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INTERNATIONAL STUDIES AND EVALATIONS IN THE FIELD OF

# ARCHITECTURE PLANNING AND DESING

## EDITORS

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PROF. DR. MURAT DAL

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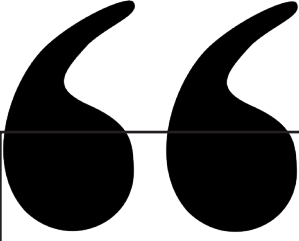
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# Chapter 1

## **AESTHETIC APPROACHES IN THE ENVIRONMENTAL DESIGN PROJECT PROCESS**

*Tuğba DÜZENLİ<sup>1</sup>*

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## 1. Introduction

Environmental designs have multiple pragmatic, sociological, and aesthetic impacts (Baird, 2002). Although open spaces are individual entities, they are components of a larger whole on an urban scale. In this context, environmental designs emerge as significant factors in the quality of life and identity of cities. Garshasbi (2013) states that the connection between structures and their environment, their appearance, harmony, and aesthetic approach can affect people (Sendi, 2014). When people shape their physical environment, they desire to beautify it (Yıldırım and Keskin, 2019). The concept of ‘aesthetics,’ arising from the desire to beautify one’s surroundings and its elements, holds a crucial place in the formation and evaluation of design products (Alpak et al., 2023). This satisfaction, which pleases people aesthetically, is regarded as a fundamental criterion in the evaluation of a design product (Kuban, 2005). One of the most significant pillars of cultural structure within society is the aesthetic understanding of the society and its individuals. While individuals are shaped by the aesthetic values of their society and environment, they also shape the visual values of that society (Göğebakan, 2012).

According to Vitruvius (2005), one of the important criteria for a successful design is the concept of aesthetics. A good design product should be useful, durable, and aesthetic (Vitruvius, 2005). According to Kuban (2015), a design must satisfy human appreciation to be considered beautiful. Often, this appreciation is determined not only by pure aesthetic feelings but also by social symbolic values (Yılmaz and Keskin, 2019). In this respect, shaping includes subjective qualities that go beyond mere utility and necessitates defining a broader benefit, a broader need, and a more general function. This need, which encompasses a comprehensive desire for beauty, can only have meaning within the entirety of a society’s culture (Kuban, 2005). Aesthetic concerns appear in the interior, exterior, and overall structure of a design product. Different criteria, rules, guidelines, and principles have been established for the aesthetic quest. This study examines aesthetic approaches in the environmental project design process, which is fundamental to landscape architecture.

## 2. The Concept of Aesthetics

The term “aesthetics,” an important component of culture, has been named differently in various languages. In Ottoman Turkish, it is referred to as “bediiyat, ilm-i husn, ilm-i mehasin, ilm-ibedi, ilm-i bedayi, hikmeti bedayi, ilm-i zevk,” in Arabic as “ilm-i cemal,” in French as “esthetique,” in German as “aesthetic,” and in Italian as “estetica.” The word originates from the Greek “aisthesis” or “aisthanesthai,” meaning sensation, sensory perception, or the science of feelings (Altıntaş, 2002). The German philosopher

A. G. Baumgarten (1714-1762) founded the science of aesthetics and gave it its name. In his work *Aesthetica* published between 1750 and 1758, Baumgarten laid the foundation of this science and defined its boundaries. According to Baumgarten, aesthetics is the twin sister of logic. Just as logic investigates the perfection and truth of intellectual knowledge, aesthetics explores the truth of sensory knowledge, which is beauty (Tunalı, 1989).

In nature, nothing is inherently created as ugly or beautiful. However, humans aesthetically evaluate nature, defining as beautiful what aligns with their ideals and as ugly what opposes them (Alpak et al., 2018a; 2018b; Kurdoğlu et al., 2019; Yılmaz et al., 2020). People label certain objects as beautiful or ugly based on their ideals. The value placed here is partly inherent in the object and partly a reflection of the value that people attribute to the object. This aesthetic attitude is subjective and individual (Tunalı, 1989; Timuçin, 1993; Tunalı, 2004). Comparisons have been made between natural beauty and the beauty presented in artistic contexts, and it has been accepted that natural beauty serves as a precursor to artistic activities (Bayramoğlu and Seyhan, 2021). Thus, humans feel the beauty of a tree, a plant, a landscape, or the sky on a rainy day before creating something artistic. There has always been a continuous interconnection between artistic beauty and natural beauty. According to Homer (9th century BC), nature is the source of all kinds of beauty (Altıntaş, 2002). This association has also led to comparisons of which is superior. Aesthetics, like ethics and logic, is a normative science, establishing rules.

When people create their physical environment, they seek to beautify it. In doing so, they aim to positively impact their surroundings and make them livable. Integrating this positive effect into life necessitates developing an “aesthetic environment” consciousness (Buyurgan, 1999). A high level of aesthetic consciousness is closely related to the internalization of artistic formations by society. Indeed, Gençaydın (Buyurgan, 1999) emphasizes the importance of this sensitive and selective attitude, which is necessary for artistic creation, in observing the relationships of order or disorder among objects. The desire to beautify the spaces where people live is also seen as a manifestation of this artistic reflection. This approach to beautifying buildings and their surroundings, constructed as places enabling the continuation of life, has existed even in the most primitive societies. The production of each structure has also been the production of its and its surroundings’ appearance. Today, architecture, as a system of aesthetic norms, includes not only the object concerned with form and its qualities but also the reactions connected to the expression of form, the subject, and the socio-cultural values involved in these reactions. When shaping their environment, humans encompass all the physical, social, and psychological conditions of society and their surroundings. This shaping, which reflects human tastes and

preferences, varies in different periods. Especially in giving buildings stylistic qualities, human creativity and the pursuit of beauty, which drives it, are seen as fundamental motivating forces. Aesthetics, as a criterion for evaluation in architecture and design, is based on the concepts of durability, usability, and beauty (Şentürer, 1990). These concepts have undergone changes due to technological and social transformations throughout history.

The buildings and their surroundings that constitute the urban environment determine the nature of urban aesthetics (Seyhan and Bayramoğlu, 2023; Yılmaz et al., 2016). Therefore, aesthetic approaches are important in environmental design projects. The variability of determining factors in aesthetic approaches is evident not only across different cultures but even within the same cultural environment. The biggest reason for this difference is “education.” Education, especially aesthetic education, is considered one of the most important factors determining judgment of taste and is a prerequisite for understanding and evaluating art (Tunalı, 1984; Tunalı, 1989). Taking an aesthetic attitude is a prerequisite for aesthetic appreciation, which primarily depends on education. This study examines the place of environmental design projects in the landscape architecture education process, focusing on aesthetic approaches.

### **3. Environmental Design Project**

Design holds a crucial place in landscape architecture. This profession aims to create suitable spaces for humans within a certain order and form. Therefore, when starting the environmental design process, it is necessary to observe and analyze decision-making, production, analysis, and shaping according to human activities (Rodiek & Steiner, 1998; Düzenli & Alpak, 2016). The design process involves defining and identifying the problem, gathering information, generating options, selecting and developing one of the options, evaluating, and producing the final product; aesthetic approaches and creativity should be included in this process (Yılmaz and Yılmaz, 2000). According to Steinitz (1990), the landscape architecture design process comprises aesthetic, perceptual, ecological, historical, and natural elements. Each stage is evaluated within its context. Therefore, design should be considered a tool for determining and assessing all physical data contained within the existing condition analysis of the open spaces to be designed. In this context, the landscape designer must be creative to analyze and synthesize the guiding data while also producing original and aesthetic designs. Aesthetics is often used by landscape architects as a synonym for design style or form-making; however, aesthetics has the power to alter people’s responses to their environments. Thus, the fundamental philosophy of landscape aesthetics and how it relates to design is essential. Evaluating visual satisfaction in outdoor spaces is a significant aspect of landscape research and is often related to landscape aesthetics (Yılmaz et al., 2018). The most appropriate time for

creating creative and aesthetic designs is during the educational process (Bayramoğlu et al., 2019), as students can draw on different theories to propose new ideas through research.

The landscape architecture department at Karadeniz Technical University (KTÜ) is considered a design-oriented program where students and instructors interact directly in practical studio courses. In KTÜ's landscape design education, aesthetic designs are integrated with creative thinking, aiming for lifelong learning. The environmental design project courses are viewed as prerequisites and are evaluated each semester. Each semester's project course consists of different topics and scales. Six to eight faculty members lead the design process in the studio with randomly formed groups throughout the semester. In this context, the environmental design project aims to allow each student to create spaces that are functional and aesthetic based on different scenarios within their creativity. The goal is for students to produce creative, original, and modern aesthetic products suitable for the project design process by the end of the 16th week. Design, creativity, and aesthetics are important for all professions but hold particular significance in architecture and its branches. This is because designing enhances a student's creativity and reveals their abilities related to aesthetic perception (Mumcu and Düzenli, 2018). Within this framework, this study examines the aesthetic aspects of students' environmental design project products based on the identified design problem.

#### **4. An Aesthetic Examination of Environmental Design Project Products**

In a design, “unity” and therefore “order” can be discussed when the elements that constitute the design—such as scale, form, color, and texture—come together aesthetically according to design principles (Yılmaz et al., 2019). It is challenging to merge education with design because they encompass two often conflicting practices: education aims to achieve expected learning outcomes, while design and art seek to achieve the unexpected. In the new world order, contemporary design education systems have an analogous relationship with visual culture, almost mirroring its structure. Therefore, examining the current system through the lens of visual culture helps us identify the social indicators and impacts of global culture.

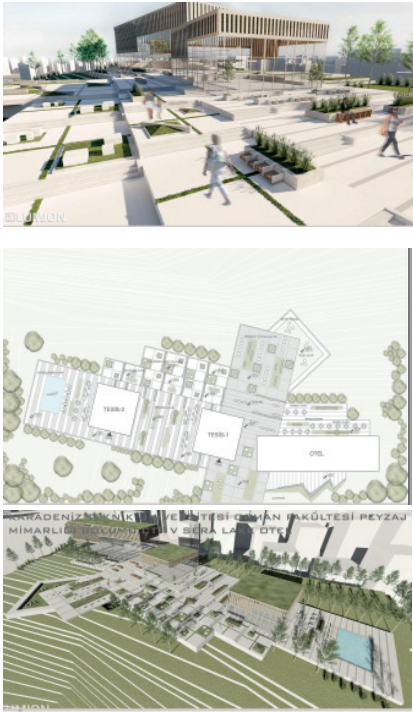
The concern in this art-design program is less about considering the practices from the perspective of visual culture learning methods and more about researching and developing ways to understand visual policies (Tavin, 2003). Another step in redefining design education is to structure aesthetics to meet the cultural and educational needs of young design candidates. In this regard, it is expected that aesthetics will first be defined with a different task than being a critical examination based on valuing forms and analyzing

them using art principles and elements (formalist). As Fry (1996) notes, “real life requires moral responsibility, but there can be no place for morality in design. This offers us a life independent of real life.” The formalist aesthetic philosophy in design education transforms into pedagogical formalism. Thus, the integration of seeing becomes the pathway to knowing through the process of seeing; the line, form value, shape, texture, color, space, or contrast in a work of art. Such an understanding may give students the impression that art consists solely of a series of forms made of isolated emotions and objects devoid of meaning. The fundamental assumption here is that the model used can analyze any object (Aykut, 2013).


In this study, the works produced in the Environmental Design Project Course, a core course in the Landscape Architecture Department at Karadeniz Technical University (KTÜ), were examined in terms of formal aesthetics. The study evaluates the work of three students from the Environmental Design Project V course in the KTÜ Landscape Architecture Department, focusing on the aesthetic-formal aspects of the products (Table 1,2,3). The project involved designing the surroundings of the Sera Lake Resort Hotel in Yıldızlı, Akçaabat, Trabzon, and preparing a landscape design project to meet the users’ needs. The primary goal of the project was to create scenarios for open-space activities, ensuring the Hotel’s function while meeting the recreational and social needs of the users and other city dwellers, and to produce spatial solutions for these activity areas. The project process included a literature review, scenario creation, identification of user needs, needs list, functional diagram, analysis of needs and area opportunities, sketching and critique of initial spatial organizations, developing and critiquing proposals until the end of the semester, and finally, delivering plan, section, and elevation representations of the agreed-upon work to ensure a proper project process. The designs should be functional and, most importantly, possess aesthetic value according to landscape architecture principles, serving the area users. The project work aims to achieve the best functionality for the area through planning and design.



**Table 1.** *1<sup>st</sup> Student’s project and Evaluation*


	<p>In the student’s environmental design project, a formal aesthetic was created using rectangles and squares, along with linear lines, to develop the layout of activity spaces. Continuity was achieved between the textures and forms used in the plan, and the repetition of linear forms at regular intervals strengthened the characteristic of “rhythm.” This approach significantly imparted a sense of “order-system” to the spatial composition. The principles of harmony and contrast were applied together among forms and textures, thereby enhancing the feature of “complexity.” The repetition of shapes and textures in the design was diversified with contrasting elements to strengthen the complexity of the project and reduce the sense of monotony caused by repetition. Hierarchical variation and repetition were established among spaces of similar forms and textures. In conclusion, the aesthetic approach in the project was achieved in adherence to design principles.</p>
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**Table 2.** 2<sup>nd</sup> Student's Project and Evaluation

 <p>The figure consists of two parts. The top part is a detailed architectural site plan for the 'BENA LAKE RESORT HOTEL'. It shows a central building complex with various rooms, courtyards, and surrounding landscape elements like trees and paths. Labels include 'BENA LAKE RESORT HOTEL', 'TERRACE', 'POOL', 'GARDEN', and 'PARKING'. The bottom part is a 3D perspective rendering of the same project, showing the building's facade, the pool area, and the surrounding landscape with people walking around. The rendering is credited to 'lumion'.</p>	<p>In the student's environmental design project, a formal aesthetic was created using rectangular and radial lines to develop the layout of activity spaces. Continuity was achieved between the textures and forms used in the plan, and the repetition of rectangular forms at regular intervals strengthened the characteristic of “rhythm.” This approach clearly imparted a sense of “order-system” to the spatial composition. The principles of harmony and contrast were applied together among forms and textures, thereby enhancing the feature of “complexity.” The repetition of shapes and textures in the design was diversified with radial forms and contrasting elements to strengthen the project's complexity and reduce the sense of monotony caused by repetition. Hierarchical variation and repetition were established among spaces of similar forms and textures. In conclusion, the aesthetic approach in the project was achieved in adherence to design principles.</p>
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**Table 3.** *3<sup>rd</sup> Student’s Project and Evaluation*

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	<p>In the student’s environmental design project, a formal aesthetic was created using rectangles, squares, and broken lines to develop the layout of activity spaces. The relationship between broken lines and rectangular and square forms, along with the contrast among textures and forms used in the plan, strengthened the characteristic of “rhythm.” This approach clearly imparted a sense of “order-system” to the spatial composition. The principles of harmony and contrast were applied together among forms and textures, thereby enhancing the feature of “complexity,” with the large square space emphasizing dominance. The repetition of shapes and textures in the design was diversified with contrasting elements to strengthen the project’s complexity and reduce the sense of monotony caused by repetition. Variation was achieved through spaces with different forms and textures. In conclusion, the aesthetic approach in the project adhered to design principles.</p>
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**5. Results**

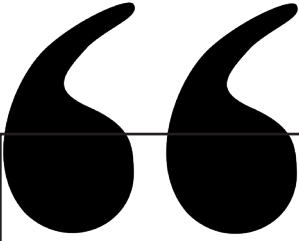
One of the important functions of environmental design projects is the aesthetic value they contribute to a space. This aesthetic value is achieved through their visual properties such as form, color, and texture. Consequently, the value created by the arrangement of forms within a space is of great significance. This value is measured by “Formal Aesthetics,” which examines the composition, form, rhythm, and complexity of the space. In landscape projects, formal aesthetics facilitate the perception and interpretation of the environment. Formal aesthetics encompasses order, rhythm, harmony, and complexity. All these principles are achieved through the designer’s conceptualization of the grouping of elements within a space. Design principles such as proximity and similarity help achieve perception within a cohesive whole, contributing to readability, consistency, and high aesthetic value in environmental design. Therefore, the relationship between formal aesthetics and the perception of form should not be overlooked in environmental project design. This study investigated the formal aesthetics

of environmental design projects and found that projects featuring similarity and proximity incorporate elements of order and harmonic relationships. The inclusion of formal diversity among these relationships provides complexity. Well-utilized diversity enhances the concept of unity in design and increases the effectiveness of the project's formal impact. Environments designed in this manner are crucial for the ease with which people perceive, interpret, and achieve aesthetic satisfaction in their surroundings. Thus, the study aims to provide insights to designers on how to achieve strong projects in terms of formal aesthetics through design principles.

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## Chapter 2

### **SUBJECTING UNLICENSED BUILDINGS IN PUBLIC UNIVERSITY CAMPUSES TO THE ZONING LAW THE CASE OF ALADDIN KEYKUBAT CAMPUS GÖKKUŞAĞI SHOPPING CENTRE**

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## 1. INTRODUCTION

The origin of universities, known today as institutions where science is produced, dates back to the XIIth century in the Middle Ages. The first universities established in Western countries were initially church-affiliated educational institutions with a closed life and education approach based on learning and knowing. This understanding was also reflected in the plan schemes and the buildings were designed as closed spaces with inner courtyards. In Anatolia, the first similar spatial formation in the name of university in the process until the proclamation of the Republic was realised in the madrasah origin.

In the years when the Republic of Turkey was founded, the need for higher education was met by the “Mühendis Mektebi” and “Darül Fünun”. Darül Fünun was transformed into Istanbul University in 1933 and the School of Engineering into Istanbul Technical University in 1944. Following the reorganisation of these existing institutions according to the criteria of the Republic of Turkey, Ankara University was established in 1946, and the changing and developing educational policies after the Second World War found their reflections in Turkey and led to the establishment of new universities. Until 1973, a total of 9 universities were established, two of which were located outside the three big cities. Istanbul University (1933), Istanbul Technical University (1944), Ankara University (1946), Karadeniz Technical University (1955), Ege University (1955), Middle East Technical University (1956), Atatürk University (1957), Hacettepe University (1967) and Boğaziçi University (1971). As a result of the new breakthrough periods experienced at intervals in the historical process, there are 208 higher education institutions (state/foundation) in our country as of 2024 January.

Universities, which were built on the foundations of madrasahs in Turkey and churches in Europe, were almost trapped in the city as a result of the rapidly increasing urban population and urbanisation in the 20th century, and they sought different physical formations in Europe and Turkey for different reasons. The changing and developing economic, social, cultural and recreational requirements of the society made it necessary for universities to be planned in a small city model on large areas outside the cities (Önder et al. 1998). Thus, today’s campus concept was born and universities started to be established based on certain systems in large areas away from the city.

Universities, which are among the educational institutions where qualified manpower that will shape the future of a society is trained, physically means a collection of buildings in which education and research activities take place. Apart from education and research, which are the basic functions of universities, they should also include physical formations that will respond to the functions required by today’s education system such as working, nutrition,



shopping, entertainment, sports, recreation, health, etc. (Aydın 2003).

With the developments in our country in recent years, universities have been changing in terms of structural environment, and campus formations have come to the agenda with the understanding of 'physical sufficiency' for the different functions they host. University campuses include physical formations such as faculty buildings within the university, dormitory buildings to be used by students for accommodation, shopping centres for shopping, entertainment and recreation, libraries for research, sports centres for sports activities, cafeterias, restaurants, recreation areas, health centres for health needs, cultural centres for cultural activities, different lodging arrangements for the accommodation of academic staff (Aydın 2003).

In Turkey, the urban university model was preferred until the 1950s. In other words, the units of the universities were scattered in different parts of the city. Istanbul, Istanbul Technical and Ankara Universities are examples of this model. During the 1st World War, Germany, which influenced our country, was replaced by the United States of America with the 2nd World War. Universities were also affected in the period after 1947, when the United States was predominantly influential in every field. Especially with the DP government in 1950, the USA became fully felt in every field of Turkey. Its influence on universities was seen in the Middle East Technical University and Atatürk University, which were established in this period. Thus, the period of 'universities with special laws' began in the history of universities. The special law not only provides for the establishment of the university, but also includes special provisions on the management of the university. It is observed that these universities follow the general law if there is no provision in their own laws. The special laws of both universities were based on the US model. This model was followed by Hacettepe and Boğaziçi Universities, and was extended to all universities by the Council of Higher Education (YÖK). Today, while Turkey is endeavouring to become European in economy and to join the European Union, it is seen that in education and science, it is insistently in a race to resemble the US model. One of the characteristics of this model is that the university is campus type and located outside the city (Hatiboğlu, 2000).

University campuses, with their urban facilities, socio-cultural environment and diversity of users, emerge as important public spaces in the form of small cities. University campuses are defined as the land (area and all structures) in which the buildings that make up a university are located, an academic village established in a green area inside or outside the city, or the reflection of academic ideals on physical planning, where recreational activities that can socialise and integrate with society are also carried out. In order to have a self-sufficient system, university campuses, which should have equipment such as health, central administration, sociocultural activities

centre and areas, library, sports activities centre and areas, research and development centre, accommodation, shopping centre, support units and outdoor usage areas, have an important place in existing public spaces with almost a small city scale structure.

Universities, which have an intensive use and an important place in the city, are areas that highlight the social-economic structure, cultural and political characteristics of the society in which they are located and have important potential to create alternative green areas in cities (Güneroğlu et al., 2018; Yıldız, 2020). Universities are organisations that train the high-level staff needed by the society, while at the same time presenting their scientific studies for the benefit of individuals and societies and contributing to the development of the society in the regions where they are established. The location selection of university campuses, the region where they are established, their economic, social and cultural characteristics are important for the development of the campus and its surroundings, and also constitute their spatial constructions. Therefore, the establishment of a university in a region to be developed is a tool for achieving the determined goals (Ercan Oğuztürk et al., 2022).

Although the main functions of universities are education and research, they should meet the needs of all users. In addition, open-green areas in university campuses have many functions such as ensuring the integrity of the architectural structures and the environment, providing vehicle-pedestrian circulation within the campus, strengthening the bond between people and the environment, creating special areas for physical development, and providing aesthetic value to university campuses (Ertekin & Çorbacı, 2010).

It is possible to consider university campuses as a set of buildings that develop and grow from the design process. The growth of the buildings in the campuses over time and their ability to maintain their functional dynamics in this process are realised thanks to the right flexibility decisions taken during the design process of the campus. Shopping, resting and eating and drinking areas on the campus are also important socialisation spaces as they are one of the main meeting points.

According to the Law No. 2547 on Higher Education (1981), the concept of university and higher education is defined as follows 'University: A higher education institution consisting of faculties, institutes, colleges and similar institutions and units, which has scientific autonomy and public legal personality and which provides higher level education, scientific research, publication and consultancy. 'Higher education: All education and training at all levels within the national education system, based on secondary education, covering at least four semesters' (Url-1). According to the Constitutional Law No. 2709 (1982), higher education institutions are defined as 'Institutions with

public legal personality and scientific autonomy consisting of various units to provide education and training at various levels based on secondary education, scientific research, publication and consultancy, and to serve the country and humanity in order to train manpower in accordance with the needs of the nation and the country in an order based on contemporary education and training principles' (Url-2).

According to Article 47 of the Higher Education Law No. 2547 (1981), Higher Education Institutions; 'In accordance with the plans and programmes to be made by the Higher Education Institutions, it is the duty of the Higher Education Institutions to meet the social needs of the students such as the protection of their physical and mental health, nutrition, work, rest and leisure time, and for this purpose, to open reading halls, inpatient health centres, student canteens and restaurants, to provide meeting, cinema and theatre halls, sports halls and fields, camping places and to take the necessary measures to ensure that students benefit from them in the best way possible' (Url-3).

As it can be understood from these regulation articles; education and recreation should not be considered independent from each other: Recreation can be used as an educational tool and as a part of education. In addition to its positive contributions to education, this tool also provides a basis for the physical, social and psychological development of individuals (Dawer & Pangraz, 1975; Onder, 2003).

The personal and social benefits of recreation activities can be grouped as follows (Bucher, 1972; Tezcan, 1982):

- Personal benefits: It is effective in the development of mental and physical health. It provides physical, psychological and social activism. It gives individuals the opportunity to express themselves, explore and increase their creativity. Provides new knowledge, skills and experiences. Increases success and work efficiency by providing physical and mental serenity.

- Social benefits: Ensures the development of society. It increases social solidarity and integrity. In order for campuses to have a self-sufficient system, they should have areas that meet different needs such as sociocultural centres, libraries, health centres, administrative buildings, sports centres and fields, R&D centres, accommodation, food and beverage areas and open spaces (Yerli & Ozdede, 2017; Tolon, 2006).

Recreation units (sports facilities, food and beverage areas, auditoriums, etc.) in university campuses have the mission of meeting the physiological and social needs of students and staff (academic and administrative). Food and beverage areas, which have the highest user rate among recreation units, positively affect preference decisions with the social atmosphere it provides to its users as well as meeting the nutritional needs.

In parallel with the number and diversity of users of universities, there are many different types of eating and drinking areas on campuses. It is a necessity, not an option, for a modern and developed university not to force its users to go to a single unit for a basic need such as nutrition on the campus where they spend most or all of the day.

This diversity required in food and beverage areas is an inevitable result of the supply-demand relationship. There are users of the food and beverage areas on campus for a single meal, as well as users who meet all their meals from these areas. With the diversity of users and demand, it is inevitable to have different types of eating and drinking places on university campuses.

