be considered the primary producer of movement patterns in buildings consisting of spaces where individuals move, come together, and become aware of each other.

Space Syntax is a theory and methodology that made it possible to perform configuration-based measurements of social and behavioral patterns to understand the social logic of space. The book Social Logic of Space explains the theory as the relationship between external factors that generate the forms and the social structure. Syntax is the rule necessary to produce various spatial arrangements and combinations (Hillier & Hanson, 1989).

The spatial dimension of the organization in a building is called a program. The essential element in any program is the interfaces that buildings exist or construct (Hillier, 2007). The main point of the programming concept is based on the interaction in the building of two different groups of people -visitors and inhabitants. While visitors are in a temporary out-of-control interaction, inhabitants are the dominating group for the entire spatial configuration of the building (Sailer et al., 2013). Inhabitants are the ones who have control over the space, while the visitors lack it. Identities of visitors are collective, temporary, and subordinated, such as students and patients, while inhabitants dominate the space as teachers, doctors, etc. This categorization of the interface is taken as the program of a building in terms of strong or weak. The idea of the organization of the spatial dimension must be realized in the spatial form of the building (Hillier, 2007).

In a building defined as strong programming, the interaction of different groups of people is under very tight rules, and the use of space

is shaped by the program rather than the plan diagram. When the program constructs the movement, spatial configuration only allows primary and necessary movements. On the other hand, if the program becomes weaker, the structure of the layout starts to allow random interactions. Furthermore, movement is defined less by the program and more by the structure of the layout (Hillier, 2007). In addition to this, in various studies, it has been found that in the buildings defined as weak programming, random interactions occur without related to the program (Grajewski et al., 1992; Hillier & Grajewski, 1990; Penn et al., 1999); cited in (Sailer et al., 2013). By another definition, the program of a building specifies the spatial dimension of the organization in the building (Sailer et al., 2013). Sailer et al. (2013) defined strong and weak programming in their study as the criteria considered to be a building for strong or weak programming in theory (Table 1).

Table 1. Criteria for strong and weak programmed buildings are derived from the literature (Sailer et al., 2013)

	STRONG PROGRAMMING	WEAK PROGRAMMING
THEORY ORIGIN (Hillier, Hanson ,Peponis, Penn)	1. More complex and segregated layout 2. Low ratio of bounded spaces to convex space 3. Low ratio of axial lines to convex spaces 4. Smaller buildings 5. Strong control of inhabitant -visitor interface: 5.1 Separate non-interchangeable entrances 5.2 Easily controlled spaces for visitors, shallow in the building -close proximity to visitors 5.3 Independent routes 6. Strong control of inhabitant - inhabitant interface: 6.1 Strong division of categories of users by division of spaces used 7. Preserved professional status with more segregated spaces 8. Activities follow programme 9. Correspondence model examples of building types: courts, prisons, hospitals, airports	1. Simpler and more integrated layout 2. High ratio of bounded spaces to convex space 3. High ratio of axial lines to convex spaces 4. Larger buildings 5. No control of inhabitant – visitor interface: 5.1 Same entrances for inhabitants and visitors 5.2 No control over visitors 5.3 Shared routes 6. No control of inhabitant – inhabitant interface: 6.1 No division of spaces, therefore categories of users are mixed 7. No status expressed with spatial properties 8. Activities follow configuration 9.Non-correspondence model examples of building types: offices, museums, galleries
CONTRIBUTIONS (Sailer, Koch/Steen, Heoetal, Lu et.al, Cai/Zimring)	10. Attractors placed in segregated areas without configurational logic (Sailer, 2010) 11. Time restrictions of space usage (Sailer, 2010) 12. Activities follow programme: no influence of a spatial factor on different roles and tasks 13. Spatial practices (tasks and roles) are realised in space and time (duration) similarly (Koch & Steen, 2012)	10. Attractors placed in integrated areas according to configurational logic (Sailer, 2010) 11. No time restrictions of space usage (Sailer, 2010) 12. Activities follow configuration: different spatial factors influence different roles and tasks 12.1 Targeted visibility (Lu, et al., 2009) 12.2 Visual connectivity / generic visibility (Lu, et al., 2009) 12.3 Axial integration (Heo et al.,2009) 12.4 Distance (Heo et al., 2009) 13. Spatial practice (tasks and roles) are realised in space and time (duration) differently (Koch & Steen, 2012)

In traditional space syntax theory, it is suggested that high integration areas exist with a high flow of motion, defined as natural

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movement. On the other hand, when strong and weak programming is added to the design, it is expected that the natural movements in which random choices are made, and morphogenetic behavior occur only in weak programming (Sailer, 2015).

Hillier (2007) emphasizes that the spatial configuration can be regarded as the primary producer of motion patterns where the individuals move, come together, and are aware of each other. Space Syntax analysis gives us numerically spatial schemes that describe social functions, cultural differences, and behavior change patterns. Space is considered an environment consisting of a combination of different convex parts. The forms of interaction in the environment are defined as concepts of isovist area, isovist perimeter, circularity, integration, depth, connectivity, inclusivity, etc. The syntactic parametric expressions of spatial relationships (integration, connectivity, etc.) strongly reference using spaces and forming interactional patterns between individuals (Haq & Zimring, 2003). Each unit receives a numerical value so spaces can be represented graphically, allowing comparison through configuration values to correlate with spatial data.

METHODOLOGY

The study is conducted on two different school buildings in Bolu, Turkey. A comparative method is used to examine the effects of the syntactic contents of spatial programming on social behavior. Hall's (1966) proxemics theory is used to categorize the students' social behavior, and spatial data is obtained using Syntax 2D software (developed by the University of Michigan). Numerical values of each space are obtained from the grids where the recess areas' center points and used to calculate the space's mean value. The obtained data is compared with simple regression analysis. The process followed for the study is explained step by step in detail in further sections.

Case Study Environment

The research is carried out in 50. Yıl İzzet Baysal Middle School and Merkez Şehit Ozan Özen Middle School, which have different plan typologies and space layouts, are located in the Merkez district of Bolu province, Turkey. The plan layouts of selected buildings are produced by the studies from the Ministry of National Education's cooperation with universities between 1998 and 2000 in Turkey. Plan schemes that are still up to date to provide an area for discussion on the essential design criteria of educational buildings.

In the scope of this study, buildings are referred to as Type-1 and Type-2 buildings. Each building has the same logic for maintaining educational areas (classrooms) at first but differs in architectural layout decisions (Figure 3).

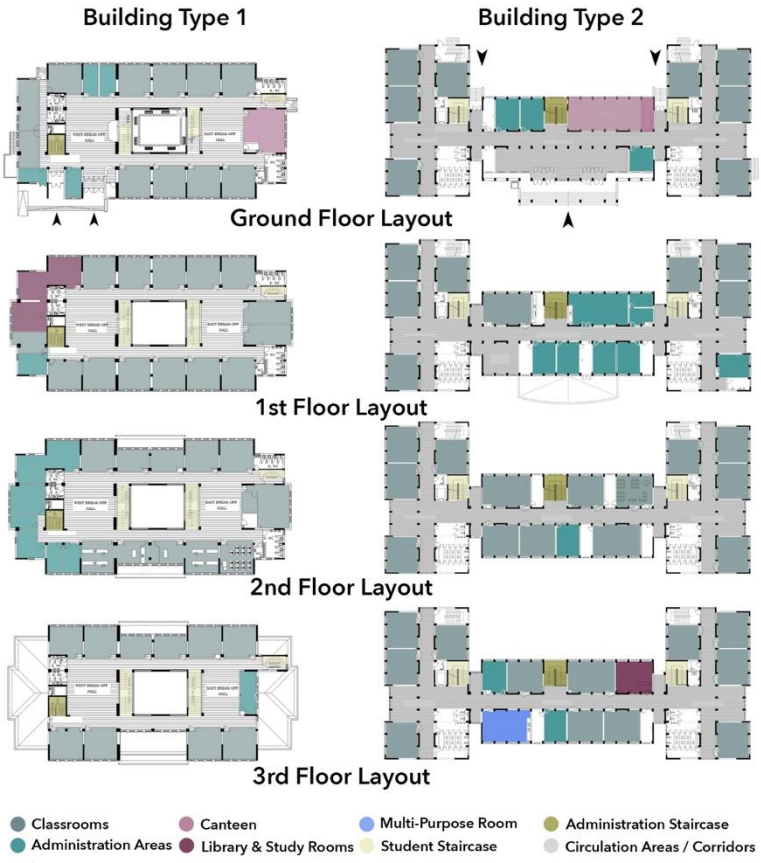

Figure 3. Layout and floor plans of the case study buildings

The building has a Courtyard plan layout (50. Yıl İzzet Baysal Middle School), defined as a Type-1 education building. It consists of a basement, ground floor, and three floors, with a total of 40 classrooms, eight administrative rooms, and a capacity of approximately 1200 students; it includes primary branch classrooms, science laboratories, music and painting workshops, a library, administrative units, and a canteen area. Entrances to the building are provided through two separate doors, administrative and student, and vertical circulation within the building is separated into student and administration stairs. In the building, which has two separate square-shaped break halls on each floor, east and west, access to the break halls is provided through the passage corridors located in the north and south. Following the architectural program of the building, it consists of classroom volumes, administrative units, food and beverage areas, and technical volumes, and the students' extracurricular lives are shaped through two separate break halls surrounded by these areas. While the break halls in the western part of the building are primarily associated with administrative spaces.

The plan diagram of the other building (Merkez Şehit Ozan Özen Middle School), defined as a Type-2 education building, is located in the city center, and consists of a basement, ground + 3 floors on a symmetrical H-type plan scheme (Figure 4). The building has a total capacity of 32 classrooms and 13 administrative rooms with a capacity of approximately 600 students. Located a little outside the main city

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center, the school has a ceremony area and open playgrounds in its garden. The building program includes multi-purpose halls, dining halls, classrooms, and administrative units. The general design of the building consists of classroom units located on both sides of a central corridor. Break halls have been left at the intersections of classroom corridors, causing the spaces to be perceived through a long corridor.

In other words, Type-1 building is relatively small and segregated, while Type-2 is more integrated by the main corridor. The spatial layout in Type-1 is shaped around an inner courtyard in the middle, which divides the floor plan into two and creates two break halls that are visually separated. This building has separate administrative rooms and classrooms, with distinctive entrances for students and teachers. The spatial layout in Type-2 is shaped over the main corridor with one main entrance to the building, administrative spaces are located at the center of the building, and classrooms are located mainly around the main corridors.

The buildings selected in the study are considered regarding the spatial differences between the non-classroom circulation areas. Therefore, the relationship between behavior and design could be revealed regarding strong or weak programming. Classification is shown in detail in the above table (Table 2).

Table 2. Evaluation of schools in terms of strong and weak programming criteria

Type-1 Educational Building	**Type-2 Educational Building**
1. More complicated and separated layout - two separate halls	1. Simple and more integrated layout - placement on a straight corridor
2. Small building	2. Big building
3. Strong control of users.	3.No control of the movement of users by the administration
3.1. Separate building entries	3.1. Everyone uses the same entry to the building. No control over the students' movements
3.2. The area where the students are located is easily controlled, and the students are close to each other.	3.2. Shared routes, no division or identification over the areas.
3.3. Independent routes, teachers and students using different staircases.	
3.4. identified spaces, parent lounge area, and chess play area.	
4. Activities following the program; no influence of a spatial factor on different roles and tasks.	4. Activities follow configuration; different spatial factors influence different roles
5. No visual connectivity, unable to perceive layout at once.	5. Targeted visibility, distance, and visual connectivity.

Data Process

The data collection process is based on a two-stepped methodological structure, which belongs to the students (behavioral data) and the other belongs to the space (spatial data). First, to measure spatial behavior and syntactic relations, floor plans are divided into regions according to functional relations upon the layout (Figure 4). Every floor is categorized upon circulation and recess halls' locations and coded as (F1a, F1b. etc.). Besides the syntactical data, photoshoots and behavior observations at recess are also based on these regions. The basement floors are excluded from the evaluation because of the limited access on special occasions.

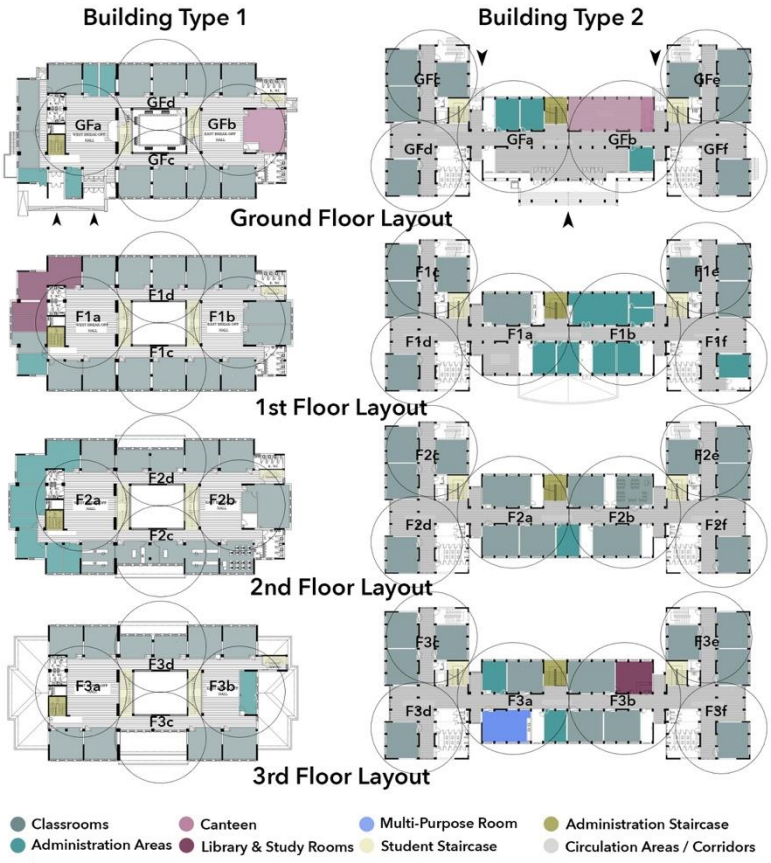

Figure 4. Areas where behavior is observed on building floor plans.

Behavioral Data

Student behavior is categorized into three different social settings: individual behavior, intimate distance, and group interaction, as projected from Hall's (1966) proxemics theory. Individual behavior (mode-1) is taken for intimate/close distance, intimate interaction (mode-2) is for friendship for two individuals in the range of social distance, and group interaction (mode-3) is for public distance and beyond (Figure 5).

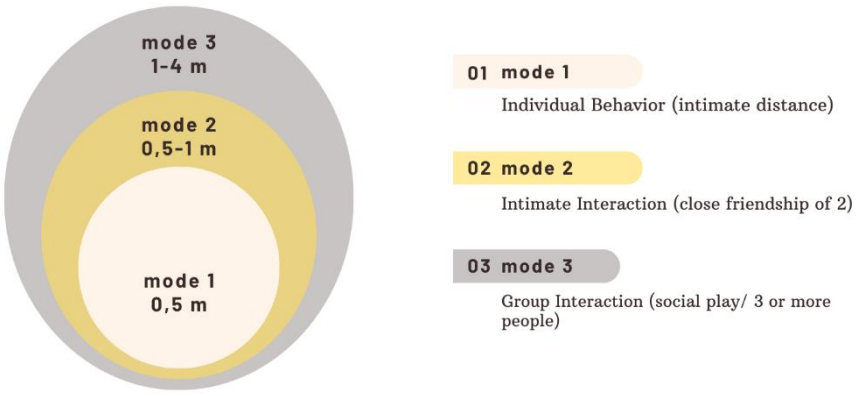

Figure 5. Students' behaviour categorization projection from Hall's (1966) proxemics theory.

Behavioral maps are drawn out to enable the socia behavioral parameters of the students in the non-class time (recess time) in the spatial order in the educational buildings during the three school days. In order to obtain behavior map data, photographs, and observations

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are taken on the floors during the first 15-minute break in the morning and afternoon during the three class days allowed by the school administration. Obtained behavioral data are processed by entering the '1' numerical value per category of individual behavior, intimate interaction (close friendship), and group interaction (active/social play) within the regions determined for every 15 minutes, as described in the previous methodology section. The sum of the children in that region is evaluated as the spatial behavior value of that region.

Spatial Data

Space syntax analysis evaluates space as an environment consisting of a combination of different convex space parts on the plane. The relationship forms within this environment are defined through concepts such as isovist area, circularity, compactness, integration, depth, connectivity, and inclusivity (Batty, 2001). Each unit receives a digital numerical value, allowing spaces to be represented graphically and configuration values to be compared statistically with other spatial data.

For the spatial data, isovist area, isovist perimeter, integration, and connectivity values of the regions obtained with Syntax 2D software over the floor plans of the previous two buildings.

First of all, it is essential to explain what the isovist is. Isovist is the data that enables the understanding of the space from the inside. It enables us to understand how the individual perceives the space, what kind of visual interaction he has with the space, and how the visual perception of the individual changes at each step (Benedikt, 1979). The isovist analysis is based on the point of view that gives the numerical equivalent of the relationship between the location and other spatial units within a physically unrestricted field of view. Due to their general architectural programs, educational buildings have a layout consisting of the main corridor and different classroom units attached to it. Therefore, curricular areas are the most determined places for examining space and human relations.

Since the isovist graphs are based on the visibility of the spatial components of the planning scheme, it is possible to compare the syntactic data of the points where the behavioral movement is detected on the corridor space via behavior maps of those regions. However, the effect of the space on visual perception also varies with different parameters—the expansion and contraction of circulation areas and the creation of gathering areas. Furthermore, different widths of corridors have different isovist values and significantly relate to variations in environmental and behavioral models. Therefore, it is assumed that there is a significant relationship between the isovist values of the corridor. Extension spaces and density of the student's behavior patterns relate to the relationship between behavior and visibility.

Isovist area is one of the spatial data subheadings, defining the area's visual and perceptual dominance when a person stands still and turns

360 degrees with the sense of sight. At the same time, the isovist perimeter is the calculated data calculated by the perimeter of the polygon in two dimensions determined by the relevant isomorphic field instead of the area value of the 360-degree field of view at a single point (Şalgamcıoğlu, 2013).

The other is the integration value of the space, which expresses the depth/shallow value of the space depending on other spaces. In other words, integration expresses how many spaces are distant from a particular space (Hiller et al., 1984). It is expected to be the most integrated/integrated space in the entire layout, considering the relation of corridor areas designed in educational buildings with other spaces. Therefore, it is essential to analyze whether there is a significant relationship between the regions where the frequency of behavior on the corridor space intensifies/ decreases and the integration values of these regions. This relation gains importance over whether the shallow and deep areas on the plan match the content of the behavior. Also, it is expected that comparing the total values of the behavior patterns obtained from the behavior maps and the integration values will give clues about which behavior patterns the layout motivates.

The connectivity value obtained from space is a value that changes according to the relationship between that space and other spaces close to it. In other words, the higher the number of neighbor spaces, the higher the connectivity value of that space. In this context, the places with the highest connectivity value in educational buildings are undoubtedly corridor areas. The width and narrowness of the corridors and spaces opened to corridor areas can be associated with the usage contents of the corridor areas in the education building.