In the next part of the study, the construction and license process of Gökkuşığı Shopping Mall, which constitutes the study area and was built in Alaaddin Keykubat campus for the food and beverage, shopping, recreation and entertainment needs of the users, will be examined.

## 2. ALAADDİN KEYKUBAT CAMPUS AND GÖKKUŞAĞI MALL

Selçuk University was established in 1975 in accordance with the Law No. 1873, and in the 1976-77 academic year, it started to serve with two faculties, the Faculty of Science and the Faculty of Literature, but there was no significant development within the university until 1982. Arch. Academy and Higher Islamic Institute were transformed into faculties and affiliated to the university. In 1976, the Girls' Art High Teacher Training School, which was opened under the Ministry of National Education, was affiliated to the Faculty of Education as the Girls' Art Education High School. In the same year, Faculties of Medicine, Agriculture and Veterinary Medicine were also opened (Önder et al. 1998).

When the spatial arrangements of educational institutions are analysed, it is seen that the Selçuk Institute of Education and the Higher Islamic Institute, which were among the first educational institutions established, started to provide education in the buildings built for them in Meram. However, the faculties established later on started education in temporary buildings belonging to other institutions in different places in the city. Eng. Arch. Academy of Engineering and Architecture in a building belonging to the Child Protection Agency, the Faculty of Agriculture, which was established later, in sheds belonging to the municipality, and the Faculty of Veterinary Medicine in the Animal Health Vocational High School are examples of this situation. With the increase in the number of faculties and departments opened, the existing buildings became insufficient, and the need to gather all faculties in one area was felt, and as a result, the campus area was established on an area of 9200 da on the Afyon highway, 20 km from the city centre, with the allocation of land belonging to the treasury and the expropriation of private land in 1979. In 1997, a land of 6200 da was added to this area. The site

selection and physical planning studies of the campus were carried out by the TEKSİS project group during the foundation years (Büyükşahin, 2005).

The planning of the university, the design of which was undertaken by the TEKSİS group, started with a preliminary study in order to prevent the problems and inadequacies that might arise in the physical planning process. Thus, a series of reports entitled 'Campus Planning and Programming Research' were prepared in 1980 (Anonymous, 1980). Following the preliminary study, which was the first stage research, the first general settlement plan of the campus area was prepared in 1981 as an idea project. With some changes made in these first settlement plans with 1/5000 and 1/2000 scales, the final projects were prepared in 1983 and the construction started on the campus in the same year (Önder et al. 1998). When the campus layout plan is analysed, it is seen that it has the characteristics of planning based on a common type settlement system (Figure 1). Except for the Faculty of Dentistry and the Rectorate, the buildings are located randomly without being affected by the topography, with low density. It is seen that the academic area and the housing area develop around the common uses area (cafeteria, rectorate, Süleyman Demirel Cultural Centre, library) located in the centre.

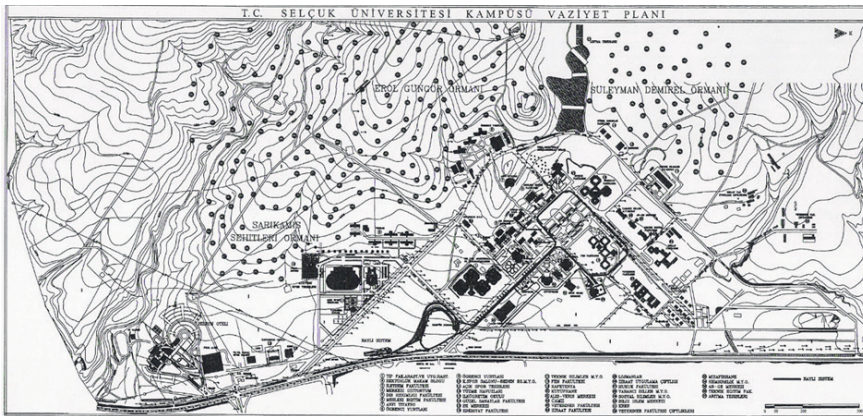


Figure 1. Selçuk University Site Plan (S.Ü. Directorate of Building Works and Technical Department, 2005)

## 2.1. Unlicensed Gökkuşığı Shopping Mall

Gökkuşığı Shopping Mall, which constitutes the field study of this research, is located on the immovable property numbered 1 plot 334, 338 parcel. In 1995, the construction was started with the build-operate-transfer model in order to meet the food, stationery, shopping and entertainment needs of the students on the university campus, and the construction was completed in 1999 (Figure 2). The 17,500 m<sup>2</sup> Gökkuşığı Shopping Centre is located close to the centre of the campus but far from the academic area. The location of



the facility, which is outside the 750-metre development plan adopted in the design of the campus, causes pedestrian access problems. The facility has its own car park. Although it is a common use space, the fact that it is located close to the faculties and dormitories, which are far from the centre of the campus, has brought about the use of students rather than staff.



*Figure 2. General view of Gökkuşığı Shopping Centre (Author, 2005)*

## **2.2. Build-Operate-Transfer Model**

The university administration agreed with an architect-contractor to construct the Gökkuşığı Shopping Mall with the build-operate-transfer model. The building was constructed in the form of reinforced concrete prefabricated system with partial mezzanine (the part where there are 3 axles on the west side of the building) and the other parts were built as single storey. There are no projects and calculations of the building except for the unapproved and unsigned prefabricated reinforced concrete drawings.

Due to the inadequate control of the constructor and the operator, the tenants have made alterations to the premises over time (additional mezzanine floors, combining the warehouses located outside the building with the main spaces and adding mezzanine floors on these warehouses, etc.), which are not in accordance with the static and architectural assumptions (closing some corridors, adding common areas to commercial areas, etc.).

In 2004, the buildings were transferred to the S.U. Foundation ahead of time, and during this period, some arrangements were made in the building (the creation of a mezzanine commercial space instead of the removal of the cinema, the addition of mezzanine floors in some commercial spaces, the addition of stairs from the passage corridor to the mezzanine part of the building in the provincial construction of the building, etc.). Since the control of the building was transferred to the foundation during these periods, structural system reports were requested for the mezzanine floor modifications. However, only four structural system reports were prepared.

In 2008, especially after the smoking ban in indoor areas, unauthorised semi-open seating areas and terraces were built outside the building from the mezzanine floors. In order to prevent these uncontrolled additions, static projects were made by the administration and they were added to the building as steel construction terraces. In spite of these additions, some businesses in the interior have built dangerous mezzanines inside the roof to be carried to the prefabricated roof purlins. The integrity of the roof of the existing structure has deteriorated due to the subsequent additions. In this direction, hidden terraces were formed in some parts of the roof.

The high commercial rent expectation of the building has led to irregularities in the spatial use of tenants. For example, the ground floor of a space is used by another tenant with an independent staircase connection and another tenant uses the mezzanine floor. Although this situation seems to be contrary to the integrity of architectural space planning, an architectural project, which should be adhered to and modifications should be made according to legal procedures, had not been made.

Neither shelter nor fire safety measures have been taken for the building, which does not comply with any legal procedure. Mezzanines and terraces added to the building have created a fire escape problem. Fire cabinets placed on some columns are the only measures taken. This was required by the municipality for the workplace opening license.

Gökkuşığı Shopping Mall is defined as an illegal building due to the fact that the building was constructed without a license in its initial state and all subsequent renovations were made without a license and it does not have a building permit for use.

### **2.3. Demolition Decision of Gökkuşığı Shopping Mall**

Konya Selçuklu Municipality has issued a demolition decision according to Article 32 of the Zoning Law No. 3194 due to the fact that the building is unlicensed. There is a decision of the Selçuklu Municipality Council dated 25.07.2002 and numbered 344 regarding the imposition of a fine on the owner of the building in accordance with Article 42 of the Law No. 3194. A payment order dated 02.10.2002, account number 2002/77 was issued for the collection of demolition costs. In the lawsuit filed for the cancellation of the payment order, the Administrative Court ruled for the dismissal of the lawsuit for the part related to the fine and the cancellation of the transaction subject to the lawsuit. This decision was reversed by the decision of the Sixth Chamber of the Council of State dated 22.12.2006 and numbered 2004/5745 Precedent and 2006/6531. In order to appeal the decision dated 24.09.2008, dated 24.09.2008 and numbered E:2008/1109, K:2008/1158, given by Konya 1st Administrative Court for the rejection of the case regarding the cancellation of the payment order by complying with the reversal decision, an application was made by

the plaintiff's attorney to the 14th Chamber of the Council of State with the request for reversal for the reasons set forth in the petition.

The 14th Chamber of the Council of State has stated that the decisions made by the administrative and tax courts upon the examinations made by the 14th Chamber of the Council of State can be reversed by appeal if there is one of the reasons specified in Article 49 of the Administrative Procedure Law No. 2577. Since the decision of Konya 1st Administrative Court dated 24.09.2008, numbered E:2008/1109, K:2008/1158 and the grounds on which it is based are in accordance with the law and procedure and there is no reason for its reversal, it was unanimously decided on 20.12.2011 to reject the request for appeal and to approve the said decision.

In line with the decision of the 14th Chamber of the Council of State, the demolition decision and the fine became final. Upon the finalisation of the decision, Selçuklu Municipality, on the grounds that the building would be demolished, notified the tradesmen that the workplace opening licenses they had previously allocated were cancelled and that the building should be evacuated until 14 February 2013. Upon the finalisation of the demolition decision, the deputy chairman of the board of directors on behalf of the tenant tradesmen in Gökkuşığı Shopping Mall made statements to the press that they would protest (14 February 2013 Merhaba Journal).

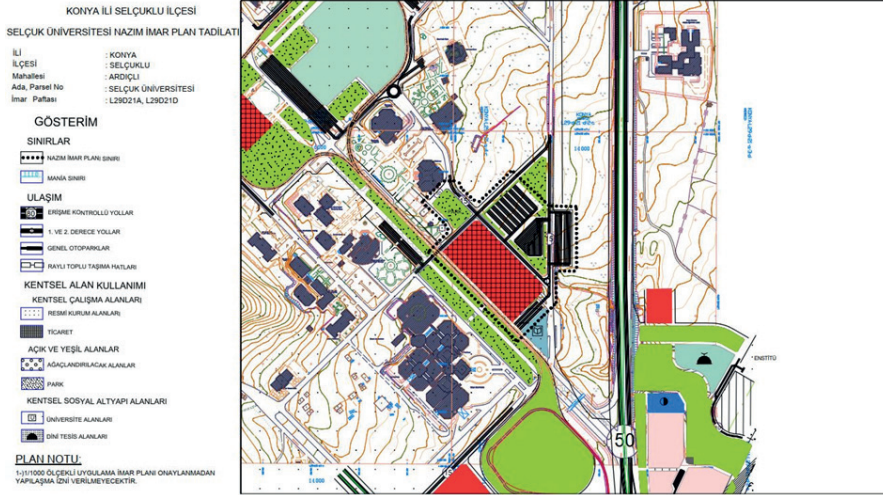
#### **2.4. Building Licensing Process**

The tradesmen who were not informed about the demolition decision undertook the maintenance and repair works of the building by making renovations with their own means. At the time of this decision, there were even tradesmen who had just completed their costly renovations. For this reason, there was an intense reaction against the university administration against the decision. High income is generated from the building rented out by the university financial affairs unit. At the same time, an agreement was reached between the university administration and the Selçuklu Municipality on the non-implementation of the demolition decision of the building, considering that the tradesmen would have to compensate for their expenses based on the demolition decision and that it would damage the image with the news in the press. It was agreed that the municipality would provide temporary occupancy to the building so that Gökkuşığı Shopping Mall would have a building license in order to be able to provide business license, cleaning and garbage services. As a result, Selcuk University Rectorate was given time by Selcuk Municipality to carry out the necessary work for the building license procedures.

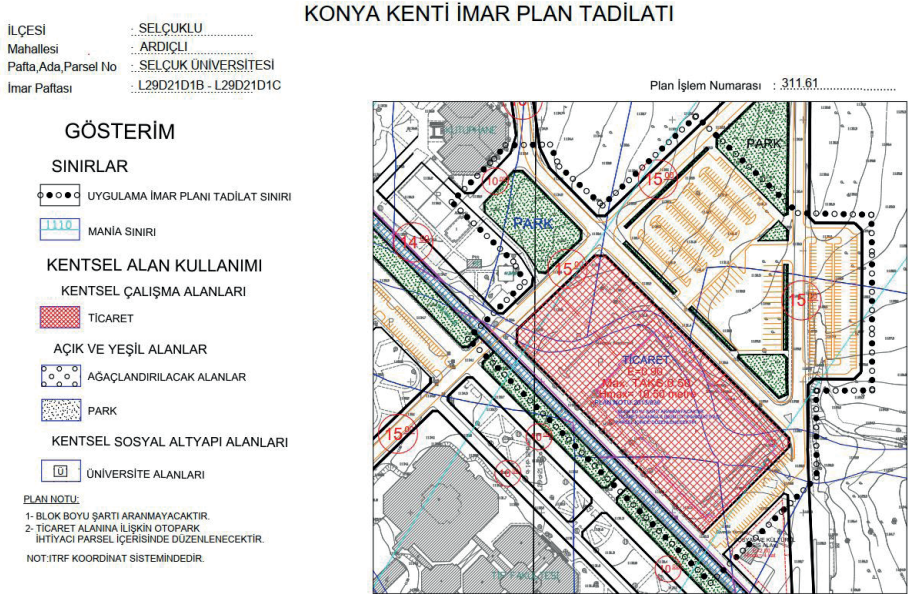
Considering that the building should obtain a building permit in the first stage, the university administration formed a technical committee from architects, civil engineers, electrical engineers and urban planners working



within the university through the revolving fund. The task of the committee was determined as obtaining a building license and then a occupancy license for the building. In the interview with the municipality license department, it was found sufficient to submit only the architectural project as an annex to the building license. In this context, the committee carried out studies on the structural system, transformer and electricity to assist the architect in terms of engineering data and to add to the architectural project. In addition, they signed the building license documents as chief engineer and project authors. In the preparation of the architectural project, the current situation will be determined and its final state will be decided. Although the building is not a newly constructed building, this process will operate in the new building format during the building license process. For this reason, it has become necessary to make a zoning plan amendment for the commercial unit located within the education campus and to document that Gökkuşığı Shopping Mall has been built on the commercial pir parcel. The city planner in the committee prepared 1/5000 (Figure 3) and 1/1000 (Figure 4) zoning plan amendments and registered the parcel where the building sits as a commercial area.



Şekil 3. Selçuk Üniversitesi Nazım İmar Plan Tadilatı



Şekil 4. Ticaret amaçlı kullanımı gösteren 1/1000 ölçekli imar plan tadilatı

With the zoning plan amendments, the settlement area of the existing building was registered as a commercial area.

## 2.5. Gökkuşluğu Shopping Mall Architectural Project Preparation

The building has become quite different from its first form with different additions over time. The most extensive addition was the addition of a balcony surrounding the building. Except for the part solved as two storeys in the existing planning, some of the commercial units planned as single storeys have been transformed into two storeys by making illegal mezzanine floors. With the length of the building, the high density of users and the additions made, it has become necessary to review the emergency exits for situations that may cause problems.

As a result of the zoning plan amendments, floor area, building length and precedent values were regulated for the architectural project of the building. Gökkuşluğu Shopping Mall has been subjected to many different spatial changes and new additions today compared to when it was first built. An official architectural project prepared for the building was not found in the records. There is only a prefabricated structural system project for the building built with prefabricated construction system. For this reason, an architectural project drawing was made for Gökkuşluğu Shopping Mall with the survey technique. In addition to the length of the building, the unplanned space arrangements of the business owners, which made the measurement

process difficult, caused inconsistencies even in small proportions while preparing the survey of the project. For this reason, GPRS measurements were made from the existing carrier systems and certain points of the building (Figure 5) and combined with the survey project.

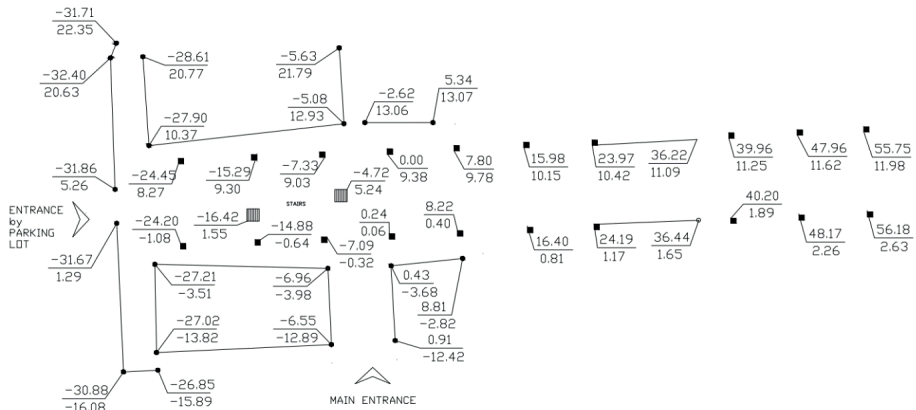


Figure 5. Existing columns of Gökkuşuşı Shopping Mall building and detection of certain points with GPRS system

In the first architectural project prepared for the building, site (Figure 6.) and application plan, ground floor and 1st floor plans, sections and elevations were prepared as floor plans. There is no basement floor due to the use of superficial foundation in terms of prefabricated building feature. In order for the building to obtain a license by the Seljuk Municipality Zoning Directorate, it is obligatory to show a shelter in the architectural project. On top of that, since the basement floor could not be built, the necessary shelter area was provided by combining some spaces on the ground floor. However, this process is only in the architectural project and there are active spaces belonging to tradesmen in these areas.

Since the above-mentioned procedure for the shelter during the construction license process was not actually done in this way, an underground shelter with an indirect connection to the building was planned with the idea that it would create a problem for the occupancy license, and the basement floor plan (Figure 7) was added by submitting an amendment project to the municipality.

There are entrances on the east and north facades, with the main entrance on the south facade. Considering the escape distances with sprinkler systems according to the fire regulations in force, the architect decided to add a fourth

exit in the west direction. In addition, it was planned on the architectural project to add fire escapes to the terraces surrounding the building in order to provide fire escape from the spaces with upper floors. The fourth entrance specified in the architectural project and the fire escapes on the terraces were constructed by the construction site supervisor in the committee. In addition, a sprinkler system was provided to cover the entire building.

While the building was located on a floor area of 7300 m<sup>2</sup> in the first planning, the ground floor area reached 9500 m<sup>2</sup> with the additions (Figure 8). With the illegal mezzanine floors, the 1st floor area reached 6000 m<sup>2</sup> (Figure 9).

Legal applications were made to the municipality for the shopping mall for which plans were submitted and a construction license could be obtained for the building. However, since the shelter requested for the building was not in accordance with the science conditions, it was planned underground under the ground level outside the building, but since the current production could not be made, the occupancy license could not be issued. In order for the commercial units to benefit from municipal services, temporary settlement was provided, but zoning amnesty was utilized for permanent settlement.

Although, considering the cancellation of the demolition decision of the building and the licensing procedures of the existing building, the lack of a designed architectural project, the building does not carry the science and architectural elements sufficiently, but the high rental income, even the building renovations are undertaken by the tradesmen, easy-to-access shopping-shopping, eating- drinking, recreation, entertainment, etc. for the student, it is thought that it would be more appropriate to demolish such a building and rebuild it as a planned building, even if it has received a zoning amnesty.

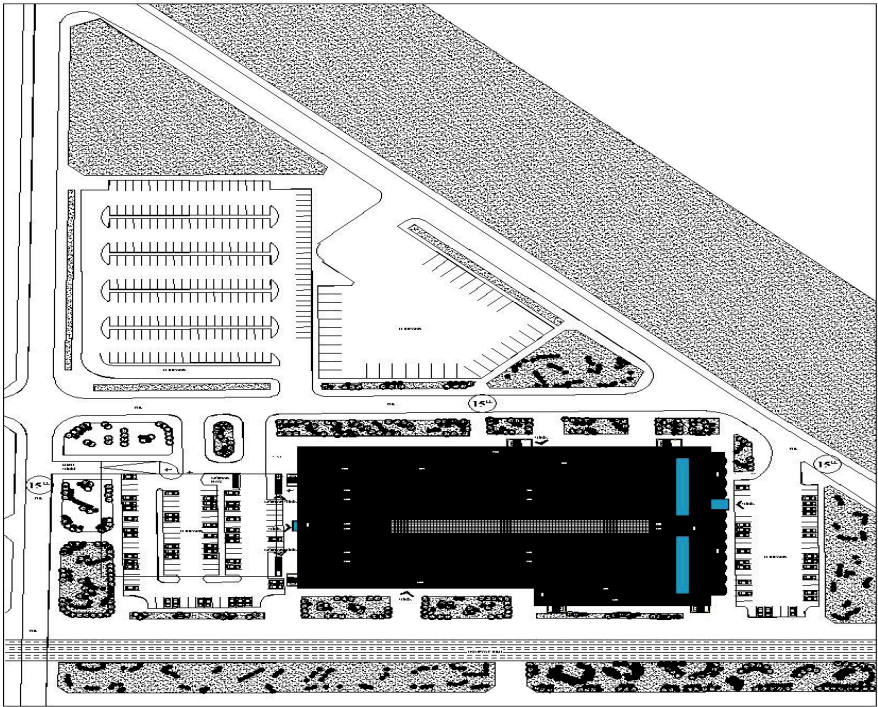


Figure 6. Site Plan

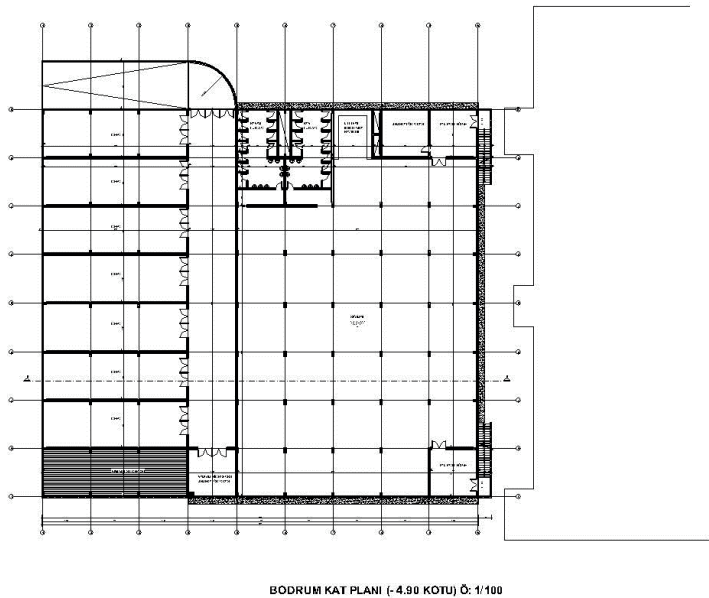


Figure 7. Basement Floor Plan



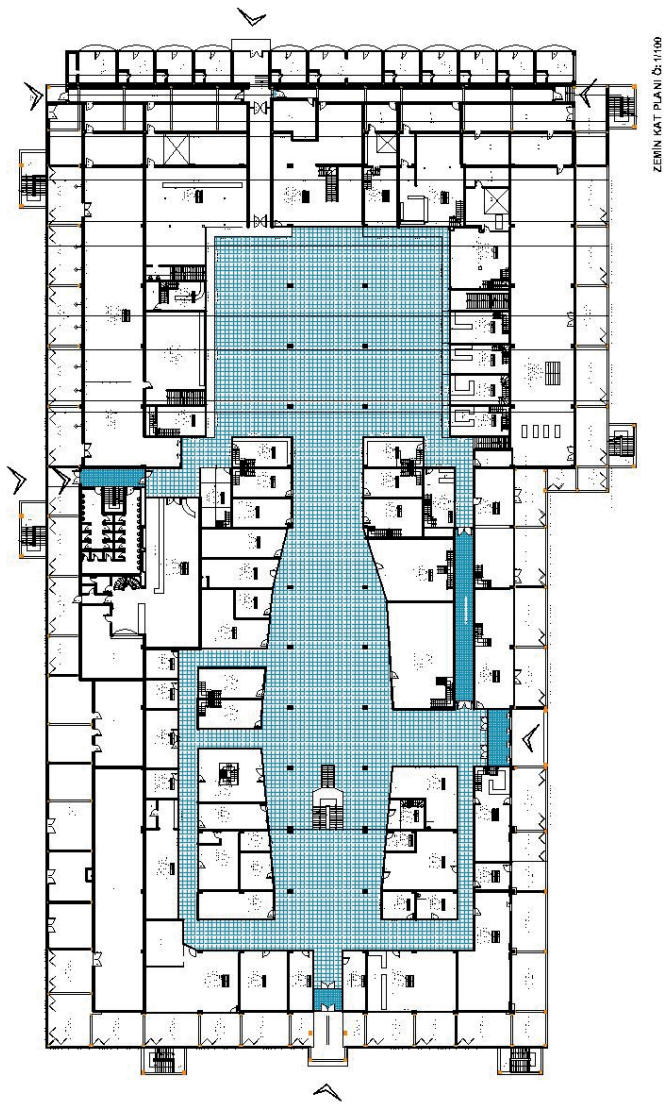
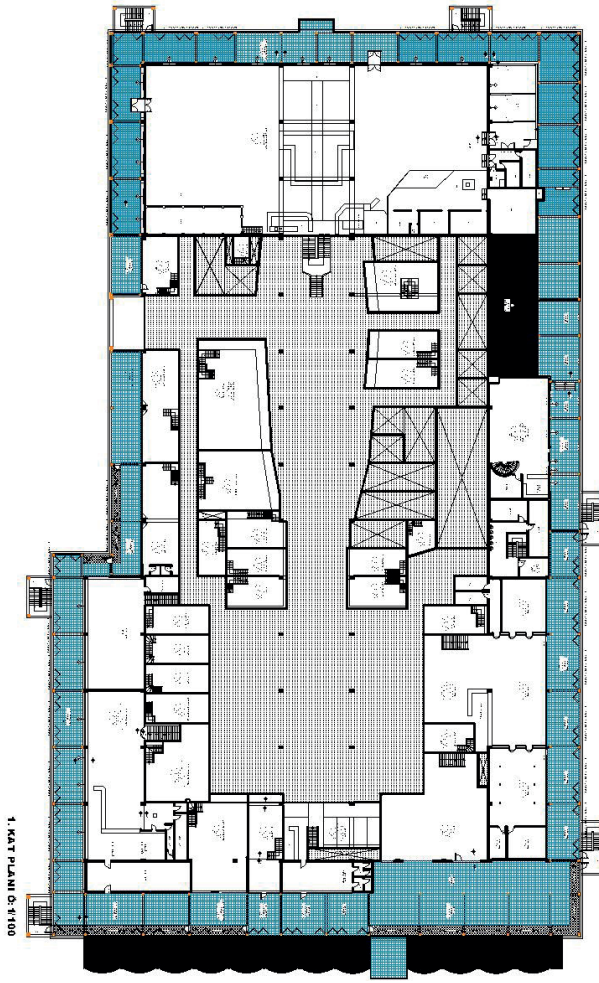


Figure 8. Ground Floor Plan



*Figure 9. 1st Floor Plan*

### 3. CONCLUSION

Gökkuşu Shopping Mall was built without a license to meet the needs of Selçuk University students. The building, which is used for commercial purposes, has reached the status of an illegal building as a result of the complaints of the tradesmen of the region and for this reason, a demolition decision has been made. As a result of this decision that the tradesmen who are tenants within the building, the university administration that provides



rental income and the students who meet their needs will suffer, it was decided to stop the demolition decision by making official negotiations and to issue a license for the building. In this direction, the following practices were carried out during the building licensing process.