In the scope of this study, simple regression (R) analyses are used to determine whether there is a significant relationship between the frequency of spatial and social behaviors obtained from these regions, and the findings are explained in a further section.

DATA & FINDINGS

When the behavioral data is analyzed through social interaction, in the Type-1 building, 53.74% of the students showed individual behavior (mode-1), 32.67% of mode-2 (intimate interaction -close friendship), and 13.59% of the students showed mode-3 (group interaction -playing active games) in curricular areas. On the other hand, in Type-2, it is seen that the social behavior is distributed in a balanced manner. At the same time, 32.45% of students showed individual behavior, 34.08% showed close friendship relationships, and 33.47% showed group behavior (Figure 6).

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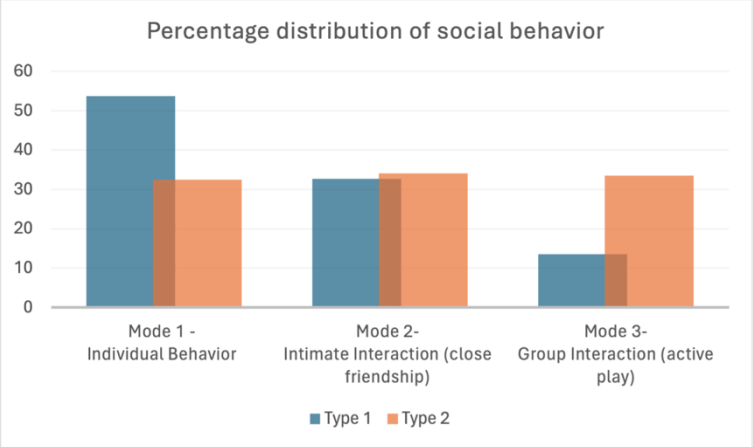

Figure 6. Distribution of modes of social behavior

In the context of these data, it is seen that the students' social behaviors differ in these two different school settings. While the most dominant social behavior observed in Type-1 building is individuality, there is a balanced social interaction distribution in Type-2 building.

In the Type-1 building, with distinct and disconnected recess halls, social behavior is observed mainly individually, while short-term games occur and dissolve in minutes. According to the observations during behavior mapping, students tend to behave isolated from each other while playing temporary games, and these areas mainly serve to pass by or use personal student lockers. It is mainly observed that students tend to stay in classrooms or go directly outside rather than staying in the halls. It is possible to say that lack of visual contact in layout causes limited social interaction in this spatial behavior. Therefore, this can be a reason for students to prefer staying in the classrooms or going outside rather than staying in the halls. Also, in the Type-1 building, it is observed that the students are standing alone and in a distance in front of the classroom doors, trying to participate in the games set in the middle area by watching or cheering. No reachable window openings to the outside due to the inner courtyard is another spatial fact in this building.

On the other hand, students in the Type-2 education building use the halls and circulation areas intensely for playing and socializing and for walking by. Children tend to play group games across the floors, not only in the corridors but also in intimate friendships in the non-class areas of the layout of this building. It is also determined that the social interaction observed in these areas can spread to the entire floor area from time to time.

Besides behavior mapping data, syntactic values are obtained from the center points of the areas based on the regions (F1a, F1b. etc.) determined for the behavior maps on the floor area of both education buildings. Then, an average sequential value is obtained for each floor area, and the general syntactic value of the building is tried to be obtained from these values.

Syntactic values of these two buildings differ in isovist area, isovist perimeter, integration, and connectivity. Type-1 building has lower

syntactic values than Type-2 building, considering the average syntactic values obtained from the areas in both layouts. This situation can be interpreted as the plan layout created in the form of H over the linear corridor scheme having high values against a planning scheme that can be considered compact with its inner courtyard as a square. Therefore, it is seen that the spatial mobility formed in the plan layout influences the spatial syntax values (Table 3).

Table 3. Distribution of the syntactic data

Syntactic Values of the Buildings	Building Type-1	Building Type-2
Isovist Area	1339,798	2531,535
Isovist Perimeter	10,959	20,603
Integration	794,481	2271,485
Connectivity	523	965,25

The syntactic graphs obtained from the buildings' ground floor plans show that main social spaces exist, such as the canteen area and main entrance halls. The diagrams' warm (red) color indicates the highest degree of searched value on the layout, while the cold (blue) indicates the lower. It can be seen that the higher values of syntactic relations occur in administrative areas in Type-1, while recess halls have a higher value in Type-2 (Figure 7). Similar graphs area obtained from the other floor levels of the buildings.

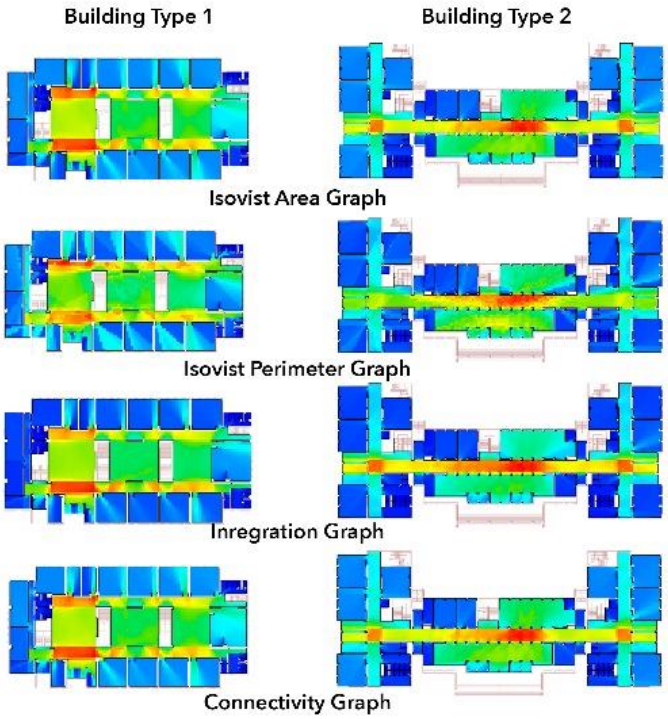

Figure 7. Syntactical Graphs of buildings.

It is seen that the width of the sight in the floor area in the Type-2 building, which has a linear plan scheme, is also reflected in the syntactic values. One reason for the low isovist area value in the Type-1

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building is the inner garden in the middle area, which negatively affects the interaction of the break halls by cutting off the visual interaction. On the other hand, the isovist perimeter value of the Type-1 building decreases while the square-shaped break halls and the surface lengths of the space decrease. In contrast, this value increases in Type-2 building with the window fronts and recessed and protruding areas created on the corridors.

Considering the integration values, the long corridor area in the Type-2 education building is the most significant factor in increasing the building's value. This increase is because all space units in the floor area are directly related to that area. In addition, separating the break halls in the Type-1 building also reduces the integration value of the entire floor area.

In connectivity values, it is seen that the values of the Type-2 education building are higher than the Type-1 building. This data shows the effect of the corridor areas on the connectivity value, which forms the basis of the space setup. The connectivity value is high in the corridor layout of the building, where all units can interact with its linear scheme. In contrast, the connectivity value is low in the layout connecting to the short, narrow corridors and vast break halls.

After obtaining the behavioral and syntactic data, simple regression (R) analyses are established between the behavioral data and the syntactic values obtained from the same areas. In the evaluation of the results of the correlation, the "r" value being between +1 and -1 determines the direct or inverse relationship by being positive or negative, and the "p" value less than 0.05 defines the significant relationship between the data.

When we look at the relationship between social behavior and space, we see that only individual behavior is associated with the space with values of isovist area and integration in the Type-1 education building. On the other hand, close friendships and group behaviors significantly correlate with the syntactic values of isovist perimeter, isovist area, and connectivity in the Type-2 education building (Figure 8).

In Type-1 building, the isovist area values ($r2= 0.484^*$; $p=0.049<0.05$) and integration values ($r2=0.495^*$; $p=0.044<0.05$) have significant relation with the individual behavior model while other social behavioral modes (friendship and active play) do not relate with the layout.

On the other hand, individual behavior defined as Mode-1 is unrelated to the syntactic values in Type-2 education building. It is seen that there is a significant relationship with the isovist perimeter ($r2=0.419^*$; $p=0.042<0.05$) between the close friendship relations exhibited by the students. Also, group behavior (active play) and the area of isovist area ($r2=0.685^*$; $p=0.000<0.05$), isovist perimeter ($r2=0.644^*$; $p=0.001<0.05$) and connectivity ($r2=0.707^*$; $p=0.000<0.05$) values are found to be correlated in this building.

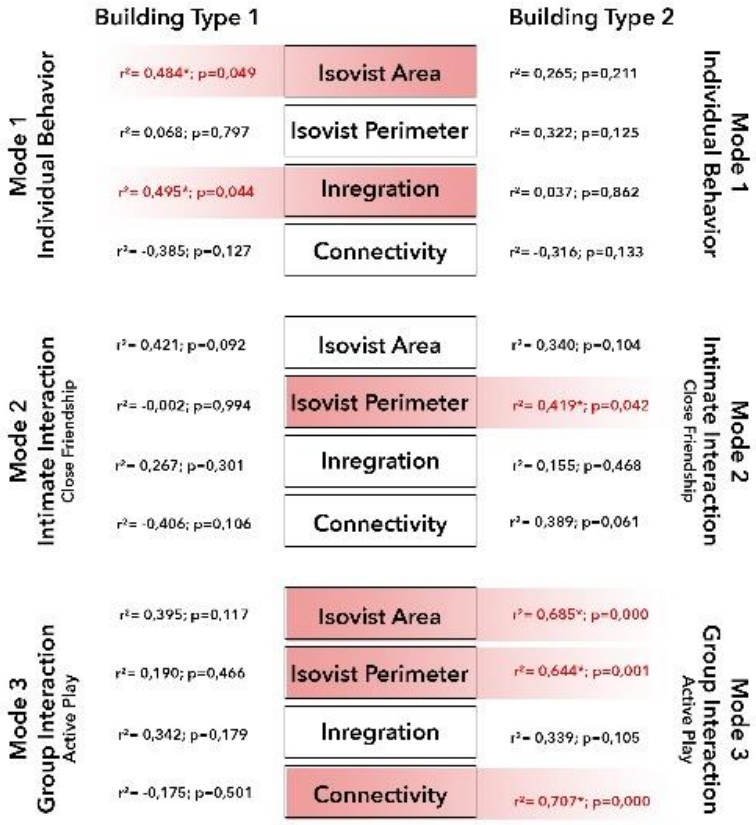

Figure 8. Syntactic and behavioral correlations

EVALUATION

When looking at the correlational relations between social behavior and space, only individual behavior is associated with the layout in the Type-1 educational building. Throughout the spatial behavior analysis process, it is observed that students created singular, distanced, defined personal space in front of the classroom doors in the Type-1 building. Based on the data, it is possible to say that only individual behavior defined as Mode-1 is motivated by the spatial layout in the Type-1 educational building. Avoiding interaction with each other and using these areas by keeping a distance between themselves can indicate that the spatial order in this building has a feature with low social interaction.

On the other hand, intimate interaction (friendship of two) and group behaviors show a significant relationship with the Type-2 building's syntactic values. According to the behavior data, students' effective use of corridors and break halls and the formation of groups of two or more friends resulted in meaningful results with the syntactic values of the space. It is possible to say that as the level of visibility and connectivity of the space increases, students can see each other, interact, and, if necessary, establish social spaces between groups. Thus, such a spatial setup allows students to engage in social interaction.

The study's findings show a significant relationship between architectural design and behavior, and spatial programming directly relates to social life. The significant correlations between syntactical and

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behavioral data indicate that when visibility and accessibility richen in a school layout, group activities such as group plays occur effortlessly.

In other words, when halls and divisions separate the layout, children tend to act alone; the socialization of students weakens, and they prefer to be alone during recess periods. As the syntactic features of the space increase, the behavioral patterns and the social interaction that takes place in these areas are enriched. This situation can be evaluated as the combination of programming content and syntactic values in the spatial setups of these educational buildings will support social interaction.

According to the space syntax, when a building's programming is weak, natural movement occurs. This study shows that if the layout is divided visually and functionally in educational buildings, it affects students' natural movement during recess.

When layout becomes rigid, and students avoid interacting with each other in such a layout. In such setting students interact with the social areas within the school building for a short time, and after meeting their basic needs, they return to their classes or directly use the garden area. This is an indication that as the spatial design becomes more rigid, students become individualized and retreat to their classrooms, or they cannot establish a relationship with the general setup by directly interacting with open spaces. Students tend to prefer to be in places where they can see each other without any spatial obstacles. They seek visual flexibility in layout.

CONCLUSION

The environment is a holistic concept that can be understood by physical characteristics, whereas social life is experienced in the context of environmental and behavioral theories. On the other hand, educational buildings, which have become an extension of the students' everyday experiences, can be accepted as designed configurations with their spatial identities. Therefore, the spatial order in educational buildings influences students' behavior, and behavioral maps become valuable tools in the analysis of the contents of design parameters.

There are several studies investigate social interaction in the setting and its relationship with spatial configuration (Ünlü et al., 2001; Ridwana et al., 2018; Golshan et al., 2021; Aelbrecht, 2016; Wu et al., 2017). This study proposes a new method for spatial behavior studies in educational buildings by categorizing social behavior in proxemics theory. Understanding the interaction between the physical layout of the spaces and the student's behavior in high-interactive and low-interactive space concepts is essential in the design parameters of educational buildings.

The study's results are significant in that they show that as the architectural layout in educational buildings becomes flexible, the social relationships between spaces can also be enriched. They also contain clues that the educational environments in which students are happy to

live should be supported with more flexible designs that allow visual interaction. Therefore, flexible programming is needed in educational buildings to integrate with the space. Revealing the relationships between socialization and spatial order is thought to guide the evaluation of the design criteria of educational buildings and the contents presented for new designs.

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Resume

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A Study About Discourse Relationship Between the Design Concepts and Architectural Expressions of Residential Works by Steven Holl

Yurika Mori *

Abstract

The purpose of this study is to clarify the relationship between the contextually expressed design concepts and the corresponding architectural expressions in residential design by Steven Holl. His work utilizes motif ideas and incorporates experimental thinking into the central concept. The purpose of this project is to clarify the process of conception of discursive expressions and related motif expressions in residential design. This study focuses on 17 residential architectural works from 1975 to 2012 and categorize the elements that influenced the concept and the motifs of the works. It identifies how architectural expressions that reflect motifs influence specific concepts or motifs by KJ method and Matrix analysis. It has been found that the concept is composed of 15 elements from five context types. Motifs were extracted as the subjects. To find out how motifs are expressed, a survey was conducted on architectural expressions corresponding to the motifs. The architectural expressions could be summarized into five categories. A matrix diagram was created to explore the relationship between the architectural expressions corresponding to the motifs and the concept. It became clear that the there is a unique concept that incorporates cultural and art into the composition with architectural expressions. This research focuses on the discursive expressions described, and it is advantageous to elucidate the design theories spoken by architects themselves. Combining KJ method and matrix analysis with the discursive expression of the concepts of architectural works and how they are expressed is a new method for clarifying architects' design theories.

Keywords:
Architectural expression, Concept writing, Design intention, Design theory, Residential works.

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INTRODUCTION

Background

For architects, a house is not only a living space for the client, but also a "work of art" in which the architect's own design philosophy appears throughout. Unlike the prototyping of a model case for commercial use, residential work can be expressed as an experimental effort to realize the design concept and philosophy. One architect who has strongly reflected such a design concept is Steven Holl. Holl is a leading American architect who has worked extensively not only in the United States but also in Europe and Asia. His representative work include the KIASMA(Helsinki Museum of Modern Art) (1998) and MIT Simmons Hall (student dormitory) (2002). Figure 1 and 2 shows façade and entrance hall of KIASMA (Helsinki Museum of Modern Art).

Holl was born in 1947 in Washington, U.S.A., and studied architecture at the University of Washington and the AA School of Architecture. In addition to his design activities, He is also active as an educator, teaching at universities. Holl's design philosophy is influenced by French philosopher Maurice Merleau-Ponty and, together with architectural theorist Juhani Pallasmaa, they refer to the influence of phenomenology on architecture. It is apparent that Holl has been influenced by philosophical influences on the design philosophy of architecture.

There have been studies about his design influenced by phenomenology, and Holl himself has described his design ideas and design process in many articles. He is widely known for his conceptual sketches using watercolor sketches. The architectural design process by Holl includes the use of watercolor sketches. Using the watercolor sketches, the process of "Stochastic thinking," which is to retain an intuitive image on the screen, is carried out to express the concept. Holl conducts a careful design study of the concept by himself, and then conducts further studies using 3D and models to create the drawing. Holl emphasizes the importance of sensitively expressing the images obtained through watercolor sketches. He likes to describe a design method that is sensitively generated by his own hands. While some architects do not talk much about their work or design theories, writings by architects on various design theories can be an important element in revealing an architect's thinking. In his own words, Holl often refers to design methods and concepts of his work. Among them, Holl describes the importance of phenomenology in understanding architecture and indicates that it is important to playfully explore concepts and forms away from rationality. He also uses writing and sketches to express his experimental thinking in the process of creating architectural works. Designing concepts and motifs is one of the factors that determine the form of his architectural works. The way in which he also mentions the structure and choice of materials that are connected to the concept and motif suggests that the expression of the concept is expressed concretely in the form of architectural expression. It is unclear how the concepts and motifs are expressed in words, and how they are expressed in architectural forms.

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Holl has been working continuously on residential works since the early days of his design career, and there are certain works for each age group. Residential works are designed on a relatively smaller scale than public buildings and other facilities with large areas, and intuitive conceptual ideas are more likely to be expressed in architectural expression. This study analyses the written discourse of Steven Holl's residential design to extract concepts, motifs, and architectural expressions, and to clarify the relationships among them.

Introduction previous studies and research objectives

Much of the literature on the design by Steven Holl is concerned with his design method and philosophy. Ono's research has found a diagrammatic representation of the Holl's design concept influenced by phenomenology. (Ono, 2007) This is similar to the present study in that the research is conducted from Holl's discursive representation. Tajima's study has analyzed Holl's watercolor sketches. (Tajima,E.2007)

Other studies have described design philosophies related to phenomenology based on Holl's work. (Kim; Jun-Sung; Chung; Tae-Yong, 2013)(LvXiao Hui, 2003) Taken together, these studies provides important insights into the architectural design theory influenced by phenomenology on Steven Holl's work. However, this study differs from previous studies in that it clarifies the relationship between design concept and architectural expression in terms of discursive expression for Holl's residential works.

As for research on contemporary architects' design theories from discourse expression, Shikasho and Shiozaki's research showed the relationship between design theme in houses with piloti by contemporary Japanese architects. (Shikasho & Shiozaki, 2013) And Shiozaki and Nakajima's research illustrated how contemporary Japanese architects make a framework of concept in their design theory with using words of geometrical figures. (Shiozaki & Nakajima, 2007)

Geometric shapes such as squares, circles, and triangles have been used by architects as concept ideas in conceiving architectural works. The greater part of this literature on architects' design theories using geometric shapes from discourse expression is exploratory to the relationship between conception and architecture using same methodology, KJ method. Sasaki and Yamada have conducted a study on the image of the relationship between the given conditions and architecture in the creation of contemporary Japanese housing. (Sasaki & Yamada, 2006) Although there have been many studies on the residential works of specific architects, this study takes a different perspective from others in that it focuses on the discursive activities of Steven Holl to gain new insights into the relationship between the discursive expression of design concepts and architectural expression.

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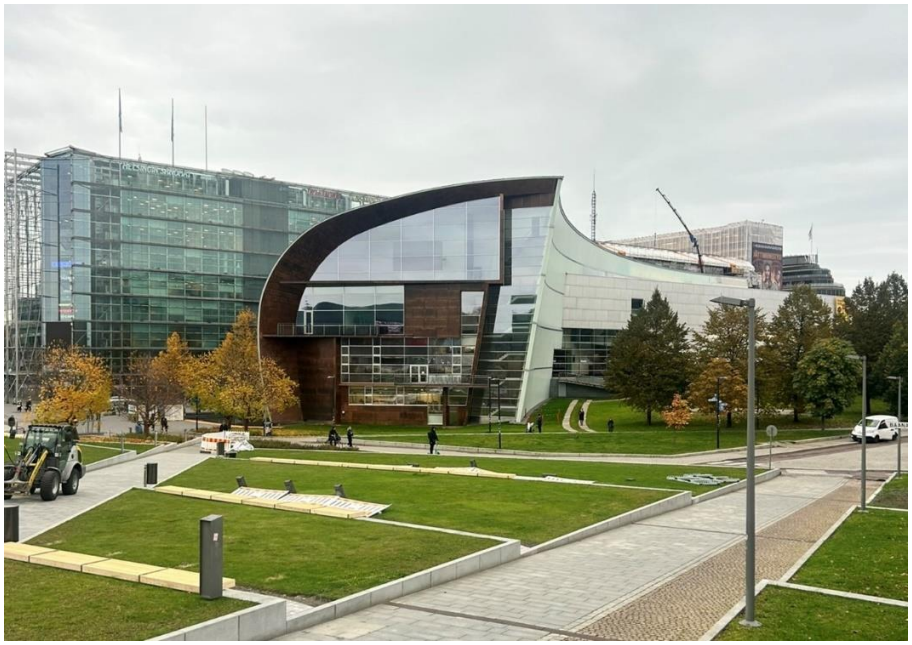

Figure 1. Figure 1. Façade of KIASMA(Helsinki Museum of Modern Art) Helsinki, Finland, 1998.(Photograph by author October 15th. 2024)

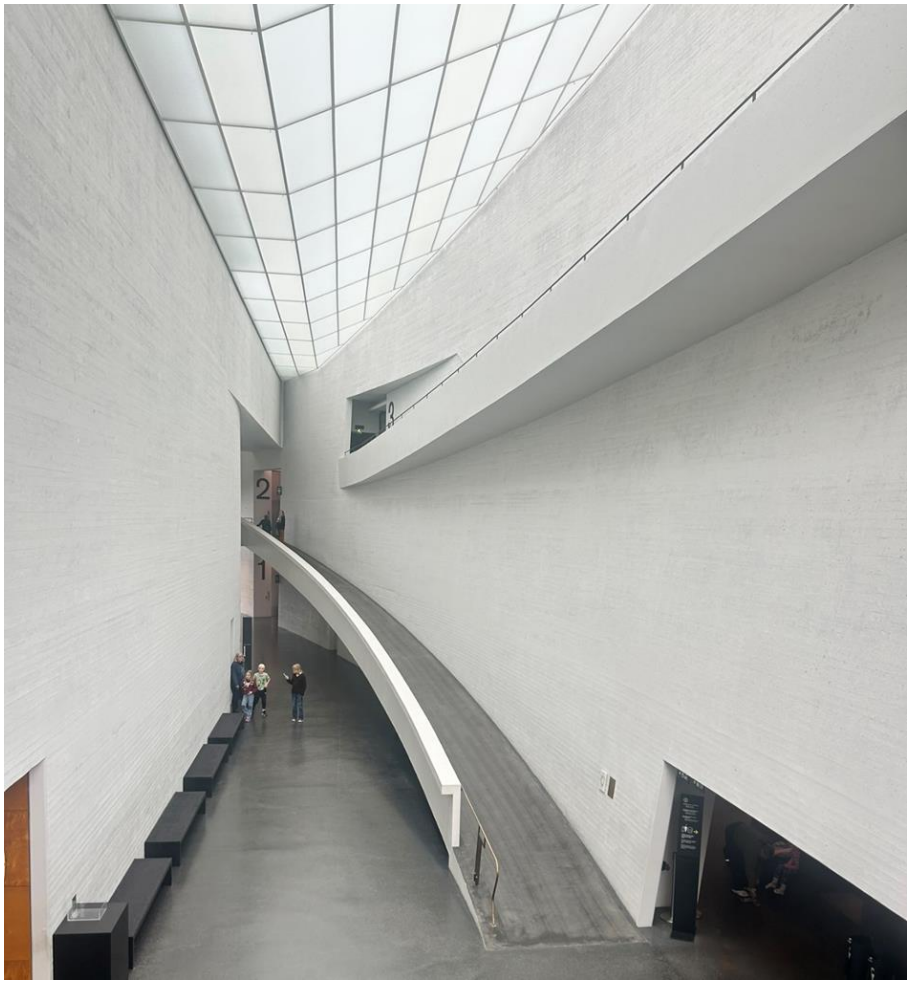

Figure 2. Entrance hall of KIASMA(Helsinki Museum of Modern Art) Helsinki, Finland,

METHODOLOGY

This study focusses on 17 residential architectural works by Steven Holl from 1975 to 2012, and categorizes the elements that influenced the concept and the motifs of the works. It identifies how architectural

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expressions that reflect motifs influence specific concepts or motifs. First, the KJ method is used in categorization. The KJ method is a specialized method for organizing information developed by cultural anthropologist, Jiro Kawakita. It is a method of organizing information through a process of writing down words and fragments of information from the data obtained, and then organizing and grouping these pieces of information. By using the KJ method to summarize the architect's discourse, keywords can be extracted from the architect's editorial on the purpose of the design. The framework of the architect's thinking could be captured. Next, a matrix analysis is performed to organize the relationships among concepts, motifs, and architectural expressions. Matrix analysis is a method of arranging two elements in rows and columns to determine their degree of relatedness. In this study, discursive expression of residential works was recruited from collection of works by STEVEN HOLL ARCHITECTS. (Futagawa, 2012, 1975-1998 Volume1 & Volume2 STEVEN HOLL, A.D.A.EDITA TokyoCo.,Ltd) Additional information such as drawings and sketches for each house were referenced as supplements to the books published by STEVEN HOLL ARCHITECTS. Throughout this paper, the terms “concept” and “motif” are distinguished. The term “concept” will be used to refer to the idea or point of view that forms the backbone of a work of art. It means a coherent concept in a creative work. The term “motif” will be used to refer to the main idea or subject matter that motivates a concept. The difference between a concept and a motif is that a motif is a nucleus that forms a concept, while a concept is a complex idea that includes a direction in creation.

Next, the analytical procedure is described. This analysis is divided into three major parts: the categorization of concepts and motifs of works, the categorization of architectural expressions reflecting the motifs, and the analysis of the relationship between concepts and architectural expressions reflecting the motifs. First, about method of analysing the categorization of concepts and motifs, it focuses on the sentences which contain information that may have been influential in determining the concept of the work. The elements that influenced the concept composition were extracted from the concept written in the text. The KJ method was used to extract the concept elements. The concept elements were categorized and summarized by the meaning. From the sentences related to the composition of the concept, motif expressions were extracted as specific ideas that shape the design, i.e., as subjects that motivate the creation of the work. Next is an explanation of how to analyse the categorization of architectural expressions that reflect motifs. It focusses on sentences that indicate that the motifs used are embodied as architectural expressions. Elements of architectural expression were extracted from the sentences describing the part where the motif is spatially expressed by the KJ method. The extracted elements were grouped by related content. When extracting concepts, motifs, and elements of architectural expression, analysis notes were made as shown in Figures 3 and 4, and the results were summarized in a table.

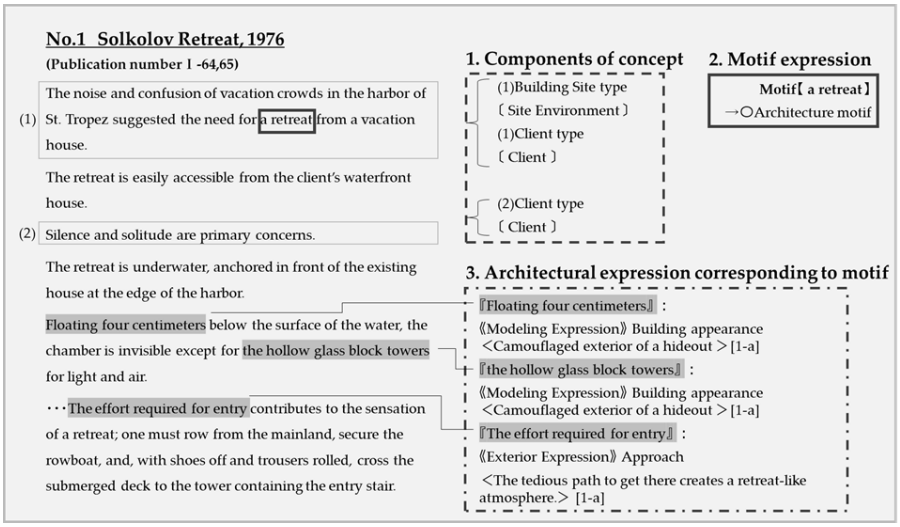

Figure 3. The memo for No.1 Solkolov Retreat for analysis of concept components, motif expression and architecture expression.

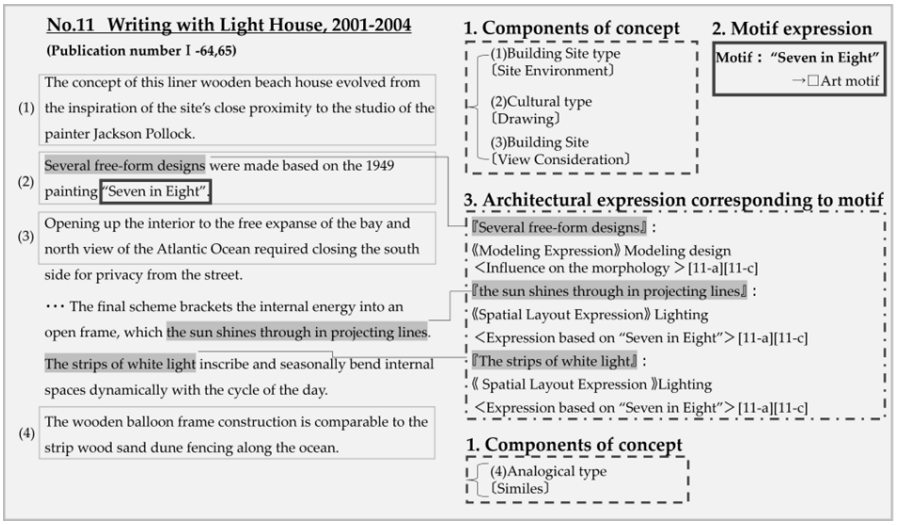

Figure 4. The memo for No.11 Writing with Light House for analysis of concept components, motif expression and architecture expression.

Finally, the method of analysing the relationship between the architectural expression reflecting the concept and the motif is described.

This part used matrix analysis, which is useful for organizing the relationship between two elements. This method of analysis analyses the relationships among data compiled in a tabular format consisting of multiple rows and columns to organize problems and find clues to solutions. In this study, an L-shaped matrix diagram was created to handle the two items. From the matrix diagram using the elements of the concept on the vertical axis and the architectural expression elements of the motif reflecting the concept on the horizontal axis, the architectural expression reflecting the concept and motif was summarized. The L-shaped matrix analysis is useful in clarifying the relationship between the concepts and the architectural expressions that reflect the motifs. The L-shape was used because it is the simplest tabular format, and the information is easy to organize. In the future, this study could propose a methodology to reveal architects' design theories from their discursive expressions.

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DESIGN CONCEPT AND ARCHITECTURAL EXPRESSION WITH WRITING

Extraction of design components

This chapter extracts the components of the design concept by focusing on the design conditions and environment related to the design concept or how it is expressed. Extraction of the motifs is performed for the areas that are indicated as specific ideas for creation from the context of the design concept. Figures 1 and 2 show examples of analysis notes for extracting concepts, motifs, and elements of architectural expression. The concept composition statements were categorized by intent and divided as shown in Table 1. Table 2 shows Motif extraction and architectural expression corresponding to the motif. The context can be divided into five major categories. Each category type has components of concept, and they were then given a code as an abbreviated name for ease of later discussion.

Table 1. Components of concept and explanation

Conditions	Sentence type	Components of concept	Code	Componets explanation and context number
Passive condition	Building site type 3	Site Environment components(24)	SE	The environmental background of the site, including the natural environment surrounding the site and its location 1-a,2-a,3-a,3-e,4-a,4-b,4-c,5-a,5-b,5-c,6-a,7-a,8-f,10-a,10-b,10-d,10-e,11-a,13-a,14-a,15-a,16-a,17-a
		Site History components(3)	SH	History on the site and events that have occurred on the site in the past 2-b,12-a,12-b
		View Consideration components(2)	VC	Consideration for views around the site or statements regarding views 2-c,11-b
	Client type 1	Client components(14)	C	Design requirements by client and statements for the client's lifestyle 1-a,1-b,2-a,3-b,3-c,3-d,6-b,8-a,8-b,10-c,12-c,13-b,15-b,16-b
Active condition	Cultural type 4	Literature components(4)	L	A statement of content from a literary work that is relevant to the purpose of the design 5-d,5-e,6-c,12-d
		Philosophy components(1)	P	A statement of philosophy or philosophical keywords that are relevant to the purpose of the design 6-d
		Musical Factor components(4)	MF	A statement of content related to the purpose of the design based on a musical work 7-b,7-c,17-b,17-c
		Drawing components(1)	D	A statement of content related to the purpose of the design based on the pictorial work 11-c
	Analogical type 4	Antithesis components(1)	A	Reflexive identification with social matters and architecture 2-e
		Experiment components(6)	E	A statement about experimental ideas being tested by design intent 6-f,7-d,7-e,12-b,16-b,17-b
		Similes components(6)	S	The design intent is stated as an analogy using a direct similes expression 3-e,7-b,10-f,10-e,11-d,14-c
		Metaphors components(5)	M	The design intent is stated as an analogy using metaphorical expressions 4-c,6-e,8-e,13-b,14-b
	Architectural type 3	Architectural Style components(2)	AS	The design intent is stated in relation to the architectural style or method 2-b,3-f
		Phenomenal Architecture components(5)	PA	The design intent is described in terms of light, space, and other phenomenological elements 8-c,8-d,9-a,15-a,15-b
		Geometry components(6)	G	The design intent includes the expression of geometric elements 6-d,8-e,9-a,10-d,14-c,16-a

Table 2. Design concept

No	Publication	Year	Work	Sentence	Components of concept	Building Site	Client	Cultural type	Analogical type	Architectural type
1	Ⅰ-64,65	1976	Solkolov Retreat	The noise and confusion of vacation crowds in the harbor of St. Tropez suggested the need for【a retreat】from a vacation house.(1-a)	Site Environment, Client	SE	C			
				Silence and solitude are primary concerns. (1-b)	Client		C			
2	Ⅰ-66,67	1978-1979	Telescope House	With this project we launched our debate against eclecticism and against the importation of history. (2-d)	Antithesis				A	
				This project is for us its opposite; it is a kind of distilled modern interpretation of certain cultural developments. (2-e)	Antithesis				A	
				A retired couple with a very narrow site on Chesapeake Bay required a house in portions hat could be closed off when not in use. (2-a)	Site Environment, Client	SE	C			
				We fused a model of a particular type,【the telescope house】, with the program. (2-b)	Site History, Architectural Style	SH				AS
				The house does not so much fill the site as create a new, synthetic one, looking over the trees to the Chesapeake.(2-c)	View Consideration	VC				
3	Ⅰ-68,69	1980-1981	Mets House	The site for this project is a thickly wooded lot on Staten Is land overlooking a forested ravine. (3-a)	Site Environment	SE				
				It is an inexpensive house for a young couple, both artists. (3-b9	Client		C			
				Conventional living and dining rooms are excluded in favor of two larger studios and a large kitchen. (3-c)	Client		C			
				The client expressed dislike of the suburban image of local developments, favoring an approach that leaves all natural vegetation on the site untouched. (3-d)	Site Environment, Client	SE	C			
				The house is a dialectic of two parts based on a traditional U-type courtyard plan. (3-f)	Architectural Style					AS
				The analogy of urban building type, like【an island in the forest】, is carried out in all the elevations: (3-e)	Site Environment. Similes	SE			S	
4	Ⅰ-72,73	1980-1981	Pool House and Sculpture Studio	The site in Scarsdale, New York has a history that dates from the transference of property rights by King George in the early eighteenth century. （4-a）	Site Environment	SE				
				The land is marked by stone walls that were used to define its boundaries. (4-b)	Site Environment	SE				
				The project is organized with the idea of【"walls within walls"】. (4-c)	Site Environment, Metaphors	SE			M	
5	Ⅰ-78,79	1984-1988	House at Martha's Vineyard	The site is a hill overlooking the Atlantic Ocean. (5-a)	Site Environment	SE				
				The ground, densely overgrown with brush, is cut by a gully that descends to an unobstructed bog. (5-b)	Site Environment	SE				
				The steep terrain and other building restrictions strictly limit the siting and construction material as well as the building height for the vacation home. (5-c)	Site Environment	SE				
				According to【Melville's Moby Dick】, the Indian tribe that originally inhabited Matha's Vineyard created a unique dwelling type. (5-d)	Literature			L		
				Finding a whale skeleton on the beach, they would pull it up to dry land and stretch skins or bark over it, transforming it into a house. (5-e)	Literature			L		