- No official architectural project has been prepared for the existing building. The building was built on the project prepared for the prefabricated carrier system. For this reason, a survey was taken for the plan showing the current state of the building.

- Illegal mezzanine floors were built in the interior of the building and the usage area increased over time. While the interiors whose mezzanines comply with the science conditions are included in the planning to be used for licensing, dismantling decision is given for those that are not deemed appropriate.

- The balconies surrounding the building were included in the planning as semi-open spaces and fire stairs were added for fire escapes.

- In addition to the existing entrances on three facades, an entrance was planned in the fourth facade for ease of emergency exit.

- Due to the necessity of shelter planning in order to obtain a housing license, a shelter planning, which has an indirect connection with the building, was made to be underground outside the building.

- Due to the inability to construct the existing shelter, occupancy could not be obtained.

- A settlement license was issued for the building during the zoning amnesty process.

As a result of the above-mentioned issues, although the building continues to function, it has been observed that risks that may harm the users have occurred due to the lack of an architectural project designed in accordance with the necessary science conditions and the inability to prevent illegal use of the building by the tenant tradesmen. It has been observed that a shopping mall building in the campus area is quite useful in favour of students. However, it is recommended that this building should have a project designed by an architect, in addition, engineering services should be obtained and the necessary static, mechanical and electrical installation projects should be prepared and produced as a licensed building in accordance with the zoning.

## **ACKNOWLEDGEMENT**

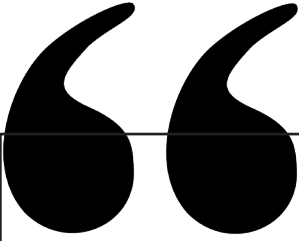
For Gökkuşığı Shopping Mall, which is the subject of this study, Mustafa DERELİ has been assigned as a responsible architect for the preparation of “Architectural Application Project” and “Construction License” through revolving fund.

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## *Chapter 3*

### **NEIGHBORHOOD SUSTAINABILITY ASSESSMENT TOOLS**

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## INTRODUCTION

Today, more than half of the world's population lives in cities; by 2050, it is estimated to be 70% (Wahba, Wellenstein, & Das, 2020). In addition, cities are responsible for around 70% of the world's energy consumption and greenhouse gas emissions (IEA, 2021). The pace and scale of urbanization are disruptive forces in the social, environmental and economic equilibrium of cities giving rise to many problems, including climate change, pressure on natural resources, environmental degradation, lack of access to essential services and socio-economic inequalities (Ameen, Mourshed, & Li, 2015; Cohen, 2017; Lin & Shih, 2018; Ortiz-Fernandez, Astudillo-Cordero, & Quesada-Molina, 2023; Asaad et al., 2024). It is thus imperative to ensure the sustainable development of cities.

Many studies on sustainable urban development have been carried out since Local Agenda 21, formulated at the Rio Earth Summit in 1992 and emphasized the local level's importance in ensuring sustainable development. The aim is to create safe, healthy, liveable, resilient and sustainable communities by providing urban development with urban plans and management strategies based on the principle of sustainability (Komeily & Srinivasan, 2015; Ferrari et al., 2022). With this in mind, sustainability assessment tools have been developed on different urban scales taking into account various contexts worldwide.

Sustainability assessment tools are decision support systems that recognize sustainability as a fundamental principle in the planning and development of urban areas. They enable better decision-making by transforming data into information, which helps create a more environmentally, socially, and economically sustainable world in terms of buildings and cities. These tools have been used since the 1990s to assess the sustainability of buildings (Reith & Orova, 2015). The main objective of building-scale assessments is to maximize the efficiency of the building while minimizing its impact on the environment. However, to assess the environmental performance of buildings, it is necessary to go beyond the sustainability assessment of individual buildings and to identify their relationship with other systems in the city (Berardi, 2013; Cheshmehzangi et al., 2020; Dawodu et al., 2022). Therefore, a need exists for assessment at the neighbourhood scale because neighbourhoods are the building blocks of cities, and all of their components must be sustainable for a city to be sustainable (Yıldız et al., 2016). The neighbourhood is a good starting point for creating a sustainable community, given that it is a scale within which people can meet their daily needs, socialize and feel safe. The neighbourhood is small enough to experiment with sustainable planning and design initiatives yet large enough to consider the complex interactions between different urban components (Choguill, 2008; Tam et al., 2018; Bahale & Schuetze, 2023). The neighbourhood scale is also appropriate for

analyzing socio-economic impacts more accurately and engaging with citizens meaningfully (Sharifi, Dawodu, & Cheshmehzangi, 2021). Extending the assessment boundaries to the neighbourhood scale allows us to assess individual buildings in the context of the urban space as a whole, including the spaces between buildings, the services provided, the living community and the shared values that arise from all these (Hamedani & Huber, 2012; Reith & Orova, 2015; Naji & Gwilliam, 2016). The city's sustainability is in direct proportion to the sustainability of its neighbourhoods.

Over the years, building-scale sustainability tools have been adapted to neighbourhood and city scales. Many 'Neighbourhood Sustainability Assessment' (NSA) tools have been developed to recognize the importance of the neighbourhood scale in achieving urban sustainability (Zhen et al., 2017; Sharifi, Dawodu, & Cheshmehzangi, 2021). More than forty NSA tools have been developed worldwide to monitor urban development. Among these, the most widely used and generally well-implemented urban sustainability assessment tools are LEED-ND (Leadership in Energy and Environmental Design for Neighborhood Development, US), BREEAM Communities (Building Research Establishment Environmental Assessment Method, UK) and CASBEE-UD (Comprehensive Assessment System for Building Environmental Efficiency for Urban Development, Japan) (Sharifi & Murayama, 2014; Yigitcanlar, Kamruzzaman, & Teriman, 2015; Yoon & Park, 2015; Medved, 2016; Wangelet al., 2016; Lin & Shih, 2018; Sharifi, Kawakubo, & Milovidova, 2020). NSA tools transform dense data on urban areas into information that can be used for sound decision-making. These NSA tools have been used primarily in developed countries to achieve sustainable development goals. They facilitate informed decision-making for the future.

NSA tools use indices and indicators categorized according to environmental, social and economic aspects to assess and rate the sustainability of projects in the neighbourhood (Sharifi & Murayama, 2013; Komeily & Srinivasan, 2015; Reith & Orova, 2015; Yigitcanlar, Kamruzzaman, & Teriman, 2015; Boschetto, Bove, & Mazzola, 2022; Ferrari et al., 2022; Ergönül et al., 2023). As multi-criteria models, NSA tools subject projects to specific scoring and weighting within a framework of categories and indicators in a hierarchical structure (Ortiz-Fernandez, Astudillo-Cordero, & Quesada-Molina, 2023). However, the tools are not mandatory for all urban projects; they are used voluntarily by project managers to promote sustainable design and planning strategies in the decision-making process. Many urban planners and researchers who promote sustainable development have integrated the criteria of the sustainability assessment tools into their urban design guidelines (Yoon & Park, 2015). While the various NSA tools have similar themes, they vary in scope, approach, and clientele, and they have sustainability criteria that are categorized differently within the context

of their adoption. In addition, the institutional functioning and certification processes of the assessment tools vary (Sharifi & Murayama, 2013) (Ameen, Mourshed, & Li, 2015; Yoon & Park, 2015; Cheshmehzangi et al., 2020; Sharifi, Dawodu, & Cheshmehzangi, 2021). This study reviews the literature on LEED-ND, BREEAM Communities, and CASBEE-UD, the world's three most widely used, advanced, and comprehensive sustainable assessment tools. It emphasizes the importance of developing an NSA tool specific to Türkiye.

### **LEED-ND (Leadership in Energy and Environmental Design for Neighborhood Development)**

LEED aims to optimize the use of natural resources to encourage green building development, promote renovation strategies, minimize negative environmental and human health impacts of construction and provide high-quality indoor environments for occupants (Işınkaralar, 2017). LEED serves as a guideline and rating mechanism and is a voluntary, market-driven, consensus-based tool with twenty-one separate rating systems designed to meet the needs of different market sectors. LEED for Neighbourhood Development (LEED-ND) is a rating system through which LEED is certified at the neighbourhood level and is thus a sustainability rating system for neighbourhood development. It was developed in partnership with the U.S. Green Building Council (USGBC), the Congress for the New Urbanism (CNU) and the Natural Resources Defense Council (NRDC) (Aranoff, Clark, Lavine, & Suteethorn, 2013; Wangel, Wallhagen, Malmqvist, & Finnveden, 2016; Bahale & Schuetze, 2023). LEED-ND began certification in 2009 after four years of development and pilot testing (Ameen, Mourshed, & Li, 2015; USGBC, 2014; Ameen, Mourshed, & Li, 2015; USGBC, 2018; Kaur & Garg, 2019). LEED-ND can be applied to a neighbourhood development project that is fully completed or nearing completion or to a neighbourhood development project that is less than 75% complete (Bahale & Schuetze, 2023).

LEED-ND aims to plan and develop environmentally, socially and economically sustainable neighbourhoods. Within this framework, LEED-ND addresses design principles that ensure sustainability and energy efficiency based on smart growth at the neighbourhood scale, reduced dependence on the automobile, accessibility to public spaces, proximity to housing and jobs, the creation of mixed-use neighbourhood centres, connectivity and walkability (Stangl & Guinn, 2011; Sharifi & Murayama, 2013; Sharifi & Murayama, 2014; Okumuş & Türkoğlu, 2017; Ameen, Mourshed, & Li, 2015). LEED ND places more emphasis on social issues than other NSA tools (Diaz-Sarachaga, Jato-Espino, & Castro-Fresno, 2018). Many of the criteria, particularly the design of the site and the neighbourhood, are inspired by the design and planning principles of the New Urbanism approach (Yoon & Park, 2015).



Due to the scale of its application, LEED-ND is the most popular NSA tool in the United States, although it is also being used in projects globally. In this context, LEED-ND has been adopted to guide neighbourhood development plans in Canada, China, Malaysia and South Korea (Berardi, 2013; Sharifi & Murayama, 2013; Dawodu et al., 2022). The LEED-ND rating system defines a neighbourhood as having at least two buildings and 320 acres of land (Park & Rogers, 2015). It can be applied to the sustainability assessment of residential, non-residential or mixed-use development or renovation projects. LEED-ND has two different certification options at the design and completion stages of the development process (USGBC, 2024a; USGBC, 2024b). LEED-ND employs a three-tiered certification process: optional conditional approval of the development plan, pre-certification, and full certification after all the prerequisites and credits have been submitted (Wangel et al., 2016; Ferrari et al., 2022). Three main groups of actors are involved in the certification process: the applicant, who acts as a team leader; a multidisciplinary group of design professionals; and local support partners. The applicant is the person or organization whose project is under consideration for LEED-ND certification. This person or organization is the individual or company that controls the majority of the space within the project boundaries and is the property owner or investor who accepts the certification agreement. The project owner may authorize a representative to register the project and accept the certification agreement. The LEED-ND rating system includes smart growth, new urbanism, social equity and green building practices. Because of this, it is overseen by the second group of actors, a team of experts. LEED-ND requires expertise in various disciplines, depending on the assessed project characteristics. For the LEED-ND assessment process to succeed, the team of experts must have the appropriate technical skills. For this reason, the applicant should form a project team of individuals with expertise in urban planning, architecture, civil engineering, and transportation planning. USGBC emphasizes that at least one project team member should have the experience to manage the proposed project's certification process, and it requires at least one LEED-ND accredited professional to be involved in the process. The project manager oversees the LEED project and decides which project team members are responsible for specific tasks, criteria or prerequisites. Finally, the third group of actors, local support partners, are government agencies or non-profit organizations influencing specific rating criteria. The project manager ensures that these partners are informed about the project and, if necessary, helps them with the application documents (USGBC, 2024a; USGBC, 2024b).

LEED-ND's rating indicators are divided into five themes: "Smart Location and Connectivity", "Neighbourhood Patterns and Design", "Green Infrastructure and Buildings", "Innovation", and "Regional Priority Credits"

(İşınkaralar, 2017; Sharifi, Kawakubo, & Milovidova, 2020). The submitted project is rated on a 110-point scale based on LEED-ND's design criteria rating table to determine whether the project is eligible for certification and, if so, the LEED-ND certification level. LEED-ND classifies project applications into four certification levels according to the number of points earned: Certified (40-49 points), Silver (50-59 points), Gold (60-79 points), and Platinum (80 + points) (USGBC, 2024a; USGBC, 2024b).

### **BREEAM Communities (Building Research Establishment Environmental Assessment Method)**

The Building Research Establishment Environmental Assessment Method (BREEAM) is the first environmental certification scheme for building development based on European Union standards (Ameen, Mourshed, & Li, 2015; Yıldız et al., 2016). The primary purpose of BREEAM is to reduce the environmental impact of the building by setting certain standards and to ensure that the building is socially and economically beneficial (Berardi, 2013; Sharifi, Kawakubo, & Milovidova, 2020). In 2009, BREEAM launched a unique programme called BREEAM Communities for Neighbourhoods to monitor sustainability at an urban level beyond the building scale. BREEAM Communities was created to ensure that planners and developers consider sustainability principles at the earliest stage of the decision-making, planning and design process and to measure and independently certify the sustainability of project proposals (Sharifi & Murayama, 2013). BREEAM Communities began offering neighbourhood certification in 2011 (Ameen, Mourshed, & Li, 2015).

BREEAM Communities assesses neighbourhood development under six headings: governance, social and economic well-being, resources and energy, land use and ecology, transport and movement, and innovation (Kaur & Garg, 2019; Ferrari et al, 2022). Social and economic well-being is divided into three subcategories: social, economic, and environmental. These are further subdivided into smaller categories, which are scored on a one-to-three-point scale. In this system, transport and mobility are the most critical categories, with the others, such as land use, ecology, resources and energy, well-being, economy, governance, and innovation, ranked according to importance (Okumuş & Türkoğlu, 2017). A project can be certified as good (45 points), very good (55 points), excellent (70 points) or outstanding (85 + points), depending on its score out of 100 points (Sharifi & Murayama, 2014; Sharifi, Kawakubo, & Milovidova, 2020).

### **CASBEE-UD (Comprehensive Assessment System for Building Environmental Efficiency for Urban Development)**

The Comprehensive Assessment System for Building Environmental Efficiency (CASBEE) was developed by the Japan Sustainable Building

Consortium (JSBC) in 2004 (Yoon & Park, 2015; Ferrari et al., 2022). CASBEE is an independent assessment and certification tool designed to protect the natural environment and improve sustainability in urban planning (Yıldız et al., 2016; Işınkaralar, 2017). The Japan Green Building Council and the Japan Sustainable Building Consortium developed CASBEE-UD in 2006. CASBEE-UD is used to assess urban development projects considering the impact on people and the impact of groups of buildings and other areas for different purposes, such as roads, squares, and green spaces (Sharifi & Murayama, 2013; Ameen, Mourshed, & Li, 2015; Okumuş & Türkoğlu, 2017). In addition, the statistical information on all 351 smart city indicators defined in the CASBEE-UD tool is collected and stored in a database for 1750 Japanese municipalities, from which the data required to run the tool can be automatically retrieved (Sharifi, Kawakubo, & Milovidova, 2020).

The evaluation criteria are divided into “Urban Environmental Quality” within the project area and “Urban Environmental Burden” outside the project area. “Urban environmental quality” addresses issues related to the natural environment, quality of services and contribution to the local climate. In contrast, “nonurban environmental impact” addresses issues related to impact on the local environment, social infrastructure, energy and material consumption (Berardi, 2013). The “environmental quality inside the urban development area” and the “environmental impact outside the urban development area” are divided into three main categories, environmental, social and economic, which are broken down into two/three intermediate categories and then into two/three smaller categories (Kaur & Garg, 2019). These are then ranked according to a five-point scale based on the resulting scores, where each category is given equal weight, but the scores of the subcategories are different. The target urban development area is finally determined based on the Built Environment Efficiency (BEE) score, which is the environmental quality score within the urban development area divided by the environmental impact score outside the urban development area (Sharifi, Kawakubo, & Milovidova, 2020). CASBEE-UD has five different levels of certification ranking projects according to their Built Environment Efficiency (BEE): poor, slightly poor, good, very good, and superior (Sharifi & Murayama, 2014).

### **SCORING and WEIGHTING of NSA TOOLS**

The NSA tools assess urban development projects and practices regarding urban sustainability by applying a multi-decision approach to categorized indicators. The unique criteria scoring and weighting methodology of NSA tools determines how well the project performs against the indicators. The project’s sustainability is then assessed and certified according to its score on the different categories.

NSA tools generally focus on the social, environmental, economic and institutional structure of cities and neighbourhoods (Dawodu, Cheshmehzangi, & Williams, 2019). These are the core dimensions of sustainability. Common themes in the NSA tools include transportation solutions that discourage the use of private vehicles, streets that encourage walking and cycling, building, energy and water efficiency; energy production and supply; water and waste management systems, permeability, urban density, ecology, mixed-use, quality of life and public participation (Yigitcanlar, Kamruzzaman, & Teriman, 2015). To assess a neighbourhood development project, the NSA tools LEED-ND uses 59 indicators, BREEAM Communities uses 41 indicators, and CASBEE-UD uses 53 indicators (Sharifi, Kawakubo, & Milovidova, 2020). There is a similarity in the indicators used by the different NSA tools for neighbourhood development, albeit they use different wording and are under various headings.

On the other hand, although there may be similarities in the categories of NSA tools, similar criteria will be rated differently because of the use of different criteria under the categories and different scoring and weighting systems (Yildiz et al., 2016). Boyle et al. point out that NSA tools cannot be applied in the same way in different parts of the world. Three different sustainability performance ratings were obtained in their evaluation of a neighbourhood project using LEED-ND, BREEAM-C and CASBEE-UD tools (Boyle, Michell, & Viruly, 2018). The main reason is the different percentage weights used by the NSA tools to evaluate the criteria. For example, using several criteria and percentage weights, the LEED-ND and BREEAM-C tools prioritize environment and land use, whereas the CASBEE-UD tool prioritizes social development (Yildiz et al., 2016).

### **PARTICIPATION in NSA TOOLS**

The benefits of involving people in the decision-making process include the ability to assess different points of view, to understand the priorities and needs of the population, to increase the sense of ownership of decisions by those involved, to promote transparency, to increase trust in the process and to reduce the potential for conflict. These benefits increase the effectiveness and sustainability of decisions. Identifying stakeholders' needs and priorities, increasing the effectiveness of decisions, and speeding up the process can be achieved by adopting a participatory approach to the decision-making process for urban projects. In this context, local knowledge can help shape the project, achieve the goal of sustainable development and create sustainable communities by ensuring public participation in developing NSA tools. The public can define the sustainability objectives of the NSA tools and the criteria to be assessed (Yigitcanlar, Kamruzzaman, & Teriman, 2015; Lin & Shih, 2018). Increased citizen participation in selecting the evaluation criteria for NSA tools is necessary to share priorities and tailor sustainability goals for each community. Determining indicator weights in the NSA process in

consultation with local stakeholders allows the evaluation process to be site-specific. Participation not only identifies people's priorities and needs, but it also prevents conflict between people when a consensus is reached. People's participation in the NSA process also facilitates the evolution of the evaluation process with the possibility of criteria being reviewed (Sharifi, Dawodu, & Cheshmehzangi, 2021). Furthermore, the feedback obtained from citizens during the participation process helps to update the NSA system itself (Sharifi & Murayama, 2013).

Without adequate citizen participation in the NSA assessment process, a gap may emerge between theory and reality. Therefore, it helps to bring NSA tools closer to the truth of the urban environment by adjusting the categories and criteria used by NSA tools in line with the views of local residents (Berardi, 2013). Their opinions in the assessment process contribute significantly to developing the NSA tools (Cheshmehzangi et al., 2020). Public participation in the sustainability assessment process also increases public confidence in the process, facilitating project implementation and helping to reduce costs in the long term. In addition, stakeholders' communication and cooperation opportunities are increased by adopting a participatory approach. Participation contributes to a common understanding among stakeholders and a healthier process overall (Wangel et al., 2016). However, this does not mean that decisions should be based solely on the public's views (Dawodu, Cheshmehzangi, & Williams, 2019). The process should be initiated by experts and executed scientifically. By managing the process in this way, experts can gather local knowledge naturally and integrate it into the process dynamically.

### **LIMITATIONS of NSA TOOLS**

The applicability of NSA tools is critical as achieving sustainability without practically applying real-world criteria is impossible. Therefore, developing NSA tools is crucial for creating a sustainable urban built environment. However, it has to be emphasized that NSA tools have limitations, such as limited sustainability dimensions, imbalance of categories and criteria, the process not always being carried out in a participatory and transparent manner and context-specific problems encountered during the evaluation process (Wangel et al., 2016; Sharifi, Dawodu, & Cheshmehzangi, 2021). Developing approaches to minimize or overcome these limitations in newly developed NSA vehicles can assist in creating more sustainable cities.

NSA tools generally aim to set a global standard for use internationally. However, when the mechanism of NSA tools is examined, it is clear that their focus is on different issues and ignores location-specific situations (Yoon & Park, 2015). The universal applicability of NSA tools is questionable as each region has different characteristics, such as its own legislation, climate, cultural structure and natural conditions (Yigitcanlar, Kamruzzaman, &

Teriman, 2015; Pedro, Silva, & Pinheiro, 2018; Cheshmehzangi et al., 2020). In the same way, there are contextual differences and different priorities in developing countries and developed countries. Some concerns in developing countries may not be present in developed countries. For example, developing countries may have limited investment capacity due to difficulties accessing finance (Kamble & Bahadure, 2020). Because of these contextual differences, NSA tools cannot be used as they were developed in different regions. The development of NSA tools is driven by local conditions, even though their primary objectives are similar. Conditions that require sustainability assessment vary from country to country and even from city to city within a country (Yildız et al., 2016). Therefore, revising the tools according to local characteristics or developing assessment tools appropriate for each country's conditions is essential.

Another limitation is that NSA tools may overemphasize specific issues to the detriment or neglect of others (Komeily & Srinivasan, 2015; Yigitcanlar, Kamruzzaman, & Teriman, 2015; Ergönül et al., 2023). For example, NSA tools may prioritize environmental, infrastructure and resource management issues according to their context but ignore topics such as culture, trade and innovation (Kaur & Garg, 2019). Similarly, while NSA tools aim to contribute to climate change mitigation, information on the magnitude of energy and emissions savings must also be included in the sustainability assessment process. Moreover, the NSA tools themselves differ from each other in terms of the issues that they prioritize. For example, the CASBEE-UD tool focuses on disaster and ICT, while BREEAM Communities places more emphasis on social inclusion. Similarly, the inclusion of socio-economic sustainability is considered to be at odds with the optional or low scoring of housing affordability in the LEED-ND tool (Dawodu et al., 2022). Furthermore, NSA tools need to address the complex relationships between different criteria and categories when, in practice, each criterion is assessed in isolation, regardless of how it may affect or be affected by other criteria (Kaur & Garg, 2019).