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No	Publication	Year	Work	Sentence	Components of concept	Building Site	Client	Cultural type	Analogical type	Architectural type
6	Ⅰ-83	1988-1990	Residence	A thickly wooded site east of Cleveland characterized by ravines and steep grades is the site for a house for a lawyer and his wife, a painter. (6-a)	Site Environment	SE				
				Large open spaces and vertical emphasis were requested, along with a three-car garage. (6-b)	Client		C			
				A series of conditions erase the dialectic nature of the house's double-formed:(6-c)	Philosophy, Geometry			P		G
				This passage was inspired by C. Brockden Brown's novel,【Memoirs of a Sleep Walker】, published in 1779. (6-d)	Literature			L		
				Sleepwalking and a cave are metaphors Brown uses for subconsciousness. (6-e)	Metaphors				M	
				Here the psycho-symbolic program of sleep-walking finds an architectural equivalent. (6-f)	Experiment				E	
7	Ⅰ-88,89	1989-1992	Stretto House	Sited adjacent to three spring-fed ponds with existing concrete dams,（7-a）	Site Environment	SE				
				Coursing over the dams, like the overlapping reflection of the space of the landscape outside as well as the virtual overlapping of the apace inside. (7-b)	Musical Factor, Similes			MF	S	
				A particular music with this "stretto,"【Bartok's Music for Strings, Percussion and Celeste】, was a parallel on which the house form was made. (7-c)	Musical Factor			MF		
				Where music has a materiality in instrumentation and sound, this architecture attempts an analogue in light and space, (7-d)	Experiment				E	
				That is material*sound/time=material*light/space (7-e)	Experiment				E	
8	Ⅰ-97,101	1997-1999	Y House	A weekend retreat for a European family with three bedrooms, kitchen and living space. (8-a)	Client		C			
				The house is designed to integrate a large collection of modern art. (8-b)	Client		C			
				The【"Y"】cuts a slice of sky and draws the sun into heart of the house. (8-c)	Phenomenal Architecture					PA
				The slow passing of time from early morning to sunset is to be a primary experience as different areas of the house become activated by the path of the sun, (8-d)	Phenomenal Architecture					PA
				The geometry allowing light and shadows to "chase still time" with the diurnal movement of the sun across the walls of the "Y". (8-e)	Geometry, Metaphors				M	G
				The house occupies the hill and site through three primary relationships: "in the ground," "on the ground," and "over the ground." (8-f)	Site Environment	SE				
9	Ⅱ-52,53	2001	Little Tesseract	A hollow charcoal【cube】is warped by distorting forces opening a triangle of light from above. (9-a)	Phenomenal Architecture. Geometry					PA,G
10	Ⅱ-58,59	2001	Oceanic Retreat	The site for this retreat is on the northwest "prow" of Kaua'i with Japan 3,600 miles over the distant Pacific horizon. (10-a)	Site Environment	SE				
				The 18 acre site is 90% natural preservation area. (10-b)	Site Environment	SE				
				This is a special place of retreat and reflection to be occupied in special visits by the owner and his son and daughter. (10-c)	Client		C			
				The absolute and severe qualities of the site are continued in【two "L"s】forming a platform like the space of horizon. (10-d)	Site Environment. Geometry	SE				G
				If space is like water, the plan and section contains, drops, embanks and then releases the space down the curvilinear path through the natural gardens finally to the ocean horizon. (10-f)	Similes				S	
				Like the ancient concept of Zen garden organization with a pool at the end-but here it is the pounding ocean. (10-e)	Site Environment. Similes	SE			S	

No	Publication	Year	Work	Sentence	Components of concept	Building Site	Client	Cultural type	Analogical type	Architectural type
11	II - 60,63	2001-2004	Writing with Light House	The concept of this liner wooden beach house evolved from the inspiration of the site's close proximity to the studio of the painter Jackson Pollock. (11-a)	Site Environment	SE				
				Several free-form designs were made based on the 1949 painting【"Seven in Eight"】. (11-c)	Drawing			D		
				Opening up the interior to the free expanse of the bay and north view of the Atlantic Ocean required closing the south side for privacy from the street. (11-b)	View Consideration	VC				
				The wooden balloon frame construction is comparable to the strip wood sand dune fencing along the ocean. (11-d)	Similes				S	
12	II - 66,67	2001-2004	Nail Collector's House	Overlooking the expanse of Lake Champlain in the 19th Century town of Essex, this 1.200 sq. ft. house for a writer is sited on a former nail factory foundation. (12-a)	Site History	SH				
				The owner has a collection of square head 19th Century nails gathered over the years on this site. (12-c)	Client		C			
				Windows correspond to【the 24 chapters of Homer's Odyssey】and are organized to project "Fingers of Light" into the interior volume. (12-d)	Literature			L		
				A poetic reinterpretation of the industrial history of the site and the pre-Civil War architecture of Essex. (12-b)	Site History. Experiment	SH				E
13	II - 86,87	2002-2005	Planar House	Sited in Paradise Valley with a direct vista to Camelback Mountain. (13-a)	Site Environment	SE				
				This house is to be a part of, and vessel for, a large【contemporary art collection】. (13-b)	Client. Metaphors		C		M	
14	II - 72,75	2001-2005	Turbulence House	Adjacent to adobe courtyard houses bult by the artist Richard Tuttle, this small construction is sited atop a windy desert mesa. (14-a)	Site Environment	SE				
				It's form, imagined like【the tip of an iceberg】indicating a much larger form below, allows turbulent wind to blow through the center. (14-c)	Geometry, Similes				S	G
				The artist's friend Kiki Smith calls it a "brooch pinned to the mesa". (14-b)	Similes				S	
15	II - 90,91	2005-2006	Sun Slice House	This weekend house on Lake Garda for an Italian lightning company owner and his family is organized to frame slices of sunlight. (15-a)	Site Environment, Phenomenal Architecture	SE				PA
				While the owner's profession revolves around artificial light,【slices of natural light】and their change in space throughout the day and year is the focus of the house. (15-b)	Client, Phenomenal Architecture		C			PA
16	II -76	2001-2006	Swiss Residence	It is not only to be a private house but also a cultural gathering place on which standards and【self-image of a country】are measured. (16-b)	Client, Experiment		C		E	
				Sited on a hill with a direct view through the trees to the Washington monument in the distance, a diagonal line of overlapping spaces drawn through a cruciform courtyard plan was the conceptual starting point. (16-a)	Site Environment. Geometry	SE				G
17	II - 94,95	2008-2012	Daeyang Gallery and House	The private house and gallery is sited in the hills of the Kangbuk section of Seoul, Korea. (17-a)	Site Environment	SE				
				The project was designed as an experiment parallel to a research studio on "the architectonics of music". (17-b)	Musical Factor. Experiment			MF	E	
				The basic geometry of the building is inspired by a 1967 sketch for a music score by the composer Istvan Anhalt,【"Symphony of Modules,"】discovered in a book by John Cage titled "Notations". (17-c)	Musical Factor			MF		

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There is Building site type, Client type, Cultural type, Analogical type, and Architectural type as sentence type category. First, building site type includes the context that describes the natural or historical content of the surrounding area, such as the environment and history of the site, and the views of the surrounding area. The site environment components describe the environment and natural background of the site.

The site's history components describe the historical background and past of the site. The view consideration components describe the perspective or view of the site when it exists in the surrounding environment. Next is the client type, which describes the design conditions presented by the client and the importance of the client's lifestyle. We should explain the abbreviations, codes and indicate where some expressions in the table come from or where we can find the equivalent, such as (11-a). It would also be good to provide visuals of these structures. This context includes client components, i.e., components that were stated as design conditions in response to the client's requests and lifestyle. The cultural type is the context that describes the content related to the design intent based on works of art such as literature, philosophy, music, and painting. This type includes four components: literature components as the element that influenced the design intent based on works of literature, philosophy components that influenced works of philosophy, musical factor components that influenced works of music, and drawing components that influenced works of painting. Analogical type is the context in which the design intent is influenced through analogies and experimental ideas that use direct metaphors and similes. This context includes four components: antithesis components, in which the design intent contains an antithetical identity to social events and architecture; experimental components, in which experimental ideas are tested by the design intent; similes components, in which the design intent contains content as an analogy using a direct simile; and metaphors components, in which the design intent contains content as an analogy using a metaphor. The architectural type is the context that describes the contents related to architectural style, spatial composition, modelling, and phenomenal expression of light and ambiguous spatial areas. This context has three components: the architectural style components, in which the design intent includes content related to architectural style; the phenomenal architecture components, in which the design intent includes phenomenal content such as light and ambiguous spatial areas; and the geometry components, which includes geometric architectural expression related to the design intent. The concept components can be divided into passive conditions and active conditions. Passive conditions is that the designer must necessarily accept as design conditions, such as the site context and the client context, and active conditions such as the cultural context, analogical context, and architectural context is that the designer actively adopted based on his or her own ideas. It became clear that the concept composition consists of two major conditions.

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Classification of architectural expressions corresponding to motif

In this chapter, motifs were extracted from design concept context. The motifs selected in Table 2 are shown in the symbols 〖〗. In addition, the citation number of the sentences related to the creation of the motif is added. These motifs can be classified according to the meaning and form they represent. The contents of the motifs are described in the table of motifs extracted by each work in Table 3. Motifs such as "retreat," "telescope house," and "wall" were defined as architectural motifs. Motifs related to images and phenomena, such as "an island floating in the forest" and "a slice of natural light," were considered image motifs. The "Y" shape, the "cube," and other geometric shapes were considered geometric motifs. Artistic motifs were defined as those related to art, such as "H. Melville's 'Moby Dick'" and "C. Brockden Brown's 'Memoirs of a Sleepwalker. As a result, it was found that the design intent could be divided into four motifs of expression. These results suggest that the diversity of artistic motifs derive from art. The influence of artworks on the concept of residential design is suggested.

Relationship between design concept and architectural expression

This chapter investigate how the motifs are expressed, focusing on the expressions corresponding to the motifs. Contexts in which architectural expressions corresponding to the motifs are suggested are extracted from texts of the works. These architectural expressions are compared with each other based on the KJ method. The architectural expressions corresponding to the motifs that were compared are shown in Figure 5. As a result, the following five expressions were able to summarize: Architectural Material Expression, Spatial Layout Expression, Exterior Expression, Modelling Expression, Plan Expression. Among these, this chapter has placed the two types of expressions into two categories: "physical expression," such as architectural components, forms, and drawings that are actually expressed as architecture, and "phenomenal expression," such as lighting and spatial areas that are difficult to grasp as realities. Architectural Material Expressions are a kind of expressions involving construction procedures, materials, structure, color, and the substantive components of building construction, including walls, corridors, clapboards, skylights, roofs, solar panels, and windows. Walls, corridors, clapboards, skylights, roofs, solar panels, and windows are operational expressions of the installation of architectural elements.

And procedures in Architectural Material Expression focus on methodology and belong to the group of phenomenal operations. Some architectural expressions are focused on physical manipulation and belong to the group of existential manipulation. Procedure is expressed by the order in which the construction is carried out.

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Table 3. Motif and architectural expression

No	Motifs	Code	Architectural Expression	Sentences that have architectural expressions corresponding to the motifs	Architectural expression	Components
1	a retreat	○	『Floating four centimeters』	『Floating four centimeters』 below the surface of the water, [1-a]	《Modeling Expression》：Building appearance	SE/C[1-a]
			『the hollow glass block towers』	the chamber is invisible except for 『the hollow glass block towers』 for light and air. [1-a]	《Modeling Expression》：Building appearance	SE/C[1-a]
			『The effort required for entry』	『The effort required for entry』 contributes to the sensation of a retreat; [1-a]	《Exterior Expression》：Approach	SE/C[1-a]
2	the telescope house	○	『Some were built』	『Some were built』 large section first, descending, some small section first, ascending, and some, all sections at once. [2-b]	《Architectural Material Expression》：Procedure	SH/AS[2-b]
			『three portions』	The proposed house is in 『three portions』 corresponding to frequency of use: a) the basic house for two persons, used year round; b) the formal entertainment rooms for visiting family; and c) the guest rooms, closed off when not in use. [2-a],[2-b]	《Modeling Expression》：Modeling configuration 《Spatial Layout Expression》：Room composition	SE/CS[2-a], SH/AS[2-b], SE/C[2-a], SH/AS[2-b]
3	an island in the forest	△	『integral color concrete blocks』	The front façade is articulated in 『integral color concrete blocks』, the side walls are painted black like the party walls in a city, and the courtyard is painted white for maximum light. [3-a]	《Plan Expression》:Contrast representation：Coexistence representation	SE[3-a] SE[3-a]
			『the side walls are painted black』	The front façade is articulated in integral color concrete blocks, 『the side walls are painted black』 like the party walls in a city, and the courtyard is painted white for maximum light. [3-a]	《Architectural Material Expression》：Color scheme：Material	SE[3-a]
4	"walls within walls"	○	『New walls』	『New walls』 enclosing the existing pool form a courtyard recalling the ancient stone boundary wall around the site. [4-a]	《Architectural Material Expression》：Wall	SE[4-a]
5	Melville's Moby Dick	□	『wooden construction』	This house is an inside-out balloon frame of 『wooden construction』: [5-a]	《Architectural Material Expression》：Structure	SE[5-a]
			『modern bones』	a skeleton house whose 『modern bones』 define a veranda. [5-b]	《Architectural Material Expression》：Structure	SE[5-b]
			『a skeleton house』	『a skeleton house』 whose modern bones define a veranda. [5-b]	《Architectural Material Expression》：Structure	SE[6-b]
			『porch, wooden members』	Along this continuous 『porch, wooden members』 receive the natural vines of island, which transform the straight liner mode of the architecture. [5-c]	《Architectural Material Expression》：Structure	SE[5-c]
			『The structural frame』	『The structural frame』 exposed inside and out meets the undisturbed sand dune on point foundations rather than on a common perimeter footing. [5-d]	《Architectural Material Expression》：Structure	L[5-d]
			『the undisturbed sand』	The structural frame exposed inside and out meets 『the undisturbed sand』 dune on point foundations rather than on a common perimeter footing. [5-d]	《Exterior Expression》：Ground	L[5-d]
			『Roofing is a rubber membrane』	『Roofing is a rubber membrane』 unrolled over the frame, analogous to the skins over the whale skeleton. [5-e]	《Architectural Material Expression》：Material：Roof	L[5-e]
6	Memoirs of a Sleep Walker	□	『a blind passage』	d) Sleepwalk passage: above the "skywalk," 『a blind passage』 leads from the mezzanine to a roof terrace. [6-c],[6-e],[6-f]	《Architectural Material Expression》:Corridor	L[6-c]/M[6-e]/E[6-f]
7	Bartok's Music for Strings, Percussion and Celeste	□	『concrete block "spatial dams"』	the house projects the character of the site in a series of 『concrete block "spatial dams"』 with metal-framed "aqueous apace" flowing through them. [7-a],[7-b]	《Exterior Expression》：Exterior space 《Spatial Layout Expression》：Spatial area：Room composition 《Architectural Material Expression》：Material	SE[7-a]/MF/S[7-b] SE[7-a]/MF/S[7-b] SE[7-a]/MF/S[7-b]
			『metal-framed "aqueous apace"』	the house projects the character of the site in a series of concrete block "spatial dams" with 『metal-framed "aqueous apace"』 flowing through them. [7-a],[7-b]	《Exterior Expression》：Exterior space 《Spatial Layout Expression》：Spatial area：Room composition 《Architectural Material Expression》：Material	SE[7-a]/MF/S[7-b] SE[7-a]/MF/S[7-b] SE[7-a]/MF/S[7-b]
			『four section, each consisting of two modes』	The building is formed in 『four section, each consisting of two modes』: [7-c],[7-d]	《Spatial Layout Expression》：Room composition 《Modeling Expression》：Modeling configuration	MF[7-c]/E[7-d] MF[7-c]/E[7-d]
			『heavy orthogonal masonry and light, curvilinear metal』	『heavy orthogonal masonry and light, curvilinear metal』 (the concrete block and metal of Texas vernacular). [7-c],[7-d]	《Architectural Material Expression》：Material:Structure 《Modeling Expression》：Modeling configuration	MF[7-c]/E[7-d] MF[7-c]/E[7-d]
			『The plan is purely orthogonal; the section, curvilinear.	『The plan is purely orthogonal; the section, curvilinear.』 [7-c],[7-d]	《Plan Expression》：Geometrical representation	MF[7-c]/E[7-d]
			『The guest house is an inversion with the plan curvilinear and section orthogonal』	『The guest house is an inversion with the plan curvilinear and section orthogonal』, similar to the inversions of the subject in the first movement of the Bartok score. [7-c],[7-d]	《Plan Expression》：Geometrical representation	MF[7-c]/E[7-d]

No	Motifs	Code	Architectural Expression	Sentences that have architectural expressions corresponding to the motifs	Architectural expression	Components
8	"Y"	◇	『The "Y", like a found forked stick』	『The "Y", like a found forked stick』, makes a primitive mark on the site, its reaching view extending in several directions. [8-c],[8-f]	《Modeling Expression》：Geometric modeling design 《Exterior Expression》：Landmark	PA[8-c]/SE[8-f] PA[8-c]/SE[8-f]
			『the geometry of the "Y" 』	As an alternative to an upside-down section with bedrooms (night) below and living (day) above, 『the geometry of the "Y" 』 contains a sectional flip of public/private or day/night zones. [8-e]	《Spatial Layout Expression》：Room usage	M/G[8-e]
9	cube	◇	『The cubic wooden structure』	『The cubic wooden structure』 is linked by an exoskeletal street "L" to an existing stone "U". [9-a]	《Architectural Material Expression》：Structure	PA/G[9-a]
					《Modeling Expression》：Geometric modeling design	PA/G[9-a]
10	two "L"s	◇	『a bracketed zone of two "L"s around an inner court』	The house, retreat is limited even further to 『a bracketed zone of two "L"s around an inner court』. [10-d]	《Modeling Expression》：Geometric modeling design 《Exterior Expression》：Exterior space	SE/G[10-d] SE/G[10-d]
			『the geometric line』	While the extreme promontory of the site is left for the birds, 『the geometric line』 is continued in a way that the house builds back the eroded part of the site. [10-b]	《Plan Expression》：Geometrical representation 《Exterior Expression》：Exterior space	SE[10-b] SE[10-b]
11	"Seven in Eight"	□	『Several free-form designs』	『Several free-form designs』 were made based on the 1949 painting "Seven in Eight". [11-a],[11-c]	《Modeling Expression》：Modeling design	SE[11-a]/D[11-c]
			『the sun shines through in projecting lines』	The final scheme brackets the internal energy into an open frame, which 『the sun shines through in projecting lines』. [11-a],[11-c]	《Spatial Layout Expression》：Lighting	SE[11-a]/D[11-c]
			『The strips of white light』	『The strips of white light』 inscribe and seasonally bend internal spaces dynamically with the cycle of the day. [11-a],[11-c]	《Spatial Layout Expression》：Lighting	SE[11-a]/D[11-c]
12	the 24 chapters of Homer's Odyssey	□	『Windows correspond to the 24 chapters of Homer's Odyssey』	『Windows correspond to the 24 chapters of Homer's Odyssey』 and are organized to project "Fingers of Light" into the interior volume. [12-d]	《Architectural Material Expression》：Window	L[12-d]
			『project "Fingers of Light" into the interior volume』	Windows correspond to the 24 chapters of Homer's Odyssey and are organized to 『project "Fingers of Light" into the interior volume』. [12-d]	《Spatial Layout Expression》：Lighting	L[12-d]
			『The main northeast wall has 14 windows; the southeast walls contain 5 windows』	『The main northeast wall has 14 windows; the southeast walls contain 5 windows』, white the northwest wall is blank. [12-d]	《Architectural Material Expression》：Window	L[12-d]
			『A "prow" thrust to ward Lake Champlain』	『A "prow" thrust to ward Lake Champlain』 completes this upward spiral of space. [12-d]	《Modeling Expression》：Modeling design	L[12-d]
			『"cartridge brass" siding nailed in pattern over a wood frame』	White plaster walls, hickory floors and 『"cartridge brass" siding nailed in pattern over a wood frame』 create a tactile weathering for this structure, [12-d]	《Architectural Material Expression》：Material：Siding	L[12-d]
13	contemporary art collection	□	『Constructed of tilt-up concrete walls』	『Constructed of tilt-up concrete walls』, the nature of the walls merges with simple orthogonal requirements of the interiors for art. [13-b]	《Architectural Material Expression》：Wall	C/M[13-b]
					《Spatial Layout Expression》：Spatial area	C/M[13-b]
14	the tip of an iceberg	◇	『form, imagined like the tip of an iceberg indicating a much	It's 『form, imagined like the tip of an iceberg indicating a much larger form below』, allows turbulent wind to blow through the center. [14-c]	《Modeling Expression》：Modeling design	S/G[14-c]
15	slices of natural light	△	『the play of light』	While most elevations are simple rectangles strategically sliced and cut for 『the play of light』 within, the north façade is made of glass with views of Lake Garda. [15-a],[15-b]	《Spatial Layout Expression》：Lighting	SE/PA[15-a] C/PA[15-b]
			『simple rectangles』	While most elevations are 『simple rectangles』 strategically sliced and cut for the play of light within, the north façade is made of glass with views of Lake Garda. [15-a],[15-b]	《Architectural Material Expression》：Window	SE/PA[15-a] C/PA[15-b]
			『the bends and changes in the strips of sunlight』	In order to emphasize 『the bends and changes in the strips of sunlight』, simple cubic volumes form the basic building geometry. [15-a],[15-b]	《Spatial Layout Expression》：Lighting	SE/PA[15-a]
			『simple cubic volumes form the basic building geometry』	In order to emphasize the bends and changes in the strips of sunlight, 『simple cubic volumes form the basic building geometry』. [15-a],[15-b]	《Modeling Expression》：Geometric modeling design	C/PA[15-b]
16	self-image of a country	△	『a diagonal line of overlapping spaces』	Sited on a hill with a direct view through the trees to the Washington monument in the distance, 『a diagonal line of overlapping spaces』 drawn through a cruciform courtyard plan was the conceptual starting point. [16-a],[16-b]	《Plan Expression》：Geometrical representation	SE/G[16-a] C/E[16-b]
			『the south façade use passive solar energy』	Constructed according to Swiss "Minergie Standard", 『the south façade use passive solar energy』. [16-a],[16-b]	《Architectural Material Expression》：Solar panel	SE/G[16-a] C/E[16-b]
			『"sedum" green roof with PVC panels』	The roof is a 『"sedum" green roof with PVC panels』. [16-a],[16-b]	《Architectural Material Expression》：Roof	SE/G[16-a],C/E[16-b]
17	"Symphony of Modules,"	□	『The basic geometry of the building』	『The basic geometry of the building』 is inspired by a 1967 sketch for a music score by the composer Istvan Anhalt, "Symphony of Modules," discovered in a book by John Cage titled "Notations". [17-c]	《Modeling Expression》：Modeling design	MF[17-c]
			『Three pavilions』	『Three pavilions』; one for entry, one residence, and one guest house, appear to push upward from a continuous gallery level below. [17-c]	《Modeling Expression》：Modeling configuration	MF[17-c]
			『the cutting of 55 skylight strips in the roofs of the three pavilions』	The idea of space as silent until activated by light is realized in 『the cutting of 55 skylight strips in the roofs of the three pavilions』. [17-c]	《Architectural Material Expression》：Skylight	MF[17-c]
			『Proportions』	『Proportions』 are organized around the series 3, 5, 8, 13, 21, 34, 55. [17-b]	《Modeling Expression》：Modeling configuration	MF/E[17-b]

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The image of magnification and reduction, such as the meaning of a telescope or a telescope, seeing a small object as a large object or vice versa, is projected through the construction procedure of building a large room or component from a small component or room in architecture. Spatial Layout Expression can be summarized into four categories: Lighting and Spatial area, Room composition and Room usage. Phenomena that are difficult to grasp as entities, such as lighting and spatial domain, are summarized as phenomenal space, while the composition of each room and the way the room is used are classified as room use characteristics, which are categorized as physical space.

Exterior Expression can be divided into four categories: Ground, Approach, Exterior space, and Landmark. The design of approaches, exterior space design, and landmarks that have materialized as design are considered Physical design, while those that are not altered in relation to the external environment are considered phenomenal design and are grouped into two major operational expressions. Modelling Expression can be summarized into four categories: Modelling configuration, Building appearance, Modelling design and geometric modelling design.

These four types of expression are Physical expression. Finally, Plan Expression can be summarized into three categories: geometric, contrastive, and coexisting. Geometric expressions are expressed two-dimensionally in the form of flat cross sections. Geometrical representations are expressed in two dimensions as flat cross-sections, while contrast representation and coexistence representation are expressed as elevations. As shown in Figure 5, architectural expressions corresponding to motifs can be roughly divided into five categories by the KJ method: Architectural Material Expression, Spatial Layout Expression, Exterior Expression, Modelling Expression, Plan Expression.

It is clear that Holl has two types of architectural expression corresponding to the motifs: physical expression and complex expression of both physical and phenomenal manipulation.

DISCUSSION

This study has argued that the relationship between concept and architectural expression from Holl's discursive. Using the KJ method and matrix analysis, Holl's concept statement about the residential work revealed the following results. This study found 15 components of the concept, consisting of five elements: site context, client context, cultural context, analogical context, and architectural context. These elements could also be summarized into passive conditions that must be accepted as design conditions and active conditions that are conceived by the designer.

Similarly, architectural expressions corresponding to the motifs were also extracted from the concept statement and categorized according to meaning and use. An L-shaped matrix diagram was created with these elements on the vertical axis and architectural expressions corresponding to the motifs on the horizontal axis.

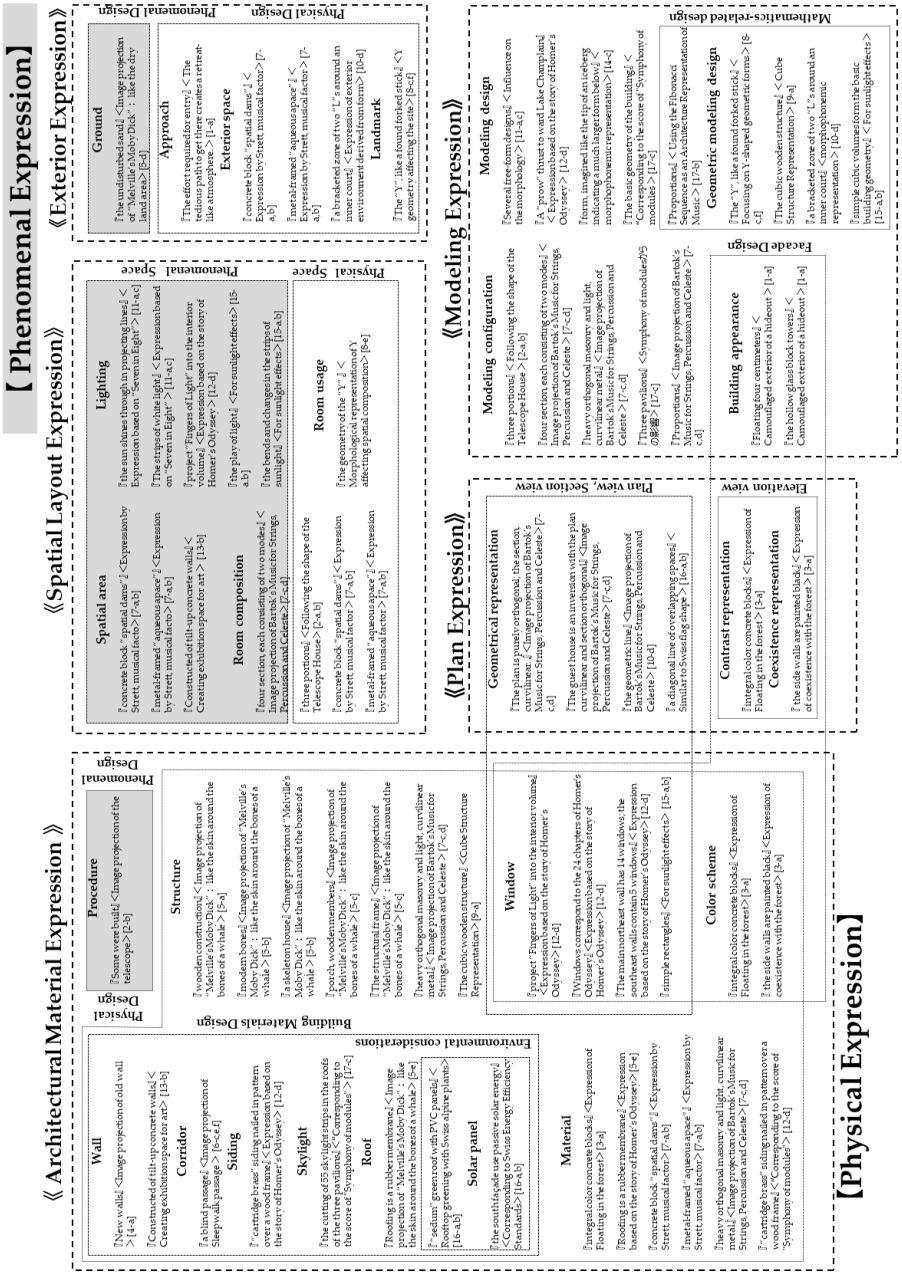

Figure 5. The summary of motif and architectural expression （Note1）

Table 4 shows the relationship between the components of the design concept and the architectural expression corresponding to the motif. The characteristics obtained from the matrix diagram are discussed by comparing the two factors of passive and active conditions on the vertical axis. First, as motifs in Architectural Material Expression, the concept components in passive conditions and the radar diagram in active conditions tend to be similar, especially in artistic motifs.

Next, motifs in Spatial Layout Expression showed a similar radar diagram in the passive and active conditions, especially in the artistic motifs. There was a tendency to use artistic motifs in the expression of motifs using Architectural Material Expressions and Spatial Layout Expressions.

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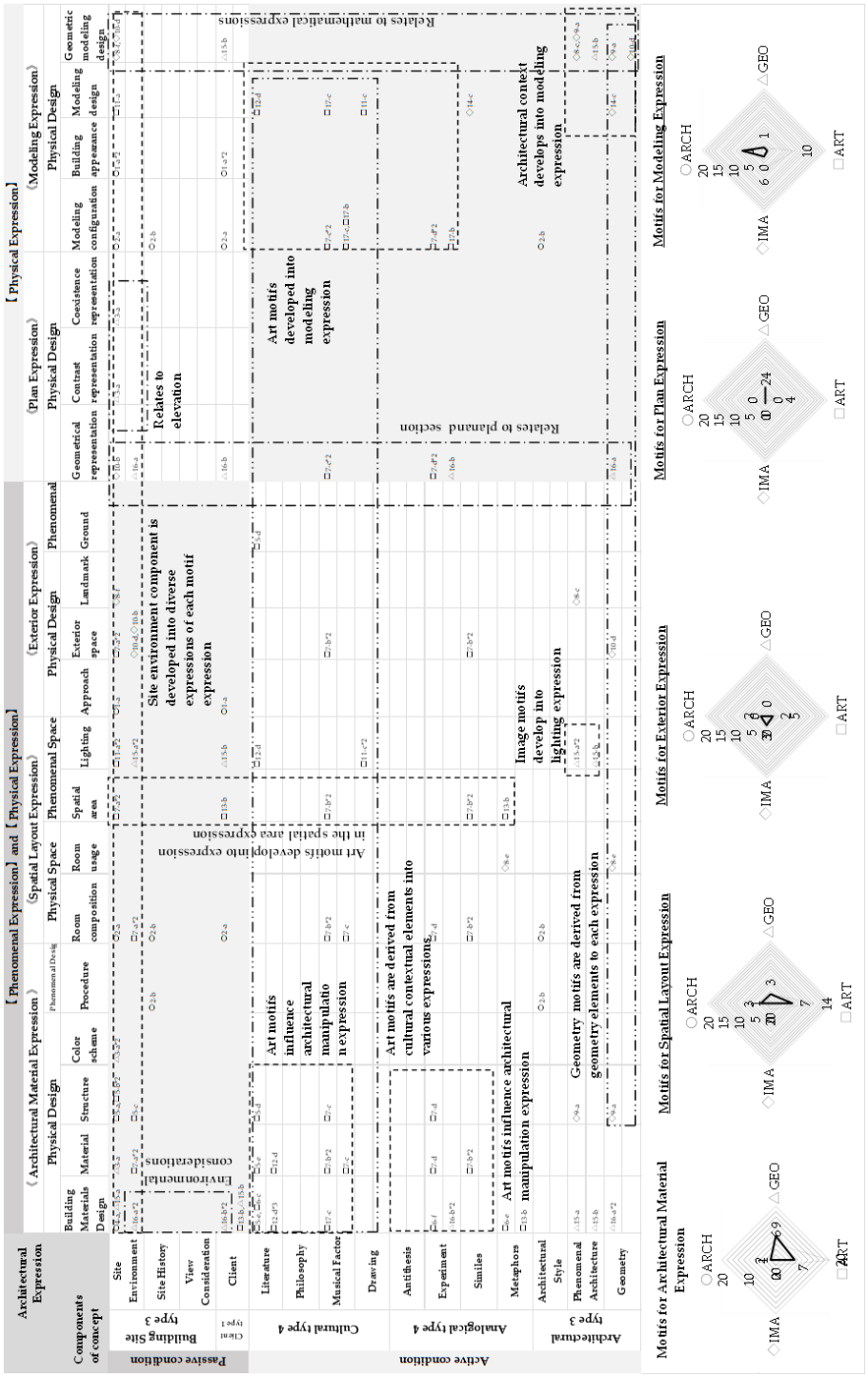
Table 4. The relationship of motif and architectural expression



Artistic motifs were also found in active conditions, so the purpose of the design was based on the designer's own ideas. Next, a radar diagram of the motifs in Exterior Expression is presented, showing the different trends between the concept components in the passive condition and the active condition. First, the motifs of architecture, art, and geometry were equally likely to be present in the passive condition, while the motifs of art and geometry were more likely to be present in the active condition. The next section discusses motifs in architectural Plan Expression. A

radar diagram of the different tendencies in the passive and active conditions is presented. In the passive condition, the motifs are specialized in image motifs, while in the active condition, the motifs tend to be artistic motifs.

Finally, there are motifs in Modelling Expression. A radar diagram of the different tendencies between the passive and active conditions is presented. The passive condition is characterized by architectural motifs, while the active condition is characterized by artistic and geometric motifs. Although each of the five forms of expression has its own characteristics and outcomes. The artistic motifs are considered to be derived from the concept components under active conditions. This suggests that thoughts and ideas related to art are motifs that spring from the architectural thinking and identity cultivated by the designers themselves. This study has analysed the discourse written in the design of Steven Holl's residential works to extract concepts, motifs, and architectural expressions, and has clarified the relationships among them. Many previous studies have described design philosophies cantered on phenomenology based on Holl's works. Ono's research clarified the structure of Holl's words, which indicate a methodology for speculating on architectural design. In Ono's study, Holl's architectural design methodology shows the influence of Merleau-Ponty's philosophy, and Ono found that illustrating Holl's phenomenology-inspired design concepts. The contribution of this study has been to confirm that the relationship between concept and architectural expression from Holl's discourse on residential works. Ono's research discussed Holl's design concept itself, focusing on phenomenology, but this study differs in that it deals with the concept text of the residential work and focuses on the relationship between Holl's design ideas and the architectural expression in the specific text.

Next, I will discuss the usefulness of the research methods used in this study. The KJ method is an efficient and effective method for extracting important elements of discourse expression. Matrix analysis, which was used to clarify the relationship among the extracted elements, was a useful research method in that it facilitated the comparison and evaluation of many elements together.

CONCLUSIONS AND FUTURE WORKS

In this study, the relationship between concept and architectural expression is discussed from the viewpoint of textual expression. However, it will be possible to examine how the relationship between concept and architectural expression is changing not only in terms of discourse but also in terms of sketches, models, and drawings. In addition, this research can be applied to identifying the design design methodologies of other architects.The purpose of this study is to examine the relationship between the contextually expressed concept and the corresponding architectural expression in Steven Holl's residential design, and to clarify some aspects of architectural expression. It has

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been found that the design concept is composed of 15 elements from five context type: building site type, client type, cultural type, analogical type, and architectural type. From the design concept, motifs were extracted as the subjects that motivate the creation of residential works. Each motif was grouped by meaning, which could be summarized into motif expressions of architecture, image, art, and geometric forms. In order to find out how motifs are expressed in residential works, a survey was conducted on architectural expressions corresponding to the motifs. The architectural expressions could be summarized into five categories: Architectural Material Expression, Spatial Layout Expression, Exterior Expression, Plan Expression and Modelling Expression. An L-shaped matrix diagram was created to explore the relationship between the architectural expressions corresponding to the motifs and the components of the concept, and the characteristics of each motif expression were clarified. It became clear that the Holl was a manifestation of a unique and experimental architectural concept that incorporates cultural subjects and works of art into the composition of its design purpose in a variety of architectural expressions. The findings in this study will contribute to the diversity of concepts in architectural design and to the cultural appeal of architecture.

Holl will continue to be increasingly active and will continue to be culturally recognized as one of the architects influenced by phenomenology. Future study will focus on how phenomenology has influenced architecture and the relationship between concept and architectural expression.

NOTES

1. The symbols used in Figure 2 have the following meanings

【】	Expression Classification
《》	Expressions corresponding to motifs
『』	Keywords for sentences expressing motifs
＜＞	Rationale and reasons for supporting motifs
[]	Text quotation number of sentence expressing the motif

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Designing for the Future: The Relationship Between the Interior Design Profession and Sustainable Development Goals

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Abstract

Interior architecture has the potential to create social benefits by designing spaces that affect people's quality of life. The Sustainable Development Goals (SDGs) offer a framework to comprehend the profession's social and environmental responsibilities, and develop strategic approaches. This study aims to assess how the social impact of interior design aligns with the SDGs, offering an opportunity to explore the relation between discipline and sustainability in a comprehensive manner, considering both environmental and social dimensions. The profession's relations and contribution to the goals was evaluated through a review of current literature. To this end, the year 2015, when the Sustainable Development Goals were adopted, was chosen as the starting point and a bibliometric analysis of studies in the Web of Science database between 2015 and 2023 was carried out. In addition to the analysis function of the WOS database, the bibliometric analysis program Vosviewer was used for data analysis. The results of the analysis show that interior design has a strong relationship with goals such as Climate Action (SDG 13), Sustainable Cities and Communities (SDG 11), Responsible Consumption and Production (SDG 12), Good Health and Well-Being (SDG 3), and Affordable and Clean Energy (SDG 7). However, the relationships between Quality Education (SDG 4), Gender Equality (SDG 5) and Reduced Inequalities (SDG 10) are not yet at a sufficient level. The findings indicate that interior architecture has the potential to fulfill its social responsibility by supporting the Sustainable Development Goals. Furthermore, in order to foster a more inclusive relationship with the SDGs, Interior Architecture needs to evolve. It is expected that this will enable to create new perspectives and methodologies, both in professional practice and in the academic literature.

Keywords: *Bibliometric analysis, Interior architecture, Literature review, Social responsibility, Sustainable development goals.*

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INTRODUCTION

The term "sustainable development" was first used in 1980 by the World Union for Conservation of Nature and Natural Resources (IUCN 1980). Subsequently, the Brundtland Commission Report (1987) and the Rio Earth Summit (1992) made sustainable development as a political goal for the global community. The Brundtland Report defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". The definition refers to an approach that balances economic growth, environmental protection, and social equity (WCED, 1987).