NSA tools also have limitations in how they are applied. LEED-ND is the most recognized neighbourhood sustainability assessment tool. LEED-ND has had support for its development from many organizations, notably the US Department of Housing and Urban Development (HUD) and the US Environmental Protection Agency (EPA). LEED-ND is also an NSA tool that has been used around the world. Despite this relative success, the LEED-ND tool has some limitations. One of these limitations is the lack of a legal basis for mandatory implementation of the LEED-ND tool. As the assessment of the sustainability of urban projects is voluntary on the part of developers, projects that are already successful in sustainability apply for this certification tool. The fact that the sustainability of all projects is not assessed prevents full sustainability at the urban scale. In addition, the process of obtaining



LEED-ND certification carries an additional cost burden to an already costly certification process where meeting the sustainability criteria in a building requires the use of expensive materials. There are also challenges in implementing the CASBEE-UD tool. Although Japan has an Environmental Impact Assessment (EIA) Law, its scope is limited to specific large projects and focuses mainly on the environmental aspects of sustainability. In addition, with the decline of Japan's population, the development of the urban built environment is slowing down. These situations limit the applicability of CASBEE-UD. On the other hand, using the BREEAM Communities tool for a project according to UK regulations contributes to approving the plans for the project in question at a lower cost and more quickly. The UK is making legal arrangements to integrate the BREEAM Communities tool into the planning system (Sharifi & Murayama, 2014).

Another limitation is the lack of attention to institutional sustainability in NSA tools. Institutions play an essential role in guiding human interactions, and their performance on various issues, such as budget management and planning management, affects the sustainability of the community. The NSA tools do not have a mechanism to assess the performance of the government and civil society organizations in the neighbourhood. Furthermore, NSA tools ignore other essential criteria such as governance, decentralization, legal frameworks and instruments, information systems, and research and education to institutionalize sustainable development (Sharifi & Murayama, 2013).

Another factor to be considered is that a sustainability assessment cannot be limited to a specific timeframe, as sustainability is about meeting the needs of present and future generations. However, the static nature of existing NSA tools tends to ignore this dimension of sustainability (Komeily & Srinivasan, 2015). NSA tools monitor and certify urban projects at the production and implementation stages. However, they do not test whether the project can adapt to changes over time, although people's needs and demands may change. For this reason, NSA tools should develop mechanisms to continuously or periodically monitor the evolution of the projects they certify (Cheshmehzangi et al., 2020). In addition, NSA tools need to enhance their certification systems to move urban development forward constantly.

NSA tools also ignore the importance of urban renewal projects for urban and global sustainability (Boyle, Michell, & Viruly, 2018). As a technical tool to evaluate urban projects against sustainability criteria, NSA tools cannot assess the sustainability of a project aimed at renewing the existing built environment. Therefore, more than NSA tools are required to certify urban regeneration projects aiming to redevelop physically, economically and environmentally problematic urban environments. The revitalization through urban renewal projects of areas suffering from problems such as poverty and lack of services and dilapidated buildings helps to improve the quality of life of



those living in the neighbourhoods, reduce the environmental impact of urban areas, preserve the cultural heritage of the city, reduce crime rates and create sustainable communities. Given the opportunities that urban regeneration projects offer for promoting urban sustainability, NSA tools should provide a system for assessing the sustainability of urban regeneration projects.

Participation and transparency are issues that need to be addressed in NSA development as the existing systems do not provide a sufficiently participatory and transparent governance mechanism (Boyle, Michell, & Viruly, 2018). Limited stakeholder engagement in the NSA process may not accurately reflect the needs and values of all stakeholders because the included stakeholders do not represent the entire community, and there are insufficient opportunities for participation (Sharifi, Dawodu, & Cheshmehzangi, 2021). Therefore, strategies should be developed to ensure stakeholder engagement on a holistic basis, thereby ensuring inclusive sustainability assessment. Furthermore, NSA tools often do not disclose detailed performance data after the evaluation. Final results are presented only in the form of rankings and checklists; thus, the assessment results are not reported transparently. There is, thus, a need for more transparency in the presentation of performance data. To make NSA tools more transparent and increase confidence in their use, updates on the methods and criteria used in the evaluation and evaluation reports should be easily understandable and accessible to all. In conclusion, NSA tools still need to improve in addressing sustainability's social, economic and institutional dimensions. In short, there are shortcomings in the weighting and scoring of the tools, their adaptability to the local context is weak, and the level of participation needs to be improved (Sharifi & Murayama, 2013).

## EVALUATION

Increasing population and energy demand, inequalities in social structure, rapid urban growth and many other issues threaten the sustainability of natural areas, social structure and economic order. This situation necessitates the adoption of policies in all areas of life to be consistent with the principle of sustainability. NSA tools aim to assess the level of sustainability of neighbourhood-related projects using a series of environmental, social and economic indices and indicators to ensure the continuity of sustainable communities and living spaces. With the ongoing development of NSA tools, there has been a move towards assessing different sustainability criteria. More recent versions of NSA tools have emphasized the social and economic structure, including indicators such as community well-being, affordability, access to public transport and facilities in their systems. This development in NSA tools contributes to creating more sustainable and liveable neighbourhoods and communities.

This study included a literature review of NSA tools such as LEED-ND,

BREEAM Communities and CASBEE-UD. The results show the importance of Neighbourhood Sustainable Assessment tools for sustainable urban development. However, the limitations of the tools mentioned in the previous section need to be addressed in further developing NSA tools. The main limitation of existing NSA tools is their general lack of adaptability to local conditions. The NSA tools examined carry out sustainability assessments at an international level. However, in many examples, it was found that the tools lacked criteria related to the local context (Yigitcanlar, Kamruzzaman, & Teriman, 2015; Sharifi, Dawodu, & Cheshmehzangi, 2021). Therefore, NSA tools should be developed to address the socio-cultural, environmental, economic, and political conditions relating to the specific location.

In Türkiye, the LEED-ND and BREEAM Communities tools are used to assess urban projects at the neighbourhood level. However, it is difficult to say that LEED-ND and BREEAM Communities are appropriate for Türkiye regarding the local context. Developing a country's tools for sustainability assessment at the neighbourhood level has to avoid contextual problems (Sharifi & Murayama, 2014; Dawodu, Cheshmehzangi, Sharifi, & Oladejo, 2022). Therefore, it is necessary to develop a neighbourhood sustainability assessment system that is specific to the context and culture of Türkiye and considers all local specificities (Yıldız et al., 2016; Işınkaralar, 2017; Okumuş & Türkoğlu, 2017; Ergönül et al., 2023). It is essential to adapt the indicators of the NSA tool to be developed so that the unique climatic, environmental, socio-cultural and economic characteristics of different regions are considered. In addition, the NSA tool to be developed should not limit its assessments of projects to a specific timeframe, as sustainability assessments should be ongoing, with the performance of projects being monitored and re-assessed periodically (Cheshmehzangi et al., 2020).

Ensuring neighbourhood sustainability is directly proportional to ensuring that all stakeholders who make up the community have a say in the decision-making process. A participatory approach to the NSA process ensures that stakeholders' preferences, priorities and needs are considered (Sharifi & Murayama, 2013). By involving local stakeholders in developing the NSA tool, neighbourhoods' different social, cultural and economic contexts can be addressed, leading to inclusive sustainability decisions being made. Furthermore, a participatory process provides a learning environment for the stakeholders, allowing them to take ownership of the decisions and increase social capital. Ensuring participation in the NSA process contributes to the tool's fairness, reliability, and transparency and allows stakeholders to contribute directly to and understand the assessment process.

While making an urban project sustainable is expensive, implementing NSA tools introduces a new cost element for citizens. Strategies are proposed to overcome this escalation of costs, including moving towards legal

codification, providing bonuses and grants for approved developments, attracting investment, making assessments less costly, raising citizens' awareness, and increasing the transparency and simplicity of instruments (Sharifi & Murayama, 2013). Integrating NSA tools within a specific planning process leads to tremendous success in achieving the objectives. Therefore, to increase the success of NSA tools in terms of sustainability and quality of life, it is essential to make provisions in planning legislation and integrate NSA tools in the planning process. Another advantage of this integration is that it facilitates establishing a network of links between assessment systems at different geographical scales (building, neighbourhood, city) (Sharifi & Murayama, 2013). Moreover, integrating the indicators used by sustainability assessment tools into smart city applications enables the creation of a city-wide sustainability database. This database will guide experts, designers and other urban design and sustainability stakeholders in creating liveable and sustainable neighbourhoods and communities. The assessment and planning process should consider local challenges, include the views of local people, and adapt sustainability goals to local conditions. More research should be therefore done to develop NSA tools specific to Türkiye.

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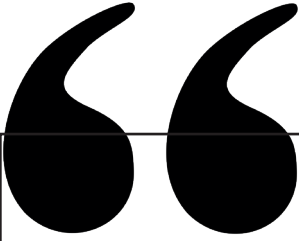
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## *Chapter 4*

### **TIME EFFECT IN ARCHITECTURE: CHANGES IN SAFRANBOLU TRADITIONAL ARCHITECTURE FOR THE SAKE OF MODERNIZATION**

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## 1. Introduction

Time represents the constant changes in human life and the world around us. Objectively, time functions merely as a measurement unit, whereas in conjunction with space, it alludes to diverse experiences. The experiences lived in a space at different times contribute to the formation of the space's identity. H. Minkowski, in the 1980s, asserted that "when space and time are considered separately, they are doomed to vanish like shadows," thus highlighting the strong relationship between time and space (Ragon, 1972) (Erdoğan&Yıldız, 2018). Similarly, Deleuze (1999) argues that time and space should be approached together. According to Deleuze, space produces quantitative differences, while time generates qualitative differences (Tanju, 2008).

Turkish literary figure Ahmet Hamdi Tanpınar (2016), known for his insights into the interplay of time, space, and human experience, explores this theme in his works. In his novel "Saatleri Ayarlama Enstitüsü (The Time Regulation Institute)," Tanpınar states: "The clock itself is space, its ticking is time, and its adjustment is humanity." Tanpınar suggests that the modernization process in Turkey has led to a disconnection in time, resulting in a crisis where meaning cannot be constructed. He asserts that this inability to construct meaning leads to a crisis of identity. Tanpınar argues that identity can be constructed through continuity in time, facilitated by intergenerational transmission. Safranbolu, a place where temporal rupture and interruption in intergenerational transmission are evident, is emblematic of this phenomenon. The temporal effect manifests tangibly in the built environment, where traditional arrangements and ways of life can undergo significant changes over time. This study examines the impact of time on the built environment through the lens of Safranbolu, a city situated in the Karabük province of Turkey. Renowned for its distinctive architecture, sloping and organic streets, and its integration with the surrounding topography, Safranbolu boasts a wealth of culturally significant structures, including religious and commercial buildings, particularly noteworthy are its houses. These structures, characterized by timber construction, projecting bays, and internal features such as hayat, sofa, and functional elements like pools, rotating cabinets, tobacco cabinets, and window shutters, embody historical value.

## 2. Methods

In this study, firstly, the concepts of time and space and their relationship have been examined in order to investigate the impact of time on the built environment. It has been understood that these two concepts cannot be considered separately. As a good example of this, Safranbolu, a traditional settlement where the influence of time can be clearly observed in Turkey's

modernization process, has been selected as the research area. Despite undergoing partial changes, Safranbolu has managed to survive to the present day, bearing many different historical values such as its buildings, street texture, settlement pattern, and traditional occupations, making it globally renowned. This study delves into the process of turning away from traditional lifestyles and striving to become modern as a result of the opening of factories and the increase in the number of people working in them during the modernization period in Safranbolu. For this purpose, articles, books, and reports related to Safranbolu have been read, and Süha Arın's (1976) documentary "Time in Safranbolu," produced in 1976, has been watched to understand the footsteps of change in Safranbolu. Additionally, historical environments and structures were observed on-site, findings were made, and photographs were taken.

Safranbolu has been the subject of numerous publications from the past to the present. These can be categorized as publications examining the history of Safranbolu (Yazıcıoğlu, 1998; Kalyoncu, 2010; Acar, 2006; Tunçözügür, 1999; Yaşar, 2004) and its historical buildings, especially publications aimed at identifying the plan typology of its houses (Bayazıt, 2014; Doğan, 2019; Şahinbaş, 2010); publications investigating the change in Safranbolu (Kütükçüoğlu, 2022) and the necessity of conservation (Emiroğlu, 1981; Kuban, 2001; Özkan Altınöz, 2022; Bozkurt, 2022) publications aimed at developing tourism, improving quality of life, and revitalizing the economy in the region (Özdemir, 2011; Koçan, 2022; Görmüş et.al. 2018).

This study, however, sheds light on the process that began with the construction of the iron and steel factory in Karabük in 1937 and continued with the change in population, the transformation of historical pattern, structures, and traditional occupations until the declaration of the historical site in 1977, differentiating it from existing studies. The article by Aktüre and Şenyapılı (1976) and Süha Arın's documentary published in the same year, in 1976, have been important sources utilized in this study.

### **3. Safranbolu**

#### **3.1. Location and History of Safranbolu**

Safranbolu is situated in the north of Turkey, within the Black Sea Region. Today, it is a district affiliated with the province of Karabük and does not have a coastline on the Black Sea (Figure 1). In the Byzantine era, it was known as Theodoropolis, Zalifre during the Seljuk period, Tarakluyı Bolu in 1446, and Borlu or Taraklıborlu in the 16th century (Sezen, 2017) Safranbolu is mentioned as Zafaranboli on Jean Baptiste Bourguignon d'Anville's map dated 1794 and Richard Kiepert's map dated 1914 (Figure 2). Ainsworth (1842: 65) visited Safranbolu in 1837 and stated that the new name of the city was Zafaran boli, and its old name was Flaviopolis. The origin of both names is the saffron plant (*crocus sativus*), which grows abundantly in the region.



**Figure 1.** *The location of Safranbolu*



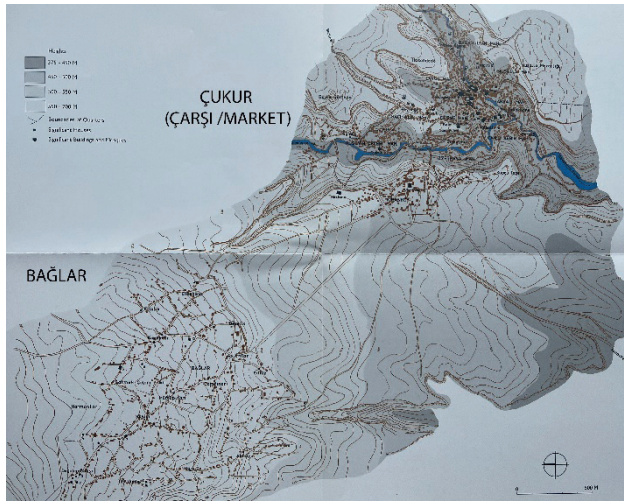
**Figure 2.** *Safranbolu and Eflani in; (a) d'Anville's 1794 dated map (b) Kiepert's 1914 dated map*

Safranbolu and its surroundings have been a settlement area since the Paleolithic era. There were three large mounds near Eflani, close to Safranbolu. This region is referred to as Paphlagonia in Homer's works. Paphlagonia remained a densely populated area during the Persian, Hellenistic, Roman, and Byzantine periods. In the Eflani region northeast of Safranbolu from these periods, there are tumuli, rock tombs, and a Roman temple. After the Turks arrived in Anatolia, the region came under the rule of various Turkic beyliks, including the Danışmentliler, Çobanoğulları, and Candaroğulları, from the 12th to the 15th centuries. In the 15th century, it fell under Ottoman rule (Günay, 1981: 10). From the Candaroğulları period, the Old Mosque, Süleyman Pasha Medrese, and Old Bath, built in 1332, have survived to the present day (Günay, 1981: 10). From the Ottoman era, there are also many fountains and mosques, including the Cinci Hoca Caravanserai, Köprülü

Mehmet Pasha Mosque, İzzet Mehmet Pasha Mosque, and Dağdelen Mosque. Additionally, Safranbolu is renowned for its traditional house architecture.

### 3.2. Settlements in Safranbolu

There were three main settlement areas in Safranbolu, each showing distinct differences: Çukur (Çarşı/Market), Bağlar, and Kıranköy (Figure 3). The Çukur or Market area, located in the city center where trade is predominantly conducted, is surrounded by hills, providing shelter from winds but making it warmer. As a result, residents-built summer houses in the higher and cooler region of Bağlar and spent the summer there. The houses in the Çukur area, located within the valley, are closely spaced, and the streets are narrow, whereas the settlement pattern in Bağlar is more scattered. This area is generally used for viticulture. Kıranköy, on the other hand, is mainly inhabited by non-Muslims, and its architecture is shaped according to their lifestyle. In Kıranköy, the ground floor of houses is used as shops<sup>1</sup> while the upper floor is used as residences. There may be a winery in the basement (Emiroğlu, 1981). While the windows of the buildings in Çukur have shutters, those in Kıranköy do not. The houses in Kıranköy directly face the street and do not have gardens like those in Çukur. In the Çukur area, shops are concentrated in the central market, while residences are located in the vicinity (Aktüre&Şenyapılı, 1976).



**Figure 3.** The settlements of Çukur and Bağlar within Safranbolu (Günay, 1988).

<sup>1</sup> Non-Muslims typically engaged in professions such as tailoring, shoemaking, masonry, blacksmithing, and tavernkeeping (Emiroğlu, 1981: 34).



### 3.3. Architecture of Safranbolu Houses

In all three settlements of Safranbolu, the construction technique of historical buildings exhibits quite similar characteristics. The reason for Safranbolu being a settlement since ancient times can be attributed to the region's abundance of water sources, fertile soil suitable for agriculture, and the presence of surrounding forests. Being located in a region rich in forests, the construction technique in Safranbolu consists primarily of timber and stone. Houses are typically two or three stories high with projecting bay windows. They are positioned on the plot in a manner that does not obstruct each other's views (Figure 4 and 5).



**Figure 4.** General view of Safranbolu, looking from the castle, west to east (photo by the author)



**Figure 5.** General view of Safranbolu, looking from the south to the north: In the foreground, on the right, Köprülü Mehmet Pasha Mosque, on the left, traditional Safranbolu houses, and in the background, atop the castle, Safranbolu City Historical Museum on castle (photo by the author)

The foundations and ground floors of the houses are constructed with stone, upon which the structure is built using a wooden frame system (Figure 6a). The stone basement can also serve as storage or a warehouse (Figure 6b). In settlements with sloping topography, stone is used to prevent sliding and cracking (Emiroğlu, 1981). The wooden carrier on the stone is filled with adobe, which is a good insulation material, and the structure is plastered. The buildings have pitched roofs covered with traditional Turkish tiles (Figure 4). The houses are arranged in a courtyard layout, and the courtyard floor is paved with stone. The roads and streets are winding to reduce slope, and the ground is made of stone and constructed very narrow to prevent erosion. The streets are quite narrow. The construction of large houses is attributed to the traditional family structure, where the father's profession is continued by the male members of the family, and when they marry, the children settle in a room in the house. Another reason for the large size of the houses is the scarcity of land. In the old city center, the flat and low-sloped areas, which are held by administrative and religious buildings, suffer from a scarcity of land due to being squeezed into a narrow valley (Emiroğlu, 1981). Due to the limited space for constructing a large number of houses, they were built only once but on a large scale.



**Figure 6.** An example of a typical Safranbolu house, which is currently used as a museum, the Kaymakamlar house (a) façade; (b) hayat (taşlık) (photos by the author)

Religion and traditions have influenced the design of the houses. According to the Muslim understanding, it is essential for women not to be visible from the outside. For both structural and religious reasons, the garden walls of the houses are built with high stone walls that cannot be seen from the outside. The windows on the upper floor are also covered with shutters for the same reason. The houses are quite spacious. In houses, transition from the common area where the stairs are located (sofa) to the rooms is provided (Figure 7). Inside the rooms, there are quite large closets (Figure 8). In large mansions, there are separate halls for women, called 'harem', and for men, called 'selamlık', and these rooms are designed so that foreign women and



men will not see each other. To transfer food and beverages from the kitchen to the selamlık section without being seen, a revolving cabinet called a döner dolap has been designed (Figure 9). The food is placed in the kitchen, and the revolving cabinet is turned around a circular, vertical axis, transferring the food to the adjacent room without being seen by men. The entrance door knocker of the house is also two, producing thin and thick sounds, respectively. If the guest is a man, the thick knocker is used, and if it is a woman, the thin knocker is used, and the door is opened by a woman or a man according to this sound. Some Safranbolu houses have a pool in the lounge (Figure 6). There are many rooms in the house. Designed for the accommodation of a family, the rooms are equipped to serve many functions. For example, there is a small cabinet called a gasilhane for bathing in the rooms. Safranbolu houses are adorned with decorations both inside and outside, displaying skilled craftsmanship and artistic taste. The ceiling paintings and decorations, wood carving, fireplace decorations, ironwork on doors (hinges, locks, bolts, handles, door knockers) demonstrate the integration of traditional arts with residences (Emiroğlu, 1981). All these decorated houses indicate not only the economic and cultural qualities of the homeowners but also their appreciation for art. The diversity and richness of the decorations in the houses signify both the period of cultural richness when these houses practiced Safranbolu's rich traditional crafts and their prosperity economically<sup>2</sup>.



**Figure 7.** *In Kaymakamlar house, central area (orta sofa) (photos by the author)*

<sup>2</sup> For detailed information about Safranbolu houses, please look at Günay (1998).



**Figure 8.** (a) A full-length built-in wardrobe on the wall; (b) Recessed wardrobe cabinet for storing quilts and pillows (photos by the author from Kaymakamlar House Museum)



**Figure 9.** A rotating cupboard (dönme dolap) designed to serve food from the kitchen to the selamlık room (photos by the author from the City Museum).and pillows (photos by the author from Kaymakamlar House Museum)

### 3.4. Trade in Safranbolu

From the 13th century until the emergence of the railway in the early 20th century, Safranbolu served as a significant caravan station along the East-West main trade route. The architecture of Safranbolu reached its zenith in the 17th century, influencing urban development across much of the Ottoman Empire. The magnitude of Cinci Han, constructed in the mid-17th century in the city center, stands as the best example substantiating its function as a caravan station (Figure 11). Cinci Han comprised 60 rooms, warehouses, and a large stable (Aktüre&Şenyapılı, 1976). Safranbolu, particularly Eflâni, emerged as the epicenter of a vast geographical area renowned for breeding

the region's finest livestock. Consequently, crafts such as leather processing by tanners, shoemaking by cobblers (yemeniciler) from animal hides, soap making utilizing animal fats by soapmakers, and the weaving and processing of hairs into yarn by weavers emerged. Kastamonu province near Safranbolu specialized as a center for weaving, while Safranbolu became a highly specialized intermediary city for processing the finest collected hides from the region; thus, leatherworking became the primary production sector in Safranbolu in the 17th century (Aktüre&Şenyapılı, 1976:65). By the late 19th century, Safranbolu had become a collecting center meeting Istanbul's raw leather demand. During this period, raw hides prepared in small-scale tanneries were exported, and after processing in Europe, they were sold back in Istanbul at more than triple the price (Aktüre&Şenyapılı, 1976: 74). Primarily, the Greeks in Safranbolu engaged in such trade activities, while Turks, constituting the majority of the urban population, were involved in retail trade and handicrafts. The 19th century, marked by Safranbolu's status as a district center, witnessed the most vibrant period of trade and economy (Tunçözgür, 1999:23,24). Besides leather-working, other professions observed in Safranbolu included blacksmithing, coppersmithing, saddlery, tailoring, and shoemaking (Figure 10). Workshops and shops associated with these functions were arranged along streets named after the respective crafts. The mobilization of Turkish youths for military service during World War I (1914-1918) created a shortage of skilled labor nationwide. Additionally, the departure of Greeks from the city through exchange agreements after 1920 disrupted the trade in processed leather (Aktüre&Şenyapılı, 1976: 79). Nevertheless, during the National Liberation War between 1919 and 1923, it is documented that the army's shoes were made in the marketplace (arasta) in Safranbolu. The establishment of the Republic in 1923 and subsequent industrialization efforts for national development led to the construction of numerous factories. Particularly, the initiation of the Karabük Iron and Steel Factory in 1937 increased urbanization in the region, altering the balances and impacting Safranbolu, situated near Karabük. Over time, traditional crafts began to decline<sup>3</sup>.

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3 An agreement was reached on September 29, 1936, for the establishment of the Karabük Iron and Steel Factory. The foundation of the factory was laid on April 3, 1937, and the first production began on June 6, 1939 (Atatürk Encyclopedia, 2024).



**Figure 10.** *Traditional professions in Safranbolu (a) blacksmithing; (b) saddlery; (c) shoemaking (yemenicilik) (photos by the author from the City Museum)*

### 3.5. Transformation in Safranbolu

During the process of modernization in Safranbolu, numerous historical values have undergone change. These can be classified as fundamental to the economy and consequently, in terms of structures and the historical environment.

#### 3.5.1. Transformation of the fundamental economy (occupations) of Safranbolu

The traditional occupations that were the main livelihood in the 17th century, primarily leatherworking, along with its related professions such as cobbling, tanning, weaving, basket making and blacksmithing, which diversified in the 19th century, gradually began to be abandoned with the opening of the iron and steel factory in the 20th century. The younger population opted to work in the factory rather than continue the ancestral profession, resulting in a dwindling number of elderly individuals continuing to practice traditional crafts. By 1939, iron and steel had become the primary economy in Safranbolu. In the initial years following the establishment of the factory, there was a significant labor shortage in Safranbolu due to the recruitment of workers for the factory. High wages offered during this period led almost everyone, except the sick, disabled, and elderly, to prefer working in the factory. Consequently, there was a significant shift in the labor force

(Aktüre&Şenyapılı, 1976: 79). Over time, the city's primary production sector collapsed, and workplaces closed. Additionally, mechanization in agriculture spread during this period, leading to the detachment of those unable to keep pace with this process from agriculture. Besides the construction of the factory, the construction of highways, increasing urbanization nationwide, and population growth resulting in migration to major cities also contributed to the decline in Safranbolu's population (Emiroğlu, 1981: 33).