In 2000, the United Nations established the Millennium Development Goals (MDGs), which were aimed at being accomplished by 2015. These goals were created to address global issues like poverty eradication, food security, and improved health. At the meeting held in New York on 25-27 September 2015, the UN announced the Sustainable Development Goals (SDGs), which represent the continuation of the aforementioned goals and will set the UN's agenda until 2030. The new goals not only complement the MDG's commitments, but also offer a more expansive global agenda to advance sustainable development by focusing on a wider range of issues and universal goals (Blanc, 2015; Dewan, 2009; Sachs, 2012).

The 2030 Agenda for Sustainable Development provides a universal political framework with the objective of ensuring peace and prosperity for humankind and the planet for both the present and future generations. The overall objective of this agenda is to achieve 17 Sustainable Development Goals (SDGs) and 169 associated subgoals. The goals are a compelling call to action encouraging both developed and developing countries to collaborate globally and take measures to achieve these ambitious targets. The order of these 17 goals is as follows: No Poverty (SDG 1), Zero Hunger (SDG 2), Good Health and Well-Being (SDG 3), Quality Education (SDG 4), Gender Equality (SDG 5), Clean Water and Sanitation (SDG 6), Affordable and Clean Energy (SDG 7), Decent Work and Economic Growth (SDG 8), Industry, Innovation and Infrastructure (SDG 9), Reduced Inequalities (SDG 10), Sustainable Cities and Communities (SDG 11), Responsible Consumption and Production (SDG 12), Climate Action (SDG 13), Life Below Water (SDG 14), Life on Land (SDG 15), Peace, Justice and Strong Institutions (SDG 16), Partnerships for the Goals (SDG 17).

The objective of these goals is to eradicate poverty and other social deprivations, improve health and education, reduce inequalities, and foster economic growth. In addition, the SDGs include a number of action plans that are meant to combat climate change and safeguard oceans and forests. The interconnected and integrated nature of the SDGs focuses on balancing the economic, social, and environmental dimensions of sustainable development, defining them as an inseparable whole. The goals and targets have been established to encourage concrete action in

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areas of critical importance to humanity between 2015 and 2030. The SDGs' entire agenda is aimed at guiding all countries towards the actions required for future sustainability, while also promoting global cohesion and cooperation (United Nations, 2015). As a significant initiative, the SDGs represent a significant effort to make the world a more livable and sustainable. The importance of this idea is rising due to the environmental and social problems facing the world (Sachs, 2012).

Active participation in the Sustainable Development Goals at both the individual and societal level represents a fundamental social responsibility, one that is essential to the realization of a more sustainable world in the future. The social responsibility of the professions can be defined as the duty of professionals to consider the impact of their actions on others and to prioritize the welfare of society (Frankel, 1988). In this context, the Sustainable Development Goals (SDGs) can be considered as criteria that enable professionals to fulfill their social responsibilities.

One of the disciplines where social and environmental responsibility has a massive impact is design. It is imperative that designers adopt a socially and environmentally conscious approach that is sensitive to living beings, moving beyond the traditional profit-oriented approach. Designers have considerable impact on environmental and social issues through their design choices (Koo, 2016). Similarly, spatial design is a factor both in the construction of structures and related directly with individual preferences. In other words, the objective in the activities of the interior architecture profession should be to create solutions that will improve human life and support the sustainability of life on Earth. It is incumbent upon interior architects to accurately identify the spatial issues that arise in all aspects of life and to devise novel solutions to these problems. Therefore, interior architects have a responsibility to address the ecological and social problems facing the world through the production of space. The primary objective of professionals in this field should be to guarantee the continuity of life on Earth by making substantial changes in all aspects of life, thereby creating a more livable world for future generations (Andereas, 2019). Additionally, they have the opportunity to develop projects that contribute to sustainable development and enhance the general welfare of society (Anderson et al., 2007).

The responsibility to ensure our living spaces for future generations in environmental, economic and social dimensions places the consideration of the sustainability of interiors among the fundamental duties of interior architecture. The Sustainable Development Goals (SDGs) provide a set of criteria that will enable the profession to fulfill this task by enriching the design of interiors with considerations of energy efficiency, the use of environmentally sensitive materials, waste reduction and social equality and accessibility. These goals encourage interior designers to develop innovative and responsible design

solutions, thereby enabling them to fulfill their professional social responsibilities.

In this framework, the main aim of this study is to evaluate the social responsibility of interior architecture in the context of the Sustainable Development Goals (SDGs). To elucidate the relationship between the two by analyzing current literature on the subject. In this context, the research questions for the study are as follows:

1. Which disciplines and sustainable development goals are the research topic related, and how have these relationships evolved over time?

2. What is the geographical distribution of the research topic? What is the relationship between this distribution and sustainable development goals?

3. What are the major themes in the literature and the sustainable development goals with which the topics are related?

In order to address these questions, a systematic literature analysis was conducted to examine the developments, changes and focal points that occurred in the handling of the subject between 2015 and 2023. It is anticipated that the findings will illuminate both the theoretical and practical aspects of how interior architecture contributes to sustainable development. Additionally, it can provide insights on the potential evolution of the field's relationship with sustainable development goals.

A review of the literature on the relationship between sustainable development and interior architecture reveals a variety of research topics and approaches. The headings for these topics include sustainable design principles and practices, technological innovations and environmental sustainability, interior space and human welfare, and interior architecture education and curriculum development. In the first category, sustainable design principles and practices, studies are presented which delineate the fundamental elements of sustainable interior design (Ayalp, 2012; Sinha & Fukey, 2022) and which discuss the integration of sustainable design principles into Interior Architecture, together with the difficulties encountered in this process (Lee, 2014; Pilatowicz,2015). Furthermore, the necessity of incorporating sustainability indicators into interior design and integrative solutions that facilitate the transition to sustainable architectural design is emphasized (Sarmento & Souza, 2017; Celadyn, 2018).

Studies that focus on technological innovations and environmental sustainability have predominantly demonstrated the potential of smart technologies and innovative design solutions in sustainable interior design (Rashdan, 2016; Attia, 2018) according to the review of the literature. Furthermore, research has also concentrated on the implementation of sustainable strategies in interior architecture and the environmental and social consequences of such strategies (Ahmed, 2022; Sorrento, 2012). The aforementioned sources provide detailed accounts on how innovative design approaches and sustainable practices are implemented within this field. Another group of studies focuses on the

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selection of sustainable materials and their environmental impact (Hayles, 2015; Lee & Allen, 2013). These studies address the motives of interior designers to use sustainable materials, emphasizing the importance of material origin knowledge and environmental awareness. A substantial body of researches examining the topics of adaptive reuse, integration of reclaimed materials, resource efficiency, application of sustainable materials and their contribution to sustainable interior design has consistently highlighted the pivotal role of material innovations in interior design (Celadyn, 2019; Fathy, 2016; Linhares & Pereira, 2017; Mrinalini et al., 2023; Jeadi et al., 2023; Santoso et al., 2023; Van, 2018; Yang, 2022).

Several studies have explored the impact of interior architecture on sustainable development and its connection with human well-being (Barbosa et al., 2015; Banaei et al., 2015). Furthermore, integrating sustainable practices that improve indoor air quality and optimize energy efficiency is a key area of focus in environmental sustainability within interior design (Rashdan & Ashour, 2017; Sari, 2024). These studies highlight the significance of critical factors such as ventilation, material selection and waste management. The final group centers on the education and curriculum development within interior architecture, highlighting the incorporation of sustainability principles (Afacan, 2019; Afacan, 2013; Boehm, 2015; Celadyn, 2020; El-Zeney, 2017; Ioannou-Kazamia & Lapithis, 2020; Schneiderman & Freihoefer, 2013; Shu, 2023; Oduho, 2022). These studies explore various strategies for curriculum development to help students embrace sustainable design principles. Additionally, studies examine the attitudes and perceptions of interior architecture students towards sustainability concepts and practices (Bettaieb, 2020; Gale et al., 2014; Ruff & Olson, 2007), as well as how these perceptions evolve over time (Gulwadi, 2009; Gürel, 2010; Stark & Park, 2016). These studies emphasize the role of educational processes in shaping students' understanding of sustainability concepts and the effectiveness of sustainability practices in interior architecture education.

This study discusses the relationship between interior design and the Sustainable Development Goals (SDGs) from a broad perspective, focusing on the social and environmental responsibilities of the profession. The SDGs offer a universal framework for enhancing social welfare and supporting environmental sustainability, and guiding effords to solve pressing global problems. On the other hand, as a profession with the ability to shape living environments and meet environmental obligations, interior architecture, plays an important role to play in advancing the SDGs and improving individual well-being. However, the relationship between these two fields remains underexplored in the literature. In this context, the main objective of this study is to understand the relationship between the interior design profession and the SDGs, and to evaluate the link from a social responsibility perspective. In this

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regard, it aims to contribute to the field by reviewing existing literature and conducting quantitative research on the topic.

The significance of this study lies in its identification of the interior design profession's potential impact on sustainable development, and its effort to raise awareness about the future role of the profession. It is anticipated that the findings will shed light on the development of new approaches in education, practice and interdisciplinary collaboration, enhancing the contribution of interior architecture to the SDGs.

METHOD OF RESEARCH

A literature review is essential for advancing a research field. It entails the collection of information within a specific area, identifying gaps in the existing literature, and formulating potential topics and questions related to the research area (Şimşir, 2022). The term "bibliometric research" is defined as "a systematic literature review in which bibliographic data are analyzed by bibliographic methods" (Block & Fisch, 2020) through quantitative analyses (Ellegaard & Wallin, 2015). This study conducted a bibliometric analysis of existing literature to examine the connection between sustainable development goals and the discipline of interior architecture. Furthermore, the objective was to collect data that enables the exploration of this field in the context of social responsibility aligned with these goals.

Method: Bibliometric Analysis

Bibliometric analysis has emerged as a significant methodology for evaluating the scientific outputs, including studies, authors, keywords, journals, institutions and countries across different research domains. It facilitates the analysis of a field's intellectual, social, and conceptual evolution, clarifying the relationships and interactions between these aspects (Aria & Cucurullo, 2017). The principal goal of the analysis is to identify, evaluate and understand the literature (or a specific segment thereof) within a given scientific domain. A bibliometric analysis is a process of examining publications in a particular field or in a academic journal with the help of numerical analyses and statistics on various bibliometric indicators. These metrics include the number of articles published over the years, topics, contributing universities, leading journals, authors, citation counts, keywords and so forth. The aim is to obtain findings on scientific communication (Cobo et al., 2011).

In the context of the study, common word analysis, a bibliometric analysis technique, is employed to identify the core topics of the studies. This analysis looks at the relations between the concepts and words used in the titles, abstracts and keywords of the studies in a specific research field (Aria & Cucurullo, 2017). The co-occurrence of two keywords in different studies within a field is an indicator of the connection between those words. By measuring the strength of the relationship between words through common word analysis, patterns and trends of a particular field or discipline can be revealed; dominant research topics in

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a field can be identified; and the relationships between them can be visualized (Donthu et al., 2021; Öztürk, 2020). In the common word analysis technique, the title, abstract and keywords of the study are used as data. The technique identifies main topics or research areas in a given field, the most studied topics/concepts and their relations and the dynamics of conceptual changes can be determined (Bağış, 2022).

The Processes of Data Collection, Analysis and Evaluation

In bibliometric research, a four-step process is usually followed to identify relevant literature in a transparent and reproducible manner. This process involves selecting a database, conducting an initial search, filtering the dataset and downloading the results (Öztürk, 2020). The following section outlines the steps carried out in the context of this study.

1. Selection of the database: The Web of Science (WOS) database, which is compatible with bibliometric data analysis software, offers the ability to download data sets, is updated daily, and provides a filtering feature that allows categorization of publications according to Sustainable Development Goals. Thus, it was selected as the preferred database. First released in 1997, this database, produced by the Institute for Scientific Information, is the oldest and most widely used database in the world, and is internationally recognized.

2. Initial search process: The search terms "sustainable development" or "sustainable development goals" and "indoor" or "interior" or "interior design" or "interior architecture" or "interior decoration" were used. A search was conducted in the WOS database using the TOPIC[1] option in the search field for the relevant keyword in the search bar on the Basic Search screen.

[1] With this search option, the relevant keyword is searched in title, abstract, author keywords and Web of Science keywords.

3. Filtering: In the results screen, the year 2015, when the Sustainable Development Goals were adopted, was identified as the starting point to 2023. In the initial stage of the process, no filtering was applied to the other search options.

4. Downloading the data set: The data for preparing the relevant graphs were downloaded by selecting the desired parameter that appears after selecting 'Analyze Result' on the result screen and then selecting the 'Download data table' option. The data used in the common word analysis were downloaded in PlainText file format, which is compatible with the VOSviewer bibliometric analysis program, from the export button located in the top left corner of the result screen. To do so, the Full Record option was selected from the Export Records to PlainText File option. The data were imported into the VOSviewer bibliometric analysis program.

The analysis results were interpreted based on their answers to the research questions. The research questions were evaluated under the two sub-headings; former the general trend and orientation of the literature were determined later the structure and basic dynamics of the research area.

FINDINGS

A search was conducted using the defined keywords[2], and 861 results covering the years 1993-2023 were retrieved. Upon filtering the results to include only those published between 2015 and 2023, 640 publications were identified. The literature, which began with a modest number of publications in 2015, the year the Sustainable Development Goals were adopted and the research period started, has shown a steady upward trend through 2023. The analysis titles, aligned with the research questions, are presented below.

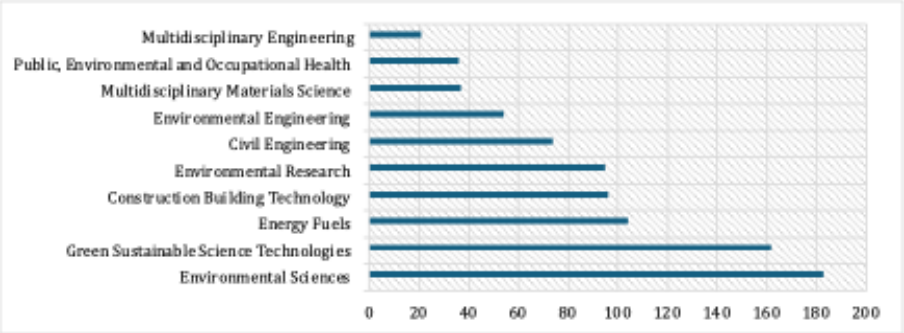
[2] The data obtained from the search results on 13/03/2024 was employed in the study.

Analysis of the Research Topic in the Perspective of Disciplines and Sustainable Development Goals

Distribution of Publications by Scientific Field Category

The distribution of publications according to the scientific field category has been presented in a graph with reference to the WOS database category. This graph demonstrates the positioning ot the study's topics within academic disciplines and highlights the fields are most associated with the searched keywords. Publications related keywords were classified into 124 different categories in the WOS database and the graph presents data for the top 10 categories with the highest publications counts.

Graph 1: Distribution of publications by Web of Science category



As illustrated in Graph 1, the categories with the highest number of publications are Environmental Sciences and Green Sustainable Science Technologies. Categories with a moderate number of publications are Energy Fuels, Construction Building Technology, Environmental Research, Civil Engineering and Environmental Engineering. The categories Multidisciplinary Materials Science, Public, Environmental and Occupational Health and Multidisciplinary Engineering have relatively fewer publications. It is worth noting that the field of interior architecture is absent as a distinct category within the WOS database. However, due to its significant role in sustainability and environmental issues, interior architecture is likely categorized under fields with a medium or low number of publications. This suggests that interior architecture can occupy a position within a diverse range of disciplines and engage with multiple academic fields.

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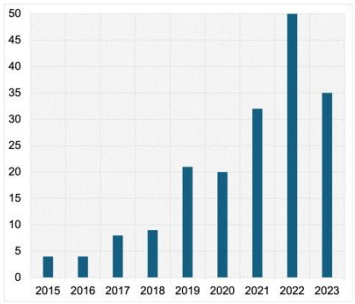
Distribution of Publications According to WOS Scientific Field Category by Year

The annual distribution of publications by WOS Scientific Field category (Table 1) illustrates the publications across the 10 scientific fields with the highest publication counts. There has been a notable increase over time in the categories of Environmental Sciences (Graph 2), Green Sustainable Science Technologies (Graph 3), Construction Building Technology (Graph 5), and Environmental Research (Graph 6). Meanwhile, Energy Fuels (Graph 4), Civil Engineering (Graph 7) and Environmental Engineering (Graph 8) show an overall upward trend, though with periodic declines. However, the number of publications in all these categories decreased in 2023.

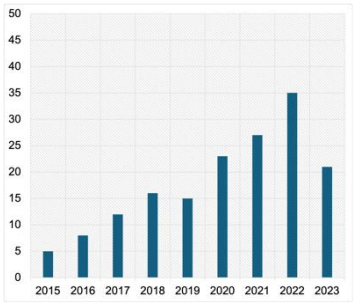
A comparison of the number of publications in Multidisciplinary Materials Science (Graph 9), Public, Environmental and Occupational Health (Graph 10), and Multidisciplinary Engineering (Graph 11) shows a relatively low and fluctuating trend compared to other categories. However, these categories saw an upward trend in recent years (2022-2023). Furthermore, the categories Construction Building Technology (Graph 5), Environmental Engineering (Graph 8), Multidisciplinary Materials Science (Graph 9) and Public, Environmental and Occupational Health (Graph 10) have doubled or tripled compared to previous years.

Table 1. Distribution graphs of publications according to web of science category by year

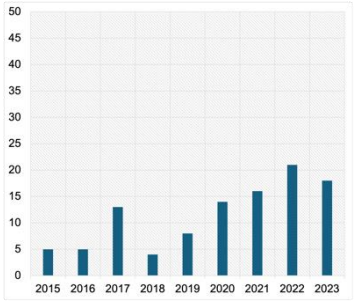
Graph 2: Environmental Sciences



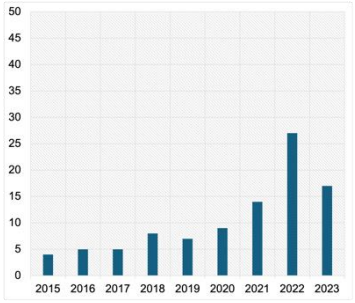
Graph 3: Green Sustainable Science Technologies



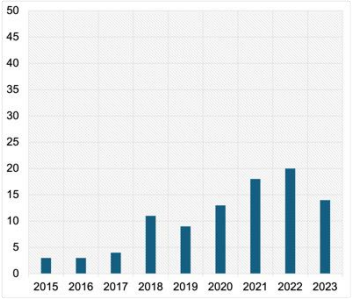
Graph 4: Energy Fuels



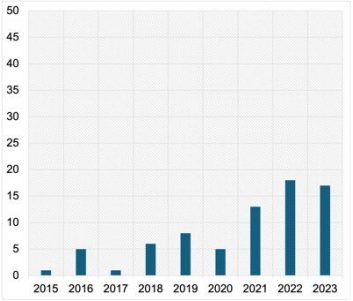
Graph 5: Construction Building Technology



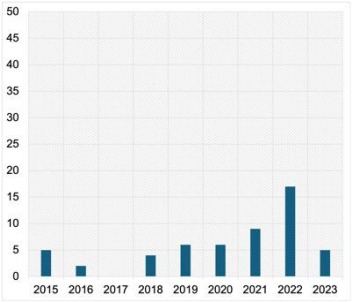
Graph 6: Environmental Research



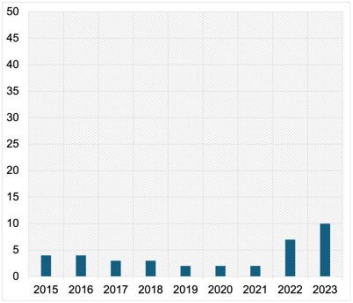
Graph 7: Civil Engineering



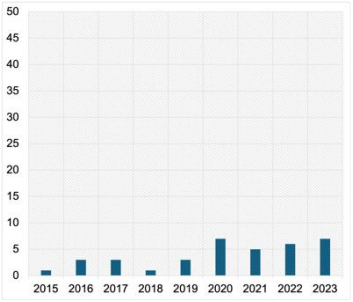
Graph 8: Environmental Engineering



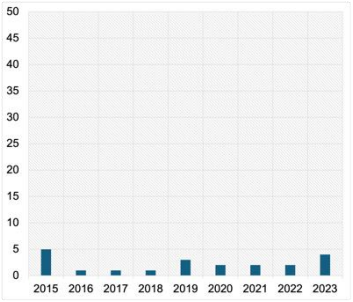
Graph 9: Multidisciplinary Materials Science



Graph 10: Public, Environmental and Occupational Health



Graph 11: Multidisciplinary Engineering



Distribution of Publications by Sustainable Development Goals

The graph of publication distribution according to sustainable development goals (Graph 12) illustrates how the analyzed publications align with the sustainable development goals. Partnerships for the Goals (SDG 17) is not included in the graph, as it is not among the options available for searching the database by filtering according to sustainable development goals.