### **3.5.2. Transformation of the fundamental economy (occupations) of Safranbolu**

#### **3.5.2.1. Evolution of the Bazaar**

The historical center of Safranbolu, known as the bazaar area, was formed by the juxtaposition of shops with similar functions lining up along streets and merging these streets. The names of the streets were based on the functions of the shops on that street. Streets such as Demirciler (Blacksmiths) and Bakırcılar (Coppersmiths) formed the heart of the bazaar by converging, akin to Yemeniciler Arasta. The change in the region's fundamental economy led to the closure of some shops in the bazaar area and interrupted the continuity here. The construction of many factories aimed at increasing production during the Republican period resulted in the sale of ready-made products instead of handcrafted products by local artisans, adversely affecting Safranbolu's traditional handicrafts (Belder, 2023). Consequently, many shops in the bazaar area were either sold or leased. Demirciler Arasta is currently the only guild bazaar in Safranbolu. This bazaar houses handcrafted wrought iron and copper items. Copper and tin artisans also work within this bazaar (Yemeniciler ve Demirciler Arastaları, 2024). Another factor contributing to the diminishing importance of the bazaar is the migration to the Bağlar region that began in the 1940s. During these years, many people who had homes in both Çukur and Bağlar sold or rented out their houses in Çukur and settled in Bağlar (Kütükçüoğlu, 2022: 471; Özkan Altınöz, 2022). Safranbolu's historic bazaar has also begun to lose its central role (Kıray, 1998: 43). During this period, 80% of the bazaar was transferred to the ownership of migrants from surrounding rural areas (Emiroğlu, 1981: 39).

#### **3.5.2.2. Transformation of Residences and the Historical Environment**

With the commencement of production at the Iron and Steel Factory in 1939 and the preference of a significant portion of the population to work there, numerous houses were vacated throughout Safranbolu, and their owners moved to Karabük. Consequently, a predominantly elderly population remained in Safranbolu. Though resi-dential quarters were constructed for workers in Karabük, these were insufficient. Some of the workers employed at the factory chose to stay in Safranbolu, where rents were lower but the distance to the factory was greater, by renting out their residential quarters.



Those without housing in the factory also opted to stay in Safranbolu for accommodation (Aktüre&Şenyapılı, 1976: 79). The appeal of the Bağlar region for workers increased due to the spacious and garden-filled nature of the houses used as summer residences, coupled with the availability of vacant land nearby for new construction. As a result, workers constructed what were considered ‘modern’ residences using reinforced concrete construction techniques in this area. Similarly, vacant houses in the Çukur region were occupied by workers. However, the lack of extensive space in this region prevented new housing construction. Those unable to demolish their existing residences to build concrete structures resorted to making piecemeal alterations to both interior and exterior spaces. For instance, bathrooms and kitchens were added, and wide windows, considered modern, were installed on facades (Aktüre&Şenyapılı, 1976) (Figure 11).



**Figure 11.** Window that have been altered and expanded in the name of modernization  
(photo by the author)

Traditional residences in Safranbolu were characterized by a traditional load-bearing system consisting of wood and infill material. Enlarging traditional window dimensions based on the size of the load-bearing system openings led to the cutting of load-bearing wooden posts, inevitably compromising the stability of the structure. In Kıranköy, the population, unable to attain the income level of Bağlar, did not undergo urbanization; however, residences were subdivided and rented out (Aktüre&Şenyapılı, 1976), damaging the integrity of historic structures and altering the silhouette of the historical urban pattern. However, interventions of this nature were less prevalent in the Çukur region, where new homeowners, generally lacking financial resources, were unable to undertake significant renovation works, thus ensuring the preservation process of residences continued at this stage (Özkan Altınöz, 2022). With the urban plan dated 1955, the administrative

center of the city was relocated outside the old town, closer to Karabük, to the area between the Bağlar region and the city, and modern residential areas developed around this center. This planning decision led to the isolation of the old town from its daily activity centers, but it became one of the factors ensuring the preservation of the old pattern (Kuban, 2001). While residences in the bazaar area remained unchanged, construction of new buildings commenced in the Bağlar and Kıranköy districts during this period. In conclusion, following 1936, rapid urbanization occurred in Bağlar and Kıranköy as a result of changes in the lifestyles and modernity concepts of Safranbolu's local users and inhabitants. This led to spatial alterations in traditional residences, adversely affecting historic structures and the historical environment. Over time, the construction of single, two, or three-story worker and civil servant houses accelerated, sometimes damaging the historical pattern by being built near historical structures. In comparison to other settlements, significant changes were not observed in the bazaar area. The prevalence of large-sized structures such as mansions, which prevented their demolition, contributed to Safranbolu becoming one of the generally well-preserved cities.

### **3.6. Safranbolu from post-change to present**

Safranbolu, one of Turkey's characteristic settlement areas, was deserted and abandoned in 1975 (Emiroğlu, 1981: 31). The deterioration of the urban pattern was notable during this period, prompting a request from the mayor at the time for a change in the urban planning by the Ministry of Settlement to preserve the original pattern (Akbulut, 2020: 82). In 1975, as part of the Architectural Heritage Year by the Council of Europe, Istanbul Technical University organized an event in Safranbolu called the "Safranbolu Architecture and Folklore Week." Two mansions, one serving as the governor's residence and the other as a hotel, were purchased and restored (Akbulut, 2020: 84). The documentary "Time in Safranbolu," filmed in 1976, depicted the transformation of Safranbolu over time, contributing to raising awareness of the preservation of cultural and natural environments. Its screening in Europe in 1977 extended its influence internationally. The documentary greatly contributed to the preservation of the city. In 1977, Safranbolu was declared a "historic site" by the Ministry of Culture. Tours to the region began in 1979. In 1994, Safranbolu was added to the UNESCO World Heritage List and registered as the "common heritage of humanity." Since then, various restoration efforts have been undertaken with support from the Ministry of Culture (Akbulut, 2020: 84). In 2024, Safranbolu was recognized for its lifestyle, appreciating and preserving its value, and was included in Cittaslow, hosting many domestic and foreign tourists today.



#### 4. Discussion and Conclusion

Architectural structures are subject to a continuous process of change and transformation under the influence of time. Therefore, in the planning, design, and preservation process of architectural structures, the effect of time should be taken into account, and the sustainability of the structures should be considered. Otherwise, structures may become obsolete over time, and the cultural heritage of society may be lost. In this context, understanding and managing how architectural structures change over time are of critical importance for creating a sustainable environment.

In the preservation and sustainability of historical environments, it is crucial to preserve existing structures with original construction techniques and original users, and to sustain traditional productions in these spaces. Preserving traditional values plays a significant role in the development of a city. Safranbolu is one such unique settlement known for its rich history, regional architecture, and meticulous iron and wood craftsmanship. The local population, who preferred to work in the nearby Karabük factory during Turkey's modernization process, became detached from their region and abandoned the city. Over time, the locals of Safranbolu turned away from their traditional way of life in pursuit of modernization. However, when faced with the risk of losing the city's unique values, various actors such as universities, civil society organizations, local residents, and local governments intervened. Safranbolu was preserved through a comprehensive conservation approach and even made its way to the World Heritage List in 1994, with its profound history and unique elements.

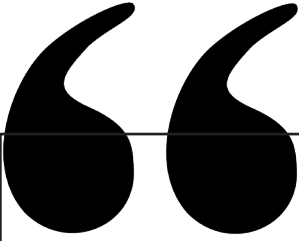
Understanding and managing the effects of time on the built environment are crucial for creating a sustainable environment. It is essential for historical environments to reach the present day with all their values preserved without discontinuity over time. Discontinuities over time lead to changes in the historical environment, including the structures that make up the city and therefore, the streets and the city itself. Ensuring the sustainability of values such as traditional professions that have been sustained for many years throughout history is crucial for bridging the gap between the future and the past. Supportive institutions, especially the government, are essential for settlements with strong roots to pass on their existing values to future generations. The transfer of the unique values of settlements that have reached the present while preserving their traditional characteristics will contribute to diversity on a global scale and have the potential to contribute to many new inventions/designs made in the future, drawing inspiration from the past.

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## Chapter 5

### **COLORS IN INTERIOR SPACES AND THEIR EFFECTS ON HUMAN PSYCHOLOGY**

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## Introduction

The instinct for protection is a fundamental natural drive that enables people to create spaces by establishing enclosed areas. This tendency has been evolving since the early history of humanity (Sennett, 1994). People have shaped their understanding of architecture by considering the physical structures of the spaces they inhabit and the lives experienced within them. Therefore, an architectural work is not merely a structure but a reflection of the human experiences it encompasses.

Spatial perception is a phenomenon that determines how people understand and interact with their surroundings. This perception depends on the spatial conditions that influence people's perceptions and can be examined from physiological, psychological, and sociological perspectives (Gifford, 2014). There are many factors that affect our perception of space, including dimensions, vision and hearing abilities, light, heat, and sound. Additionally, the impact of light on space can significantly alter the mood and perception of its users (Kaplan & Kaplan, 1989).

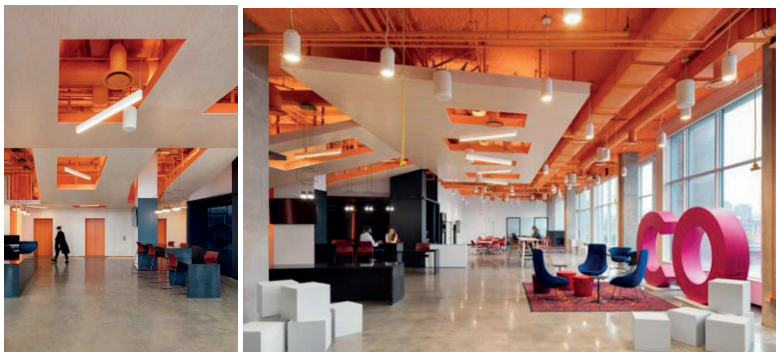
Designers focus on the user's needs when developing their projects in interior design. The space is shaped according to the user's requirements. This process combines design principles such as shape, material, form, color, and texture to create the space (Tuan, 1977). In interior spaces, user requirements and design principles should be addressed holistically regarding function, meaning, and aesthetics. Color plays a critical role in space design; it not only gives a room identity and character but also sets the emotional tone of the atmosphere (Elliot & Maier, 2007).

Color has always been a fascinating and inspiring subject for people. For this reason, scientists, artists, and thinkers who have researched colors have developed many different results and theories throughout history (Birren, 1978). Research on the effects of colors on perception has revealed various psychological and physiological outcomes. For example, warm colors (red, orange, yellow) create a sense of energy and movement, while cool colors (blue, green, purple) provide calmness and tranquility (Ökmen & Satıcı, 2021). Additionally, various color systems have been developed to systematically examine the effects of these colors on human psychology (Crowley & Hoyer, 1994).

In conclusion, the role of colors in interior design should be considered not only as an aesthetic element but also as a factor that directly influences user experience and mood. A successful design in interior architecture should be supported by a color palette that meets the users' needs and positively impacts them. Thus, spaces will become not just physical areas but also social and emotional realms that enrich and give meaning to human life.

## Space and Space Design

Space refers to a specific location or area and significantly influences individuals' lives through its physical characteristics, structure, and the elements within it. People often choose their spaces based on their functional, aesthetic, and emotional qualities (Ersoy, 1967). Space stands out as a central design element in disciplines such as architecture, landscape architecture, and interior design. The design and use of space define the creations of architects and other professionals (Roth, 2006).



**Figure 1:** *Perception of Space with Colors [URL-3, URL-4]*

Space is not limited to tangible physical barriers; it can be created visually and abstractly. Roth uses “physical space” to describe the volume occupied by objects or environments, emphasizing that space is defined by visual and physical boundaries (Roth, 2006). Lowry argues that physical space is measurable and can be determined by geometric concepts, demonstrating that space can be understood through mathematical principles (Lowry, 1980). The perceptual dimensions of space are shaped based on individuals' experiences and observations (Roth, 2006).

Space is created through the body's movement, transforming it into an interpretable text (Mutman, 2006). It is a dynamic network of relationships, highlighting the importance of the location and user needs in the design process. Space is categorized into five types: pragmatic, perceptual, existential, cognitive, and abstract (Göler, 2009).

Interior space design aims to provide the most suitable conditions for the user. This process involves conducting research and offering creative, innovative solutions by considering functional, aesthetic, and psychological elements (Hasol, 2011). The design process requires balanced integration elements such as function, aesthetics, comfort, safety, and practicality (Ching, 2004). Designing space is a complex process that encompasses both physical and sensory perceptions, profoundly impacting the space's functionality and the user experience.



### Design Components (Shape-Material-Texture-Color-Form)

In space design, three main criteria—function, meaning, and aesthetics—are interconnected and form the fundamental elements of design. Aesthetics refers to the visual appeal and beauty of the design; the formal aspect facilitates the communication of signs. Walter Gropius, the founder of the Bauhaus School, believed that the nature of an object should determine its design. According to Gropius, when designing a functional object, one must first consider its purpose and nature, and the design process should provide a practical, durable, economical, and aesthetic solution that aligns with this purpose [URL-1]. Meaning represents design's intellectual, cultural, and psychological dimensions, where messages are expressed. In visually perceiving an object, past experiences, and concepts can create specific associations in a person's mind. This reflects the symbolic function of communication; individuals tend to derive meaning from the objects they observe. Designs gain meaning through visual representations and combining psychological, social, and situational elements. Therefore, a design's semantic or symbolic function requires considering its internal and external interactions (Çelik, 1996). Functionality, the most crucial design aspect for practical use, focuses on creating the desired response by meeting the user's needs.

The form is defined as an object's overall shape, structure, or configuration, determined by masses or voids. In close spatial relationships, forms create arrangements or patterns (Aydınlı, 1986). The primary elements contributing to an object's form include design principles such as symmetry, balance, and hierarchy. Additionally, how the parts that constitute the form are assembled, the choice of materials and the application techniques influence the overall aesthetics and structure of the form (Hasol, 2011).



**Figure 2:** Architectural Form [URL-5, URL-6]

Other aspects of the form include proportion and dimensions. Proportion defines the relationship of a form's parts to each other and the whole, while dimensions express the physical measurements of the form, such as length,

width, and depth. The position and orientation of the form within the space also affect its shape; position describes its placement relative to other objects, and orientation refers to its alignment concerning a reference point (Aydınlı, 1986). Mobility is another crucial aspect of form, encompassing the capacity of the form to move or change, either autonomously or due to external influences. These changes can be physical or related to the functional or aesthetic aspects of the form (Hasol, 2011).

Different geometric forms and lines can influence people's psychological perceptions. For example, horizontal lines convey stillness and continuity, while vertical lines suggest infinity and sharp-angled forms often create discomfort. In contrast, circular and oval shapes are calming (Aydınlı, 1986). Materials in interior spaces can be used to shape this perception. Natural materials (wood, stone) and artificial materials (glass, steel, plastic) determine a space's atmosphere. For instance, metal may create a cold aesthetic, but when combined with warm colors, it can provide a more intimate environment (Hasol, 2011).

The materials used in a building's construction can reflect the character of that building and its surroundings. For example, most structures in Istanbul feature materials like wood and stone, varying based on geographical location. In places like Safranbolu, where wood is abundant, wooden buildings are standard, while stone buildings are preferred in regions where stone is more accessible (Aydınlı, 1986). This difference can be observed between the wooden buildings in Kastamonu and the stone structures in Van.



**Figure 3:** Wooden Houses in Safranbolu [URL-7]



**Figure 4:** Stone Houses in Van [URL-8]

In architectural history, buildings are seen as being shaped based on criteria like durability, functionality, and aesthetic beauty. Vitruvius's principle of "Firmitas, Utilitas, Venustas" forms the basis of this approach. Bülent Özer also formulated architecture as "Function x (Structure + Construction) x Artistic Value." The modern era in architecture, marked by the development of steel building systems, has made it possible to create new forms and structures. Kenzo Tange's Tokyo Olympic Facilities and the Bosphorus bridges in Istanbul are significant examples of these systems (Hasol, 2011).

Texture is vital in the visual impact of materials, surfaces, and spaces, defining their characters and identities. Every object, whether natural or human-made, has a texture. Physical texture is experienced through touch, while visual texture is perceived through sight, providing information about the surface, though it may not always be accurate (Aydınlı, 1986).

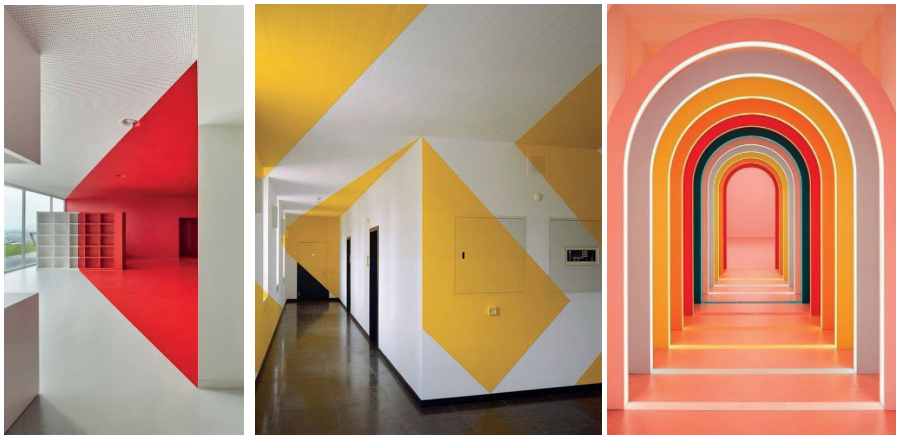
Light, color, and scale are key factors affecting texture perception. The textures of materials tend to reflect at certain levels; when textures are dense and small-scale, they create a soft and uniform perception. The effect of texture in a space depends on its direction and arrangement. For instance, linear textures emphasize the dimensions of a surface, while irregular textures draw more attention and are often used to conceal imperfections. On the other hand, smooth surfaces tend to reflect color and form better, adding brightness and highlighting details. Texture also influences the perception of colors; two objects of the same color may appear in different shades depending on their surface texture. Smooth textures create a cold effect, while rough textures provide a warmer feeling (Hasol, 2011).



**Figure 5:** Various Texture Examples [URL-9]

Color is a vital component of visual information in our environment and significantly influences our behavior. Colors can evoke excitement or calm, joy, or gloom. In building or product design, using different colors in the same form can convey various meanings and emotions. In this context, the combination of form, shape, and color has the potential to uniquely express the character of an object.

Color is a cornerstone of visual perception. Vasiliy Kandinsky described color perception as: “Beyond its abstract conceptual value, it is perceived along with the colors of the surfaces it belongs to, the light’s type, tone, and brightness.” Color forms an intrinsic and extrinsic value based on light, the geometric shape of the object reflecting the color, and the form and color of surrounding objects (Atalayer; Özkan, 1994).



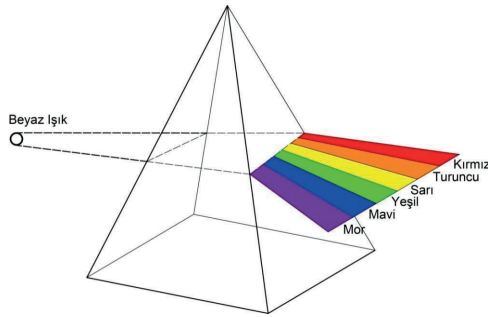
**Figure 6:** Geometric Perception of Color in Interior Spaces [URL-10, URL-11, URL-12]





Color has various definitions and applications across different fields. In physics, it relates to wavelengths; in chemistry, to pigments and photons; in biology, to the eye and cone cells; and in psychology, to neurons and the subconscious (Küçükerşen, 2010). In modern science, color consists of electromagnetic waves, and the objects around us reflect specific colors (Eti, 1986). While lighting in a space can alter how the color of an object appears, its structural relationship remains constant. Our perception of color is formed by stimulating the eye with light of different wavelengths. Colors are perceived by the brain as primary colors, with other colors defined as combinations of these primaries.

Colors are a significant tool in visual arts and have contributed to the evolution of art throughout history. Cultural, religious, and socioeconomic factors can influence an individual's perception of color (Çağlarca, 1993). Moreover, the emotions and effects of color can vary from person to person, including feelings of warmth, heaviness, relaxation, or excitement.



**Figure 8:** Newton's Color Prism [URL-15]

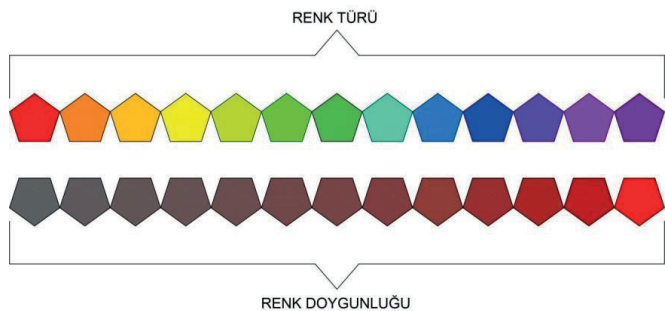
Isaac Newton demonstrated that white light consists of a spectrum of colors. In experiments conducted in 1672, he showed that white light could be separated into its component colors through a prism. These colors include violet, blue, green, yellow, orange, and red. The knowledge that white objects reflect light while black objects absorb it has become essential to understanding nature's perception of color.

### **Classification of Colors**

Daylight, composed of sunlight, blue skylight, and light from clouds, affects the appearance of an object's color. The Optical Society of America highlights three critical attributes in defining color: hue, saturation, and brightness. These attributes help classify colors more accurately. Since Newton's time, many studies have been conducted on color classification. In 1913, H. Munsell developed a system categorizing colors based on hue,

value, and saturation. Hue refers to the scientific classification of colors based on wavelengths; primary hues are red, green, and blue. The human eye can distinguish approximately 200 different hues. Every color on the spectrum is identified and classified as a hue.

Saturation determines the purity and intensity of a color. High saturation is associated with vivid and bright colors, while low saturation dulls colors. The saturation of a color is measured by comparing it with gray of the same brightness. At zero saturation, a color is indistinguishable from gray, while high saturation makes colors appear more pure and vibrant (Aykul, 2015).



**Figure 9:** Saturation in Colors [URL-16]

Brightness, or value, refers to the lightness or darkness of a color. Lighter colors are classified as high-value and darker colors as low-value. This term does not always align with everyday language usage. For instance, a fire truck described as “bright” is considered high-saturation in color theory. Similarly, a grayish pink called “pale” may still be bright. In artworks, tone differences are achieved by adding black or white; if the ratios are not carefully maintained, the color may lose character.

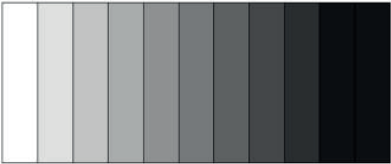


**Figure 10:** Brightness in Colors [URL-16]

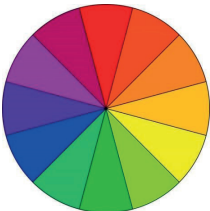
Colors are categorized into two main groups based on the type of light they reflect: “achromatic” and “chromatic.” Achromatic colors include black,



white, and shades of gray, considered colorless and without hue. These colors are perceived as tonal variations ranging from white to black. On the other hand, Chromatic colors have distinct hues, such as red, green, and blue. Unlike achromatic colors, chromatic colors are defined by their specific color tones (Gurney, 2010).

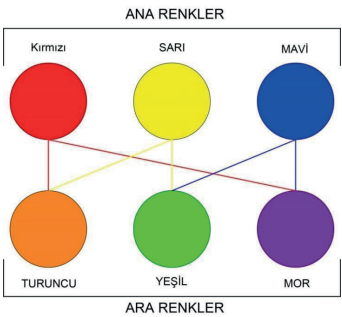


**Figure 11:** Achromatic Colors [URL-16]

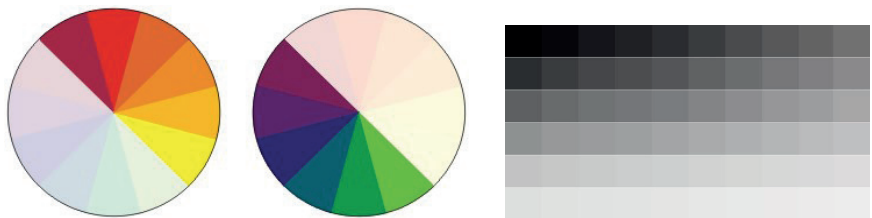


**Figure 12:** Chromatic Colors [URL-16]

Primary colors—red, yellow, and blue—are pure and cannot be created by mixing other colors. Combined, they form secondary colors like orange, green, and purple. Secondary colors maintain their purity and are not considered mixed colors despite being formed from primary colors (Yılmaz, 1991). Based on their psychological impact, colors are classified as “warm” and “cool.” Warm colors like red, yellow, and orange are associated with fire and evoke warmth and energy. Excellent colors, like blue, green, and purple, are linked with water and nature, creating a calming effect.