Climate Action (SDG 13) leads with the most publications, comprising 32.7% of the total, while Sustainable Cities and Communities (SDG 11) ranks second with 17.3%. Health and Quality of Life (SDG 3) with 12.8%, Responsible Production and Consumption (SDG 12) with 10.8%, Accessible and Clean Energy (SDG 7) with 8.4% and Life on Land (SDG 15) with 6.1% have medium coverage, collectively accounting for 38% of the total publications.

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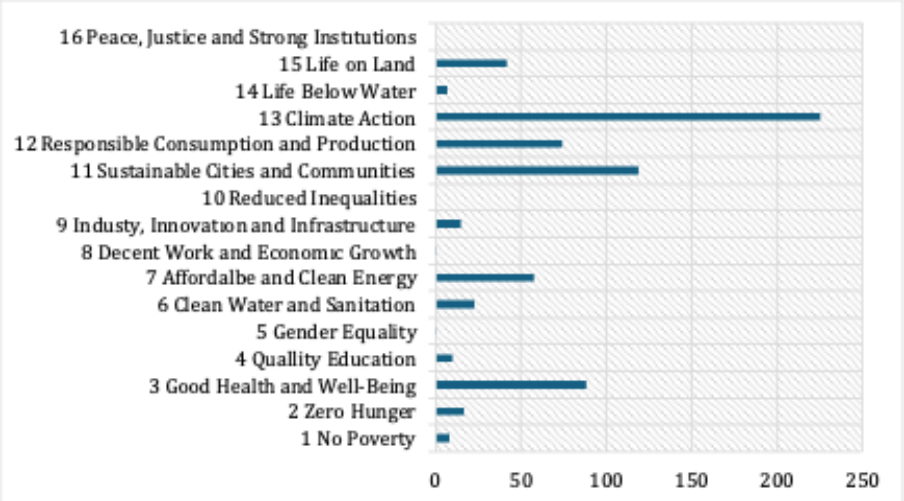
Graph 12. Distribution of Publications by Sustainable Development Goals



Clean Water and Sanitation (SDG 6) with 3.3%, Zero Hunger (SDG 2) with 2.4%, Industry, Innovation, and Infrastructure (SDG 9) with 2.2%, Quality Education (SDG 4) with 1.45%, Zero Poverty (SDG 1) and Life on Water (SDG 14) with 1% have low coverage, comprising 11.6% of the total. Decent Work and Economic Growth (SDG 8), Gender Equality (SDG 5) and Reducing Inequalities (SDG 10), Peace, Justice, and Strong Institutions (SDG 16) have no publications associated with them.

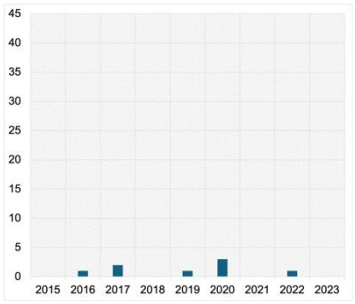
Publication Distribution of Sustainable Development Goals by Year

The publication distribution graphs for the Sustainable Development Goals (SDGs) by year (Table 2) illustrate the evolution of publications over time. The graphs are divided into four groups based on shared characteristics. A review of publications in Graph 15-Good Health and Well-Being (SDG 3), Graph 20-Sustainable Cities and Communities (SDG 11), Graph 21-Responsible Consumption and Production (SDG 12), and Graph 22-Climate Action (SDG 13) reveals a more stable trend with higher publication numbers than other categories. While fluctuations are evident in certain years, the overall trend remains relatively stable. Graphs 17, 18, 23 and 24, representing Clean Water and Sanitation (SDG 6), Affordable and Clean Energy (SDG 7), Life Below Water (SDG 14) and Life on Land (SDG 15) respectively, indicate a general upward trend. However, decreases are observed in certain years over time. In particular, there have been increases of up to twofold since 2021.

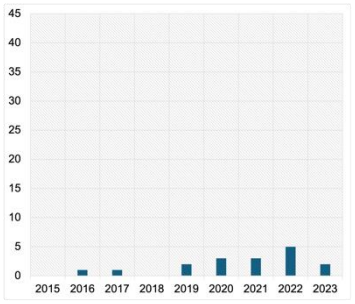
Analysis of Graphs 13, 14, 16, 19, reveals that this group with a limited number of publications exhibits a fluctuating trend with a notable decrease in 2023. A single publication was recorded for Gender Equality (SDG 5) in 2021, and another for Decent Work and Economic Growth (SDG 8) in 2015. Regarding the Peace, Justice and Strong Institutions (SDG 16) target, two publications were identified in 2019 and 2022. No publications were found for the Reduced Inequalities (SDG 10) target. It is important to noted that these goals are not represented graphically due to the statistically insignificant number of publications.

Table 2. Publication distribution graphs of sustainable development goals by year

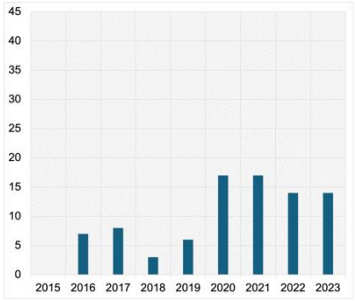
Graph 13: SDG 1 No Poverty



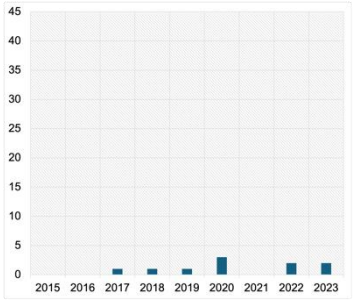
Graph 14: SDG 2 Zero Hunger



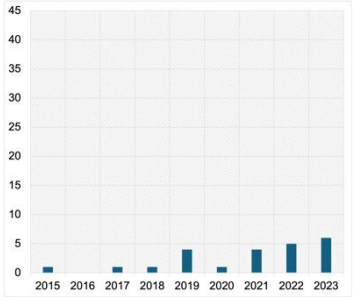
Graph 15: SDG 3 Good Health and Well-Being



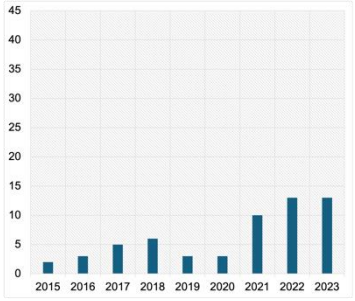
Graph 16: SDG 4 Quality Education



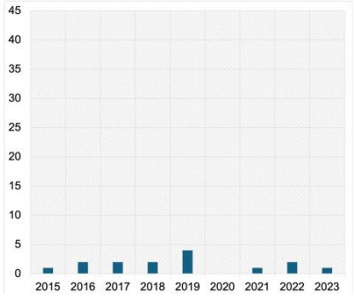
Graph 17: SDG 6 Clean Water and Sanitation



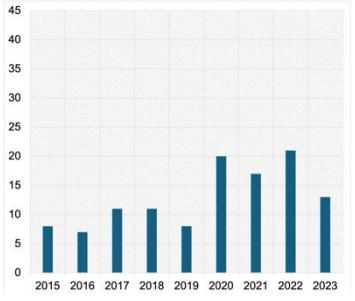
Graph 18: SDG 7 Affordable and Clean Energy



Graph 19: SDG 9 Industy, Innovation and Infrastructure



Graph 20: SDG 11 Sustainable Cities and Communities



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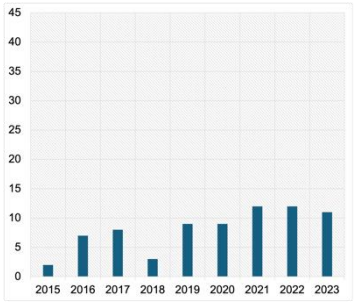
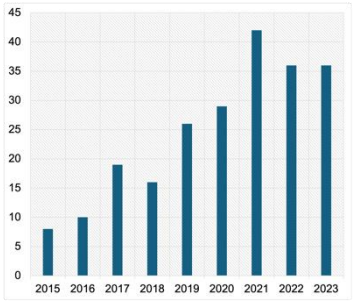
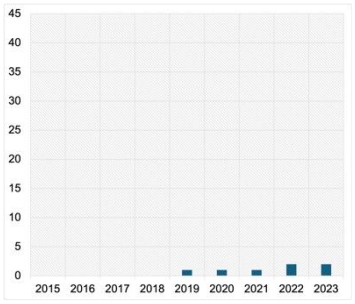
Graph 21: SDG 12 Responsible Consumption and Production



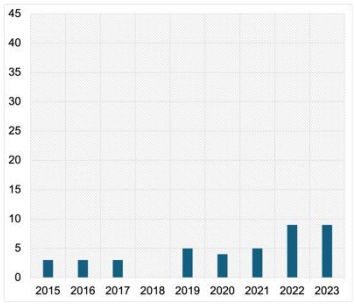
Graph 22: SDG 13 Climate Action



Graph 23: SDG 14 Life Below Water



Graph 24: SDG 15 Life on Land



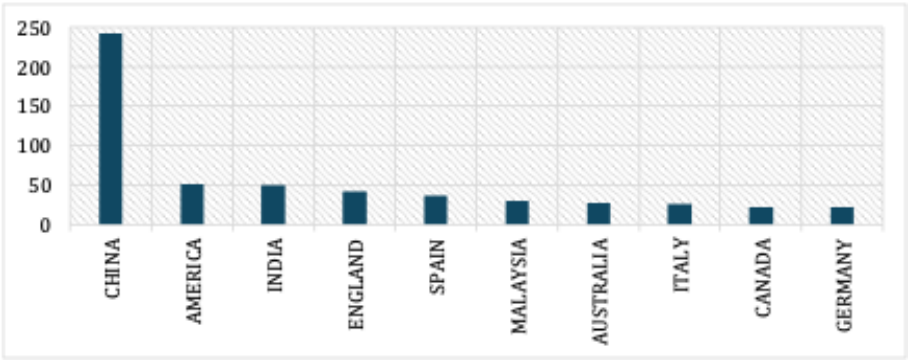
Analysis of Publications in the Perspective of Geographical Data

Distribution of Publications by Countries and Continents

The distribution of publications by country and continent provides a valuable metric of global academic activity and interest in sustainable development and interior architecture. The data shoe a clear view of the geographical spread on sustainable development and interior architecture, reflecting global interest in the field. Additionally, a publication distribution analysis can give researchers insights into which regions should focus more on these topics. The keywords were analyzed in 99 countries in the WOS database, and the data for the top 10 countries with the most publications were visualized in the graph.

A detailed review of Graph 25 reveals that China leads with 37.8% of the total publications, followed by the United States (8%) and India (7.8%). The United Kingdom (6.5%), Spain (5.7%), Malaysia (4.6%), Australia (4.2%), Italy (4%), Canada (3.4%), and Germany (3.4%) exhibit comparable rates.

Graph 25. Distribution of publications by country



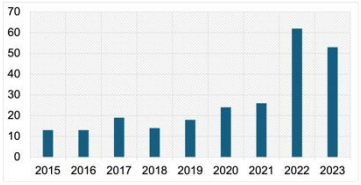
A comparison of publication distribution by continent reveals that Asia leads with the highest number of publications. It is noteworthy that a substantial portion of Asia's total publications comes from contributions by countries such as China and India. Europe ranks second after Asia, achieving significant numbers overall despite many countries publishing at average or low levels. The main contributors to Europe include England, Spain, Germany, and Italy. North America, primarily through the United States, has a moderate level of publications overall.

Publication Distribution of Countries by Years

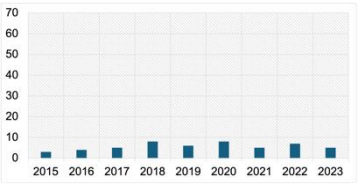
The publication distribution graphs of the top 10 countries by year (Table 3) illustrate the dissemination of academic studies on interior architecture in the context of sustainable development goals across various countries over time. These graphs demonstrate the research trends of countries on this subject over time.

Table 3. Publication distribution graphs of countries by year

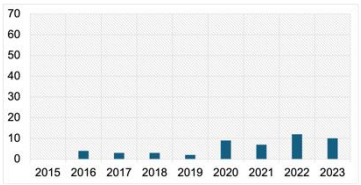
Graph 26: Publication Distribution of the China by Year Poverty



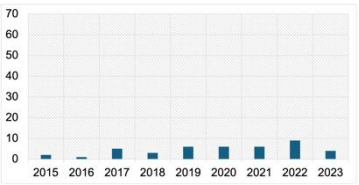
Graph 27: Publication Distribution of the USA by Year



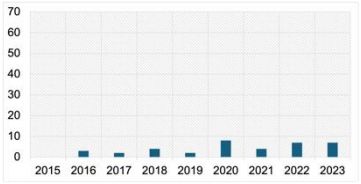
Graph 28: Publication Distribution of the India by Year



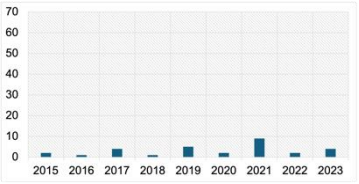
Graph 29: Publication Distribution of the England by Year



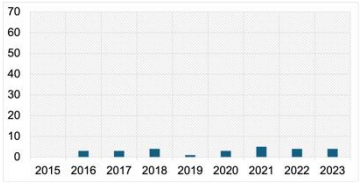
Graph 30: Publication Distribution of the Spain by Year



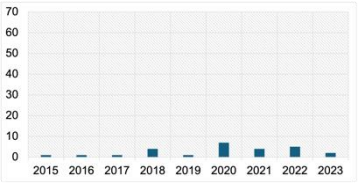
Graph 31: Publication Distribution of the Malaysia by Year



Graph 32: Publication Distribution of the Australia by Year



Graph 33: Publication Distribution of the Italy by Year



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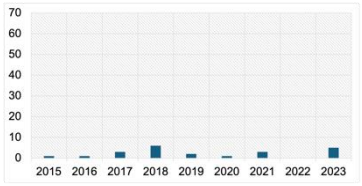
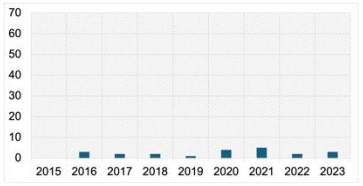
Graph 34: Publication Distribution of the Canada by Year



Graph 35: Publication Distribution of the Germany by Year



In 2015, after the Sustainable Development Goals were adopted, countries such as China, the USA, the UK, Italy, and Canada began publishing relevant material. Subsequently, other countries began contributing publication as well. China (Graph 26) has consistently demonstrated a high level of output marked by a sharp rise in 2022 and 2023. The United States (Graph 27) shows some fluctuations in its publications count, yet the overall trend remains stable.

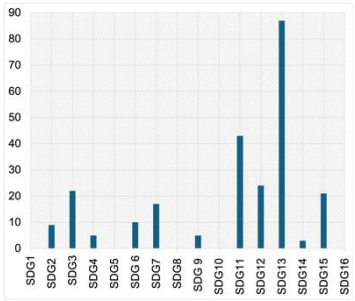
The number of publications in India (Graph 28) and Spain (Graph 30) exhibits a fluctuating pattern, but both countries experienced a significant increase in 2020. While the number of publications are relatively low in the UK (Graph 29), Malaysia (Graph 31), Australia (Graph 32), Italy (Graph 33), Canada (Graph 34) and Germany (Graph 35), there is a discernible trend of fluctuation in the number of publications.

Distribution of Publications by Sustainable Development Goal of Countries

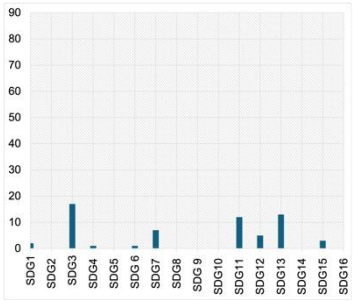
The publication distribution graphs of countries by sustainable development goal (Table 4) demonstrate the numerical distribution of academic studies conducted by different countries with an emphasis on specific sustainable development goals. These graphs reveal which countries contribute most to specific development goal. The findings presented in the graphs in Table 4 are further examined in Table 5, which shows an aggregate distribution of publications by sustainable development goal for different countries.