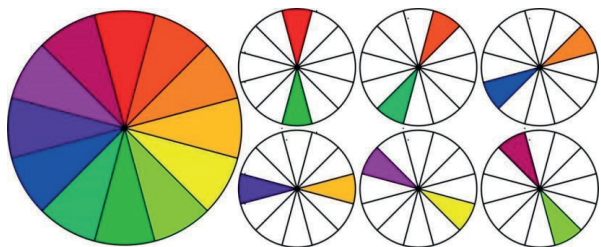


**Figure 13:** Primary and Secondary Colors [URL-16]



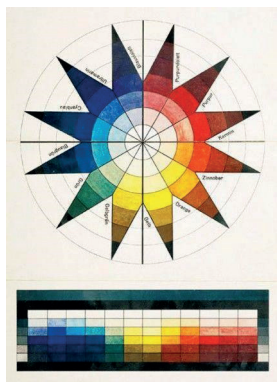
**Figure 14-15:** Warm and Cool Colors, Neutral Colors [URL-16]

From a physical perspective, black, white, and gray are technically not classified as colors because black absorbs all light, and white reflects all light. However, these colors play significant roles when interacting with other colors. When spectral colors are divided into two groups—red-orange-yellow and violet-blue-green—the combination of these groups creates white light. In art, these two groups are known as complementary colors (Çağlarca, p. 23). Complementary colors are opposite on the color wheel and tend to neutralize each other. For example, orange complements blue, green complements red, and purple complements yellow. Combined, complementary colors create a neutral effect based on the physical laws of light. However, this idea may be debatable in the application of paint.



**Figure 16:** Complementary Colors [URL-16]

Artists often combine complementary and contrasting colors in their work. When complementary colors are used together, they appear brighter and more vibrant, creating a strong visual impact. This vibrancy results from the contrast between the colors, which balance each other to create harmony. On the color wheel, colors opposite each other are complementary. This relationship can be seen in solid examples like red-orange and blue-green based on warm-cool or light-dark contrasts. Johannes Itten's color theory, developed at the Bauhaus, was one of the first systematic studies on how physical laws support these relationships. Itten developed a technical theory on using contrast and complementary colors, examining their effects on the eye. These theories are considered fundamental principles guiding the correct and effective use of colors in art and design (Tokdil, 2016).

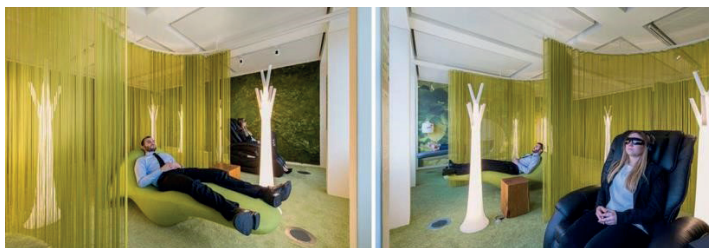


**Figure 17:** Johannes Itten (Color Sphere with 12 Hues in 7 Light Values) [URL-17]

### **Relationship Between Color, Space, and User**

Throughout human history, color has always played a significant role. The vivid colors of nature have captivated people in every era, and even in ancient times, people sought ways to incorporate these colors into their lives. The colorful paintings on cave walls reveal early humans' strong relationship with colors. Despite harsh conditions, these artworks were inspired by nature, carrying the powerful impact of colors on people from prehistoric times to the present.

Today, color is still a concept easily perceived and assessed by people. Although it is visually perceived, the psychological and emotional effects of colors leave a deep impression on people. Scientific research has proven the psychological effects of colors on humans, and this knowledge has been utilized in many fields, from space design to marketing. The conscious use of colors is a powerful tool to influence human behavior. For instance, specific color combinations can be used to create a relaxing environment, evoke a sense of hunger, or encourage the purchase of a product.



**Figure 18:** *Relationship Between Color and Individual (Relaxation Area Example)* [URL-18]



**Figure 19:** *Relationship Between Color and Individual (Restaurant Example)* [URL-19]



**Figure 20:** *Relationship Between Color and Individual (Healthcare Facility Example)* [URL-20]

### Effect of Color on Human Psychology

Psychology, as the study of human behavior and mental processes, seeks to understand individuals' desires, anger, love, intuition, and other emotional aspects. This science aims to describe, explain, and predict human behavior and mental processes. The thought structure of people is shaped by their interactions with the environment, directly affecting their behavior.

While psychology tries to understand the inner world of humans, it also considers the relationships they establish with the physical environment. Spaces, colors, light, sound, and other environmental factors can shape individuals' moods and behaviors. Freud's emphasis on the effects of the physical environment on human psychology led to further research in this area (Ayber, 2012).

Every color can trigger different emotional responses in the subconscious mind. For instance, red represents energy and excitement, while blue is associated with peace and romance. The psychological associations of colors are also intertwined with societies' cultural and historical backgrounds. Many civilizations have utilized these psychological effects in their art and architecture. For example, the use of yellow, red, and blue in ancient Egyptian and Greek architecture enhanced the visual impact of their structures.

According to psychology, the four primary colors are red, yellow, blue, and green. These colors can have direct effects on individuals' moods. People may respond differently under the influence of these colors. A study at the University of Cambridge observed that people's color preferences change depending on their psychological state. The frequent preference for cool colors, especially blue and green, was linked to their calming effects (Toğrol, 1973).

In conclusion, the impact of colors on people is multifaceted. Colors can influence individuals' psychological and physical states, guide their behavior, and even become symbolic elements of social structures. Understanding the psychological effects of colors allows for more conscious use of these effects in design spaces and art.

**Red:** Belonging to the warm color group, red is a vibrant and powerful color known for its ability to evoke intense emotional reactions. Its striking energy attracts attention, and its use in design requires care as it can symbolize negative emotions like violence and hatred. The psychological effects of red vary depending on its shade. Lighter shades can trigger feelings of confidence, dominance, and love, while mid-tones convey a sense of movement and dynamism. Dark reds can evoke introspective and melancholic emotions; they are also associated with nobility due to their severe and traditional connotations.



**Figure 21:** Example of the Effect Created When Red Cools and Shifts Toward Yellow  
[URL-21]

### The combination of Red with Other Colors and Its Effects

The effects of red can vary when combined with other colors. When mixed with blue, it cools down and has a calming effect, while approaching orange reduces its energy. When combined with yellow, it maintains its vibrancy. Red symbolizes power and nobility, appearing on many national flags. Its attention-grabbing nature also makes it a common choice in warning signs. Additionally, red is known to stimulate appetite, so it is often used in restaurants and bars.



**Figure 22:** *Use of Red in Restaurants [URL-22]*

### Yellow: Psychological Effects and Symbolism

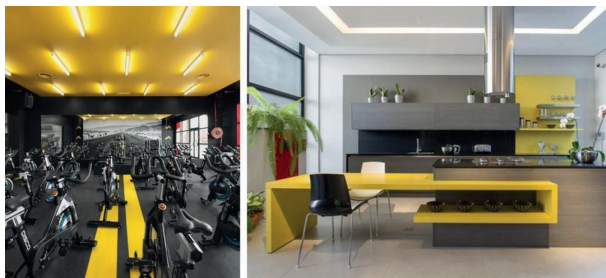
Yellow, one of the primary colors, is associated with vitality and energy and often evokes joy and happiness. In design, it can create attention-grabbing and stimulating effects. Psychologically, yellow symbolizes intense emotions, communication, and expansion. Lighter shades of yellow inspire feelings of relaxation, intelligence, and youth. However, mixed with green can create a disturbing effect (Efendioğlu, 2019).



**Figure 23:** *Use of Yellow in Work and Relaxation Spaces [URL-23, URL-24, URL-25, URL-26]*



Yellow is also associated with youth and attractiveness, standing out due to its brightness. For this reason, it is frequently used in road signs, warning signs, and taxis. In artistic expression, yellow is commonly associated with intelligence and wisdom, though it can sometimes evoke boredom or delusion. Autumnal shades of yellow, however, carry feelings of melancholy and longing. As the lightest warm color on the spectrum, yellow is believed to have cosmic power, with hope-giving and inspiring effects. Its bright and energetic nature positively affects the nervous and muscular systems, speeds up metabolism, and is thus preferred in dining areas and gyms. However, yellow carries negative connotations like deceit, jealousy, and hypocrisy. The effects of yellow vary depending on its combination with other colors; for example, when mixed with blue, it calms and adopts green's relaxing tones, while when mixed with gray, it loses its energy. When combined with white, yellow's effect is strengthened, maintaining its vibrancy. Therefore, its psychological effects can vary significantly based on color combinations (Samur, 2019).



**Figure 24:** *Use of Yellow in Gyms and Kitchens [URL-27, URL-28]*

### **Blue: Psychological Effects and Symbolism**

Blue, psychologically, evokes feelings of cleanliness, comfort, peace, and relaxation. Although dark shades of blue can create an attractive effect, excessive use can create a gloomy atmosphere. Blue is seen as a symbol of protection, and when mixed with white, it creates a soothing, reassuring effect. It is often used in workspaces, as it is believed to enhance faith and thinking abilities and bring calmness.





**Figure 25:** *Use of Blue in Work and Relaxation Spaces [URL-29]*

Blue represents a connection with the soul, an ethereal and boundless atmosphere. These qualities encourage creativity and positively influence decision-making processes. Blue is also known for its effects on regulating breathing and lowering blood pressure. Since blue is a rare food color in nature and is associated with spoiled foods, it tends to suppress appetite. Dark blue and navy represent authority and determination, making them a popular choice for high-ranking officials. Additionally, blue symbolizes peace, so it appears on flags of organizations like the United Nations and the Council of Europe. Research shows that blue tones enhance productivity and stimulate imagination in blue-painted spaces. However, the effects of blue vary depending on its shade. Dark blue, as it approaches black, can trigger feelings of sadness and melancholy, which may be interpreted as a psychological imbalance. On the contrary, light shades of blue are associated with clarity, infinity, and positive emotions (Batur, 2016).



**Figure 26:** *Psychological Effects of Light and Dark Blue in Spaces [URL-30, URL-31]*

**Purple** has a matte and excellent appearance among intermediate colors, containing both warm red and cool blue, and can exhibit warm or cool psychological effects depending on the proportions of these two colors. It

symbolizes nobility, self-confidence, autonomy, and wholeness; it is associated with spiritual energy, intuition, and vision. According to Kandinsky, purple is a cold, complex color both physically and spiritually and is often associated with negative emotions such as illness, sadness, and mystery. Typically indicating a melancholic character, purple can symbolize mysterious situations, uncontrolled power, and suffering. It has the potential to evoke feelings of sadness, regret, and cowardice and can impart a sense of endless pessimism and unreachable dreams. Therefore, unconscious use can lead to fear and panic, but when used carefully and intentionally, it can be purified of its negative effects and gain a purer meaning. The psychological effects of purple vary according to its shades; light shades like lavender represent sensitivity and elegance, while dark purple symbolizes loneliness and anger. When mixed with white, the negative aspects of purple can lighten, creating a sense of hope and positivity. Overall, purple is a complex color that requires careful use.



**Figure 27:** *The Effect of Purple Color on Space According to the Mixture of Red and Blue Colors [URL-32]*

**Orange** is a color that combines the warmth and energy of red with the joy and brightness of yellow, having a psychological warming and revitalizing effect. Orange evokes sunlight, brightness, and comfort and is commonly associated with the sun. The vibrant nature of red adds maturity and sincerity to orange. In general, orange is a warm and inviting color that brings joy and happiness to a space (Berk & Özsezgin, 1983). This color radiates energy and joy and can evoke excitement and happiness when used correctly, but excessive use can be overwhelming and overly stimulating. When mixed with brown, orange takes on a more earthy, materialistic, and practical quality but can also trigger feelings of sadness and regret. Therefore, using orange with calming colors to balance its natural energy is recommended. Orange is dominated by yellow and is often associated with dynamism and self-confidence. While it supports positive qualities such as health, vitality, creativity, and happiness, excessive use can also trigger feelings of arrogance, melancholy, and superiority. When used in the proper context, orange can create an energetic and positive atmosphere, but it is a color that requires careful consideration.



**Figure 28:** *The Psychological Effect of Orange Color on Space [URL-32]*

**Green**, an exciting color formed by combining blue and yellow, carries different psychological effects. Although it is perceived as a pure color in visual perception, it is considered an intermediate color due to its relationship with other colors. Green evokes associations with nature, cleanliness, and freshness in human psychology and is often seen as one of the calmest, quietest, and most subdued colors. It is a neutral color regarding emotions and can provide peace, comfort, and tranquility. However, prolonged exposure to green may create a longing for more vibrant colors, like red. If green is predominantly used in interior design, more active colors, like red, may need to be added to maintain balance. The most robust and universal association of green is with life, youth, renewal, and hope. It is also linked with sharing, harmony, generosity, and cooperation. Its calming effect on the nervous system can provide individuals with security, stability, and peace. However, feelings of indifference, insecurity, extreme shyness, and jealousy can also be associated with green. The warm or cool effect of green can change depending on the balance of yellow and blue. While it can impart a sense of seriousness under the influence of blue, it can create joy and liveliness when mixed with yellow. The combination of green and gray can evoke a feeling of laziness, while dark green can elicit a greater sense of power. Green is commonly used in hospitals because its calming effect is significant during medical procedures. Doctors often wear blue or green clothing, which helps the eyes to rest and contributes to psychological comfort (İzgi, 1969).



**Figure 29:** *The Effect of Green Color on Space in Terms of Naturalness* [URL-33]



**Figure 30:** *The Use of Green Color in Hospital Environments* [URL-34, URL-35, URL-36]

**Black** is the darkest color, defined by the complete absorption of light rays. When painted black, an object absorbs all the rays from a light source, which causes it to warm up. This property often leads architects to use black on the exteriors of buildings in cold regions. Although it presents a simple appearance, black attracts attention like other colors. Historically, black has long been associated with fear and darkness. Black represents the unknown and can trigger negative emotions such as panic and misfortune. The paradox of black as the absence of light also carries meanings, such as providing the impression of an infinite journey or evoking death. Tülay Kamış describes black as “dark and covering,” viewing it as a symbol of hopelessness and death. The negative associations of blacks are not limited to spiritual matters; they also manifest in daily life. In many languages, expressions like “black news” or “black money” use the word “black” to describe negative experiences. Some ancient civilizations ascribed different meanings to black; while it was seen as

a symbol of bad luck in some societies, black cats were considered sacred in Egyptian civilization (Kamış, 1994). Black can have a revitalizing effect when used on small surfaces in interiors. A color that is more stable and quiet than other colors, black can enhance other colors when used alongside them.



**Figure 31:** *The Effect of Black on Interiors* [URL-37]

**White** is a color formed from a mixture of light rays. Although these rays appear colorless in space, they produce white when interacting with matter. Large white surfaces generally leave a calm and cold impression, so white is often associated with a sense of coldness. However, white evokes joy and tranquility, symbolizing freshness, cleanliness, brightness, and sincerity. In many cultures, white represents innocence, purity, and nobility. Balzac noted that white has a calming effect and evokes a sense of goodwill. White is often associated with peace and security; thus, the white dove is frequently used to symbolize peace. Additionally, various studies have shown that white clothing makes people look younger. This could be attributed to white's bright and rejuvenating effect (Yılmaz, 1991). Rana Nuhoğlu describes white as the color of cleanliness, purity, and eternity. White can evoke a sense of space and infinity; combined with blue creates a refreshing and antiseptic effect. White is seen as a neutral color, possessing a calming vibration and signifying a free mind. It can also symbolize neutrality and is often preferred during mourning periods to represent the idea that the deceased have embarked on a clean and spiritual journey (Nuhoğlu, 2006).

Among the negative effects of white are its excessive brightness and the tendency to irritate the eyes quickly. In social perceptions, white is generally associated with surrender and defeat; throughout history, the white flag has been used on battlefields as a symbol of surrender and capitulation. White and its shades are suitable for use in areas such as living rooms and bedrooms, helping to create a calming, relaxing, and peaceful atmosphere. White is often preferred in small spaces; its high reflectivity ensures that a space appears more significant and spacious.





**Figure 32:** The Effect of White Color in Interiors [URL-38]

**Gray** is generally considered a color that lies between black and white. This color does not possess the unsettling darkness of black or the dazzling brightness of white; instead, it represents a balance between these two qualities. This balance can create a mature, cautious, and peaceful character. Gray is often perceived as a stagnant, neutral, and motionless color; it can also evoke a sense of hidden hopelessness and pure innocence. Gray is not formed by black and white but can be mixed together to create different shades of gray. Melike Efendioğlu states that gray is an autonomous color lacking character. Gray is seen as a color that cannot create anything independently; it is perceived as indecisive and neutral. It is often associated with a state of spiritual neutrality. Gray may symbolize a lack of energy and can be related to fear, aging, and the proximity of death (Efendioğlu, 2019). Gray is a unique color that cannot be created by mixing other colors. This characteristic allows gray to be used in contrast with different colors. Gray can be used to mute and soften bright and vibrant colors. Gray is considered a valuable, versatile color, as it can work harmoniously with many other colors and enhance their beauty.



**Figure 33:** The Effect of Gray in Interiors- Stagnation-Calmness [URL-39]

## CONCLUSION

Space is a void or area that abstracts individuals from their surroundings to a certain degree and allows them to carry out their actions. It is an essential concept in professions such as architecture, interior design, and landscape architecture. An interior space is created by enclosing a physical area with walls and a ceiling. The volume that remains outside the interior is referred to as exterior space. However, it is essential to remember that walls and ceilings do not solely define space; they can also be created through visual elements such as color and light.

Interior space is any enclosed area where people engage in various activities and behaviors. Multiple factors can shape these areas, including intended functions, associated meanings and values, and aesthetic considerations. Interior design involves creating an interior concept that considers all these factors and meets the needs, preferences, and tastes of the individuals who will use the space. To successfully design an interior space, the designer must fully understand the users' needs, including anthropometric, sensory, perceptual, and cultural considerations. By designing a space that encompasses all these elements, the designer can add meaning and value to the space and create an environment suitable for the needs and behaviors of its users.

As interior designers, it is essential to ensure that the spaces we design are functional and meet the needs of those who will use them. This requires understanding users' expectations, preferences, and desires. Three fundamental approaches must be considered to create a functional and meaningful space: function, meaning, and aesthetics. These approaches are interconnected, and since each contributes to the space's overall design, they cannot be separated. The absence of any of these elements can negatively affect the others and lead to deficiencies in the design. Therefore, interior designers must consider all three approaches to create a harmonious, multifaceted design that meets users' needs and expectations.

Colors have always played an essential role in human psychology and have a solid ability to influence our emotions and perceptions. How we perceive and respond to different colors is determined by the coordination of the eyes and the brain, and the colors can vary according to specific wavelengths. In interior design, color is a crucial tool for conveying particular messages and emotions to the users of the space. It can affect our perception of shape and size, creating various effects such as warmth or coolness, brightness or darkness, and feelings of spaciousness or intimacy.

Research has shown that the psychological effects of color can vary from person to person based on factors such as cultural background, age, gender, and surrounding environment. Therefore, it is essential for interior designers to consider the potential psychological impacts of color on the users of the



space and to choose colors that will create the desired atmosphere and mood.

Colors have psychological effects on people and carry symbolic meanings that can vary across different cultures, beliefs, and time periods. These meanings have existed in daily life throughout history and continue to influence our experiences today. As a result, individuals' preferences for specific colors may differ according to the historical context in which they live, as well as the styles and values of their cultures. Thus, interior designers must consider the symbolic meanings of colors, their psychological effects, and how the space users may interpret them.

Scientists have conducted a series of studies to investigate the effects of colors on human psychology and behavior. One of these studies at Cambridge University revealed that individuals are more sensitive to perceiving warm and cool colors. In the study, 49% of the participants preferred cool colors, while 39% preferred warm colors. This suggests that, in general, people tend to prefer relaxing or "cool" colors. These findings are based on experimental results and may only be generalized to some populations. However, they provide some insights into how individuals' preferences for different colors can be influenced by their psychological responses to these colors.

Research indicates that color can significantly impact human psychology, influencing emotional states such as relaxation, excitement, boredom, and sadness. In addition to its psychological effects, color can create visual interest and add dimensionality, shape, and aesthetic value to a design.

However, it is important to consider the cultural, traditional, and social context in which a design will be seen when choosing colors. Different colors can carry different meanings and messages in other cultures, and it is essential to use color to effectively convey the desired message and elicit the intended response in the viewer. To achieve this, interior designers must carefully evaluate the types of colors they use, their saturation and brightness values, and the relationships between these colors. By considering these factors, designers can create more effective and impactful designs.

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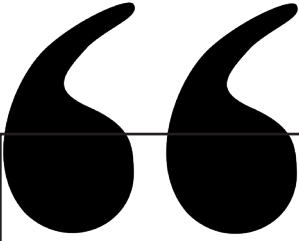
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## Chapter 6

### **EXAMINATION OF PARAMETRIC ALGORITHMS USING THE EXAMPLE OF ADAPTIVE FACADE DESIGN<sup>1</sup>**

*Meryem ALAGÖZ KONUR<sup>2</sup>*

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- 1 This study was produced from the paper presented at the '18th International Istanbul Scientific Research Congress on Life, Engineering, Architecture and Mathematical Sciences'
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## 1. INTRODUCTION

A parameter is a state that can have one or more variable quantities. In the process of developing a parametric design concept, environmental data or other elements that affect the design are considered as parameters and the design style is created by the effect-response method. The aim of the study is to examine parametric shading systems that change in synchronization with solar movement and thus provide maximum energy efficiency. Shading systems are one of the most effective ways to reduce air conditioning loads and offer designers the opportunity for different architectural effects.

## 2. COMPUTATIONAL DESIGN METHODS

In order to find a solution to the problem of fossil fuel consumption, which causes the ecological balance to deteriorate and human health to be threatened, today's designers aim to make energy-oriented design. To achieve this goal, Computational techniques are being developed to model high-performance structures that offer high comfort using less raw materials and to analyze their performance accurately. These Computational techniques are classified as follows according to their application methods:

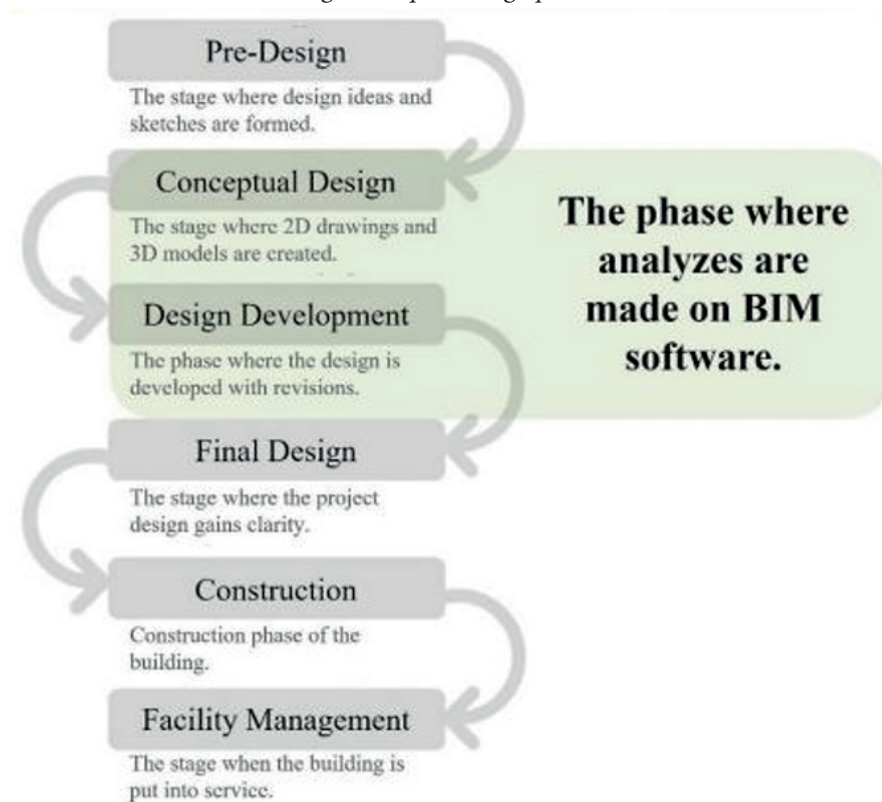
- Parametric techniques
- Nonparametric techniques
- BIM (Building Information Modeling) techniques

In addition, software such as Ecotect, Design Building, EnergyPlus, which offer simulation environments that measure the performance of buildings, can be considered as a fourth group (Ramilo and Embi, 2014). Thanks to these techniques, more sustainable and energy efficient buildings are designed to protect the ecological balance and improve human health.

## 2. PERFORMANCE-BASED DESIGN

Performance-based design can be defined as a combination of two key features of Computational design: geometry generation and simulation-based performance evaluation. This approach integrates physical environmental conditions into the design process as a quantifiable and measurable factor, taking into account the principles of sustainability in building design. Thus, a spiral design method emerges that measures building performance in real time and generates solutions (Figure 1) (Ofloğlu, 2015).

Figure 1. Spiral design process

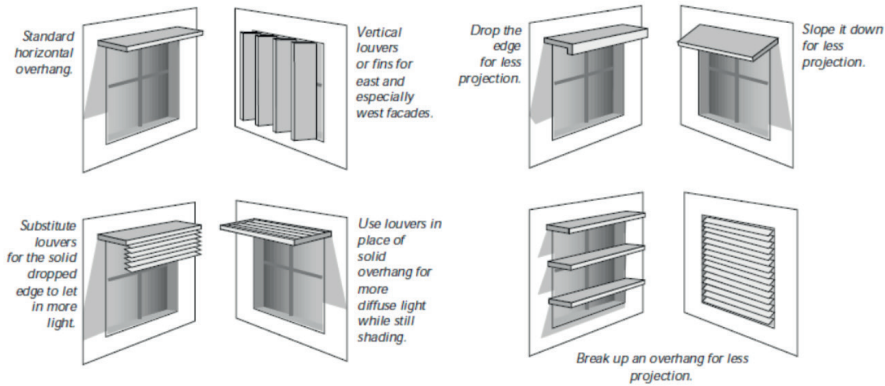


**Reference:** (Ofloğlu, 2015)

### 2.1. Heat gain and shading

Uncontrolled design of large window areas to provide natural lighting from the sun causes the building to overheat and consequently increase the cooling load (Mohsenin, 2015). Although the positive effects of natural lighting on human psychology are recognized, a balance needs to be struck in terms of thermal comfort and energy use (Krietemeyer, 2013). Figure 2 shows four different types of shading elements that are shaped according to the sun's rays: cantilevered, folding, louvered and vertical (Reinhart, 2015). Shading elements are used to prevent solar heat gains. However, when designing these elements, they should be arranged in such a way that they do not block daylight and do not interfere with ventilation breeze and views (Zemella and Faraguna, 2014).

Figure 2. Different types of shading elements shaped according to sun rays



Reference: (Url 1)

## 2.2. Solar orientated energy efficiency

The sun is an important environmental input that constitutes the architectural design process and is an important factor in the shaping of the building for energy conservation or gain by providing physical environmental comfort conditions (Serraoui, Sellam, & Rebhi, 2016). The building envelope is a filter that prevents the most difficult conditions of the environment and provides natural light and ventilation (Kiraz, 2003).

Shading elements used in the building envelope provide natural lighting and natural ventilation at the optimum level and minimise energy costs by providing indoor comfort conditions.

## 2.3. Parametric Design from Computational Design Methods

Parametric design is an approach that defines the design with mathematical algorithms depending on any variable. This approach adapts to changing conditions by adapting instantly (Woodbury and Wanderley, 2010).

The principles of parametric design are as follows (Kolarevic, 2003):

- Parameters and relationships: In the parametric design process, each element of the model and all relationships affecting these elements are determined and used. For example, floor heights, façade materials, climatic data such as sun, wind, moving data such as people can be defined parametrically.

- Parametric models: These are models that allow to create different alternatives of the design according to variable data.

- Interactive design processes: Parametric design allows the design process to proceed interactively. Different design alternatives can be easily tested and optimised.

The application areas of parametric design include design areas that require fine craftsmanship such as yacht design, jewellery design and other disciplines such as engineering and art. In particular, designs with complex and curvilinear geometry are easily managed (Oxman, 2008).

### 3. Examples of Parametric Sensitive Shading Systems

Examples of Parametric Sensitive Shading Systems are Pan-am (Metlife) Office Building and Grove Towers:

#### 3.1. Pan-am (Metlife) Office Building, New York, USA, Carlo Coppola, Rosa Buonanno, Vincenzo Nigro

Built in 2016, the office building has features such as creating a greenhouse effect with the use of large glass surfaces, reflecting natural light into the building in necessary areas with light amplification, and using PV active solar system for electricity. The design concept is a parametric combination of traditional and advanced passive systems (greenhouse effect, light amplification and light transmission) with active systems (PV) called 'Su[n]stainable system' (Figure 3), (Coppola, 2017).

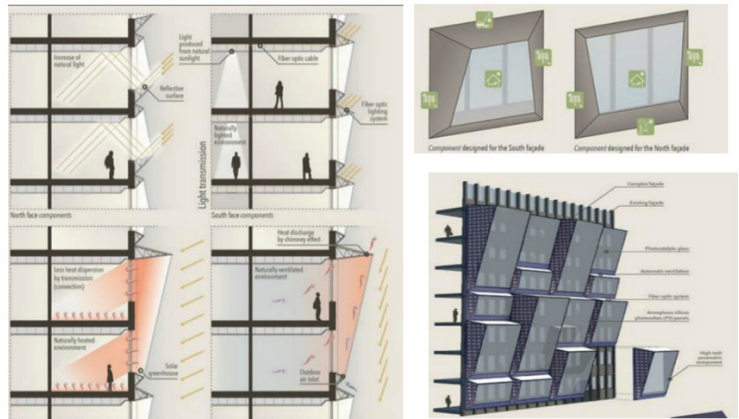
*Figure 3. Energy distribution depending on the shelter of the Windows*



**Reference:** (Heidegger, 2013).

Rhinoceros - Grasshopper was used as a computational tool. It produces natural lighting and electricity with PV (Figure 4) with its design with optimum energy expectation focused on shading and solarisation (Coppola, 2017).

Figure 4. Energy distribution depending on the shelter of the Windows

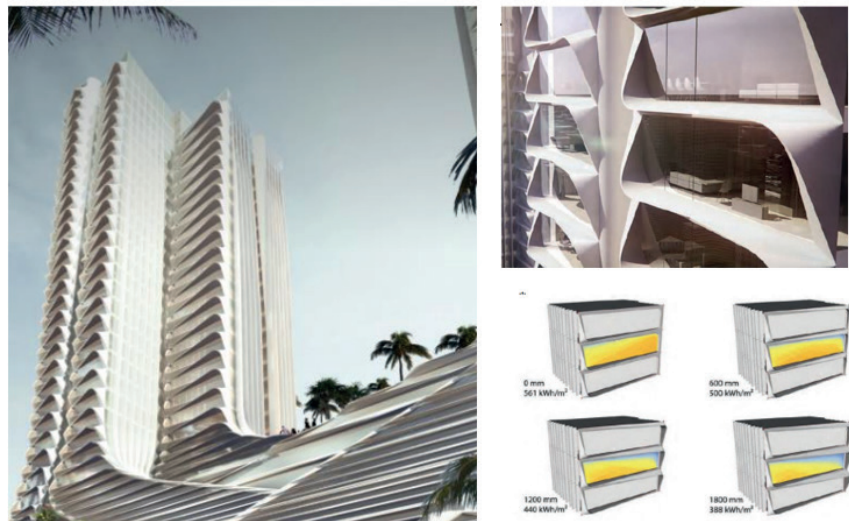


Reference: (Heidegger, 2013, Coppola, 2017)

3.2. Grove Towers, Mumbai/India, 3XN firm -Sandeephikre and Associates

Built in 2013, the towers are designed like a sculpture to reduce energy demand and self-shade when necessary. The form of the shading elements in the shell is shaped to maximise the benefit of daylight when necessary and to protect from the sun when necessary (Figure 5). Rhinoceros - Grasshopper and Visual Basic code software were used as Computational tools (Url 2).

Figure 5. Energy distribution depending on the shelteredness of the Windows



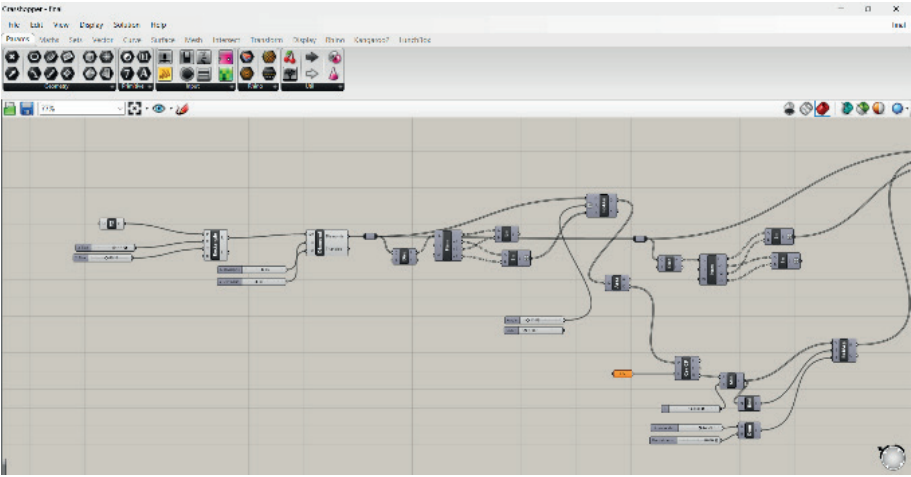
Reference: (Url 2, Url 3).

The effect of the towers in the context of energy efficiency is to provide natural cross ventilation and reduce the need for mechanical ventilation with the numerous angular forms created in the masses, along with heat conservation and gain (Url 2).

4.THE EXAMPLE OF ADAPTIVE FACADE DESIGN

The required wall dimensions in the adaptive facade example and the algorithms used for parametric adaptation and the connections between them were entered into the Rhinoceros-Grasshopper programme interface (Figure 6).

Figure 6. Entering the required wall dimensions and the algorithms used for parametric adaptation into the system

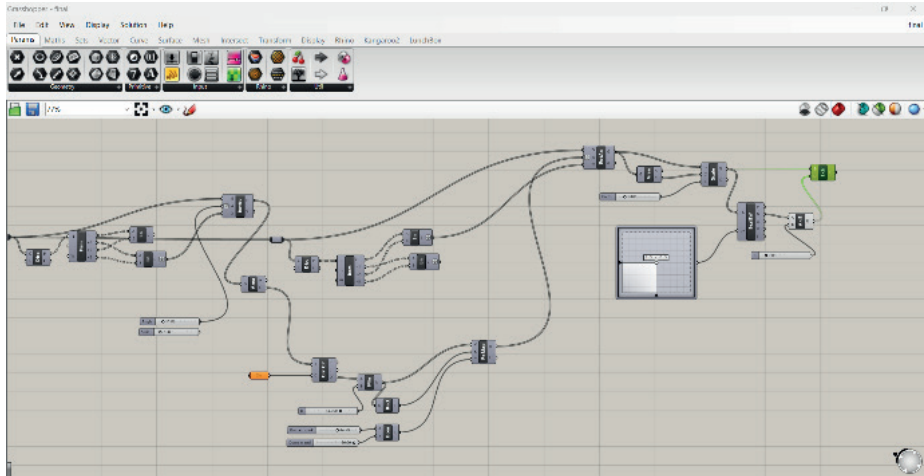


Reference: (Meryem Alagöz Konur, 2024 personal study)

Then, after the other necessary connections for the parametric setup for immediate testing were established, the testing phase started (Figure 7).



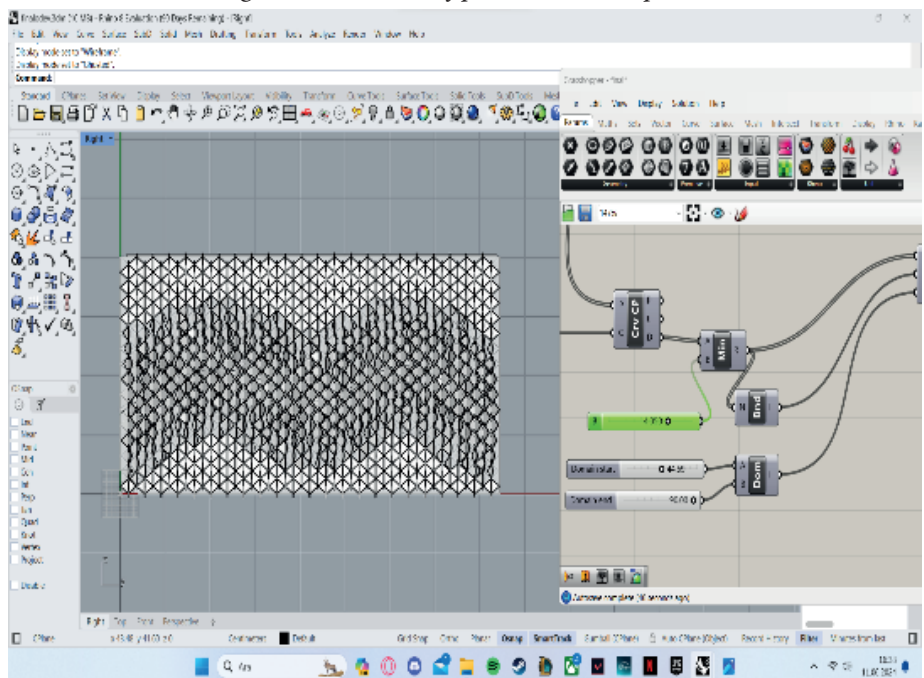
Figure 7. Testing algorithms on the fly



**Reference:** (Meryem Alagöz Konur, 2024 personal study)

In Figure 8, the options for the desired parametric wall search are evaluated.

Figure 8. Evaluation of parametric wall options

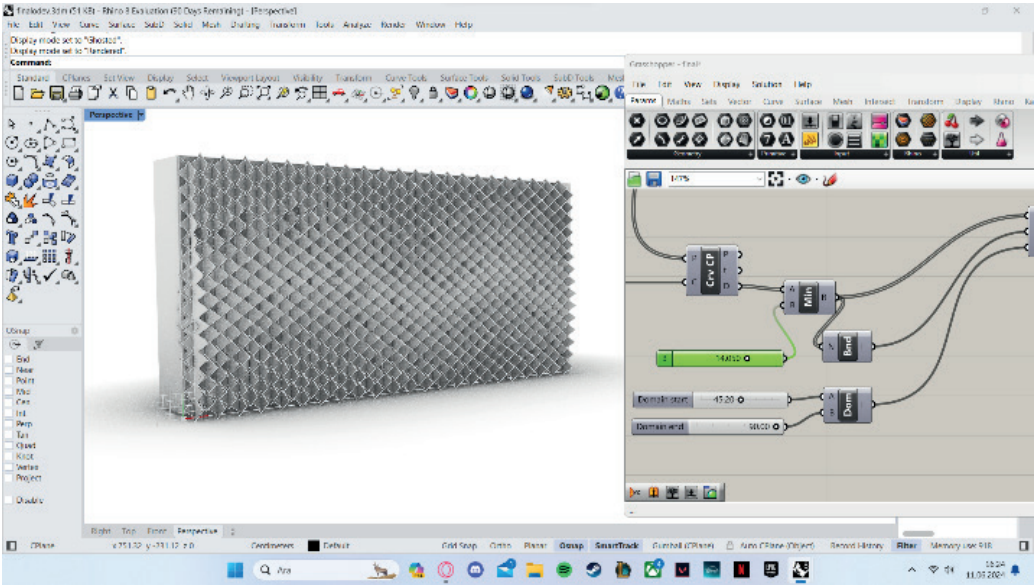


**Reference:** (Meryem Alagöz Konur, 2024 personal study)



The optimum algorithmic connections in accordance with the desired design criteria are given (Figure 9).

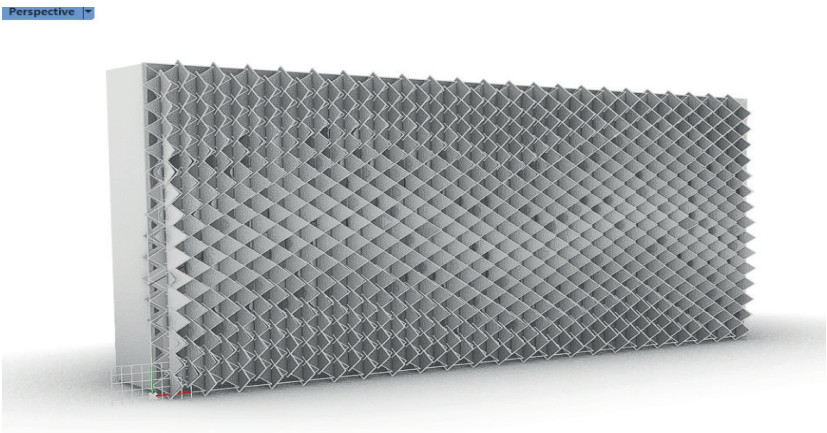
Figure 9. Decision of the optimum solution



Reference: (Meryem Alagöz Konur, 2024 personal study)

Figure 10 shows the decided optimum parametric wall solution.

Figure 10. Final product of the adaptive parametric wall example



Reference: (Meryem Alagöz Konur, 2024 personal study)

## 5. CONCLUSION

Computational design methods have brought a breath of fresh air to the architectural design process, facilitated and modernised the design formally and perceptually. With Computational design methods, algorithmic programmes are used, unlike the traditional design process, it is more free, instantly testable and the most optimum solution can be selected in a short time by bringing many alternative solutions.

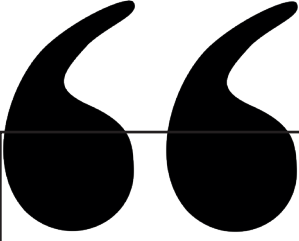
In this study, an example of a parametric wall is designed in Rhinoceros-Grasshopper programme, which is a numerical design tool, by giving information about numerical design methods.

With this design technique, designers are given the opportunity to test instantly and the optimum solution is reached quickly and easily. It also provides designers with the opportunity to present originality and a different architectural effect. Thus, it is thought that the use of this method will make a great contribution to architecture both regionally and nationally.

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## Chapter 7

### **MORPHOLOGICAL ANALYSIS: A READING ON APPROACHES IN URBAN MORPHOLOGY**

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## Introduction

In *On Growth and Form* dated 1961, Thompson says ‘(t)he form ... of any portion of matter, whether it be living or dead, and the changes of form that are apparent in its movements and in its growth, may in all cases alike be described as due to the action of force’ (p.11). This definition that Thompson makes for living organisms is important in order to understand his way of understanding morphology which is ‘not only a study of material things and of the forms of material things, but has its dynamical aspect, under which we deal with the interpretation, in terms of force, of the operations of Energy’ (p.14). Regarding city is a living organism, morphology of this living organism has a dynamic context in terms of social sciences also. In this manner, morphological analysis helps us read a process from past to present, describes what kind of urban structure we are faced with today and provides preliminary information about which elements and data we can use when planning and designing tomorrow.

This chapter aims to raise awareness about the relationship between the analyses, which we frequently use in urban and architectural studies from the highest scale readings to the lowest scale urban and architectural elements, with studies in the field of morphology and different morphological approaches. Starting with the definition that morphology is the knowledge of form, the study includes a detailed reading of different approaches driven by the British School of Morphology, the Italian School of Typology and the French Versailles Schools: (i) historico-geographical, (ii) process typological (iii) configurational and (iv) spatial analytical. In this reading, the information and data taken from bibliographical studies were discussed with the analytical-comparative method based on the contention and comparison of the data. The four main approaches are discussed emphasizing the similarities and contrasts between them. The approaches are discussed in relation with the British School of Morphology, the Italian School of Typology and the French Versailles Schools to which they belong, and in the context of an extensive literature. Below, first brief history on urban morphology researches and definitions are given, followed by different approaches in urban morphology. This discussion is accompanied by images from the works produced by scholars. The study ends with the conclusion-evaluation section.

## Brief History on Urban Morphology Researches and Definitions

Many studies have been carried out on analyzing the city from different perspectives. It is not possible to mention all of these inspiring studies in this section, but one of the pioneerings is Lynch’s *Image of the City* (1960), which measures the legibility, in other words, the imageability of the cities of Boston, Jersey and Los Angeles using 5 elements – paths (roads, streets), districts (homogenous areas with common characteristics like residential



or commercial districts), nodes (squares, junctions), landmarks (physical objects which make the areas identifiable, like tall buildings) and edges (the boundaries which break the continuity like topographical differences or water element). In the same period, Cullen (1961) in his book *Townscape*, was using serial drawings which sees and depicts the city as a serial vision. For Oliveira (2016), both studies are grounded on the individual capacity of visual perception. With her book titled *The Death and Life of Great American Cities*, also published in 1961, Jacobs was focusing on issues like public spaces- particularly the main qualities for a safe street and conditions for diversity. In the following years, in their book *A Pattern Language* (1977, quoted in Dawes and Ostwald, 2017), Alexander et al defined more than 250 patterns which serve as generic guiding principles for design.

These contributions, coming mostly from the field of urban design, are undeniable. However, when viewed from a broad perspective, it can be seen that the morphological analysis methods guided by the studies carried out since the end of the 18th century are dominated by the works of geographers, urban planners and architects whose works cover a wide area both in theory and practice. German historian Fritz, who worked on hundreds of physical plans as part of historical research in the late 19th century, made grid system inferences and proposed a classification according to plan types, is one of the pioneers in this field. Influenced by Fritz, Schlüter, who divided the city into meaningful parts and introduced the concept of 'zones', French researcher Lavedan, who classified plan types according to chronological periods, and Italian scholars Muratori and Caniggia, who used types as a tool for the historical analysis of urban fabrics are among milestone researchers.

The 'urban fringe' concept- which defines the green area for separating different zones of the city- was pioneered by Louis' work in the mid-1930's and developed by M.R.G Conzen and Whitehand. M.R.G Conzen- a german geographer who studied and practiced urban planning- has his fringe belt applications on Britain and Ireland in 1960's. Whitehand, follower of *the Conzen School (also known as the British School of Morphology)* had his applications of the fringe belt in the earlier years of 2000's in Britain and Ireland, Europe, North America and Africa (M.P Conzen, 2009).

It was also M.R.G Conzen's idea to map morphological regions by dividing the urban landscape, into three parts; first town plan/ground plan (comprising streets, plots and block plans of buildings), secondly, the building fabric, and thirdly, land and building utilization. Many key concepts that we use in urban morphology today have been formed over the last century with the efforts of many researchers, especially the names mentioned. Many researchers such as Geddes, Mumford, Krier in urban history studies, Muratori, Caniggia, Maffei (pioneers of *the Italian School of Typology*), Rossi, Panerai, Moudon, Levy and Kostof in urban fabric analysis and form studies are also part of this

extensive literature (Gauthiez, 2004; Whitehand, 2001; M.R.G Conzen, 1960; M.P Conzen, 2009, 2019; Oliviera, 2019; Larkham, 2019).

Of course, many morphology definitions have emerged throughout the historical development process briefly mentioned here. Since it is not possible to mention all of them, we would like to underline a few. One of the earliest definitions for morphology is Smailes's (1955, p.101) which says urban morphology '...is not merely two dimensional in scope... the third dimension assumes in the urban scene that much of its distinctiveness and variety arise.' About three decades later Gebauer and Samuels (1981) defines it as a method of analysis to find out principles or rules to urban design, which Maretti (2005) supports by presenting urban morphology as a basis for urban design. Meanwhile Marshall and Çalışkan (2011) stresses the dislocation between urban morphology and urban design and proposes a joint framework proposing better morphological understanding can lead to better design outcomes.

Lozano (1990) defines morphology as the science of form, or of various factors that govern and influence form, while Moudon (1997) underlines that morphology is the study of the city as human habitat and that the urban morphologists analyse a city's evolution, identifying its components. Cowan (2005), Meyer (2005), Gauthier and Gilliland (2006) like Lozano, have made definitions that focus on form. While in both Cowan's and Gauthier and Gilliland's studies morphology is given as the study of urban form, Meyer (2005) makes a definition that emphasizes the etymology of the term morphology. According to him, morphology means 'form-lore or knowledge of the form'. For Kropf (2017, quoted in Fleischmann, 2019, p.1) 'urban morphology is the area of urban studies that explores the physical form of cities in space and the way it changes in time in relation to the agents of such change'. The common aspect of all studies is that they define morphology through the formal characteristics of the city.

There is no doubt that the studies carried out in the field of urban morphology are of great importance in the development process of this terminological structure and definitions briefly summarized above. In this context, the International Seminar of Urban Form (ISUF), which is the first international organization of urban morphologists and has been carried out studies since 1994, is an important actor including its annual conferences and 'Urban Morphology', Journal of The International Seminar on Urban Form. This unit has contributed many theoretical studies and field studies to the related literature in the past 30 years. Turkish Network of Urban Morphology (TNUM) is also included in ISUF's (2024) regional network, which spreads over a wide geography. Within this network many worldwide cases on urban morphology were produced as Brazil (Alvarenga Pereira Costa and Villefort Teixeira, 2014), Sweden (Abarkan, 2009; M.P Conzen, 2001), France (Darin,

1998), Spain (Ibarz, 1998), South Korea (Kim, 2012) and Poland (Koter and Kulesza, 2010).

Following the studies conducted by the Italian School, *the French Versailles School* emerged in the late 1960s, as a response to the principles of modernism (Mosharraf, 2023). Architect Castex, architect-urban planner Panerai and sociologist De Paul, who were influenced by sociologist Lefebvre's views that mass housing destroyed the urban landscape in France, are the founders of the Versailles School (Folic and Luxor, 2015). The school was considering the combination of tradition and innovation essential to the design of cities and preserving historical values. The discussions on seeking to establish both a design theory and a theory of city building, with strong connections to the social sciences led to a rich intellectual discourse on urban life, incorporating critical ideas from sociologists such as Lefebvre and architectural historians such as Boudon and Chastel (Mosharraf, 2023). The Versailles School continues its production today as LADRHAUS (Laboratoire de resherche: Histoire et architecturale urbaine - Societe) (Folic and Luxor, 2015).

The studies in the field of morphology briefly mentioned above which exist today under these three schools reveal different approaches to urban morphology. Below, these approaches are discussed in the context of similarities and differences.