Table 4. Publication distribution graphs of countries according to sustainable development goals

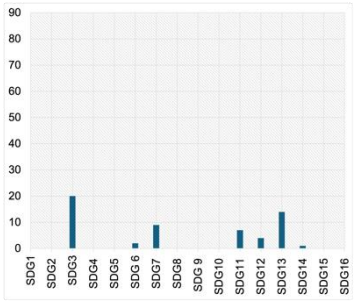
Graph 36: Distribution of China's Publications by SDGs



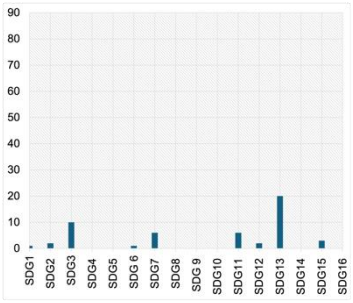
Graph 37: Distribution of ABD's Publications by SDGs



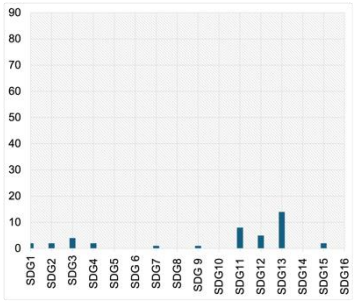
Graph 38: Distribution of India's Publications by SDGs



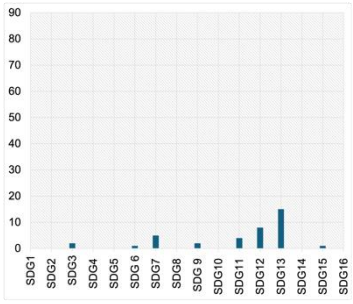
Graph 39: Distribution of England's Publications by SDGs



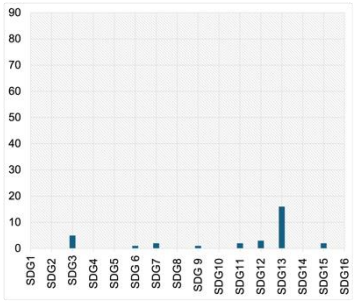
Graph 40: Distribution of Spain's Publications by SDGs



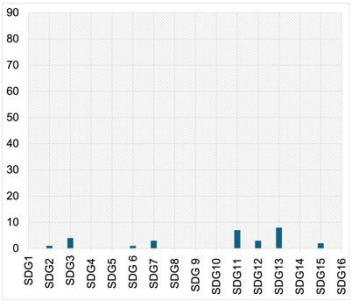
Graph 41: Distribution of Malaysia's Publications by SDGs



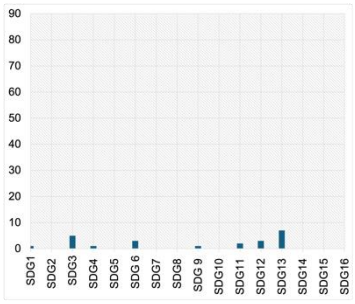
Graph 42: Distribution of Australia's Publications by SDGs



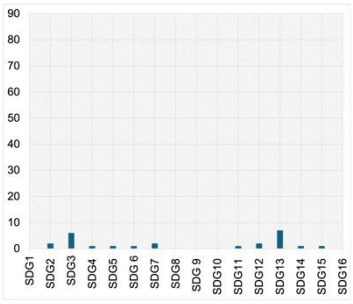
Graph 43: Distribution of Italy's Publications by SDGs



Graph 44: Distribution of Canada's Publications by SDGs



Graph 45: Distribution of Canada's Publications by SDG



According to the table, Climate Action (SDG 13) is the most studied goal, with the highest publication numbers across most countries, except India (Graph 38) and the USA (Graph 37). China contributes the most to this target. All countries have published studies related to this target. In India (Graph 38) and the USA (Graph 37), the Good Health and Well-Being (SDG 3) has the highest number of publications. SDG 3 is also frequently addressed in most countries, except Malaysia (Graph 41). Sustainable Cities and Communities (SDG 11) is the most published target in China (Graph 36), the USA (Graph 37), Spain (Graph 40) and Italy (Graph 43).

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India (Graph 38), the UK (Graph 39), Malaysia (Graph 41), Australia (Graph 42), Italy (Graph 48) and Canada (Graph 44) are countries with medium level of publications in this target. In most countries, Affordable and Clean Energy (SDG 7) is a target with a moderate number of publications, except Spain (Graph 40), Australia (Graph 42) and Germany (Graph 45). Responsible Consumption and Production (SDG 12) stands out as a prominent target with a significant number of publications in Malaysia (Graph 41). For this target, China (Graph 36), USA (Graph 37), Spain (Graph 40), Australia (Graph 42), Italy (Graph 43) and Canada (Graph 44) show medium level of publications. No Poverty (SDG 1), Quality Education (SDG 4), Industry, Innovation, and Infrastructure (SDG 9), and Life Below Water (SDG 14) have low or no publications. Unlike other countries, Canada (Graph 44) for Clean Water and Sanitation (SDG 6) and China (Graph 36) for Life on Land (SDG 15) stand out with a moderate number of publications. For Gender Equality (SDG 5), Germany (Graph 45) is the only country to contribute the target. No country has published on Decent Work and Economic Growth (SDG 8), Reduced Inequalities (SDG 10) and Peace, Justice, and Strong Institutions (SDG 16). China (Graph 36) and Germany (Graph 45) did not publish on 5 sustainable development goals, while other countries did not publish on 7 or more goals.

Table 5. Publication distribution density of countries according to sustainable development goal

	1 No Poverty	2 Zero Hunger	3 Good Health and Well-Being	4 Quality Education	5 Gender Equality	6 Clean Water and Sanitation	7 Affordable and Clean Energy	8 Decent Work and Economic Growth	9 Industry, Innovation and Infrastructure	10 Reduced Inequalities	11 Sustainable Cities and Communities	12 Responsible Consumption and Production	13 Climate Action	14 Life Below Water	15 Life on Land	16 Peace, Justice and Strong Institutions
China	–	■	■	■	–	■	■	–	■	–	■	■	■	■	■	–
ABD	■	–	■	■	–	■	■	–	–	–	■	■	■	–	■	–
India	–	–	■	–	–	■	■	–	–	–	■	■	■	■	–	–
England	■	■	■	–	–	■	■	–	–	–	■	■	■	–	■	–
Spain	■	■	■	–	–	–	■	–	■	–	■	■	■	–	■	–
Malaysia	–	–	■	–	–	■	■	–	■	–	■	■	■	–	■	–
Australia	–	–	■	–	–	■	■	–	■	–	■	■	■	–	■	–
Italy	–	■	■	–	–	■	■	–	–	–	■	■	■	–	■	–
Canada	■	–	■	■	–	■	–	–	■	–	■	■	■	–	–	–
Germany	–	■	■	■	■	■	■	–	–	–	■	■	■	■	■	–

■ Very high number of publications %30-%50 ■ High number of publications %20-%30 ■ Number of mid-level publications %10-%20 ■ Low number of publications %1-%10 – Unpublished

Main Themes in the Literature and Identification of Relevant Sustainable Development Goals

Common-Word Analysis

The analysis of recurring keywords in the publications revealed 2,387 distinct keywords, with "used at least five times" set as the inclusion

threshold. This threshold was selected to ensure a more balanced distribution of the 2,387 keywords, thereby enhancing the reliability and significance of the results. Applying a frequency threshold (a minimum of five instances) allows for comprehensive analysis by including sufficiently repeated keywords while excluding infrequent terms that could disrupt coherence. Accordingly, in this analysis, a minimum of five instances was established as the inclusion threshold, helping to identify primary themes and trends. With this defined threshold, 39 frequently utilized words were identified. The examination of the keyword map revealed six clusters, each represented by a distinct color (Figure 1).

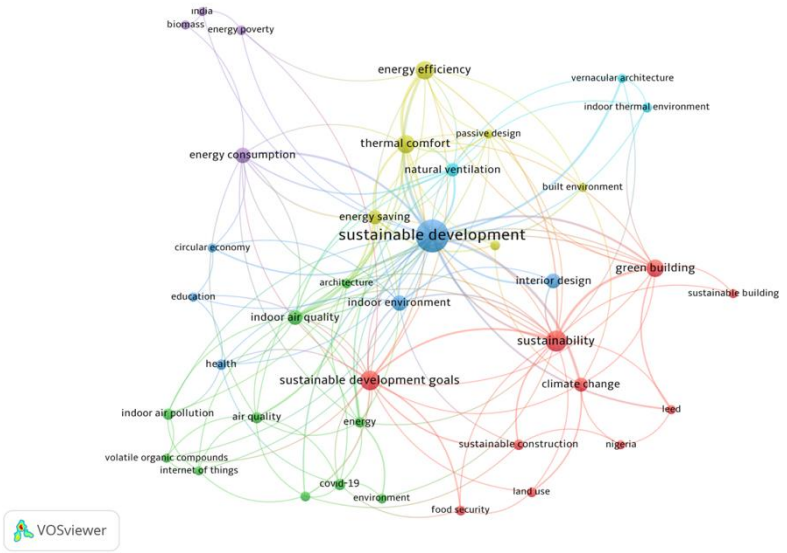

Figure 1. Bibliometric network analysis map obtained from common-word analysis in VOSviewer.

Keywords within the blue cluster are mainly focused on sustainable development, a central theme related to all other clusters. The remaining keywords in this cluster are indoor environment, interior design, circular economy, education, and health. This cluster covers general concepts related to sustainable development and interior design. It concentrates on subjects that address sustainability through the lenses of economy, education, and health.

The red cluster includes keywords sustainable development goals, sustainability, green building, climate change, sustainable construction, sustainable building, food security, land use, Leadership in Energy and Environmental Design (LEED), Nigeria. This cluster focuses on environmental issues in general, sustainable construction practices, social factors, and specific regional issues.

The yellow cluster features keywords like thermal comfort, energy efficiency, energy saving, solar energy, passive design, and the built environment. This cluster primarily addresses energy-oriented sustainable issues in the built environment.

The purple cluster encompasses the keywords energy consumption, energy poverty, biomass, and India. This cluster emphasizes the sustainable utilization of energy sources. The number of keywords in this

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cluster is relatively limited and their interrelations among them are relatively week.

The green cluster includes keywords such as indoor air quality, architecture, energy, the environment, indoor air pollution, and air quality, particularly in the context of the ongoing pandemic. It also includes volatile organic compounds (VOCs), a significant concern in the current climate. This cluster addresses environmental health issues such as air pollution and quality in the context of energy, technology, and pandemics.

Similar to the purple cluster, the turquoise one is a smaller in size compared to the others. It includes keywords related to natural ventilation, indoor thermal environments and vernacular architecture with an emphasis on natural and sustainable building practices.

EVALUATION of FINDINGS

A review of publication distribution by scientific field reveals that Environmental Sciences, Green Sustainable Science Technologies, and Energy Fuels have the highest number of publications. This may indicate that interior architecture and environmental sustainability, sustainable technologies and energy efficiency/saving/consumption, renewable energy, sustainable energy solutions and other related fields are being addressed in a comprehensive manner. The categories with moderate publication numbers are Environmental Research, Environmental Engineering, Construction Building Technology, and Civil Engineering. These disciplines include high-impact environmental applications, offering insights to the relationship between interior architecture and sustainable construction technologies. It may indicate that issues related to sustainable building technologies, construction techniques and engineering studies are frequently addressed.

The observed rising trend in categories such as Environmental Sciences, Green Sustainable Science Technologies, Energy Fuels, Environmental Research, and Environmental Engineering may reflect a growing emphasis on sustainable technologies and environmental issues in interior production. Additionally, a notable upward trend was also observed in the categories of Construction Building Technology and Civil Engineering over time.

Following the adoption of the Sustainable Development Goals (SDGs), discussions have increasingly focused on the relationship between the sector and sustainability, particularly due to the growing awareness of the environmental impacts associated with the building and construction industry. The increase in publications on this subject may indicate a similar shift in the interior architecture profession, highlighting advancements in sustainable building technologies and methods.

The categories of Multidisciplinary Material Science, Public, Environmental and Occupational Health and Multidisciplinary Engineering have relatively few publications. Nevertheless, these categories illustrate the growing association between interior

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architecture and broader scientific and engineering perspectives. The upward trajectory in the graphs of recent years indicates a significant rise in research and development activities. Despite its absence as a title in the WOS scientific field category, interior architecture plays an important role in the analyzed studies, either directly or indirectly. This situation highlights the interaction of interior architecture with other disciplines and its contribution to formulating strategies that align with sustainable development goals.

The targets with the highest publication numbers are Climate Action (SDG 13), Sustainable Cities and Communities (SDG 11) and Good Health and Well-Being (SDG 3). This may indicate that these goals are highly relevant to interior design, reflecting a strong awareness of addressing climate change and developing livable, accessible, sustainable cities, settlements and spaces that improve the quality of human life. The targets of Responsible Consumption and Production (SDG 12), Affordable and Clean Energy (SDG 7), and Life on Land (SDG 15) have a moderate number of publications. Interior architecture can directly contribute to these goals through material selection, waste management, energy reduction, energy-efficient building design and the use of renewable energy sources. The number of publications reinforces this orientation and potential.

There is evidence of a consistent upward trend in the indicators related with the Sustainable Development Goals (SDGs), particularly those focused on Good Health and Well-Being (SDG 3), Sustainable Cities and Communities (SDG 11), Climate Action (SDG 13) and Responsible Consumption and Production (SDG 12). This suggests that these areas occupy a significant position in sustainability research and reflect a growing interest in these topics. The substantial rise in Good Health and Well-Being (SDG 3) and Sustainable Cities and Communities (SDG 11) in 2020 could be interpreted as a result of the pandemic, which likely heightened interest in these targets. Clean Water and Sanitation (SDG 6), Zero Hunger (SDG 2), Industry, Innovation, and Infrastructure (SDG 9), Quality Education (SDG 4), No Poverty (SDG 1) and Life Below Water (SDG 14) are the targets with the fewest publications. This may suggest of a lack of awareness about the direct applicability or relevance of these goals to interior architecture practice.

The upward trend in Clean Water and Sanitation (SDG 6), Affordable and Clean Energy (SDG 7), Life Below Water (SDG 14) and Life on Land (SDG 15) since 2000 may indicate growing interest and increasing significance of these topics in sustainability research. The low and fluctuating publication counts for No Poverty (SDG 1), Zero Hunger (SDG 2), Quality Education (SDG 4) and Industry, Innovation and Infrastructure (SDG 9) suggest inconsistent research interest in these areas. This highlights the need for further research and support in these targets.

Decent Work and Economic Growth (SDG 8), Gender Equality (SDG 5), Reduced Inequalities (SDG 10) and Peace, Justice and Strong Institutions (SDG 16) remain unpublished targets. This suggests insufficient

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exploration of Interior Architecture's contribution to these goals, as well as a need for further research on social equality and economic growth.

A review of the literature reveals that China leads significantly in both volume and distribution of publications, as well as in aligning these with sustainable development goals. This prominence may result from China's rapid urbanization and growing awareness of sustainable development, driving efforts to address social, economic and environmental challenges. The USA and India follow China's lead, indicating that research in the academy in these countries also emphasizes interior space in relation to sustainable development goals.

An evaluation of publication distribution across countries by sustainable development goals reveals that high or medium-level publications are prevalent in Climate Action (SDG 13), Sustainable Cities and Communities (SDG 11), Good Health and Well-Being (SDG 3), Responsible Consumption and Production (SDG 12) and Affordable and Clean Energy (SDG 7). This may indicate that climate change, urbanization, human health and quality of life, sustainable resource use and waste management, use of energy resources and energy efficiency are global concerns for interior architecture research. Variations in publication profiles among countries may be due to factors such as financial resources, government policies, academic infrastructure and national research priorities.

A common word analysis was conducted on the primary themes identified in the literature and the corresponding Sustainable Development Goals (SDGs). The central positions of the blue and red clusters along with their multiple relationships to other clusters emphasize the broad connection between interior architecture and SDGs. This analysis demonstrates that interior architecture and space design can be incorporated into various sub-headings of sustainable development and directly linked to sub-topics. Additionally, it provides insights to deepen the understanding of the interconnection between the interior architecture profession and the SDGs. Table 6 illustrates the primary themes identified from the literature and their associated SDGs.

An analysis of Table 6 reveals that all clusters, except the blue cluster, align with the objective of Affordable and Clean Energy (SDG 7). This is followed by Climate Action (SDG 13) and Sustainable Cities and Communities (SDG 11). This distribution reflects the publication distribution trends according to Sustainable Development Goals.

The blue, green, and turquoise clusters are the most pertinent to interior architecture and interior space design, based on their keywords and established relationships. The blue cluster directly relates to interior design reflecting the field's primary focus on the study of the interior environment. The relationship established with keywords such as circular economy, health, and education may indicate that the contributions of interior architecture to sustainable development goals are positioned around these issues. The green cluster is related to indoor air quality and pollution, while the turquoise cluster focuses on natural

ventilation and indoor thermal environment, emphasizing the direct link between interior architecture and user health. These clusters intersect at the Good Health and Well-Being (SDG 3) target.

Table 6. Main themes in the literature and related sustainable development goals

	1 No Poverty	2 Zero Hunger	3 Good Health and Well-Being	4 Quality Education	5 Gender Equality	6 Clean Water and Sanitation	7 Affordable and Clean Energy	8 Decent Work and Economic Growth	9 Industy, Innovation and Infrastructure	10 Reduced Inequalities	11 Sustainable Cities and Communities	12 Responsible Consumption and Production	13 Climate Action	14 Life Below Water	15 Life on Land	16 Peace, Justice and Strong Institutions
BLUE CLUSTER			■	■								■				
interior space and development																
RED CLUSTER		■					■				■	■	■			
sustainable building and construction practices, environment, and food safety																
YELLOW CLUSTER							■				■		■			
sustainable built environment and alternative energies																
PURPLE CLUSTER	■						■					■	■			
energy management and renewable energy sources																
GREEN CLUSTER			■				■				■					
structural, spatial design and building physics																
TURQUOISE CLUSTER			■				■				■		■			
natural sustainable building practices, vernacular architecture, space comfort																

CONCLUSION and SUGGESTIONS

The results of the study revealed that the profession is closely linked to Climate Action (SDG 13), Sustainable Cities and Communities (SDG 11), Responsible Production and Consumption (SDG 12), Health and Quality of Life (SDG 3) and Accessible and Cclean Energy (SDG 7). However, the relationship with critical goals such as Quality Education (SDG 4), Gender Equality (SDG 5) and Reducing Inequalities (SDG 10) remain insufficient. This situation highlights a critical need to expand the scope of research on these goals in the literature.

The discipline of interior design, through its comprehensive approach, can significantly contribute to under-researched sustainable development goals such as Gender Equality (SDG 5) and Reducing Inequalities (SDG 10. Spatial arrangements and design strategies can play a crucial role in promoting gender equality and reducing inequalities. At the same time, creating accessible spaces for people with disabilities, older adults and other disadvantaged groups can contribute to reducing social inequalities. These approaches demonstrate that interior design is not solely about aesthetics and functionality, but also offers solutions for promoting social justice and equality.

Interior design, as reflected in the literature, maintains strong ties with disciplines like environmental science, civil engineering and energy technology. These disciplines contribute significantly to energy efficiency, environmental sustainability and the use of renewable materials. However, in order to strengthen the social dimension of interior design, stronger connections with social sciences like sociology and public health are recommended. Such collaborations are expected to

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amplify the impact of interior design on social welfare and support the creation of accessible and equitable spaces for disadvantaged groups.

The literature review indicates that China, the USA and India have a high number of publications on interior design in relation to sustainable development goals. In particular, China's rapid urbanization and focus on sustainability have driven a surge in related research. However, in countries with limited publications, there is a need to raise awareness of sustainable development goals and encourage academic research. In addition, given the diversity of research priorities and focus areas across countries, encouraging cross-country cooperation through interdisciplinary projects is highly recommended. Such collaborations can enable the development of innovative and effective design solutions for specific regional needs while strategically addressing weaknesses by drawing on the strengths of different countries.

In conclusion, the relationship between sustainable development and interior design has evolved over time both quantitatively and qualitatively. The analyses show that interior designers can play a pivotal role in achieving sustainability goals by providing innovative solutions to social and environmental problems through space design. In the light of findings, interior architecture holds an important social responsibility in contributing to sustainable development goals through space design. However, increased awareness of the role of design and spatial planning in achieving these goals, along with enhanced research and interdisciplinary collaboration, is expected to foster more innovative and comprehensive solutions.

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