### Approaches in Urban Morphology

Morphological studies present dominant approaches despite different conceptualizations. In this chapter, the methodological separation made by Kropf (2009) is adopted. He identifies four distinct approaches: (i) historico-geographical, (ii) process typological (iii) configurational and (iv) spatial analytical. **Historico-geographical approach** focuses on the physical structure of the city/urban areas and the changes of these structures by different ages and processes over time (Figure 1). This approach draws on M.R.G Conzen who followed the publications of authors such as Fritz, Schlüter, Geisler and Hefke in the field of German human geography in the late 19th century (Whitehand, 2001; Oliveira, 2016). He contributed to morphological analyses with his studies on Alnwick and Northumberland cases (M.R.G Conzen, 1960). In his study M.R.G Conzen (1960) defines five general aspects as; site, function, townscape, social and economic context and development. Within the townscape, he distinguishes three form complexes as; town plan, land utilization pattern and building fabric. Among these three, he subdivides town plan as the topographical arrangement of an urban built-up area which contains three distinct complexes of plan elements: (i) streets and their arrangement in a street-system; (ii) plots and their aggregation in street-blocks; and (iii) buildings or their block-plan. According to M.R.G Conzen, these basic elements in the built environment are morphological

components and they exist in a hierarchy. The author introduced the concept of ‘morphological region’ or of ‘plan unit’ (Oliviera and Yaygin, 2020), which brings these three components together hierarchically and defines every unique structure distinct from its neighbours. It’s the Conzen School which introduced the historicogeographical approach to urban historical landscapes (Jiao et al, 2023).

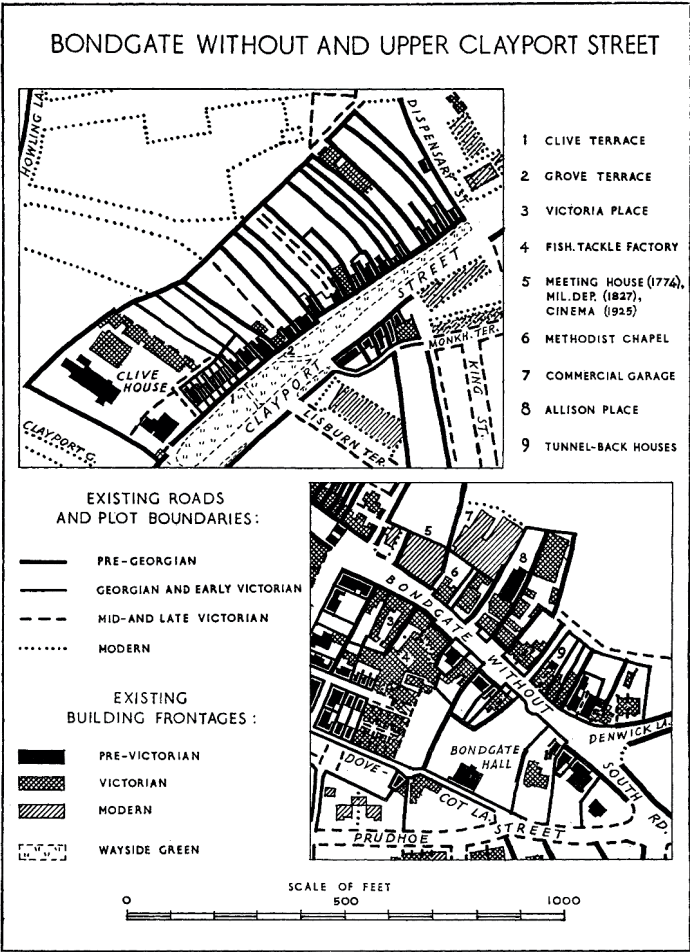


FIGURE 8

Figure 1. A sample of historical and modern tissues in M.R.G Conzen’s study on Alnwick (1960, p.45).

For Maretto (2013, pp. 93-94) ‘the scientific rationale for a ‘morphological practice’ is still in the making, as are the guide lines for translating the immense potential of urban morphology to the spheres of urban design

and architecture.’ Focusing on the importance of urban design as the link between urban planning and architectural design, Maretti (2012) underlines the contribution of the Italian architects Muratori and Caniggia- the founders of Italian typological school (known as Caniggian or Muratorian School) (Jiao et al, 2023; Chen and Romice, 2014)- to urban morphology. Their studies, considered as the architectural pillar of morphological research, is conceptualized as **process typological approach** (Oliveira, 2016) or **typological approach** (Cataldi, 2003). This approach is mainly applied to the architectural and urban design as well as the development and control of historic towns (Jiao et al, 2023).

According to the Italian School, there is a connection between the traditional and the new based on the fact that urban planning and design are deeply rooted in history. What they call ‘type’ is a priori synthesis in the builder’s minds before the actual building has been built. A ‘typological process’ is the progressive transformation of a series of related synchronic types on a particular scale in the same cultural context over time, and outlines the continuity and interrelation between types. Types not only exist in buildings, but also in urban forms at different levels of resolution. The School defines this forms in a hierarchical order as; ‘building materials’, ‘buildings organism’, ‘urban tissue’, ‘urban organism’ and ‘territorial organism’. (Chen and Romice, 2014). Therefore in Muratori’s work (1980, quoted in Maretti, 2012) we can find essential and underpinning ideas on the concept of organism, the idea of history as a dynamic sequence in a process, the necessity of context, the ‘structural’ awareness of the city and its fabric and ethico-civic dimension. For Muratori (1980, quoted in Maretti, 2012) the city is the outcome of a process involving architecture, typology, morphology and history. Its broader setting is the ‘territory’. ‘In the 1940’s, when modernism was taking off as the leading theory for design practice, Muratori stood on the side of the traditional city’ (Caniggia and Maffei, 2001, p.18).

Caniggia is among the important scholars to be highlighted as the followers of Muratorian School. Focusing on the traditional city, just like Muratori, Caniggia’s work ‘... makes strong analogies between the typological process and biological process’ (Caniggia and Maffei, 2001, p.21). Considering the generation gap between Muratori and Caniggia, Cataldi (2003) highlights the distinctions in their approaches. Muratori’s definitions as ‘theory, organism, organic, architectural organism, architecture and territory’ find their counterparts as ‘method, structure, serial, building type, building and town’ in Caniggia’s approach, respectively. Caniggia’s studies with Maffei, who like him adopted Muratori’s teachings, occupy an important place in the field of morphology. The comparative studies in Figures 2 and 3 reveal the authors’ approaches that embrace historical texture and process on an urban and architectural scale. For Jiao et

al (2023), both historicogeographical and process typological approaches play important supporting roles in analyzing the conservation of traditional forms and spaces of historical cities.

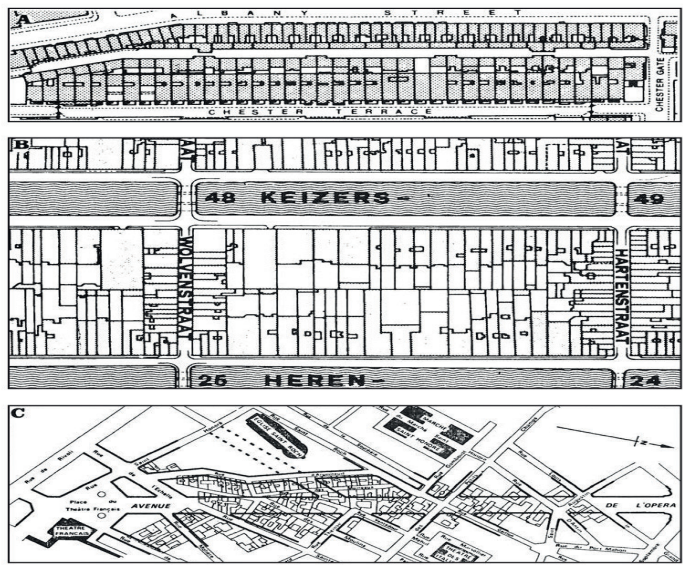


TABLE 39. A and B) the fabrics of London and Amsterdam and a comparison (1:2,800). In northern Europe, the shape of lengthened blocks in mono-directional rows is usual: note how Amsterdam's crossing streets only give rise to infill tissues. C) Paris, an example of late-19<sup>th</sup>-century break-through routes. The city with blocks in rows has been cut across by highly polarised streets indifferent to pre-existing orders.

Figure 2. Texture comparison of Keizers (London) and Heren (Amsterdam) (Caniggia and Maffei, 2001)



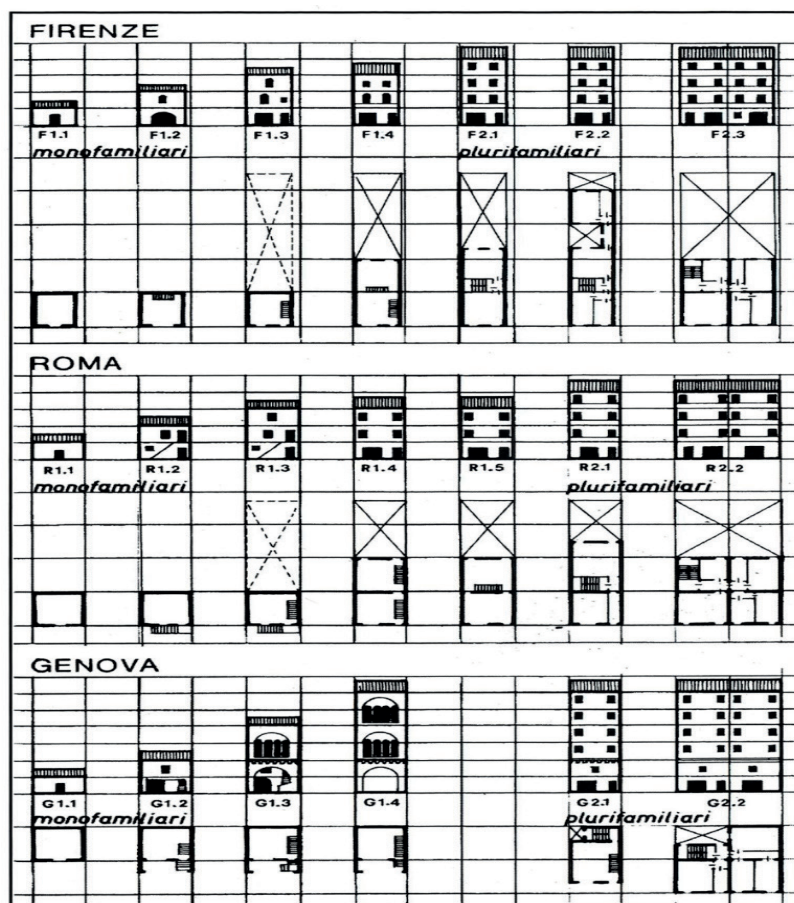


Figure 3. Comparative analysis of major mutations from single-celled base type to urban apartment in Rome and Genova (Caniggia and Maffei, 2001)

Although Kropf (2009) did not list *typo-morphology* among the basic morphology approaches, it is valuable to mention this approach, which emerged from the combination of morphology and typology studies and is widely used today in the fields of planning, design and architecture. Although we hear the term *typo-morphology* from Aymonino et al (1966, quoted in Moudon, 2013) in the mid-1960s as the use of building types to describe and explain urban form and the process of shaping the fabric of cities- Moudon's (1986) studies in combining both approaches on San Francisco case and Kropf's (1993, quoted in Chen and Romice, 2009) studies to investigate the intellectual similarities and differences between the two approaches should be considered as early efforts. For Moudon (2013) geographers and architects studying in this area using building types in order to describe and explain the structure



and the evolution of the city. Focusing on urban fabric, they see buildings and complementary open spaces as interconnecting units of space, which is more than their form or architectural style. In typo-morphological studies, the built environment is a constantly changing fabric in the hands of people living in and using it. Therefore, this approach adopts the definition of morphogenesis—which is the study of processes leading to the formation and transformation of the built environment rather than the definition of morphology, the study of form (Moudon, 2013). Jiao et al (2023) roster the spatial characteristics of typomorphological studies as; plot and block layout, size and shapes, road features, building layout (architectural form, spatial sequence, orientation, gatehouse, etc.), architectural function, roof form, number of floors, building materials and building structures. Typo-morphological interpretation of the city, in its historical dimension, represents a methodological basis for a cogent urban design strategy and helps demonstrate that the tools of urban morphology and building typology constitute a valuable basis for the urban design project (Maretto, 2005).

The French Versailles School's approach is significantly similar to the Italian typo-morphology approach. Just like the Italian School, the French School displays an approach that does not see the city as just the forms or architectural features of buildings, but accepts the urban space as a whole that is changed by the people living in the city. The difference of the Versailles School is that the sociological processes predominates in this perspective. According to this perspective, the built environment and social structure are in a dialectical relationship. The physical structure of the city only gains meaning through social processes, which have become embedded in the built environment over time (Folic and Luxor, 2015).

The third approach to urban morphology is **configurational approach**. For Kropf (2009) *space syntax* represents the configurational approach to urban morphology, with its aspects to understand the spatial structure of settlements via a range of analytical methods. The space syntax, pioneered by Hillier and Hanson's *The Social Logic of Space* (1984), emerged due to the absence of explanatory social morphological studies. For the authors (1984, p.33) '(i)f we wish to build a theory of how society, through its internal dynamics, produces order in space, then we must have some conception of what kind of spatial entity a society is in the first place'. They explain space syntax as a way to identify the non-discursive relational schemas that structure characteristic forms of architectural and urban phenomena (1997). For Hillier (1989, p.20) '(i)t is the syntax of space itself, especially at the global level, and its relation to the virtual community, that is at the heart of urban question'.

This approach examines the role of the gridal system in explaining social relations and its effects on the development of the city. '(Pedestrian movement) is seen and being to and from built forms with different degrees

of attraction, and design is seen as coping with the local consequences of that attraction' (Hillier et al, 1993, p.29). The axial maps of Hillier and Hanson, offers a new perspective on the relationships between space and movement, either pedestrian or vehicular. The dominant representation in space syntax is the axial map, which is constituted by a set of axial lines which is the longest line that can be drawn through an arbitrary point in the spatial configuration covering the whole system (Oliveira, 2016). In other words, axial maps, which consist of linear axes representing lines of sight, are created by expressing paths as intersecting lines. The axes on the map—the lines—show movement in the field (Hillier et al, 1993). The main critics is interpreting space syntax as the computer-aided drawing version of handmade axial maps (Oliveira, 2016). Nevertheless, it is important to see the space syntax approach as a method that can also guide developments in the planning-design and architectural scale. Indeed, studies conducted within the framework of this approach provide data on many elements such as structures, function areas, surrounding axes and movement, and this data is also important in terms of managing developments in this field.

In addition to axial maps, other tools used by this approach include open space maps and convex maps. Constructed with a logic opposite to the solid-void, open space maps provide a diagram for the flow in the city, especially the roads, by leaving the masses empty and painting the open areas. Convex maps are a tool for seeing the open space system (such as parks, children's playgrounds, squares) in parts and in relation to the axes. The analysis of axial and convex maps together provides important data about the flow in the city . In Figure 4, three maps studied in the example of France are given, following the base map of the area.

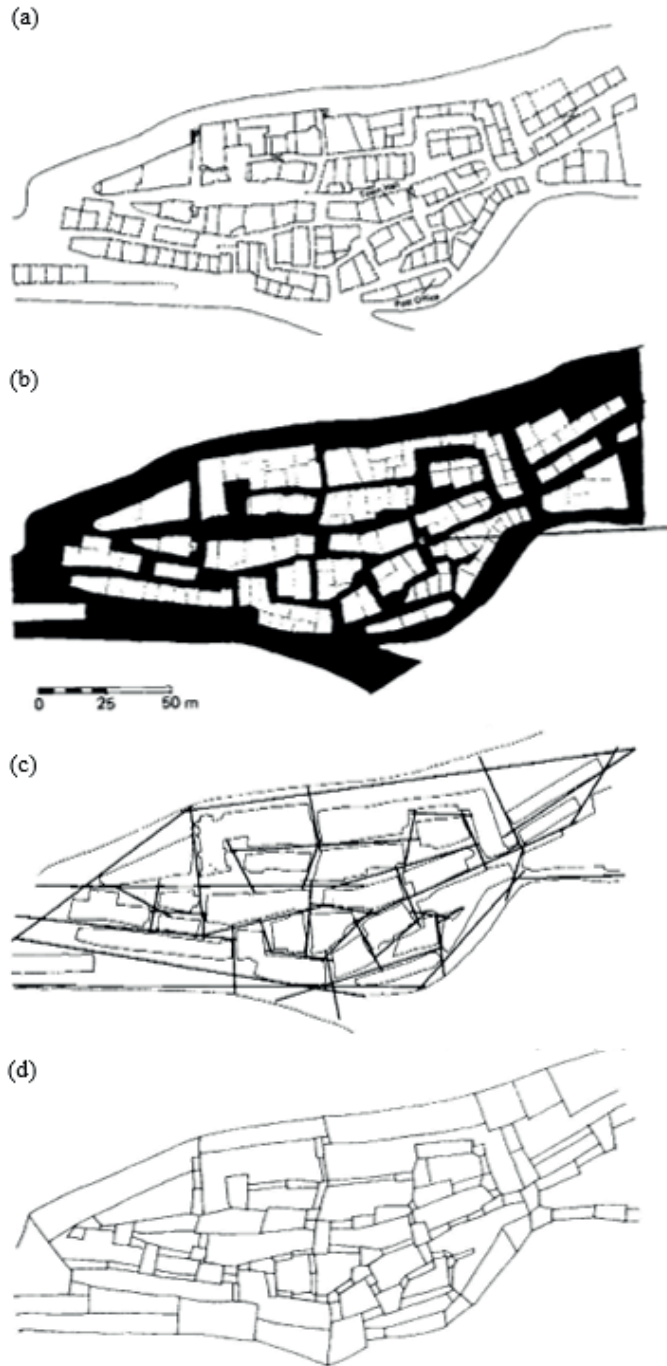


Figure 4. (a) Base map of a small town in France, (b) Open space map, (c) Axial map, (d) Convex map (Hillier and Hanson, 1984, pp.90-92)  
Maps combined by the author

The fourth approach, **spatial analytical**, includes numerical analysis methods that include computer-aided models such as cellular automata, agent-based models and fractals. To briefly mention these approaches<sup>1</sup>; *cellular automata*, which is based on the work of British mathematician and founder of computer science Alan Turing since the mid-1930s and developed with support from fields such as physics and mathematics, is used to divide each element just like cells and to develop future predictions depending on the states of neighboring cells. This method, adapted to urban studies, is used to examine urban forms and land uses and to make future predictions like urban growth (Clarke et al, 1997; Aburas et al, 2016; Berberoğlu et al, 2016). *Agent-based models* focus on the people and groups that are the cause of all formations and changes in the city (Larkham, 2019). This approach, which counts individuals, companies, institutions and organizations such as developers, estate agents, specialized contractors, architectural and planner advisors, district council planning department, local residents among the actors that have an impact on the city morphology (Whitehand, 1989, quoted in Larkham, 2019), looks at urban morphology through agents and agency<sup>2</sup> (Figure 5).

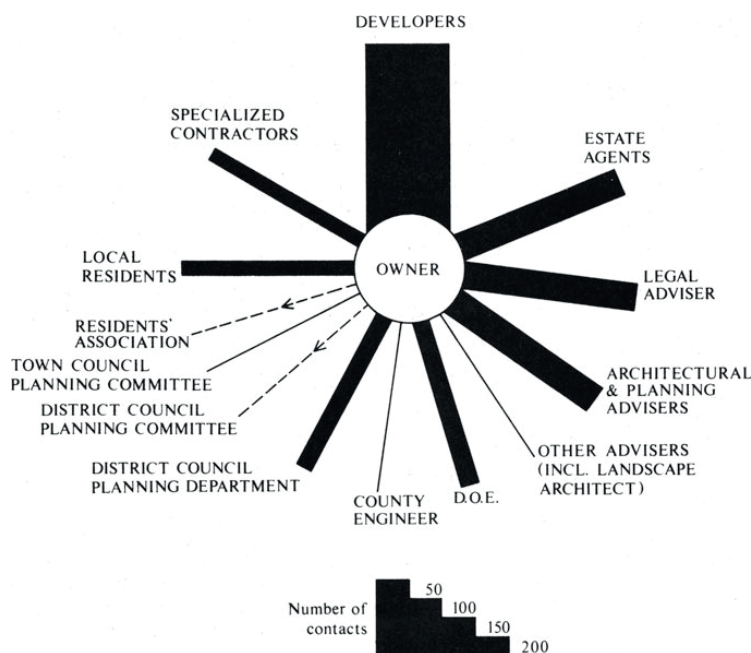


Figure 5. The high volume of communication (letters, telephone calls and meetings) among actors, A case study in London's fringe. (Whitehand, 1989, quoted in Larkham, 2019, p.77)

1 See Berberoğlu et al (2016) for the most commonly used urban modeling approaches including: Markov Chain, SLEUTH, Dinamica EGO modelling with the Logistic Regression (LR), Regression Tree (RT) and Artificial Neural Networks (ANN).

2 Larkham (2019) highlights actor-network theory which offers a new perspective on urban change.

*Fractals* refer to fragmented, broken elements in the physical structures of cities. In *Fractal Cities A Geometry of Form and Function*, Batty and Longley (1994) says, physical properties of land use in terms of plot size, shape and density display an irregularity which is considered to be fractal. Cities of the early industrial era were initially single clusters, monocentric forms organized around the central business district, which made the theories looking in the relation between home and work relevant (Batty, 1995). Batty argues that today's cities are increasingly becoming multiple clusters and more complex organisms that exist in a hierarchical order, and that urban theories developed in the last 50 years have failed to relate the economic and ecological structures of cities to their spatial structures. At this point we need to emphasize fractal geometry's two functions in urban studies: theoretical and empirical. The theoretical function is used to develop urban theory based on the possible world, while the empirical function is used to solve practical problems in the real world (Chen, 2020). For Frankhauser (2015), fractal geometry can be used to develop a multiscale approach to investigate the spatial organization of urban fabric even if their shapes seem to be irregular. Frankhauser's (2004) study focuses on the form of urban patterns in which a morphological method was introduced for extracting boundaries from detailed cartographic representations of the patterns. In Figure 6, the buildings were dilated incrementally, then black clusters appeared when neighbouring buildings were contiguous. Frankhauser emphasizes that filling up free spaces of less than 15 meters' distance doesn't really affect the results of fractal analysis.

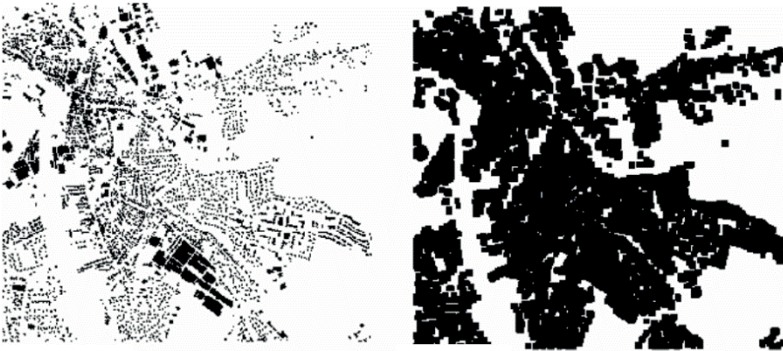


Figure 6. Solid-void (left), Fractal map (right) Frankhauser (2004, p.11)

### Conclusion- Evaluation

In this episode, the ongoing debates in the field of morphology, which have been dominated by geographers, planners and architects for the last two hundred years, and the four main approaches that emerged from these studies were discussed. The first of these approaches is the *historio-geographical approach*, also known as the British School of Morphology, pioneered by

geographer M.R.G Conzen. M.R.G Conzen put forward the concept of 'urban fringe belt' to separate different functional areas in the city, and in his analyzes and historical comparisons, he identified three elements that we frequently use today in the field of architecture and urban design; roads, building blocks and parcels on which buildings are located. In addition, M.R.G. Conzen introduced the concepts of 'morphological region' (plan unit) as a structure that brings these elements together hierarchically and differentiates them from their immediate environment.

Muratori, Caniggia and Maffei, the pioneers of the Italian School, which adopted the *process-typological approach*, carried out their works at the urban and architectural level with a perspective that sees the city as an 'organism' in the field of architecture. The authors listed the elements of this organism, from territorial organism at the highest level to building materials at the lowest level.

Although the *typo-morphological approach*, which emerged from the intersection of morphological and typological studies, is not considered among the main approaches, it is used especially in the field of architecture and urban design. This approach strives to read urban development by focusing on the urban fabric formed by urban built environment elements. The French School has also adopted this approach. According to the French School perspective, the city develops and changes under the influence of sociological elements in a historical process. Therefore, typo-morphology studies take these sociological elements into account when considering the built environment of the city.

The *configurational approach* is dominated by the space syntax which focuses on pedestrian-vehicle flows and attraction points in the area, strives to understand and forecast the relationships between space-pedestrian and vehicle flow through axial maps, convex maps and open space maps.

The last approach- *spatial-analytical*- is a combination of different models including cellular automata, agent based models and fractals models. Cellular automata perceive urban elements as interacting cells and make future predictions by focusing on their relationships with neighboring cells. We see that this approach is used in studies on land use decisions and urban growth forecasts. Agent-based models focus on different actors as the main factors that influence the development of a field and follow decision mechanisms. Fractal analysis, on the other hand, uses land elements of different shapes, sizes and densities and clusters to overcome the irregularity created by these elements in reading the city.

We need all of these approaches in our studies today on the planning, urban design and architectural scale. The urban and architectural case studies that will be produced by understanding these approaches well will undoubtedly contribute greatly to the relevant literature.



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